

NILE BASIN INITIATIVE INITIATIVE DU BASSIN DU NIL

MOUNT ELGON

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

TABLE OF CONTENTS

06	GROUNDWATER ACCESS BOOSTS WOMEN-LED Farming and financial freedom in Kapchorwa	
10	LANDSLIDE SURVIVORS FIND Hope in groundwater	3
14	GROUNDWATER, A LIFELINE UNDER Threat in MT Elgon	
18	BOOSTING HYGIENE AND SANITATION IN BUNGOMA WITH GROUNDWATER	
22	GROUNDWATER, A SOLUTION TO WATER CRISIS IN KOPSIRO, MOUNT ELGON	
26	FINDING HOPE IN EVERY DROP OF GROUNDWATER	Ę
28	HOW BOREHOLES ARE QUENCHING THRIST FOR WEST POKOT AND TURKANA RESIDENTS	Ę

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Cover Photo: An aerial perspective of Mt. Elgon forest reveals the stark effects of deforestation, with vast patches of cleared land threatening the region's ecological balance and water resources.

Photo by Jesse Chenge Designed by Jonathan Kabugo















INTRODUCTION

he 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 between groundwater 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 aguifers. This is in addition to addressing the water related Sustainable Development Goals.

The Project - 'Enhancing Conjunctive **Management of Surface Water and Groundwater 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 aguifers 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 groundwater use in the two countries that share the Mt Elgon aguifer. 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.







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 aguifers 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 Aguifers: Case Study for Selected Shared Groundwater Bodies in the Nile Basin', is implemented on the Mt. Elgon aguifer, 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 aguifers 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 aguifers 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

MESSAGE FROM THE EXECUTIVE DIRECTOR

Kagera aguifers. 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

GROUNDWATER ACCESS BOOSTS WOMEN-LED FARMING AND FINANCIAL FREEDOM IN KAPCHORWA

By Javier Silas Omagor – Uganda

n Uganda's eastern district of Kapchorwa, women farmers, just like male farmers, have historically depended on erratic rain-fed agriculture, a practice that often left them at the mercy of unpredictable weather patterns.

However, a remarkable transformation is underway as some of these women discover and embrace groundwater harvesting for farming.

They dig deep wells to access groundwater, which they pump with solar energy to irrigate their crops. Others access water from boreholes and irrigate their crops. Kapchorwa district lies on the Uganda side of Mount Elgon Aquifer.

According to the Nile Basin Initiative, the Mt. Elgon aquifer is a transboundary aquifer shared between Kenya and Uganda. It covers an estimated area of approximately 4,900 km+, with about 85% of it located within the Nile Basin. This aguifer extends from Mt. Elgon, a solitary extinct volcano straddling the Kenya-Uganda border.

On the Ugandan side, the aquifer underlies at least nine districts: Kapchorwa and Kween, which are entirely within the aquifer region, as well as Amudat, Bududa, Bukwo, Bulambuli, Nakapiripirit, Namisindwa, and Sironko.

One of the female farmers making use of Mount Elgon Aquifer's groundwater is Harriet Chelangat. She owns a farm on the slopes of Mt. Elgon in Kawowo village, Tingye county, Kapchorwa district. Using the groundwater system, Chelangat has enhanced her farming practices and increased the harvests.

With the aid of a groundwater well, Chelangat utilizes a solar-powered water pump to pump and irrigate her gardens, ensuring a consistent water supply regardless of unpredictable weather patterns. This innovation has enabled her to cultivate crops such as cabbages, onions, and other vegetables.

"The impact of this groundwater has been life-changing," explains Chelangat. She notes that she previously relied solely on rain, which often led to uncertainty and losses, especially during the dry seasons. However, she now provides her crops with the necessary water all year round with the groundwater irrigation system.

"I have seen my yields increase, allowing me to feed my family and sell surplus produce," shares Chelangat.



LEFT: Water flows from a borehole into a jerrycan. In Kapchwora, families utilize groundwater for their domestic needs and agricultural purposes.



More farmers in Kapchorwa district are harnessing underground water for irrigation enabling them to boost crop vields.

Another such farmer is Topester Chemutai, a female model small-scale farmer in Kapchesombe ward, Kapchorwa Municipality, Kapchorwa district.

She harvests groundwater from a borehole and pumps it to irrigate her passion fruits and Irish potatoes. When she is not irrigating, Chemutai and her neighbors use the borehole to access water for domestic use.

Chemutai states that harvesting groundwater for irrigation has "transformed not only our lives as rural women but also the way we do farming in this society."

With access to groundwater, Chemutai has been able to transform her barren fields into flourishing gardens, growing a variety of crops and gaining financial independence. This innovation allowed them to not only feed her family but also sell produce at local markets.

Adding to this dynamic group is Winnie Cherop,

another farmer residing in Kwoti ward, Kapchorwa Municipality.

Cherop describes the introduction of solar-powered groundwater irrigation systems as a significant turning point for their farming practices.

"Our incomes are changing daily, and this growth continues throughout the year, unlike in the past," adds Cherop.

Cherop notes that the impact of these advancements goes beyond just farming; they are changing lives and improving societal dynamics.

"We relied on traditional water sources for farming, and had little income.

Couples used to indulge in so many fights, often leading to separation, further weakening our income generation. But now we have a solution," reflects Cherop.

In Chema, Tingye County, Esther Chemusto has found a better way to water her tomato farm.

After spending sh3 million to set up a solar-powered irrigation system that taps into groundwater, she no longer faces the high costs of hydropower and water from private suppliers.

"I used to spend over sh40,000 a week just on electricity, and with the added water costs from private suppliers, my monthly expenses could reach sh250,000," she shares.

Now, she enjoys the benefits of using a natural resource, allowing her to save more from her harvest.

Martin Mangusho, who grows Irish potatoes, reinforces Esther's experience.

"Groundwater is far better than relying on rainfall," he explains.

He notes that, unlike unpredictable rain showers that can damage crops, irrigation from groundwater is gentle and reliable.

"We can't expect rain all year, but groundwater is always available," he notes.

He notes that it is not just about saving money but also means healthier crops and a more sustainable farming approach.

According to the Nile Basin Initiative, small farmers in the Mount Elgon Aquifer area primarily practice mixed farming methods. This approach involves cultivating various types of crops alongside raising livestock. However, this type of farming is water-intensive, which calls for groundwater exploration to supplement surface water.



Land cover and land use around the Mt. Elgon aquifer region of Uganda and Kenya. Map by NBI.

Uganda's Ministry of Water and Environment has been promoting the solar-powered groundwater irrigation initiative in rural Kapchorwa and is happy about the progress and positive change being witnessed.

Engineer Joel Wanda from the ministry says that as the lead agency in the project, they are impressed by the social impact, especially on the local female farmers.

"They are able to farm and harvest throughout the season using a solar-powered irrigation approach," says Wanda.

Jim Justin Yeko, the commercial officer for Kapchorwa district, reveals that around 800 small-scale female farmers in the district have adopted solar energy to pump groundwater for



irrigation.

"One of the most notable initiatives in the region has been the installation of solar-powered water pumps, which extract groundwater from deeper underground reserves and channel it into irrigation systems," she notes.

She says this technology is both eco-friendly and cost-effective. "It allows farmers to maintain consistent water access, reduce dependency on rain, and boost crop yields," she highlights.

Evelyn Kubarika, the chairperson of Kapchorwa district, praises the new groundwater initiative in her region.

She emphasizes that tapping into groundwater is crucial for ensuring stable crop production and improving food security.

"Changing weather conditions often result in crop failures and food insecurity, creating hardships for many farmers, particularly women who traditionally bear the responsibility of cultivating food for their families."

Kubarika urges all farmers in the district to support sustainable practices that fight climate challenges.

"Together, we can secure a better future for our farmers and families," she notes.

LANDSLIDE SURVIVORS FIND HOPE IN GROUNDWATER

By Javier Silas Omagor – Uganda



Bunambutye Resettlement Camp for Mt. Elgon landslides survivors have benefited from groundwater initiatives.

n November 2024, at least 15 people died, and 113 others went missing after landslides buried homes in six villages in eastern Uganda. Another 15 injured individuals were rescued and taken to Buluganya Health Center.

The Uganda Red Cross Society reported that 13 bodies were recovered from 40 homes affected by the landslides that were triggered by heavy rains in the mountainous Bulambuli District.

The affected area spanned about 50 acres, including homesteads and farmlands. Clean water becomes one of the most pressing needs for affected communities, as many water sources were contaminated or destroyed.

In the aftermath of such devastation, at a scale that has become common in recent years in the mountainous districts of Bududa, Bulambuli, Sironko, and Manafwa in eastern Uganda, survivors have found hope in an unlikely source: groundwater.

The affected area spanned about 50 acres, including homesteads and farmlands. Clean water become one of the most pressing needs for affected communities, as many water sources were contaminated or destroyed.

Groundwater Solutions in the Elgon region

Knowing that it is plentiful in the Mount Elgon aquifer the Office of the Prime Minister and several organizations saw groundwater as a first option for their response programmes.

Through drilling boreholes, wells, and solar-powered water pumps, the landslide survivors and communities in the affected areas now have access to reliable and clean water sources, even during the dry seasons when surface water is scarce.

One of the most significant interventions has been the construction of solar-powered boreholes in the Bunambutye settlement camp, an area that previously relied on surface water sources. During the November 2024 landslides, those sources were either destroyed or made unsafe due to contamination.

Solar pumps are ideal for these areas, as they provide reliable water through sustainable and affordable systems.



Springs and boreholes are a lifeline for several communities in Africa

Solar-powered systems can pump water from deep reserves underground, providing a consistent and safe supply without depending on the grid or expensive fuel-driven generators.

One of the most significant interventions has been the construction of solar-powered boreholes in the Bunambutye settlement camp, an area that previously relied on surface water sources. During the November 2024 landslides, those sources were either destroyed or made unsafe due to contamination.



Boreholes are becoming a key component in Eastern Uganda as communities increasingly rely on groundwater.

A Lifeline for Survivors

"The installation of a borehole has brought immense relief," says Stella Nabukwasi, one of the Bunambutye residents, as she fills her jerrycan with water.

Before the Government built the borehole, Stella had to walk miles to find water, and even then, it was not safe to drink. After the landslides, the nearby streams were either buried or polluted..

Like many others, Nabukwasi can now use water for daily household needs and farming, which is crucial for her family's recovery.

The reliable supply of water has enabled Stella to restart her farming, growing vegetables, as well as crops like maize and beans, which were previously too risky due to water shortages.

Water for Agriculture and Livelihoods

Many landslide survivors rely on agriculture for their livelihoods, and without reliable water, rebuilding their farming operations seemed impossible.

With the help of irrigation systems powered by groundwater, farmers can now grow crops year-round, reducing their vulnerability to the erratic rainfall patterns that have worsened in recent years due to climate change. Some of these systems use drip irrigation, which delivers water directly to the base of plants, reducing water wastage and ensuring that crops receive adequate moisture.

This has made food more available and increased food security in the households and improved income generation for women, who are the primary caregivers and smallholder farmers in the region.

Partnerships for Sustainable Solutions

The success of these groundwater interventions in Mt. Elgon is the result of close collaboration among the central Government, local governments, non-governmental organizations (NGOs), and the landslide survivors.



Bunambutye Resettlement Camp is home to hundreds of the landslides survivors.

Engineer Denis Ngabirano from the Ministry of Water and Environment says, "Our intention is to ensure that landslide survivors and the entire community in Mt. Elgon has accessible, clean, safe, and reliable water.

"Groundwater is proving to be essential for the local population in Bunambutye, and we vow to continue supporting," Ngabirano says.

Organizations like WaterAid Uganda and the Uganda Red Cross have been leading the way in providing technical support, equipment, and training for local communities on how to maintain and manage groundwater systems.

Local government agencies, and the Ministry of Water and Environment, have also played a key role in ensuring these projects align with national water security strategies and policies.

In addition, the Government of Uganda has initiated a "Water for All" programme in the Mt. Elgon region, aimed at increasing access to safe and reliable water for communities affected by natural disasters and climate change.

This programme has led to the drilling of over 30 new boreholes in the landslide-prone districts, and efforts are underway to increase the number of solar-powered water systems in these vulnerable areas.

While groundwater has provided immediate relief to landslide survivors, experts believe it also holds long-term potential as a tool for climate resilience in the slopes of Mt. Elgon and entire Eastern Uganda.

Groundwater as a Climate Resilience Strategy

While groundwater has provided immediate relief to landslide survivors, experts believe it also holds long-term potential as a tool for climate resilience in the slopes of Mt. Elgon

and entire Eastern Uganda.

With the increasing frequency of extreme weather events such as heavy rains, droughts, and landslides, groundwater could offer a sustainable solution for communities to adapt to the changing climate.

Dr. Paul Muhumuza, a water resources expert with the Uganda National Water and Sewerage Corporation, says groundwater can provide a stable water source for years to come, even in times of crisis.

"By tapping into underground water reserves, communities can reduce their dependence on surface water sources, which are more vulnerable to climate change impacts," he explains.

Challenges Ahead

While groundwater technology has proven to be an essential resource for landslide survivors, challenges remain. The cost of drilling and installing boreholes and maintaining solar-powered systems is a significant barrier for some communities.

There is also the need for continuous education on water conservation and proper sanitation to prevent contamination of groundwater sources.

Additionally, groundwater resources must be carefully managed to ensure sustainability. Over-extraction and poor management canould deplete water sources, affecting future generations.

For now though, as survivors in Eastern Uganda rebuild their lives and communities after frequent landslides, groundwater technology offers more than a temporary solution. It provides hope, security, and a path toward greater climate resilience.

GROUNDWATER, A LIFELINE UNDER THREAT IN MT ELGON

By Jesse Chenge – Kenya

t Elgon, towering majestically along the Kenya-Uganda border, is more than just a geographical landmark.

At 4,321 meters above sea level, it is a vital water tower supporting millions of lives in western Kenya and beyond.

The mountain feeds major rivers like Nzoia, Turkwel, and Malakisi, which provide a lifeline for households, farms, and industries on their way to Lake Victoria.

Yet, beneath this idyllic façade lies a growing crisis of climate change and human activity endangering the resources that sustain life.

Deforestation, rising temperatures, and erratic rainfall have reduced surface water flows and levels of groundwater. Communities that once relied on nature's bounty now face unprecedented challenges, especially those dependent on irrigated agriculture.

"We relied on rainfall, but the rains became unpredictable, and I lost everything," he says.

A Lifeline Amid a Crisis

Naibei Harrison from Chemwenda village in Kopsiro says groundwater has become a beacon of hope in the face of worsening droughts.

A father of four, Naibei recounts how his two-acre onion farm withered under the scorching sun in the past, in 2023.

"We relied on rainfall, but the rains became unpredictable, and I lost everything," he says.

Determined to avoid such losses again, Naibei



Amid escalating climate change impacts, an increasing number of people are turning to groundwater as a reliable source of water for their livelihoods.



Groundwater potential of the Mt. Elgon aquifer region. Map by NBI.

drilled a 32-foot borehole on his land, investing KSh25,000 (approximately \$204).

Powered by a solar pump, the borehole now supplies water for irrigating his crops.

"This borehole saved me," he says, "yet I know that a sustained flow water source depends on how well we manage our environment."

"Forests and wetlands are essential for maintaining adequate quality and quantities of groundwater," says an NBI specialist. "They act as natural sponges, capturing rainwater and replenishing aquifers. Without them, the balance is lost."

Underground Reservoir Under Threat

The Mt Elgon's aquifer has long provided a reliable source of ground water for both domestic and agricultural use in the communities.

However, experts warn that this lifeline is under threat due to deforestation, over-extraction, and a lack of sustainable water management practices.

According to the Nile Basin Initiative (NBI), groundwater is an indispensable resource in addressing water scarcity and sustaining livelihoods in the face of climate change.

Groundwater from the Mt. Elgon's aquifer supports both the Kenyan and Ugandan sides of the mountain, serving as a critical buffer during periods of drought.

However, away from deforestation, agricultural expansion, and poor land management are also causing rapid depletion.

An NBI study revealed that forest cover in the Mt. Elgon region declined by 20 percent between 1990 and 2015, leading to a significant drop in groundwater recharge rates.

This depletion has exacerbated the vulnerability of local communities to climate variability.

"Forests and wetlands are essential for maintaining adequate quality and quantities of groundwater," says an NBI specialist. "They act as natural sponges, capturing rainwater and replenishing aquifers. Without them, the balance is lost."



In Mt Elgon region, groundwater is sustaining people's livelihoods and combat water scarcity.

The Double-Edged Sword

While irrigation has allowed farmers to adapt to climate change, it has also placed immense pressure on groundwater resources.

Naibei, for instance, has revived his onion farm using water from his borehole, but he knows this solution isn't permanent.

"If everyone drills boreholes without proper regulation, we'll all run out of water," Naibei warns.

NBI emphasizes the importance of sustainable irrigation practices. According to its research, traditional flood irrigation wastes up to 40 percent of water due to evaporation and runoff.

In contrast, modern methods like drip and sprinkler irrigation can reduce water use by

50-70%, ensuring that groundwater reserves are not depleted unnecessarily.

A Coordinated Response

The Nile Basin Initiative has launched a five-year \$5.3 million project to address groundwater challenges in the Mt. Elgon region and other shared aquifers within the Nile Basin.

Funded by the Global Environment Facility (GEF) and implemented through the United Nations Development Programme (UNDP), the project aims to strengthen knowledge of the interdependence of surface water and groundwater resources, build community capacity for sustainable water management and conservation, and promote cross-border collaboration between Kenya and Uganda to manage shared resources. The Nile Basin Initiative has launched a five-year \$5.3 million project to address groundwater challenges in the Mt. Elgon region and other shared aquifers within the Nile Basin.

One key component of the project is enhancing communities' role in decision-making. By involving local stakeholders, NBI hopes to integrate Indigenous knowledge with scientific research to develop effective conservation strategies.

The Economic Impact

The declining availability of groundwater has had a ripple effect on local economies. Agriculture, the backbone of livelihoods around Mt. Elgon has suffered significant losses.

In 2023, a report by the NBI highlighted that crop yields in the region had dropped by 30 percent over the past decade due to water shortages.

For farmers like Naibei, the cost of drilling boreholes comes at a high cost. Many must rely on loans or sell assets to fund such projects. "It's a gamble," says Naibei. "If the borehole dries up, I lose everything."

The Urgency of Action

"We must educate our communities about the importance of protecting forests and planting trees," says Fred Ndiwa, a resident of Mt Elgon. He calls for government-led programs to train farmers on sustainable irrigation and groundwater use.

Conservation officer George Wara underscores the importance of a multi-stakeholder approach.

"Mt Elgon Forest is critical to groundwater recharge. We need stricter measures to curb deforestation and encourage reforestation," he adds.

Innovative Solutions for Sustainable Irrigation To reduce the strain on groundwater, NBI advocates for adopting water-efficient irrigation technologies.Solar-powered pumps, like the one Naibei uses, are cost-effective and environmentally friendly. Drip irrigation systems, which deliver water directly to plants' roots, are also gaining traction.

NBI is also exploring nature-based solutions such as restoring wetlands to enhance groundwater recharge and reduce surface runoff.

Pilot projects in the Mt. Elgon region found that these methods can increase water availability during dry spells by up to 30 percent.

BOOSTING HYGIENE AND SANITATION IN BUNGOMA WITH GROUNDWATER

By Jesse Chenge - Kenya



Access to safe groundwater is essential for the communities, supporting both health and hygiene.

n Bungoma County, access to clean groundwater is transforming lives, improving health outcomes, and fostering community well-being.

AMREF Health Africa and the County Government of Bungoma have been actively educating students in schools on the importance of safeguarding water sources from pollution and protecting against waterborne diseases.

The availability of reliable, clean water is essential for drinking, sanitation, and hygiene, significantly reducing the burden of disease in the region. By ensuring water is accessible and safe, the efforts are directly improving health outcomes in schools and health centers across the county.

Beyond health, groundwater is helping local communities thrive economically. Reliable water access supports agriculture and domestic use, reducing the time spent fetching water and allowing families to engage in more productive activities. climate resilience, providing a dependable water supply during droughts.

However, to maintain these benefits, sustainable groundwater management is crucial. As this resource continues to change lives in Bungoma, it is clear that protecting it is vital for the community's future health, livelihood, and resilience.

"If anything bad happens to Mt Elgon which is our water catchment area, the entire population in this area will suffer. We are therefore working round the clock to ensure that water held below the surface is not contaminated," he says. The lush landscape in Bungoma and the presence of multiple rivers can easily fool one into thinking that the residents in the area have never and probably, will never have any challenge accessing clean and safe water.

But far be it from the truth, despite being home to the majestic Mt Elgon, which is a major water source for tens of rivers traversing Kenya's Western Region and eastern Uganda, the residents are struggling to access water for domestic use.

Moses Wambusi, a Public Health Officer, in the county, reveals that the prevalence of diseases arising from poor sanitation and lack of clean water in the devolved unit accounts for a whopping 19.5 percent of all diseases in the region.

To prevent such happenings, Wambusi says the County is working alongside partners such as the Nile Basin Initiative (NBI) and community-based organisations to secure Mt Elgon, the key source of groundwater in the entire lake-economic region.

"If anything bad happens to Mt Elgon which is our water catchment area, the entire population in this area will suffer. We are therefore working round the clock to ensure that water held below the surface is not contaminated," he says.



Improving the quality and availability of water could help combat soil-transmitted diseases and enhance overall public health.

Groundwater also plays a critical role in

As part of its project, NBI has conducted a Shared Aquifer Diagnostic Analysis (SADA) which is a comprehensive analysis of hydrogeological, environmental, socio-economical, policy and institutional aspects of shared groundwater resources. the Mt Elgon transboundary aquifer shared between Kenya and Uganda was the subject of study.

Specialists from various disciplines collected data from both the Kenya and Uganda sides of the aquifer for analysis. The results from the analysis are not yet substantive primarily due to lack of monitoring, but there are signs that groundwater faces serious risks.

Solomon Mwaniki, Programmes Manager, AMREF Health, Africa says that recent granular survey mappings conducted in the four counties in the Nile Basin, including Bungoma, showed that there is a high prevalence of soil-transmitted diseases..

According to Mwaniki, these diseases include bilharzia which is not endemic in Mt Elgon.

Mwaniki emphasizes the urgent need for improved water sources in the region, highlighting the importance of access to clean groundwater.

He believes that water security would help in combating soil-transmitted diseases and improving overall public health.



Population trends of four counties based on the Kenya National Census data. Visualisation by NBI

Mwaniki urges local governments and communities to invest in sustainable water infrastructure to safeguard the health and well-being of the population in the Nile Basin. Rapid population growth is itself exerting high pressure on the water resources as more and more people need water for drinking, domestic purposes and agriculture.

Increased agriculture and urbanisation have also caused a rapid decline in land cover land cover, which affects aquifer recharge. Moreover, locals empty latrines with little caution on how to safely dispose of human waste. This further compromises the availability of safe groundwater.

Cognisant of the effects of urbanisation on the aquifer, NBI has been on the forefront, working with Bungoma County to educate the masses on the importance of proper sanitation.

Cleanliness and hygiene will not only ensure the environment is taken care; it will be an assurance that water seeping through the soil does not contaminate the groundwater.

"We are working to ensure that everyone has

a pit latrine, and that human waste is safely disposed of," says Mwaniki.

Florence Wakesho, an official in the Ministry of Health's Division of Vector Borne and Tropical Diseases, says locals in Bungoma are greatly affected by water-borne, as well as diseases caused by poor hygiene.

This has seen the Government focus on reducing or entirely eradicating the illnesses in the region by administering medicine to the local people.

"This situation can be averted if the residents boost their methods of protection and sanitation," Wakesho says. "We also ensure the children are taught these subjects in school so that they can pass on their learning to their parents.".

In addition to promoting better sanitation practices, Wakesho advocates for the protection of groundwater resources. She emphasizes the importance of safeguarding water sources from pollution and over-extraction, as they are essential for both drinking water and irrigation. Wycliffe Peter Omondi, Head of the Vector-Borne and Neglected Tropical Diseases Unit at the Ministry of Health reveals that his Unit is equipping children with health education geared towards the control and elimination of priority neglected tropical diseases, which also include river blindness and diseases caused by worms.

"Infection due to intestinal worms reduces human productivity, which in turn can undermine the economic prospects of nations," he says.

Rwanda Primary School Headteacher, Judith Kimtai, says the school has adopted its pupils as ambassadors for good hygiene.

"We teach them that they must wash their hands and tell their parents to buy them shoes," Kimtai says. "We want shoes to be part of their uniform to reduce cases of intestinal worms.".



Children at Rwanda Primary School in Bungoma engage in activities to promote sanitation and hygiene.

Kimtai argues that access to groundwater for washing hands, cleaning surfaces, and maintaining overall cleanliness will play a crucial role in improving people's quality of life.

Florence Wakesho, an official in the Ministry of Health's Division of Vector Borne and Tropical Diseases, says locals in Bungoma are greatly affected by water-borne, as well as diseases caused by poor hygiene.

GROUNDWATER, A SOLUTION TO WATER CRISIS IN KOPSIRO, MOUNT ELGON.

By Jesse Chenge – Kenya



An aerial view of Mt. Elgon forest reveals the stark effects of deforestation, with vast patches of cleared land threatening the region's ecological balance and water resources.

n Mt. Elgon, water comes to life in a beautiful way. According to the Nile Basin Initiative, higher areas catch the water when it rains, which then flows down the slopes, creating springs and streams.

This water seeps into the flatter land, where the rocks are soft and weathered. It fills up an underground aguifer that eventually shares its water with local communities through springs, dug well and boreholes.

The Mt. Elgon aguifer is a water system shared by Uganda and Kenya. It covers an area of about 4,900 km².

On the Kenya side of the aquifer, a serious problem is affecting local communities. Deforestation is damaging the environment, causing water supplies to become scarce.

However, groundwater has emerged as a critical lifeline for the residents in this area, as they seek fresh and reliable water sources. Through this photo story, photographer Jesse

Chenge, aimed to highlight how groundwater supports life in Mt. Elgon region of Kenya and why it is essential to take care of it.

This water seeps into the flatter land, where the rocks are soft and weathered. It fills up an underground aquifer that eventually shares its water with local communities through springs, dug well and boreholes.

Deforestation and shrinking water supplies

The story begins with the aerial view of Mt. Elgon forest. However which has been damaged by deforestation.

Large areas of land have been cleared, threatening the environment and putting crucial



Naibei's 32-foot solar-powered borehole pumps water to a storage tank, providing a lifeline for locals amid the growing water scarcity caused by environmental degradation.

water supplies at risk for wildlife and local communities.

The effects of deforestation extend beyond trees and wildlife. In this part of the region, residents struggle with shrinking water supplies that impact agriculture and everyday life. Families face challenges to their livelihoods and food security.

In the face of these challenges, innovation shines through. One such innovation is Naibei's solar-powered borehole, which pumps water to a storage tank, bringing hope to the community.

This 32-foot groundwater system is helping to



Community members draw water from the Chemwenda natural Water Point, a critical source in an area where access to clean water is increasingly uncertain.

provide the community with water for domestic use and agriculture to the community.

Access to clean water, a matter of survival

For many families in Kopsiro, Mount Elgon, the responsibility of fetching water falls heavily on women and children, who often have to travel long distances to reach distant wells.

But with Naibei's Solar-Powered Water System in Chemwenda village in Kopsiro, Mount Elgon, their struggle is starting to ease. Groundwater is now accessible in their community, allowing mothers and their children to spend less time collecting water and more time focusing on health, education, and family.





The Power of Groundwater in Agriculture

In Kopsiro, there is a farmer named Towett Naibei. He uses a pipe that brings water from deep underground to his fields.

Every time Towett uses this water, his crops grow strong and healthy. This clever way of watering his plants is helping him keep his farm alive. And, it is not only sustaining his livelihood but also showcases the vital role of groundwater in agricultural resilience.

Even when the weather is changing and challenges like deforestation are on rise, Towett isn't worrying. He knows that using groundwater allows him to provide food for his family and community.



Chemwenda Spring: A Community Treasure

Still in Kopsiro, Mount Elgon, a small community near the River Malakisi, there is a water source called the Chemwenda water spring. This spring is one of many residents' last reliable, sources of clean water. Each day, families gather at the Chemwenda spring with jerrycans, buckets, and jugs to fill them with water flowing from the ground.

Lately, however, the flow of water has declined. This has raised concerns among community members about where they will find water for drinking, cooking, and washing. With this challenge, many people have begun to realize how vital it is to protect this water source.

Locals including Judith Chebet from Korong'otuny in Cheptais are advocating for raising awareness about the importance of sustainable practices in saving the Chemwenda Spring. They believe that by caring for their environment, they can ensure continued access to clean water for years.



The Chemwenda water spring, a tributary of River Malakisi, serves as a vital water source. It's dwindling flow underscores the urgent need for sustainable water and environmental management practices



FINDING HOPE IN EVERY DROP OF GROUNDWATER

By Jesse Chenge - Kenya



Edina Nekesa offers her children water from the spring to drink.

n Bungoma County, western Kenya, in the small community of Pombo Mbili, the sun rises each morning over simple homes and busy families.

Bungoma County is home to Mt. Elgon, which is one of the five water towers in Kenya

The region falls under the Mt. Elgon aquifer, an underground water source that Kenya and Uganda share. It covers an area of about 4,900 square kilometers, mostly in the Nile Basin. Researchers mapped its boundaries from 2011 to 2015. The aquifer covers the middle and upper parts of Mount Elgon, which is an old volcano on the border of the two countries, but it does not include the lower slopes of the mountain.

According to the Nile Basin Initiative, on the Kenvan side, the aguifer region is within the

Lakes Victoria and Turkana basins and spans four Counties, West Pokot, Busia, Trans-Nzoia and Bungoma. It covers the areas of Kacheliba, Kapenguria, Endebes, Kitale, Saboti, Kiminini, Kaptama, Kapsokwany, Kimilili, Chwele, Webuye, Sirisia, Lwakhaha, Malaba, and Bungoma.

One of these families belongs to Edina Nekesa, a mother who works hard to care for her children and meet their daily needs.

In Pombo Mbili, water is essential. Every drop counts and access to clean water is a challenge.

Nekesa and her children start each day with a familiar routine: they grab their jerrycans and set off toward the nearby water spring. This morning journey is not just a task; it's crucial for their survival.



Edina Nekesa arrives at the spring, ready to fetch water

One of these families belongs to Edina Nekesa, a mother who works hard to care for her children and meet their daily needs.

As Nekesa walks with her children, they listen to the morning sounds.

Though the path to the spring is well-known, carrying home the water they need still takes effort either way. For Nekesa, bringing water home means her family can drink, cook, and stay healthy.



Edina Nekesa uses the water fetched from the spring for various purposes, including washing household utensils.

SCAN QR CODE TO WATCH VIDEO STORY



When they reach the spring, Nekesa carefully draws water. The spring, filled by the Mt. Elgon aguifer is a vital resource for her family and the whole community. The sound of water filling the jerrycans brings a sense of relief. Her children help her, learning the importance of working together to support their family.

After filling their jerrycans, they walk back home, sharing stories and laughter. The water they carry is heavy, but their shared effort makes the journey lighter. Nekesa uses the water for cooking, cleaning, and drinking. For her, this water symbolizes hope for her family.

Nekesa does not stop at that; she also cares for her livestock.

HOW BOREHOLES ARE QUENCHING THIRST FOR WEST POKOT AND TURKANA RESIDENTS

By Jesse Chenge – Kenya



In the face of dwindling surface water, villagers in West Pokot and Turkana counties explore the possibilities of groundwater.

ituated in the northwestern part of Kenya, West Pokot and Turkana counties are covered by vast, arid, open-lying plains dominated by shrub and grassland.

According to the Kenya Meteorological Department, rainfall in these areas is erratic and varies significantly over time and space, while temperatures range from 20°C to 41°C.

This situation has seen residents of this area live a semi-nomadic life, as they have to move from one place to another in search of water and pasture for their livestock. This is also because seasonal rivers and shallow wells often dry up because the region receives long rains as scarcely as once every three years.

However, a wave of innovative solutions is offering hope in the face of these challenges.

Through borehole drilling and water filtration systems, local communities are finding sustainable ways to secure clean water. Through borehole drilling and water filtration systems, local communities are finding sustainable ways to secure clean water.

These efforts are not just improving access to this precious resource; they are transforming lives by providing safe and easy water options for families like those in the Natoos community in Turkana County, Kenya.

West Pokot lies within Mt. Elgon aquifer area, a transboundary system shared between Uganda and Kenya, spanning three lake basins and several administrative units.

On the Kenyan side the aquifer region is within the Lakes Victoria and Turkana basins.

In the Nwaiterong sublocation, the wind of change is palpable, as seen from the bright smiles on the faces of pupils at Napur Primary School and their neighbours.

A resident of this area, only identified as Rahma, says the simple fact that she can go to the school and fetch safe and clean water for herself and her family is more than enough reason for her to be grateful.

Just a year ago, she would draw water from earth openings that trapped rainwater. This water, she says, is what her family used for drinking and other domestic activities.

"What were we to do? The only other option was to part with Ksh200 for a can of tap water supplied by vendors."

She notes that her children frequently feel it. What kept her going through these tough days was the hope that the Government would one day provide clean water to her community.

But today, this sad situation is no more. Naipur Primary School has become a source of hope, as the school's headteacher, James Kennedy Mwita says.



Groundwater can be a vital source of hope in the struggle against water scarcity.

"We had a serious challenge with water. It was scarce, salty and contaminated, often causing illness among the schoolchildren."

The school hosts 1, 345 pupils, with 450 occupying the available boarding facilities. This boarding section has 280 girls and 170 boys.

For decades, lack of safe water was the school's biggest challenge. It posed a serious public health threat to the young learners. Today, the learners have three boreholes and the school is in the process of installing a 10,000 litre water tank to help with harvesting rainwater.

"I thank Water Step for their support in helping us in harvesting water," Mwita says. Selina Awesit, a board member at Napur Primary School recalls, "We had a serious challenge with water. It was scarce, salty and contaminated, often causing illness among the schoolchildren." With three large tanks, the school can now store up to 30,000 litres of water. Moreover, Water Step has trained the school on how to harvest water runoff and use it to establish kitchen gardens.

Humphrey Muchuma, Water Step's Ambassador and Director for East Africa, says the project's goal is to ensure that marginalised and vulnerable communities have safe water. Water Step runs several similar initiatives in a prison within the community to make sure that inmates, too, have clean water.

"With a huge population and the existence of a boarding section, we were convinced that the school needed a clean and enough machines to provide a sustained supply," adds Muchuma

With three large tanks, the school can now store up to 30,000 litres of water. Moreover, Water Step has trained the school on how to harvest water runoff and use it to establish kitchen gardens.





Lack of water poses challenges for communities around the world, particularly in areas heavily reliant on rain-fed agriculture and natural resources.



HOW A GROUNDWATER-IRRIGATED RICE SCHEME TRANSFORMED A COMMUNITY

By Jesse Chenge – Kenya



Vibrant green fields flourish as rice grows robustly, nourished by groundwater beneath the surface.

Tanui says the availability of underground water combined with the heavy rains in the area made it a perfect place for growing rice, which requires heavy amounts of water.

Farmers also follow a carefully planned growing calendar. By adopting a two-crop season schedule, they maximize water use and increase production.

This strategy involves planting rice in two distinct phases throughout the year, which helps in making the most of the available water resources.

stablished in 1966, Ahero Irrigation Scheme in Kano plains, Kisumu, Kenya, has over the past five decades become a crucial nerve in the survival of thousands of households.

The flourishing irrigation scheme is not only a source of food to millions of Kenyans; it is a commercial hub offering income to farmers, suppliers, fleets of vehicles transporting cargo, as well as hundreds of retail shops in the region.

The National Irrigation Authority (NIA) has been funding the scheme, contracting men to sink boreholes and construct canals that facilitate the distribution of groundwater throughout the farming areas.

These boreholes tap into aquifers, providing a reliable source of water to irrigate the farms.

The canals are dug to transport water from the boreholes and other sources directly to the fields. This infrastructure ensures that water can be efficiently distributed to different parts of the scheme.



A drilling machine excavates into the ground to access groundwater in the Mt. Elgon region in Kenya.

Joel Tanui, Deputy General Manager, of Operations and Irrigation Management Services at NIA notes that the scheme was established due to the need to boost food sufficiency in the country's post-independence.

Tanui says the availability of underground water combined with the heavy rains in the area made it a perfect place for growing rice, which requires heavy amounts of water.

Measuring 2,168 acres, Tanui reveals that the scheme can produce as much as 5,000 metric tonnes of rice per season..

"We have a very specific mandate, the operation and maintenance of this scheme from the pump station at the water extraction point, Tanui says, "This ensures that every farmer gets a reliable supply of water.

"Moreover, we maintain the canals and ensure they function as we check on them regularly." He also reveals that there are plans to expand Ahero's irrigation infrastructure to 10,000 acres under a Ksh3.8 billion project.

On completion, the scheme will produce rice on 5,000 acres while another 5,000 acres will have bananas, vegetables and watermelons. "We plant rice in the first four months then break for four before returning to plant another four months in a year, James Omondi," an officer at Ahero says. "We do this to maximise production."

With the planned scaling up of the scheme's acreage from 2,000 to 10,000, there will be more benefits to the farmers and job seekers in the area.

Omondi explains that there are farmers are working directly on their farms in the scheme, while other people are contracted labourers in the vegetative stage to harvesting, he adds, that rice growing is labour-intensive.

Jacinta Atieno, a labourer says, "After school, I moved from one town to another looking for a job in vain. Now I am comfortable with the scheme, able to meet my financial needs." On completion, the scheme will produce rice on 5,000 acres while another 5,000 acres will have bananas, vegetables and watermelons. "We plant rice in the first four months then break for four before returning to plant another four months in a year, James Omondi," an officer at Ahero says. "We do this to maximise production."

Peter Juma, a farmer who has been at the scheme for over three decades says there have been changes in the way the irrigation scheme is managed.

Unlike in the past when NIA directly managed the farms, farmers now are more involved and have subdivided themselves into departments where they take on additional roles that benefit the community. Some are in charge of the water distribution, others supply farm inputs..

"Right now, we farmers feel like we own the project and are part of the scheme," Juma says.

The farmers have also formed farmer organisations where they conduct training on how to work productively.

Such programmes make farmers work even harder to achieve their targets and earn more from their labour, James Ogodo, a farmer says.



Abundant rice at Ahero.

RIVERS, SPRINGS DRYING UP AS MT ELGON FOREST DIMINISHES

By Jesse Chenge - Kenya



enya's water towers are rapidly drying up, raising alarm over the future of the country's water resources.

Richard Walukano, a water expert, attributes this crisis to widespread deforestation, which he believes has led to the drying up of water sources that once provided clean water to residents.

Walukano, who led the Kenya-Finland Corporation project responsible for drilling boreholes, warns that without urgent reforestation efforts, the situation could worsen.

Communities in Mount Elgon are also feeling the impact, with natural springs that once sustained them now drastically reduced during dry seasons.

According to the Nile Basin Initiative, protecting surface water systems such as forests and wetlands is vital for sustaining groundwater resources. The Initiative is currently working on transboundary projects, including the preservation of the Mt. Elgon aquifer shared between Kenya and Uganda, to address these pressing challenges and secure water resources for future generations.

Until recently, the thought of not having a steady supply of water from the numerous streams and springs that crisscross Bungoma County seemed far-fetched, but this is now the sad reality lived by its residents.

Judith Chebet, a Bungoma resident is yet to come to terms with how the water situation has morphed right before her eyes.

As a child, she easily drew water from a nearby river. But until a few months ago, she had to walk for a longer distance to get to the major rivers to wash her clothes, bathe then eventually draw some water and take home for drinking and cooking.

This situation has however changed a water point where groundwater is pumped and locals can fill their jerrycans from the perennially flowing taps.

"In truth, we have destroyed our environment. Over the years, trees have been felled without regulation and we are now seeing the effects. Most of the streams and springs have dried up. I ask the Government to come and talk to our people and help us plant more trees," Chebet calls.

Until recently, the thought of not having a steady supply of water from the numerous streams and springs that crisscross Bungoma County seemed far-fetched, but this is now the sad reality lived by its residents.

Mt Elgon covers approximately 50,500 hectares, with only 2,000 hectares plantation, while the rest is natural forest.

"Mt Elgon supports over one million people in Bungoma who rely on it as their major source of water. However, boreholes and springs are drying up and very soon we will have a serious



Judith Chebet, a Bungoma resident

water shortage in the county," says George Wara, Bungoma County Conservator.

A recent study by the Kenya Forest Service revealed that out of the 45 permanent rivers that flowed from Mt Kenya in 1972, only ten are still permanent, with the rest changed to seasonal rivers due to reduced volumes of water.

"We need to plant more trees so that we improve on the water recharge to the downstream. We need to do a lot of planting in Mt Elgon," he says.

Richard Walukana, a member of the Bukusu Elders Council, calls on the government to consider deploying forest guards to protect the forest and save the situation.

With Mt Elgon being a key area that supplies water to the Cherangany Hills, Walukana says the destruction of the forest in the mountain will result in dire consequences.

"The effect is very huge. If we do not get water to feed Lake Victoria, where will the Nile get its water from? This does not just affect Kenya, Tanzania and Uganda, it will affect several African countries," he notes.



Communities in the Mt. Elgon Aquifer area are conserving the environment so as to protect and preserve groundwater.

A local resident, Fred Ndiwa admits that since the locals began felling trees uncontrollably, not only have streams dried up; the water table has gone lower.

"We are very worried. The majority of our boreholes are running dry because the water table is going down. We risk turning this area into a desert," he says. Recent studies conducted by geological and hydrological experts show that water quality is a matter of major concern in the region, with pollution coming from multiple sources such as agriculture, households, livestock, and industry/mining, among others.

Some shallow wells are already polluted but the baseline groundwater quality in the Mount Elgon aquifer is generally still good. Nevertheless, urgent measures are required to mitigate further deterioration.

Poor sanitation, including a lack of latrines in rural- and sewage systems in urban areas, is a huge threat to water quality.

The prime pollution recipients are rivers, leading to increased abstraction of groundwater. Since surface- and groundwater are often hydraulically connected, some pollutants eventually reach the aquifer as well.

Walokana believes that every Kenyan should contribute towards the preservation of riparian land, and plant more trees and that the Government should ensure the protection of water towers.

"Through re-afforestation, we are making efforts to conserve this important ecosystem in Bungoma, as well as the entire Nile Basin," he says. If we do not act, there will be a big challenge in the region especially with desertification coming fast from the North."

"Climate change is a wake-up call to the world. We have misused the natural resources that God gave us for a reason. Trees were given to protect those rivers that we have destroyed. We cannot put the clock back. We need to act now," he says.

Vincent Mahiva, the County Officer for the National Environment Management Authority in Bungoma explained that deforestation affects underground water, especially around mountainous and hilly areas.

Forests, he says, help in the seepage of water as they soak the water when it rains and reduce evaporation. The roots of trees act as the entry points of this water into the underground.

"Through re-afforestation, we are making efforts to conserve this important ecosystem in Bungoma, as well as the entire Nile Basin," he says. If we do not act, there will be a big challenge in the region especially with desertification coming fast from the North."

IS DEFORESTATION IN EASTERN UGANDA CONTRIBUTING TO GROUNDWATER DEPLETION

By Javier Silas Omagor – Uganda



Bags of Ugandan produced charcoal found at the border district of Busia.

The slopes and valleys of the Mt. Elgon region are battling the consequences of rampant deforestation, and the effects are becoming increasingly dire.

Beyond the apparent environmental degradation damage, one of the most disturbing findings is the depletion of groundwater, a resource for domestic and agricultural use in this drought-prone area.

The rainforests that once covered the region have been steadily disappearing, mainly driven by agricultural expansion, illegal logging, and the growing demand for firewood for cooking.

As the forests disappear, the landscape and the water cycle are changing. The loss of trees is now recognized as a key factor in the dwindling groundwater reserves that many rural communities in the region depend on for survival.

As is the situation elsewhere, groundwater is a vital resource in the Nile Basin, with about 70 percent of the rural population depending on it for domestic use and watering their livestock.

There is also increasing groundwater use for economic activities such as irrigation, mining, and industries.

With a rapidly growing demand for surface water, which will soon outstrip supply, groundwater holds the promise of bridging the gap between water supply and demand and buffering the effects of climate change and variability.

There is also increasing groundwater use for economic activities such as irrigation, mining, and industries.

According to the Nile Basin Initiative (NBI), contrary to popular belief, "rainfall intensity plays a bigger role in groundwater recharge than overall rainfall amounts, especially during the monsoon."

In its study, Water Resources Management -Groundwater Series 2023, NBI warns about the likely impact of deforestation on groundwater. "Large-scale deforestation (for construction and energy usage) is affecting not only recharge but also the soil stability and even the regional climate," the report warns.

Another report, Mount Elgon Transboundary Aquifer, also by NBI, recommends the delineation of key recharge areas and processes prevailing and the influence of extreme weath-



Charcoal dealers loading a Kenya bound Fuso truck bags.

er conditions.

The Role of Forests in Groundwater Recharge Forests play a crucial role in replenishing groundwater. Tree roots help to absorb rainwater, which gradually seeps into the ground and replenishes underground aquifers.

Rhoda Nyariibi, a forester in the Mt Elgon region, says "trees help regulate the water cycle by preventing surface runoff, and ensuring that rainwater is properly filtered and absorbed into the soil."

However, as large swathes of forest have been cleared owing to human-induced activities on the environment, this natural process is being disrupted.

Nyariibi laments that "without the protective canopy of trees, rainwater is no longer absorbed efficiently into the ground. " She further stresses that "instead, it either runs off the surface, causing erosion or evaporates into the air, leaving little moisture to replenish the groundwater reserves beneath the soil."

A Growing Crisis

In its 2022 report on Groundwater Development in Sub-Saharan Africa, the World Bank highlighted the need to improve the region's groundwater development planning and resource management.

It discusses the need to increase funding for groundwater projects and develop new training partnerships to avoid the implications.

It is with no doubt that for communities living on the slopes of Mt. Elgon and surrounding districts, the consequences of deforestation are already being felt.

Many households that previously relied on groundwater for daily water needs now find that wells and boreholes are broken down.

In some areas, farmers who depend on groundwater for irrigation have watched as their crops wither and fail due to the lack of water.

In Sironko, one of the hardest-hit districts, local farmer Isaac Masakala recalls how his farm throve because a reliable well was on his property.



Groundwater is vital for our drinking water and crops.

"A few years ago, I never had to worry about water. The well was deep enough to supply water for my family and crops. But the water levels have dropped drastically for the last few years," Nabende says.

He notes thathis family members now have to walk long distances to fetch water that is

hardly enough to sustain my farm." Agnes Nabuna, another farmer, believes thatcommunities in the Elgon region collectively need to identify resilient and adaptive measures in the face of tree losses."

The depletion of groundwater is affecting farmers and putting pressure on local communities' access to safe drinking water.

In some areas, families have been forced to rely on contaminated surface water, which has led to an increase in waterborne diseases like cholera and dysentery.

Indeed, deforestation in the region is driven by the need for firewood, charcoal and land for cultivation. With the population increasing, more land is being cleared for farming.

"I think Government and development partners should also consider introducing alternative, accessible cooking options to meet often counterproductive needs of the population.," Nabuna says.

She adds that trees are felled indiscriminately in Sironko, Manafwa, Bulambuli, Kween, Bukwo, Bududa, Namisindwa and Kapchorwa.

The Ministry of Water and Environment reports that eastern Uganda has lost over 30 percent of its forest cover in the past two decades.

This loss has not only contributed to the reduction of local biodiversity; it has led to significant soil degradation, and decreased groundwater recharge.

Once rich in organic matter and capable of holding moisture, the soil is now more prone to erosion, further disrupting the water cycle.

Experts Call for Immediate Action

Experts warn that the situation in eastern Uganda is becoming increasingly unsustainable.

Nazipher Abigaba, an environmental expert with the Uganda National Forest Authority, emphasizes the urgent need for a comprehensive forest conservation and groundwater management approach.

"Deforestation has far-reaching consequences, and one of the most serious impacts is the

depletion of groundwater resources," Abigaba explains. She says there is a need to integrate reforestation efforts with water conservation strategies.

"Planting trees and protecting natural forests are essential steps to restoring the water cycle and safeguarding groundwater for future generations," she notes.

In addition to reforestation efforts, Abigaba recommends promoting sustainable agricultural practices, such as agroforestry, where farmers plant trees alongside their crops. This method helps conserve water, enhances soil fertility, and prevents erosion.

By collecting and storing rainwater during wet seasons, households can alleviate some pressure on groundwater reserves during dry spells.



Several communities in Eastern Uganda rely on clean groundwater. Photo by Jesse Chenge.

Alfred Okidi, the Permanent Secretary at MWE, believes these initiatives can inspire the local communities to embrace conservation, stabilize the ecosystem, and protect sources of groundwater.

says.

One such Initiative involves installing rainwater harvesting systems to reduce dependency on groundwater and surface water sources.

By collecting and storing rainwater during wet seasons, households can alleviate some pressure on groundwater reserves during dry spells.

While these efforts are a step in the right direction, experts warn that the problem can only be solved with the active participation of local communities, policymakers, and private stakeholders. The effects of deforestation on groundwater are not easily reversed, and significant time, investment, and effort will be required to restore the balance.

"We cannot afford to wait any longer," says Okidi. "If we don't act now to stop deforestation and invest in sustainable water management, we risk pushing aastern Uganda into a serious water crisis that will affect generations to come."

Government and NGO Efforts to Address the Crisis Both the Ugandan Government and non-governmental organizations (NGOs) are taking steps to address the issue.

The Ministry of Water and Environment has introduced programmes aimed at protecting and restoring forests, such as the Running Out of Trees (ROOTs) campaign, with the target of planting 200 million trees over five years.

Local organizations like WaterAid Uganda and The Mt Elgon Tree Growing Enterprise have also launched initiatives to raise awareness about the link between deforestation and water scarcity.

"These organizations are working with farmers and local communities to promote sustainable land use and water management practices," Okidi

UGANDA'S LAW ON UNDERGROUND: WHAT SHOULD COMMUNITIES IN EASTERN UGANDA KNOW BUT DO NOT KNOW?

By Javier Silas Omagor – Uganda

n the Elgon region, where people are grappling with the effects of climate change, erratic rainfall, and dwindling water resources, a growing number are turning to underground water sources, including wells and boreholes, to meet their water needs.

Groundwater has become a lifeline for many in the region, though there remains a significant gap in knowledge about Uganda's laws and regulations governing underground water usage.

This gap could have serious implications for local communities, especially regarding access to, management of, and protection of this resource.

Phiona Nekesa, a resident of Kaduwa in the Sironko district, confesses to being oblivious to the groundwater law. She says she had "no idea such a law even existed despite being a big user of groundwater."

According to the Act, groundwater is classified as a "national resource" managed by the Government to ensure its sustainable use for all Ugandans.

What You Need to Know

The country's groundwater is considered a public resource. Still, its use is regulated by the Ministry of Water and Environment and, specifically, by the Water Act (1997), the primary legislation governing water resources.



Groundwater is very central to the people living in the Mt. Elgon Aquifer

According to the Act, groundwater is classified as a "national resource" managed by the Government to ensure its sustainable use for all Ugandans.

This means that while individuals and communities can use groundwater for domestic purposes, agricultural activities, and even commercial ventures, they must do so within the framework of legal regulations designed to protect the resource.

One key element of this legal framework is the requirement for permits and licenses for certain activities related to groundwater extraction.

Agnes Kanyago, a lawyer, affirmed that it was a problem to "have a community that is not aware of the legislation about the resources that they use regularly."

"Groundwater is a national resource according to our founding documents as a country, and people need to know the regulation and all the provisions that concern it," adds Kanyago. For example, drilling boreholes for large-scale water extraction or commercial use, such as for irrigation or bottling, requires approval from the government.

"This approval is necessary to avoid over-extraction, which could lead to groundwater depletion and other environmental issues such as contamination or land subsidence. Our people need this knowledge," stresses Kanyago.

According to the National Water Policy and the Water Act Cap 152, the responsibility to provide water services and maintain facilities was delegated to local councils in districts and urban centers.

The central government agencies' role is to guide and support as required.

The Act thus emphasises the shared responsibilities in developing and managing water resources among stakeholders, including the private sector and non-governmental organisations (NGOs), to regulate human activities that pose risks to water resources.

It also provides for pollution control measures with associated penalties and fines. The exist-

ing policy and legal framework promote wise use of water resources from the lowest possible level while considering roles to be played by different stakeholders at different levels.

According to the NBI, this offers an opportunity to ensure that communities can actively participate in developing and maintaining water sources within a given catchment.

Other key national policies in Uganda regarding groundwater management include the National Policy for the Conservation and Management of Wetland Resources (1995), which aims to prevent the loss of wetlands and ensure equitable benefits; the Uganda National Land Policy, which outlines land's role in development and promotes effective land management; the National Forestry Policy, which focuses on the establishment and conservation of watershed protection forests; and the Renewable Energy Policy, aimed at increasing the use of modern renewable energy sources.



Government through the ministry of water and environment is helping communities secure groundwater in Eastern Uganda. Photo by Emma Muchunguzi. "It's common for villagers to simply dig a well when they need water or notice a neighbour drilling a borehole," says Sam Ayoo, a water expert.

What Communities Don't Know

Despite these clear policies and regulations, many communities in eastern Uganda are unaware of the legal complexities surrounding groundwater.

In rural areas, where surface water sources like streams and shallow wells are often unreliable, underground water sources have become essential for daily survival. However, many people are unaware of the need to obtain a license or follow specific guidelines when they dig wells or establish boreholes.

"It's common for villagers to simply dig a well when they need water or notice a neighbour drilling a borehole," says Sam Ayoo, a water expert.

"But they don't realize that there are laws in place to ensure these water sources are sustainable and safe. If too many people draw water from the same underground source without regulation, it could lead to resource depletion."

In addition to extraction rights, many communities need more awareness about protecting groundwater from contamination.

The Water Act mandates that the construction and use of wells and boreholes adhere to specific safety standards, including proper sealing to prevent surface water contamination and protect groundwater recharge zones.

However, illegal dumping, poor sanitation, and misuse of water sources are common problems in many rural communities, and these practices can contaminate underground water.

The National Environment Management Authority (NEMA) plays a critical role in regulating and overseeing the sustainable use of water resources, including groundwater.

NEMA is responsible for enforcing environmental laws, including those related to the construction of boreholes, springs, and water wells, and for ensuring that water users adhere to environmentally friendly practices.



Environment lawyers want governments to sensitize locals on groundwater laws.

However, NEMA's reach in rural areas is limited, and many people need to be made aware of their responsibilities under the law. "The challenge is often a lack of access to information," says Moses Mulindwa, an environmental lawyer based in Kampala.

"Most rural communities don't fully understand the legal aspects of groundwater use. They don't know what kind of permits are needed or how to apply for them. This creates a gap between legal requirements and the actual practices on the ground," notes Mulindwa.

Why the Law Matters for Communities

Mulindwa reckons that for communities in eastern Uganda, understanding the law on groundwater use is not just about following regulations; "it's about ensuring long-term access to this vital resource."

The environmental barrister warns that "over-extraction of groundwater, especially without proper management, can lead to a host of problems, including lower water tables, reduced water quality, and the drying up of wells and boreholes."

Moreover, climate change is exacerbating the pressure on water resources, making it even more critical for communities to manage

groundwater responsibly.

As rainfall patterns become more unpredictable, dependence on underground water will likely increase, making the need for sustainable practices more urgent than ever.

The legal framework surrounding groundwater is designed to prevent these problems by ensuring that water resources are allocated efficiently, protected from contamination, and used sustainably.

By obtaining permits, following proper construction practices, and observing environmental guidelines, communities can avoid the risks of over-extraction and contamination. Steps Towards Awareness and Education In response to this knowledge gap, government agencies and non-governmental organizations (NGOs) have been trying to educate communities about the laws governing groundwater use.

Programmes focused on water management, sustainable agriculture, and environmental protection are slowly gaining traction in rural areas of the region.

These programmes aim to empower local leaders, farmers, and water users with the tools and knowledge to navigate the legal requirements, adopt safe water practices, and ensure the protection of their water sources for future generations.

One such initiative is led by the Nile Basin Initiative (NBI). The Nile Basin Initiative (NBI) has initiated a project titled "Enhancing Conjunctive Management of Surface and Groundwater Resources in Transboundary Aquifers." This project focuses on improving the utilization and protection of shared aquifers in the Eastern Nile and Nile Equatorial Lakes regions. According to Dr. Maha Abdelraheem Ismail, the Groundwater Project Lead at Nile Basin Initiative, "this project aims to optimize the joint use of surface and groundwater by promoting conjunctive management."

One of the three targeted aguifers in this initiative is the Mount Elgon Transboundary Aquifer, which plays a crucial role in the region's water resources management. Uganda and Kenva share the Mount Elgon aquifer.

"We need to make sure that communities



Groundwater Potential in Mount Elgon Region. Map by NBI.

understand both their rights and responsibilities when it comes to water," notes Richard Kirya, a lecturer at LivingStone International University, Mbale.

He narrates that teaching communities about the laws and best practices for groundwater management can ensure that water remains available and clean for everyone in the long term.

Martha Akia, the communications specialist at the Ministry of Water and Environment, urges that "the time to act is now."

"We must bridge the knowledge gap and foster responsible groundwater use across eastern Uganda and beyond," she urges.

By educating communities about their rights and responsibilities under Uganda's Water Act and the importance of sustainable water management, the country can ensure that future generations benefit from this critical resource.

Against that background, the Nile Basin Initiative (NBI) emphasizes communications and awareness raising about the benefits, challenges, laws and policies, and opportunities of groundwater, as well as the environmental issues and threats of climate change to the ecosystem and biodiversity.

GROUNDWATER FUELS EDUCATION IN MT ELGON REGION

By Javier Silas Omagor – Uganda

G roundwater is quenching thirst and transforming the educational landscape for thousands of children, empowering communities, and boosting local economies in the districts of Mbale and Kapchorwa in eastern Uganda.

The two districts are part of the Mt. Elgon aquifer, a vital transboundary resource shared between Uganda and Kenya. According to the Nile Basin Initiative, this aquifer covers about 4,900 square kilometres and spans three lake basins and various administrative areas.

In a region facing water scarcity, the Nile Basin Initiative (NBI) cites the importance of this aquifer in filling gaps. The aquifer has been used to support surface water supplies, especially where surface water is polluted or hard to find. Despite this, many people still do not have access to safe and clean drinking water. For example, many schools in two districts previously struggled to pay their water bills from national water supplies and even considered closing.

"Our best learners lost concentration as the water scarcity psychologically derailed them," Naulele said.

A Lifeline for Schools

Many children in the Mt. Elgon aquifer region face challenges that keep them out of school. Some miss classes because they must search for water; others arrive late because they have to fetch it for their families. According to the Nile Basin Initiative (NBI), this struggle for water impacts children's education and daily lives.



Several schools in Eastern Uganda rely on groundwater for safe and clean water whose availability has increased the performance of the learners.



Location of Mount Elgon aquifer system in the drainage basins across the border between Uganda and Kenya; Inset is the map of Uganda and Kenya. This visualization was developed by the NBI.

The introduction of groundwater wells and boreholes in schools and local communities has significantly alleviated this challenge in the region. For example, the recently constructed borehole at Demiro Nursery and Primary School in Mbale has become a reliable source of water for drinking and sanitation. Moreover, schoolchildren no longer have to skip school to collect water for their families.

"Before we had the borehole, girls especially would often be absent, helping their parents fetch water from distant sources," Karen Nabushawo, a teacher at this school, narrates, adding that "now, they can stay in class and focus on their studies."

Robert Naulele, a teacher in Primary Seven at Masaba Primary School, says it was a "dreadful moment" when they operated without a borehole.

"Our best learners lost concentration as the water scarcity psychologically derailed them," Naulele said. "Ever since our school embraced the groundwater initiative a few years ago, our learners and us teachers who reside within the teachers' quarters have found peace and stability," says Akello.

Naulele also recalls how four school girls, including two from his class, reported attempted sexual gender-based violence while on their way to fetch water from the community spring well.

Another teacher, Scovia Akello of Kolonyi Primary School, believes that the water quality and reliability of groundwater rare extremely important.

"Ever since our school embraced the groundwater initiative a few years ago, our learners and us teachers who reside within the teachers' quarters have found peace and stability," says Akello.

Harriet Nekesa, the principal community development officer of the Mbale District local government, is optimistic that groundwater is bringing relief to many families.

"Our communities are flourishing, and this means well for the schools and the learners because parents can concentrate and gainfully work when their children are settled at school, consuming safe and clean water," she says.

Francis Koko, the education officer at Mbale City Council, reveals that the Council is encouraging all schools within the area to establish groundwater sources, especially boreholes.

"Our office is finalizing the framing of this policy so that all our schools can run throughout the year without experiencing acute water scarcity," notes Koko.

Water as a Tool for Gender Equality

Groundwater access is helping to drive gender equality. Traditionally, fetching water has been relegated to women and girls in this region, often taking hours out of their day. However, with more groundwater wells installed in rural schools and communities, girls have more time to focus on their education.

This simple change has profoundly impacted young girls' academic performance and retention rates in schools across eastern Uganda.

In some villages in these districts, where boreholes and springs were installed in several schools, the rate of girls progressing to secondary school has increased, according to local leaders, including Cassim Namugali, the Mayor of Mbale. He and several other local leaders believe such changes are directly linked to the reduced time that children have to spend fetching water.

"Education is key to empowering women, and access to water is a step in the right direction," says Namugali.

In some villages in these districts, where boreholes and springs were installed in several schools, the rate of girls progressing to secondary school has increased, according to local leaders, including Cassim Namugali, the Mayor of Mbale.

Improving Sanitation and Health

Groundwater benefits extend beyond access to safe drinking water to sanitation in schools. It has also helped reduce waterborne diseases.

Schools with sources of groundwater in Mbale and Kapchorwa can maintain better hygiene standards with proper handwashing stations and functioning latrines.

For instance, installing a groundwater pump at Mbale Secondary School has improved the



Children in the Mt Elgon region face the challenge of balancing education with the search for water. While some miss classes entirely, others arrive late, carrying heavy jerrycans to ensure their families have enough to drink. Groundwater access can transform their future.

school's water supply and helped reduce typhoid cases.

Kwoti Primary School in Kapchorwa is also able to provide its learners and teachers with safe and clean water.

"Water is so central to learning, says Sharon Chelimo, a teacher at Kwoti Primary School in Kapchorwa District. "it has been close to impossible to conduct studies without safe and clean water, but all is eased now."

more ways than one.

Groundwater's impact is not limited to schools. In many rural areas, the increased availability of boreholes and springs, benefits even farmers, who can irrigate their crops.

"With better crops and income, parents can afford to send their children to school," said Vincent Gizamba, a farmer in Mbale District. adding that water has made their lives better in

Gizamba says many families are now able to grow food year-round, reducing hunger and malnutrition, which were common barriers in themselves to school attendance.

TRADITIONAL TECHNIQUES CONSERVE GROUNDWATER IN MT ELGON REGION

By Javier Silas Omagor – Uganda



Bamboos is commonly grown in the Mt. Elgon region. It's deep root systems bind the soil, effectively reducing erosion and facilitating better absorption of rainwater into the ground. Photo by Fredrick Mugira

n the border between Uganda and Kenya, Mt. Elgon is a breathtaking natural wonder and water source for the surrounding communities.

As climate change and population growth put increasing pressure on water resources, local indigenous practices for groundwater conservation are gaining recognition for their sustainability and effectiveness.

For centuries, the indigenous communities around Mt. Elgon, including the Sabiny and Bugisu on the Ugandan side, have developed a deep understanding of their environment, particularly regarding water management.

These practices passed down through generations, are rooted in a profound respect for nature and a commitment to preserving the land for future generations.

Community members, especially elders, possess a deep understanding of their local ecosystems, passed down through generations. This knowledge helps them use the land and water without damaging it. For instance, they often engage in agroforestry techniques that keep the soil healthy and the water clean, ensuring that the groundwater remains protected.

According to the Nile Basin Initiative, agroforestry is common in the Mt Elgon area, with trees such as Sesbania (Sesbania grandiflora), Calliandra (Calliandra calothyrsus), and certain timber and fruit trees planted together with crops or along the farm borders.

Help our soil retain as much water as possible One of the most notable practices is constructing traditional water catchment systems. These systems, often made from locally sourced materials, are designed to capture and store rainwater, allowing it to seep into the ground and replenish aquifers.

"The idea is to ensure that we help our soil retain as much water as possible and to also secure the fertile soil of our lands itself from being washed away by running water," Simon Butsatsa, a resident of Bubulo village in Namisindwa District, says. Community members work together to maintain these catchments, ensuring they remain functional and effective.

"We have made several community groups which have within them the common goal of conserving the environment, especially the natural resources such as water, in the best manner possible," Butsatsa reveals.

In addition to catchment systems, the indigenous people of Mt. Elgon employ agroforestry techniques that enhance groundwater recharge.

Planting trees while maintaining a variety of crops create a natural barrier that reduces soil erosion and increases water retention in the soil



Planting trees and growing a variety of crops helps create a natural barrier that prevents soil erosion and improves water retention. Photo by Fredrick Mugira

Immaculate Nelima is a member of the Butiru tree growing community group, which champions "growing of trees both for conservation and commercial purposes in Manafwa district.

"The idea is paying off already since we can see an increasing amount of soil being retained and the groundwater quality and quantity as well," Nelima says.

Nelima also knows that tree canopies catch rainwater, reducing runoff and allowing more water to soak into the ground. She says this helps "replenish aquifers," particularly in areas with heavy rainfall.

The trees grown in the region do not only help in groundwater recharge, they are vital to ecosystems. They improve air quality by absorbing carbon dioxide and releasing oxygen. They also provide habitat and food for a diverse range of wildlife, which contributes to biodiversity.

The Mt. Elgon area features diverse vegetation transitioning from grass savanna in the lowlands to montane forest and bamboo on the mountain's slopes.



"Our ancestors taught us to live in harmony with nature," Oscar Wambede, says.

Wambede, a respected leader in the community in Sironko District, continues to stress that elders "must continue to share this knowledge, as it is vital for our survival and the health of our land."

Environmental organizations and researchers increasingly collaborate with local communities to document and promote these methods.

Initiatives aimed at integrating traditional knowledge with modern conservation strategies are being implemented, highlighting the value of indigenous wisdom in addressing contemporary environmental challenges.

Children in the Mt Elgon region face the challenge of balancing education with the search for water. While some miss classes entirely, others arrive late, carrying heavy jerrycans to ensure their families have enough to drink. Groundwater access can transform their future.

How Groundwater Recharge Happens

According to the Nile Basin Initiative (NBI), groundwater recharge happens when rainwater seeps into the ground.

This can occur through rainfall soaking into the soil or during floods in the wet season. After some water is lost to evaporation and plants, the remaining water goes down to the aquifer, a natural underground water storage.

How much water replenishes the groundwater depends on the type of rain. Heavy downpours lead to more surface runoff (water flowing over the ground), while lighter rains might let more water soak in.

Elders and Locals Commended

Experts such as John Osenda of Uganda Christian University commended the rural groups for using indigenous knowledge to conserve

groundwater.

"Water scarcity is a big problem within the counties that are sharing the Mt. Elgon aquifer, so any initiatives that are aimed at improving the situation must be welcomed," Osenda notes.

The indigenous technique used by the people of the Elgon Aquifer supports biodiversity and ensures that water is available during dry seasons.

The elders in the community play a big role in educating younger generations about these practices.

The importance of these indigenous practices has not gone unnoticed.

However, the communities face challenges from external pressures, including land degradation, deforestation, and climate change. As urbanization encroaches on their lands, protecting these traditional practices becomes even more urgent.

Advocacy for land rights and sustainable development is crucial to ensure these communities can continue their vital work in groundwater conservation.

LANDSLIDES COULD ALTER WATER CYCLE IN MT ELGON REGION

By Javier Silas Omagor – Uganda



A section of locals could be seen involved in voluntary search and rescue for those who were buried by the landslides.

he Mt Elgon region is endowed with numerous natural perennial water courses whose sources can be traced back to the springs on the slopes of the mountain itself.

Agricultural products like coffee, bananas, Irish potatoes, onions, wheat, vegetables, fruits, nuts, and flowers, produced for both the local market and export, are also cultivated along the river banks throughout the year.

Cultivation in the dry seasons is based on base flow, which provides water for perennial rivers.

Adjacent to the Mt. Elgon forest are smallholder farmers who predominantly practice mixed farming but depend on the forest for their livelihood. The area has recently had its first large-scale irrigated farms and greenhouses.

Although not explicit for groundwater, some large-scale irrigated farms and greenhouses exist.

The breathtaking landscape of Mt. Elgon, a UNESCO Biosphere Reserve, is a haven for biodiversity and a critical resource for the communities that inhabit its slopes.

However, regular landslides in the region have raised alarm bells among environmentalists and local residents alike. They threaten the ground's capacity to absorb and retain water, an essential function for ecological balance and human survival.

For example, at the end of November 2024, a powerful landslide struck Bulambuli district in eastern Uganda, leaving at least fifteen people dead and over a hundred missing.

Triggered by heavy rains, the landslide buried numerous homes across several villages.

Charles Odongtho, spokesman for the Office of the Prime Minister, says all bridges in the area were washed away and roads inundated.

How Landslides Affect Groundwater

According to water experts, the aftermath of a landslide can result in changes to the topography that affect how water flows across the land.

For instance, new channels may be formed, directing water away from certain areas and preventing it from being absorbed into the ground.

Over time, these changes can lead to altered hydrological cycles, with potential consequences for water availability and quality.

According to the Nile Basin Initiative, the inability of the landscape to effectively retain water can affect agriculture, ecosystems, and the overall water supply for local communities.

In addition, landslides can have devastating effects on groundwater sources, as they often lead to the physical removal of soil and rock layers that protect aquifers. When a landslide occurs, it can carry away topsoil and debris, which disrupts the natural filtration system that allows groundwater to recharge.

This disturbance not only reduces the amount of water penetrating the ground; it exposes the underlying water sources to potential contamination.

As sediments and pollutants from the surface are washed into these groundwater systems, the quality of the water can be severely compromised, posing risks to health and safety for those reliant on these sources for drinking water and irrigation.



The aftermath of floods and landslided raises the risk of contaminating water sources. Photo by Emma Muchunguzi

Lately, natural disasters have been a menace in Bulambuli, a district in the Mt. Elgon aquifer area, with floods topped by landslides.

The Causes of Landslides

According to the 2023 study by the Nile Basin Initiative (NBI) on the Mt. Elgon Aquifer, landslides in the Mt. Elgon region are often triggered by a combination of heavy rainfall, deforestation, and agricultural practices that destabilize the soil.

In its other report, Technical Reports Water Management Resources- Groundwater Series 2023, NBI highlights mass wasting and landslides as a result of overpopulation, as well as farming on unconsolidated volcanic areas as impacting the availability of groundwater.

Lately, natural disasters have been a menace in Bulambuli, a district in the Mt. Elgon aquifer area, with floods topped by landslides.

In July 2023, several sub-counties were hit hard, including Buluganya Sub County, which was the worst affected; school children were killed.

Over ten people were killed, with an estimated 500 displaced by the landslides a year ago.

The Buluganya incident aside, on September 11, 2022, hundreds of people were left homeless while the flooding and waterlogging killed five persons.

In 2010, the Government had to resettle more than 3,000 people from Bududa District to Kiryandongo District across the country since landslides had ravaged the villages. The Government then relocated thousands more from Bududa to Bulambuli District.

The region's unique geological composition, characterized by volcanic rock and steep slopes, makes it susceptible to erosion.



Young man takes a lonely but frightening walk passed their family's destroyed house in the landslide hit Bulunganya village.



Women stranded in the mudslides burried village of Namisuni as they struggle to find way out of danger. Photo By Zewu Kanyago.JPG

As trees are cut down for timber and land is cleared for farming, the protective vegetation that once held the soil in place is lost, leading to increased runoff and soil degradation.

"Climate change is a big problem that has had devastating impacts on communities in the Elgon sub-region," Beatrice Anywar, the State Minister for Environment, says.

Between 1989 and today, a lot of lives and property have been lost due to cultivation methods that trigger extreme events on the slopes of Mt. Elgon, the Minister adds.

An integrated landscape management approach is being implemented in the Mt Elgon aguifer region in the hope that it will restore forest cover and river banks, the Minster discloses.

Irresponsible human-induced activities on the environment weaken the soil texture around the mountain, which leads to mudslides, landslides, and floods that in turn disrupt the composition of groundwater, the Minister further says.

Environment underpins all human well-being," she argues, "and land and environmental degradation undermine any development efforts."

Costs for Water Absorption

The ability of the ground to absorb and retain water is crucial for maintaining the region's water supply.

According to Denis Ngabirano, the senior water expert at the Ministry of Water and Environment, healthy soil acts like a sponge, soaking up rainwater and slowly releasing it into rivers and streams.

"However landslides disrupt this natural process," Ngabirano says. "When soil is displaced, the ground becomes compacted and less permeable, reducing its capacity to absorb water."

"This not only leads to increased surface runoff; it exacerbates the risk of flooding in low-lying areas," Ngabirano says.

The consequence is obvious: These interruptions result in a region lacking good groundwater potential for boreholes, shallow wells, and springs. This also affects surface water sources, such as water pans, shades, dams, and rivers and streams.

The aguifer system has several dams, springs, streams, rivers, and shallow wells, but the locals bear the brunt whenever natural disasters such as landslides strike.

Impact on Local Communities

For the communities living around Mt. Elgon, the consequences of reduced water absorption are dire. Many rely on rain-fed agriculture for their livelihoods, and diminished soil health directly impacts crop yields.

As water becomes scarce, competition for this vital resource intensifies, leading to conflicts among farmers and threatening food security. Moreover, the loss of water retention capacity can lead to a vicious cycle of environmental degradation.

"Landslides threaten our shallow wells and springs seasonally, which impacts our agricultural livelihoods," Silver Mungoma, a farmer in Wanale sub-county, Mbale District, says.

"With reduced water, vegetation struggles to thrive, further destabilizing the soil and increasing the likelihood of more landslides," Mungoma explains.

This cycle affects agriculture and threatens the delicate ecosystems that depend on consistent water flow

Annet Nandutu, a local resident, says the depletion of groundwater poses a direct

threat to her community's food security and livelihoods.

The Wells of Wisdom initiative, which emphasizes the importance of indigenous knowledge in groundwater conservation, is gaining traction.

Beatrice Nambale, a 34-year-old resident, says that they are involved in tree growing as one way of combating landslides, which have become more frequent in the region.

"The idea is to try as much as possible to plant these trees that experts advise us to grow so that we can keep our soil strong enough to hold," Nambale said.

Elders in the community are sharing techniques for soil conservation, such as contour farming and agroforestry, which help to stabilize the soil and enhance its water retention capabilities.

Collaboration with external organizations has also led to innovative solutions that blend traditional practices. The development of the Mt Elgon model by NBI under its Mount Elgon Transboundary Aguifer Diagnostic Analysis and Ground Water Modelling, Outcomes, and Steps Forward, for example, could improve knowledge of the aquifer and predict the future status of groundwater in this region.

Through further improvements, starting with the inclusion of monitoring data, the Mt Elgon groundwater model can become a standard tool for managing water resources in the region, including conjunctive use and possible transboundary impact.

"I urge the Government to find sustainable solutions to this problem," she calls out.

Indigenous Knowledge and Sustainable Practices In response to these challenges, local communities are turning to traditional practices that have long been used to manage water resources sustainably.



ONE RIVER ONE PEOPLE ONE VISION



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