UGANDA

SECURING DRINKING WATER THROUGH WETLAND RESTORATION

Landscape around Kemwenge District. © Water for People

INTRODUCTION

Wetlands provide an abundance of resources and services to communities in Uganda and are critical to healthy watersheds. However, wetlands are under threat from the compounding impacts of human activities and climate change. While Uganda has a mostly tropical climate characterized by historically stable rainfall patterns, that is changing. More recently, both the rainy and dry seasons have become more intense, with more precipitation falling and intensifying runoff conditions during wet periods, and harsher and longer droughts occurring during dry seasons. Both swings impact the stability and function of wetlands.

Covering roughly 11% of the country's land area, wetlands provide materials for construction, habitats for fishing, and a source of water for domestic needs. Wetlands are also a physical indication of the presence and movement of groundwater. Depending on the topography and location of wetlands, they can either provide space for surface flows to recharge aquifers and or serve as a place to convey groundwater from beneath the land into streams and marshes. In a tangible and physical sense, wetlands represent a place of connection for ground and surface water, among aquatic and terrestrial habitats, and between the natural environment and human livelihoods. Particularly at this time of shifting climates and water availability in arid and semi-arid environments, the role of wetlands as a source of freshwater is essential.

In 1995, Uganda became the second country in the world, after Canada, to pass a wetlands policy. The National Policy for the Conservation and Management of Wetlands revolves around four principles: sustainability, improving wetlands productivity, diversity, and good governance (Government of Uganda, 2016). Despite the importance of wetlands and the creation of a national policy, degradation of wetlands as a result of population growth and economic development has continued. Activities such as agriculture, animal rearing, sand mining, brickmaking, and commercial planting of high-water-use trees have diminished the quality and quantity of water for local communities. From 1994 to 2008, estimates suggest that wetland areas declined by 30% across the four primary basins within Uganda, including Lake Victoria, Lake Kyoga, Lake Albert, and the Upper Nile (Government of Uganda, 2016).

NBS APPROACHES

Wetlands play an outsized role in sustaining and nourishing a range of functions and services to the health of the land and human communities. Ecologically, wetlands moderate runoff, regulate shallow groundwater tables, filter drinking water supplies, and nourish biodiverse plant and animal populations. From a socioeconomic perspective, wetlands sustain fisheries, medicinal and food plants, materials for construction as a livelihood source, and freshwater sources for communities across the country.

Given both the abundance and critical importance of wetlands to landscape functions, clean drinking water, and food sources, wetland restoration and protection is an essential component of the health and livelihoods of local communities within Uganda. Restoration actions include three sequential and integrated actions: 1) delineating wetland boundaries, 2) removing deleterious impacts such as high-water-use trees, and 3) improving upstream land use practices and hydrologic functions.

PROJECT

For the past decade, Water For People has worked with communities in Kamwenge District of the Lake Albert Water Management Zone to improve Water, Sanitation, and Hygiene (WASH) outcomes. Their work has focused on collaborating with local governments and communities across district and catchment levels to advance stakeholder processes and assess, plan, and implement measures to restore wetlands as an avenue for protecting communities' drinking and domestic water supplies.

Within the country of Uganda, water resources management zones are defined according to hydrological flows, while local district and subcounty governments are politically delineated. Overlapping governance regions and different boundaries can make it difficult to identify which portions of a politically defined subcounty are within a specific water management zone and, therefore, which

oversight or management authority should be engaged to implement water supply protection and wetland restoration efforts. To resolve some of this confusion, a distinct and critical cornerstone of this project focused on aligning governance and management area boundaries with WASH-related efforts within catchment areas.

This case study focuses on wetland restoration within the Kamwenge District of Uganda. While most of the district is within the Lake Albert Water Management Zone, a portion of the Biguli Subcounty falls under the Victoria Water Management Zone. Degraded wetland ecosystems in the Kamwenge District were within the recharge areas of existing and planned piped water supply systems and presented significant risks to the reliability and stability of groundwater dependent communities (Mahayni et al., 2021). Agriculture, brickmaking, sand mining, and forestry have contributed to wetland degradation, along with the commercial planting of eucalyptus trees, which drain water from wetlands and shallow groundwater tables and displace native plant species.

Wetlands contribute directly to the quality of WASH services, including drinking water sources, as wetlands filter water as it seeps into groundwater tables or flows as runoff into streams and diversion channels. As a result, the degradation and loss of wetlands due to both human and climate change impacts affect WASH processes and diminish reliable and sustainable access to clean drinking water for local communities. To address this problem, a collaborative effort among Water For People, local district governments, the Albert and Victoria water management zones, and community members coalesced to address and reverse degradation of key wetlands in Biguli Subcounty. Stakeholders developed a coordinated intervention strategy that involved a range of activities, including:

- **Water resources assessments.** An area water resources assessment was conducted, and degradation hotpots were identified for five priority wetlands and across 21 additional wetland systems in the district. These maps were used to familiarize local community and government members with the location and condition of wetlands, as well as to invite and encourage participation in restoration initiatives. Permanent concrete pillars were installed at three wetlands to establish buffer zones within which to avoid harmful activities and to implement planned restoration activities.
- **Community education.** Building from the mapping efforts, additional meetings and site visits with leaders and community members provided descriptive and illustrative information on the hydrological dynamics of wetlands, the importance of groundwater-to-wetland functions, and the impact of wetland degradation on plants and animals as well as on human water supplies. Further educational efforts focused on linking improved agricultural practices with the restoration of soil and improved land conditions.
- **Livelihood initiatives.** Local and regional governments and leaders worked with community members to develop water and soil conservation practices on farms that fostered greater soil health, improved moisture and nutrient retention, reduced erosion, and increased food production resilience in response to water availability fluctuations. Improved farm practices benefited both community members and the health and function of wetlands.
- **Monitoring.** Community members and scientists worked together to set up groundwater monitoring systems to track the response of groundwater levels to restoration activities. Monitoring data served several complimentary purposes, including providing feedback data on the effectiveness of restoration activities to community members and establishing a record of the types of ecological and livelihood improvements that restoration was facilitating.

IMPACTS AND OUTCOMES

From the beginning of this effort, there have been observable improvements in the health of the land and water system that have produced tangible benefits to local communities.

1. **Restored wetlands.** Within one year, five wetlands were fully restored: Rwakasirabo, Kizikibi, Nyakatooma, Kabale, and Keishunga Wetlands in Biguli Subcounty. Each of the wetlands are fully inundated and sustaining wetland plant and animal species. In Kizikibi

Wetlands, mud fish have returned after a period of total extinction and have become a renewed food staple for locally adjacent communities.

2. **Delineating wetland boundaries.** The boundaries of 26 wetlands have been delineated, and the areas within the boundaries have been described and characterized. Based on this mapping, three wetlands have been fully protected with permanent concrete pillars to allow for restoration and recovery.

3. **Increased government engagement.** As wetlands are recovered, there is growing momentum in district and subcounty local governments to prioritize wetland protection activities. In tandem, communities are taking steps to reduce wetland draining actions and remove eucalyptus plantations that are diverting water from wetland vegetation.

4. **Socioeconomic benefits.** Local communities are directly benefiting from restored ecological functions in the wetlands in a variety of livelihood-enhancing ways. Functioning wetlands produce a number of food products that local communities use, including mud fish, wetland sages and other types of vegetation that can be used for moisture retention and weed and soil erosion control in gardens.

5. **Improvements in aquifer levels.** Groundwater monitoring has provided important hydrological context for wetland restoration activities. Data suggest that groundwater levels are directly responsive to precipitation, rising during the rainy season and dropping during dry periods. This pattern underscores the importance of wetlands in slowing precipitation and retaining water for infiltration into shallow groundwater tables that can enhance water supply resilience during increasingly intense drought periods.

6. **Stability.** Additionally, water sources that are in proximity to restored wetlands are more stable and not as affected by climate change-driven extremes in more intense seasonal precipitation and dry seasons.

7. **Improvements in water quality.** Monitoring data compiled by Water For People illustrates a significant improvement in the quality across water sources in districts with marked improvements in wetland conditions. For example, in the Kamwenge District, the number of water sources with "adequate" ratings for water quality increased from 37% in 2017 to 68% in 2019 (Kanweri, Okettayot, and Nimanya, 2019).

ENABLING FACTORS

Key factors that contributed to the success of this project are outlined in the table below.

ENABLING FACTORS	
Institutional	Strong political leadership and support. Aligning various governance regions (e.g., water management zones, districts and political regions) to ensure broad engagement and representation. Compliance and committed engagement from local communities.
Social	Buy-in from stakeholders early in the process. Diversity of partners, including community members, government officials, leaders, WASH specialists, academics, NGOs, and scientists.
Technical	Investment in the "why." Maps, assessments and monitoring data illustrated the impacts of degraded wetlands as well as the benefits of improved wetland conditions, which helped local communities engage and contribute to restoration efforts.
Economic	Engagement around farms, agriculture, and fisheries produced economic benefits for local communities.

LESSONS LEARNED

A motivating and energizing outcome of this work emerges from the wetlands themselves. While wetland degradation is extensive, the wetlands responded within six months to restoration efforts—both from removing/preventing causes of impact (e.g., through boundary delineation) and proactive efforts to revive wetland species and functions. Observation and monitoring of wetland recovery provides positive feedback to local communities, leaders, and government bodies; demonstrates deeper climate resilience; enhances adaptation to climate variations; and sparks additional motivation to continue improving wetland conditions and realizing the hydrological, socioeconomic, and ecological benefits. To expand on this work in new areas, there are several key next steps that are particularly relevant.

1. **Capacity building and political will.** For this project, government leadership and engagement was a key component of success in restoring wetlands. Continuing to strengthen collaboration and capacity across government institutions will help to scale up efforts to more wetlands and hasten wetland recovery.
2. **Monitoring.** Groundwater monitoring has also been a critical piece of the project's success by demonstrating the benefits and urgency of continued restoration activities.
3. **Improvement in agricultural practices.** Engaging farmers is a key piece of the strategic process. Offering them alternative livelihood choices as well as options for improving food production, soil health, and slope stability helped to strengthen a connection between wetland conditions and personal and community well-being.

A concrete pillar denotes a protected wetland area.
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SOURCES

Government of Uganda. 2016. "Uganda Wetlands Atlas Volume II." https://www.mwe.go.ug/sites/default/files/Uganda%20Wetlands%20Atlas%20Volume%20II_Popular%20Version.pdf

Kanweri, Grace, Stanley Okettayot, and Cate Nimanya. 2019. "Wetland Restoration as Part of an IWRM Approach to Ensuring Sustainable Supply of Water Resources: A Case of Kamwenge District in Uganda." Water For People. https://thewashroom.waterforpeople.org/wp-content/uploads/sites/2/2020/01/Wetland-Restoration-in-Kamwenge-Overview-Jul-2019.pdf

Mahayni, Basil, Josh Goldstein, Kelly Latham, Kimberly Lemme, Gena Gammie, Kate Harawa, Grace Kanweri, and Azucena Serrano. 2021. "The Case for Source Water Protection in WASH Systems: Entry Points and Opportunities." USAID Sustainable Water Partnership, Tetra Tech, Winrock International, Water For People, The Nature Conservancy, and Forest Trends. https://thewashroom.waterforpeople.org/resources/the-case-for-source-water-protection-in-wash-systems-entry-points-and-opportunities/

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