



**NILE BASIN INITIATIVE**  
INITIATIVE DU BASSIN DU NIL

# **FLOWING UNDERGROUND**

**STORIES FROM MOUNT ELGON**

## INTRODUCTION

The Nile Basin is characterised by strong spatial and temporal variability of water resources availability; river flow is highly seasonal and substantial parts of the Basin are water scarce. This, coupled with the rapidly growing water demand resulting from high 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 shared 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 shared Nile Basin water resources taking into consideration the basin wide context, for win-win outcomes.

Goal 1 of NBI's 10-year Strategy focusses on Water Security. Given that water demand 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 Nile Basin.

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

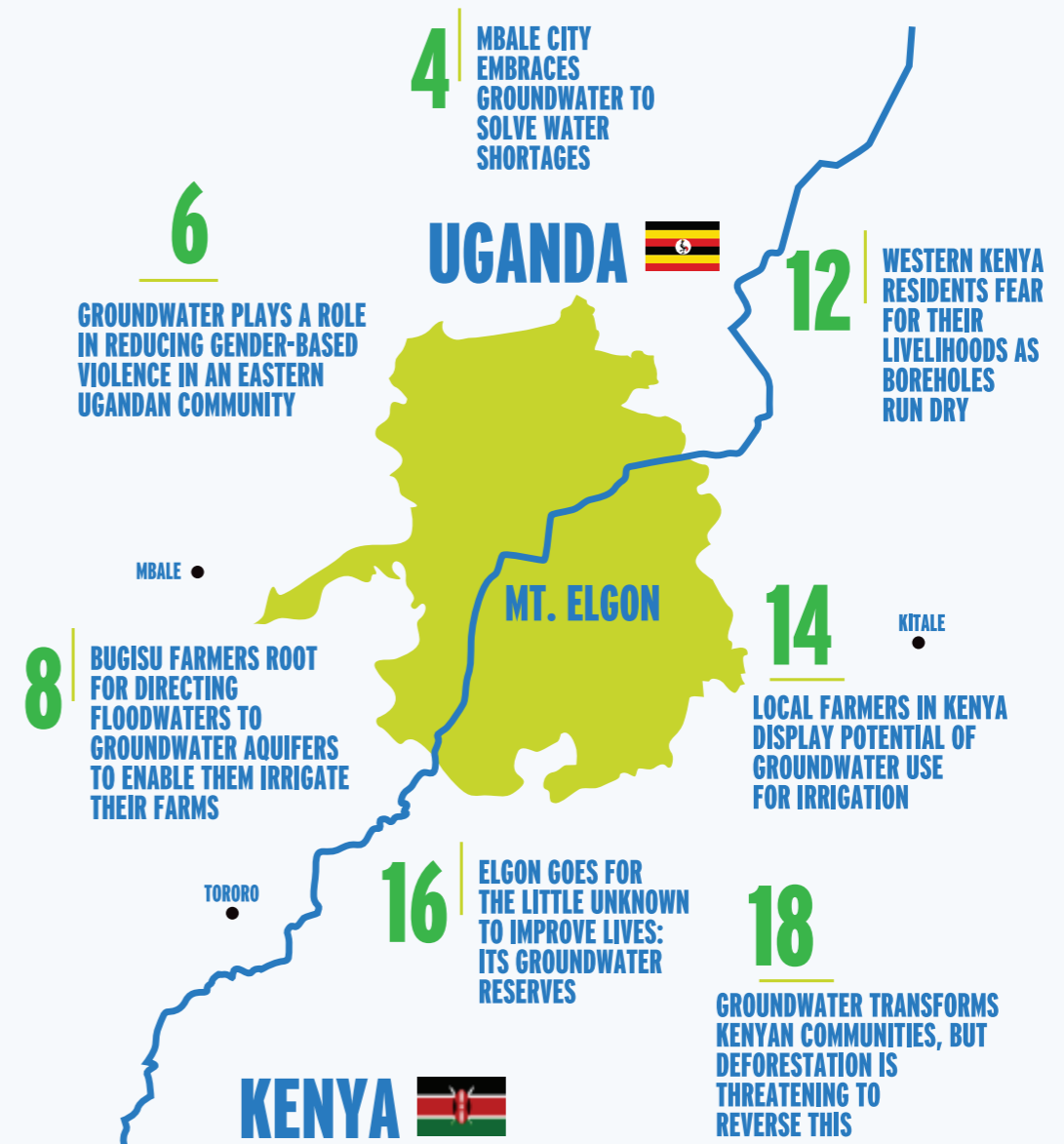
The Project - **'Enhancing Conjunctive Management of Surface Water and Groundwater Resources in Selected Transboundary Aquifers: Case Study for selected Shared Groundwater Bodies in the Nile Basin'** is implemented with financial support from the Global Environment Facility (GEF) through the United Nations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

Three aquifer areas have been chosen 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 in the four countries that share the Kagera aquifer. The purpose is to raise awareness about the importance of groundwater and its potential to close the gap between water supply and water demand, as well as in buffering the effects of climate variability.



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Cover Photo  
A resident pulls water from a borehole in Kapsambu village in the Kopsiro area, Mt Elgon, in Western Kenya

Photo by Kevine Omollo  
Designed by Jonathan Kabugo

# MBALE CITY EMBRACES GROUNDWATER TO SOLVE WATER SHORTAGES



Mbale city is embracing groundwater as a way of combating climate change. Photo By Jenipher Nakuti

By Jenipher Nakuti

Authorities in Mbale city, together with the citydwellers, have turned their attention to groundwater as an alternative source of water contributing to the fight against water scarcity and the effects of climate change.

According to records, groundwater usage stands at 45%. Some of the commonly used sources include spring wells, boreholes, and water ponds.

James Kutosi, the City's Spokesperson, says the city council has the political will to ensure increased use of groundwater sources as well as strategies for their sustainability.

"The council understands that our population is diverse and their financial status differs, so we have earmarked groundwater as an alternative source of water for communities that cannot

afford national water services," Kutosi affirmed.

Rhoda Nyariibi, Mbale City Principal Environment Officer, revealed that in the next financial year, more money will be allocated to rehabilitate the already established sources in addition to creating new ones.

"Our budget will seek to improve groundwater coverage in the city, particularly those densely populated areas," Nyariibi revealed.

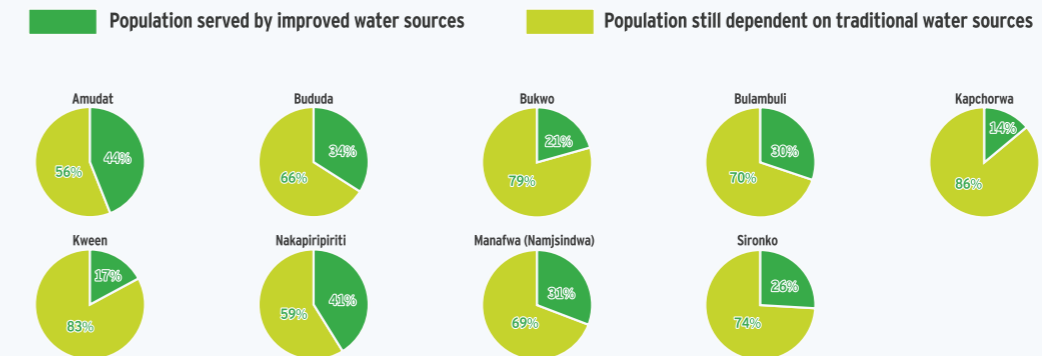
She advanced; "We risk losing many lives, property and even human extinction if we continue avoiding effects of climate change."

A couple of city schools, such as Demiro Nursery and Primary, in Half London, have also embraced the use of groundwater. The school has drilled a borehole where its learners draw water for drinking and cleaning.

<< The school has drilled a borehole where its learners draw water for drinking and cleaning >>

## ACCESS TO WATER IN DISTRICTS OF UGANDA IN THE MT. ELGON AQUIFER AREA

Quite a number of communities in the Elgon Aquifer area are depending on improved water sources compared to the traditional unsafe water sources evidenced by the percentage rates.



Source: NBI Mt Elgon Aquifer report

Besides schools, highly populated areas within the city have boreholes, spring wells, or open pits from where water for domestic and commercial purposes is fetched.

Mohamed Muto, a resident of Busajja Bwankuba cell, Northern Division in Mbale city urges the communities to embrace the use of groundwater and to protect and preserve the environment in their respective areas. Residents, through their savings groups are drilling their own groundwater sources

Having suffered several natural disasters, including the recent one in June 2022 in which River Nabuyonga burst its banks leading to a deadly flash flood, Mbale city authorities and residents are keen to jointly take precautionary measures to avoid the negative impacts of climate change. For instance, a group of 200 members in Manafwa District, Bubulo sub county have planted a number of trees to reduce the flooding during the rainy season.

<< Residents, through their savings groups are drilling their own groundwater sources >>



Sharon Wanasa a pupil at Demiro Nursery and Primary School is a keenly watched young environment activist in Mbale City. Photo

GROUNDWATER PLAYS A ROLE IN REDUCING GENDER-BASED VIOLENCE WITHIN A COMMUNITY IN EASTERN UGANDA



Mbale city is embracing groundwater as a way of combating climate change.

By Melanie Aanyu

This story first aired on Time FM in Eastern Uganda. It was supported by InfoNile with a grant from the Nile Basin Initiative.

<< The resultant impact has been an increasing need for water, yet it already has negligible amounts of surface water >>

A section of girls and women in the Eastern Sub-region of Bugisu have revealed that the quest for water that used to expose them to rapists, defilers, and cannibals on several occasions is history today.

Some of the girls and women we talked to attributed this to the presence of boreholes in the communities.

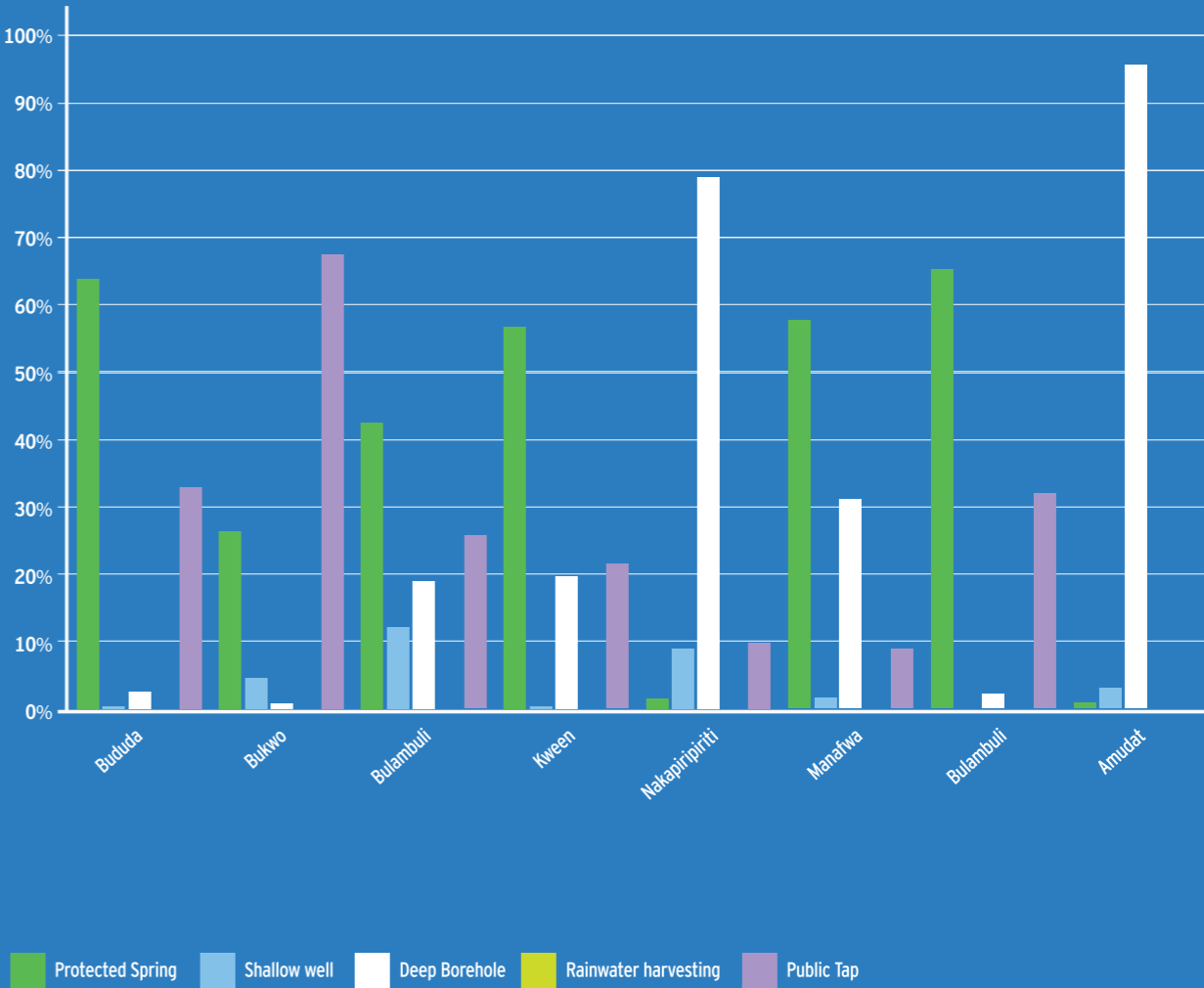
To support such communities, Nile Basin Initiative is currently implementing a project to strengthen the knowledge base, capacity, and cross-border institutional mechanisms

for sustainable use and management of selected transboundary aquifers in the Nile Equatorial Lakes (NEL) and Eastern Nile sub-basins. Mt Elgon aquifer falls in the NEL region.

The project will, in particular, build and expand on understanding groundwater resources through detailed mapping and assessment of selected aquifer systems and the development of guidelines (technical and policy) on sustainable exploration and use of groundwater together with its conjunctive use with surface water.

DISTRIBUTION OF DOMESTIC WATER SOURCES BY DISTRICTS OF UGANDA WITHIN THE MT. ELGON AQUIFER AREA

Percentage of domestic water sources by technology type indicate that most districts have adopted improved sources of water over the traditional ones.



Source: NBI Mt Elgon Ground Water Report (2022)

## BUGISU FARMERS ROOT FOR DIRECTING FLOODWATERS TO GROUNDWATER AQUIFERS TO ENABLE THEM IRRIGATE THEIR FARMS



<< Most of the destructive floods in the Elgon area are caused by seasonal rains >>

By Javier Silas Omagor

The Elgon region in Uganda, which includes two sub-regions of Sebei and Bugisu, has been hit by increasingly frequent and devastating floods. Sebei is a formation of three districts of Kween, Bukwo, and Kapchorwa, while Bugisu is made up of six; Manafwa, Sironko, Bulambuli, Namisindwa, Mbale and Bududa. Most of the destructive floods in the Elgon area are caused by seasonal rains, which are

usually above normal, particularly of late.

Climate change catastrophes in this area have claimed lives, destroyed properties, including farm fields, and ravaged human settlements. This has forced the government to relocate survivors into resettlement camps in Bunambutye (Bulambuli) and Kiryandongo districts, respectively.

The majority of farmers in the Elgon

region use small-scale irrigation schemes to support their farms. They want the flood water trapped so as to sink into the ground to replenish the ground-water aquifer. They say this could guard their farms against the effects of severe droughts and in turn boost food production.

“We have observed that while fickle weather patterns continue being a big challenge (in Elgon), with the increase in high-intensity rainfall during rainy

Local leaders have commended Government and development partners for improving groundwater coverage in Bugisu .  
By Javier Silas Omagor

seasons causing floods, we want this excess water stored in the ground,” Joel Cherop, a youth model farmer in the region, noted. Indeed, this could be one of the ways to address the issue of water scarcity and food insecurity in the Elgon subregion.

Most farmers in this region rely on rain-fed agriculture, with the “long rains” coming between March and May and the “short rains” between October and December each year. But with climate change, the rains are no longer regular, thus affecting their lives and livelihoods. Rhoda Nyariibi, the Principal Environment Officer in Mbale City applauded the farmers for their growing interest in groundwater.

“Groundwater as a community-led climate change resilience approach is a breakthrough for all of us. Efforts to combat climate change should and must be community-inspired,” Nyariibi acknowledges. Nyariibi revealed that groundwater coverage and its uptake was impressively going up in the region.

“The demand for groundwater by our communities in Mbale city and Elgon as a whole is surging,” Nyariibi noted. She explained that compared to other water sources, groundwater is cheaper, particularly for the rural farmers who use it for irrigation purposes.

According to the Nile Basin Initiative (NBI), groundwater is one of the most critical sources of water for people, livestock, and wildlife throughout the Nile Basin. More than 70 percent of the rural population in the Basin’s 11 countries depend on it for domestic use.

<<  
She explained that compared to other water sources, groundwater is cheaper >>

<< It is purely natural water, and this is what our ancestors used to consume >>

Nyariibi's office and the Ministry of Water and Environment have assessed the depth of available groundwater across the region and found that the water table is shallow enough, making it easy to support new boreholes and other groundwater sources extracting from it.

"It's a good thing that this water is closer to the surface, but we caution the public to take precautionary measures before using it for drinking purposes," Nyariibi warned.

"It is purely natural water, and this is what our ancestors used to consume," Kibet emphasized. Kween district Woman Member of Parliament (MP) Emma Rose Cherukut is one of the farmers ripping from groundwater, but she is worried

about what is going to become of it. "We are all enjoying its benefits and reliability, but my concern is the increasing irresponsible human-induced activities on the environment could potentially affect the water table in the Elgon region," Cherukut reasoned.

The MP points out irregular degradation of river banks, swamps, tree cutting among others as environmentally destructive practices which could affect groundwater supply.

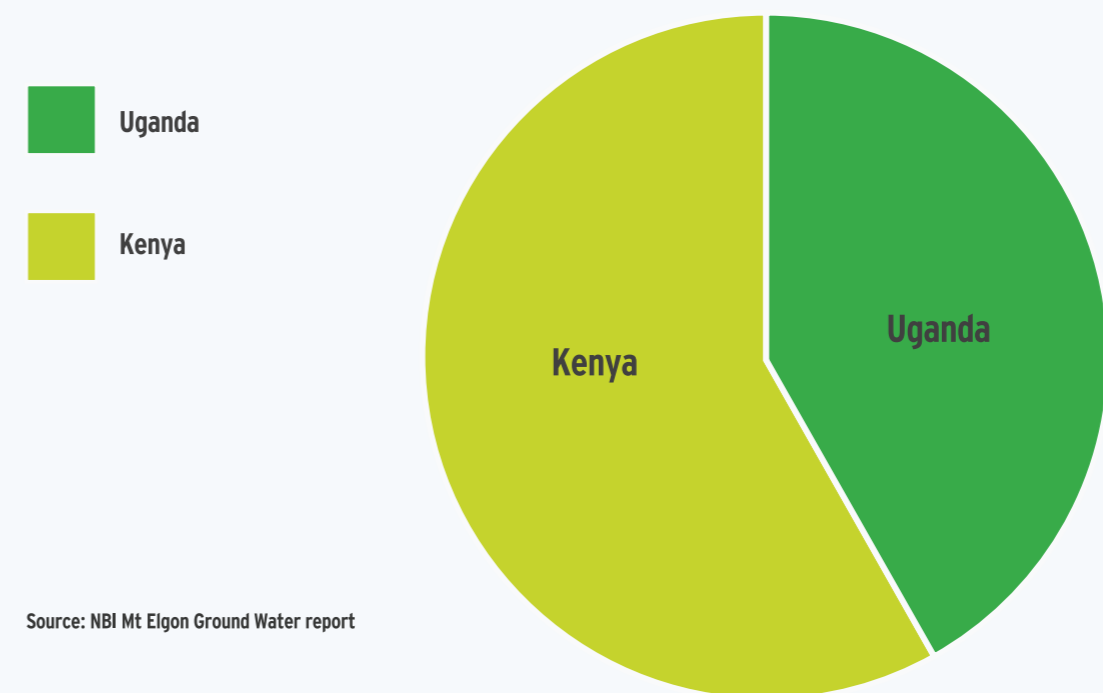
She urges urged communities in the region, on both Kenya and Uganda aside, to prioritise the protection of the environment.



Photo By Javier Silas Omagor

## DISTRIBUTION OF DOMESTIC WATER SOURCES BY DISTRICTS OF UGANDA WITHIN THE MT. ELGON AQUIFER AREA

Borehole yield is the volume of water that can be abstracted from a borehole at a given time. Regionally, the yield of groundwater boreholes ranged upto 43.3m<sup>3</sup>. The number of boreholes in the SADA report used to derive the regional borehole yields were in Uganda, n=545(42%) and Kenya, n=761(58%);/hr, with a mean of 2.6m<sup>3</sup> per hour



Source: NBI Mt Elgon Ground Water report

"Let communities do their best at the local level, and as Members of Parliament, we shall continue to legislate and enact laws that will preserve our environment, particularly with regard to groundwater," Cherukut vowed.

Maximo Basheija Twinomuhangi of the Ministry of Water and Environment, in charge of the Kyoga area, commends the farmers for embracing the use of groundwater but

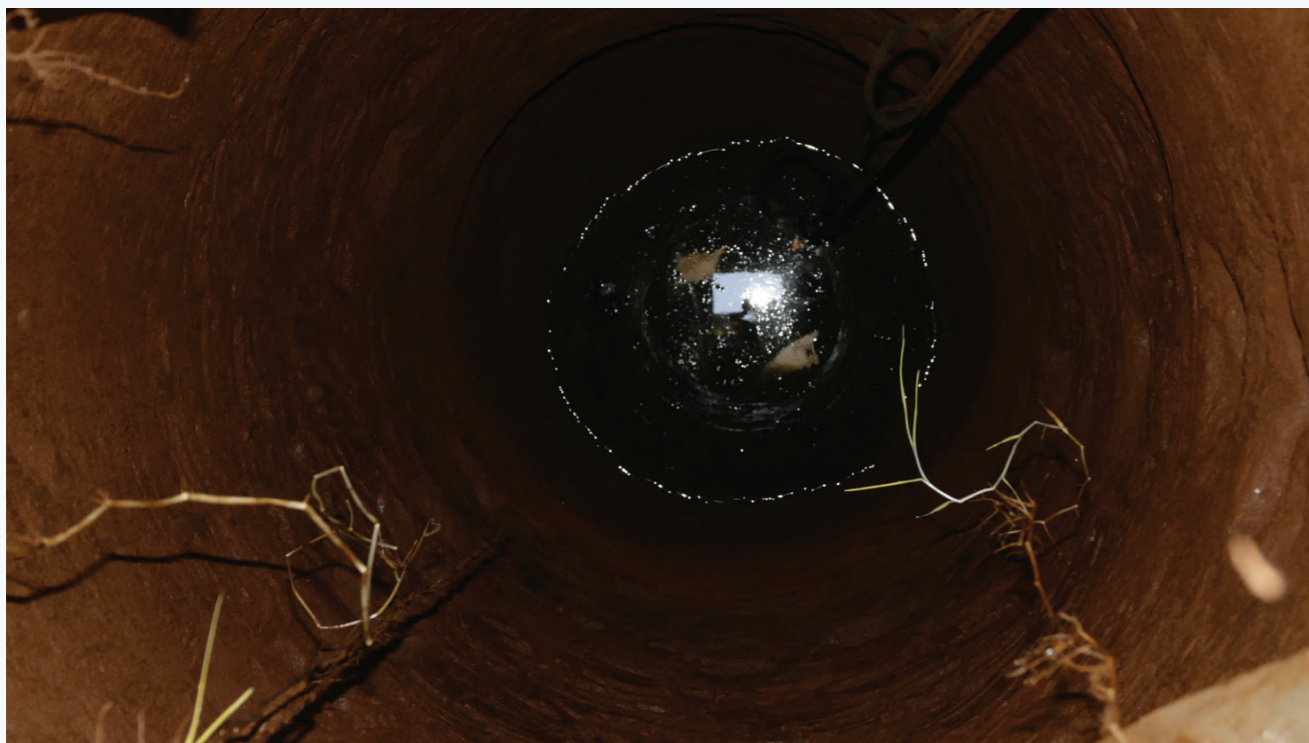
implored them to invest in environmentally friendly innovations.

"As they tap this groundwater, it is essential for farmers to creatively come up with more sustainable and reliable techniques which can help conserve the environment," Twinomuhangi adds.

This article was supported by InfoNile with funding from Nile Basin Initiative.

<< we shall continue to legislate and enact laws that will preserve our environment >>

## WESTERN KENYA RESIDENTS FEAR FOR THEIR LIVELIHOODS AS BOREHOLES RUN DRY



A borehole in Kapsambu village in the Kopsiro area in Mt Elgon.

By Jesse Chenge

Mt Elgon is one of Kenya's main water towers. It is located north of Lake Victoria along the Nile Basin and reaches an altitude of 4,321 meters above sea level. The mountain forms the upper catchment area for two major rivers: Nzoia and Turkwel and provides water to the Malakisi River.

Unfortunately increased deforestation, areas surrounding Mount Elgon have been experiencing rising temperatures and decreased rainfall, posing a significant threat to groundwater availability and, in turn, to social-economic activities in the Western Kenya region.

Communities, primarily farmers who extract water from the ground to irrigate their crops, fear a severe blow

to their livelihood as boreholes dry up.

Harrison Naibei is a farmer in Chemwenda village in Kopsiro, Mount Elgon. He says he incurred a great loss when his 2-acre onion project failed due to uncertain rainfall patterns, forcing him to invest in a borehole project that cost him about KSh 25,000 (204 USD). He uses a solar system to pump the water to the crops. "After having a challenge with the dry spell last year, I decided to drill a borehole 32 feet deep," said Naibei.

Naibei added that groundwater is a good source for irrigation and domestic use. Richard Walukano, a water expert in the region, says the water towers in Kenya are drastically drying up.

Walukano led the Kenya-Finland Corporation (KEFINCO), a project that drilled over 100 boreholes for residents to get clean, safe drinking water. Unfortunately, today, all the boreholes have dried up. He believes this is mainly due to the cutting down of trees, a vice he warned farming communities against.

Walukano proposes afforestation be considered a national priority. Walukano, who also doubles as the chairperson of the Bukusu council of elders, warns that the issue of water should not be taken lightly.

Jane Towett Naibei from Mt Elgon says their community has been utilising water from a natural spring over the years but the water level has dwindled by a considerable margin, especially during the dry period. "I was born in this area; our grandfather fetched water from this natural spring that has been here for decades, but water is reducing everyday" said Naibei

Fred Ndiwa from Kamachei village in Kopsiro calls upon the government of Kenya to come up with a stimulus program to train and sensitize the communities living in Mt Elion region on the importance of planting trees, protecting rivers and natural springs to maintain water levels and therefore ensure availability of water for domestic use and other purposes.

He said some rivers are drying up, noting that the challenge dates back to 2016 when illegal tree cutting for charcoal and firewood became rampant in the Mount Elgon aquifer area. "We

used to have enough water here, but because of cutting trees, water in our rivers has started reducing while the water streams have dried up," says Ndiwa. He expressed the risk of desertification in the Mount Elgon catchment area if the forest cover is not maintained. Judith Chebet from Korong'otuny in Cheptais says her village depends on water from a borehole, and her family uses the water for irrigation and domestic use.

"These days, I wash my family's clothes from home using water from my borehole, unlike before when I had to walk a long distance to fetch water from River Ndakuru reveals Chebet.

George Wara the forest conservation officer for Bungoma County, acknowledges that Mount Elgon Forest is a critical water catchment area. He revealed that his department works with other stakeholders to stop the deforestation and encroachment problem.



A farmer uses underground water to irrigate crops in Chebich village in Mt Elgon.

<< After having a challenge with the dry spell last year, I decided to drill a borehole 32 feet deep >>

<< Groundwater is a good source for irrigation and domestic use >>

## LOCAL FARMERS IN KENYA DISPLAY POTENTIAL OF GROUNDWATER USE FOR IRRIGATION



Woman fetches water from a well. Photo By Kevine Omollo

By Kevine Omollo

Fifteen years ago, Mathews Chepkwony relied on a seasonal stream to his vegetable farm in Chesamoo village, Bungoma County, at the foot of Mount Elgon.

The stream became unpredictable with time, sometimes drying up when needed the water most. But five years ago, he drilled a borehole and has since resolved the issue of lack of water not only for his one-acre farm but also for domestic use.

“With a hand pump, I can extract enough water for my crops, livestock, and home use,” he says. In Lokiriama village in the neighboring Trans Nzoia County, 48 year old Joseph Eluku has been using water from his borehole for domestic use and irrigation for the last 10 years. Before, his family depended

on springs but with more and more people depending on the spring, it became unpredictable to get enough water.

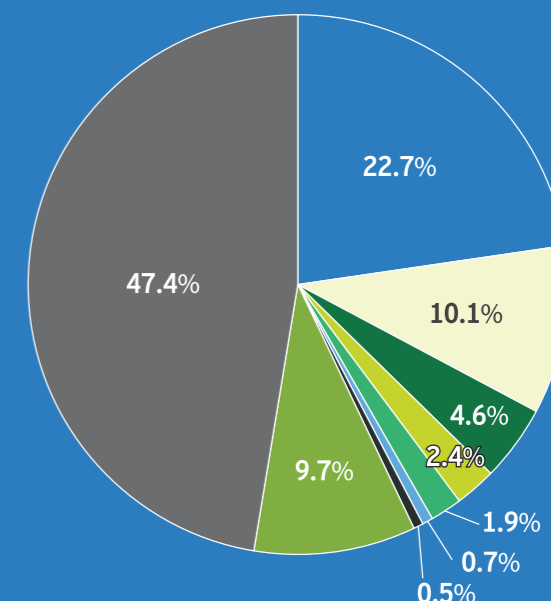
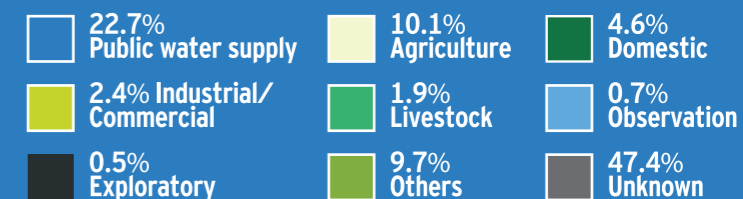
According to Dr. John Rao Nyaoro, a Water Law and Policy expert and former Executive Director of the Nile Basin Initiative, NBI (2014 - 2016), groundwater is the solution to water shortages, as it is resistant to climate change compared to surface water, which is lost through evaporation and other impacts of weather variations.”

Dr Nyaoro adds there is a need to strengthen the regulations, especially a common transboundary policy for shared resources like the Mount Elgon aquifer, to sustain groundwater exploitation.

According to the Nile Basin Initiative (NBI), groundwater is one of the most crucial sources for drinking water for people and livestock in the Nile Basin, with more than 70 percent of the rural population in many parts of the Basin depending on groundwater.

NBI notes that there is also an increasing use of groundwater for other economic activities such as irrigation, fisheries, mining, and industries.

### GROUNDWATER USE IN KENYA



Source: MWI: Water use in Kenya. Data was published in 2008

<< The stream became unpredictable with time, sometimes drying up when needed the water most. >>

<< But with more and more people depending on the spring, it became unpredictable to get enough water. >>



A resident pulls water from a borehole in Kapsambu village in the Kopsiro area in Mt Elgon.

## COMMUNITY MEMBERS DEPEND ON GROUNDWATER FOR MANY YEARS



A farmer uses underground water to irrigate crops in Chebich village in Mt Elgon.

By Mactilda Mbenywe

On the vast, towering ecological wonders of Mt Elgon lies a treasure, its groundwater reserves. The mountain boasts of massive swamps, millions of springs, flowing rivers and towering waterfalls.

Data from Transboundary Waters Assessment Program (TWAP) shows Mt Elgon aquifer is a multiple-layered hydrologically connected system that is primarily confined

According to the Nile Basin Initiative (NBI) baseline survey of the Mt Elgon aquifer, the available groundwater holds the promise of closing the growing gap between water demand and water supply and offering a buffer against human and/or naturally induced climatic and non-climatic pressures.

The fascinating water tower serving a population of over 400,000, is also home to various wildlife species. NBI studies show Mt Elgon lies on the border of eastern Uganda and western Kenya. Its vast form, 80 kilometers (50 mi) in diameter, rises 3,070 metres (10,070 ft) above the surrounding plains.

The average depth to the water table ranges from 5m to more than 20 meters.

In Kapsambu village, there is a long queue of women and children at a spring which, according to the villagers, has lasted for a lifetime without going dry.

Within a two kilometers radius, there is a borehole with a tap that has also served a nearby school and community for more than 20 years. "I have used water from the spring for as long as I can recall; it's been the source of our livelihood," says 75 year old Vitoria Ngeima. The community depends on this water for various uses including domestic, industry, and agriculture. A resident pull water from a borehole in Kapsambu village in the Kopsiro area in Mt Elgon.

Since she was born 45 years ago Delvin Yego of Chebich village says her family has depended on the two springs near her home. To keep the water flowing, the community protects the springs by planting trees and avoiding harmful agricultural practices.

According to the Nile Basin Initiative, the vast reserves of groundwater in Mt. Elgon, evidenced by springs and boreholes, have the potential to provide a buffer against the current effects of climate change and spur development in the region. They also believe the potential of groundwater in the mountain is yet to be fully exploited.

"There are few studies that have been done in this region around mapping groundwater, so we have very scanty knowledge about the aquifers," Jeremiah Lumbasi, a hydrogeologist in Trans Nzoia County. He adds that "based on the indigenous knowledge, we have huge groundwater reserves".

More than 2000 boreholes have been drilled by the local authorities to serve the communities in the region and

according to Lumbasi, going by the areas where boreholes have been drilled, there is varied yielding.

In 2018 national and local governments signed a Ksh 600 million deal with Korea International Cooperation Agency (KOICA) to supply groundwater clean water to 500,000 households within Mt Elgon area.

The project has seen the election of an 86.3 kilometers water supply pipeline, a water treatment plant of 6000 cubic meters, and 25 water collection kiosks across the three constituencies. "The project has also seen clean water supply to residents' doorsteps", said Onesmus Makhanu, Chief Officer of environment for Bungoma County.

The head of the National Environment Management Authority (NEMA) in Bungoma County Vincent Mahiva explained that through collaboration, the agency has been able to monitor groundwater extraction and protect the springs in communities. He, however, cited the degradation of water catchment areas and flooding – massive and intensive runoff from the water catchment areas during heavy rain – as a challenge to springs and boreholes. According to Kenya Water Towers for Mt. Elgon Status Report, 2020, Mt. Elgon Water Tower is among the five central water towers in Kenya and a critical water catchment for the Rift Valley and Lake Victoria drainage basins.

«  
To keep the water flowing, the community protects the springs by planting trees and avoiding harmful agricultural practices. »

« The average depth to the water table ranges from 5m to more than 20 meters. »

## GROUNDWATER TRANSFORMS KENYAN COMMUNITIES, BUT DEFORESTATION IS THREATENING TO REVERSE THIS



By Tony Wafula

Improved access to water from groundwater sources in Kenya's Mt. Elgon region is transforming communities amidst a significant challenge due to deforestation.

Harrison Naibei, a farmer from Kopsiro Sub-County, who drilled underground water at his home due to surface water shortage, says that the water source is now serving the entire community and a school.

Naibei says in the recent past; the region has faced water shortage attributing it to the frequent cutting down of

trees from Mt. Elgon Forest and within the community.

"Mt. Elgon is known for having water towers but, unfortunately, we are the ones decrying water shortage," Naibei says.

Naibei revealed that he drilled his water point in 2021 after his region was hit by a drought affecting his onion farm and leading to financial losses between Khs. 30,000 (245 USD) - 40,000 (327 USD). Besides onions, Naibei produces maize, irish potatoes, dania, and tomatoes on his three acres.

<< Mt. Elgon is known for having water towers but, unfortunately, we are the ones decrying water shortage >>

"My farm is near a water spring, but there is a water shortage during the dry season. This is why I decided to drill groundwater, I had to identify an alternative way of getting water to irrigate my crops" he said.

Naibei later engaged a water company that enabled pumping of water to serve the entire community including a nearby school - Kamachei primary school. This has saved the learners from walking long distances to fetch water, which he says exposes young girls to teenage pregnancy. Naibei says with the looming drought, he is worried about a water shortage crisis.

He is calling on the government and other environment-related agencies to work with Mt. Elgon community to plant more trees in the forest and within the community warning that if the situation continues, the water towers in the region risk drying and this will affect the flow of rivers.

Wetlands and forests trap runoff water, enabling it to sink into soil layers to form groundwater. Destruction of wetlands and deforestation impacts negatively on underground water. George Wara, an Ecosystem Conservator of Kenya Forest Service (KFS) in Bungoma County, decried the rate of deforestation in Mt. Elgon region and said that the Kenya Forest Service is working with other stakeholders to ensure that forest cover is restored.

"We have plans to rehabilitate Mt. Elgon Forest; we don't want residents to continue cutting trees because we are already feeling the pinch," Wara

noted. Groundwater is the most critical source of drinking water for people, as well as livestock and wildlife watering in the 11 countries in the Nile Basin. According to the Nile Basin Initiative (NBI), an intergovernmental partnership of 10 Nile Basin countries, over 70 percent of the rural population in this region depends on groundwater.

Vincent Mahiva, the Bungoma County National Environmental Management Authority (NEMA), said that Mt. Elgon is a vital ecosystem in the region as it provides water sources for rivers both in Kenya and Uganda.. He explained that besides helping to reduce evapotranspiration, trees form a soft carpet allowing water to soak when it rains.

Moses Wambusi, a Public Health Officer in Bungoma County, lamented that it is difficult for Mt. Elgon residents dig deep latrines due to a hard rock in the area, leading to poor health and sanitation.

<< Wetlands and forests trap runoff water, enabling it to sink into soil layers to form groundwater. >>



A resident pull water from a borehole in Kapsambu village in the Kopsiro area in Mt Elgon.