The Case for Source Water Protection in WASH Systems: Entry Points and Opportunities

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Front cover photo: At more than 4,300 meters above sea level, the Carampoma wetlands play a critical role in regulating the water supply for Lima, Peru – and new financing mechanisms and partnerships are helping urban water users play a role in their conservation. Credit: Ana Castañeda, Forest Trends

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Introduction

Water, sanitation, and hygiene (WASH) systems depend on the reliable availability of good quality water. Surface and groundwater resources around the world, however, are increasingly stressed due to overabstraction, declining water quality, and climate change. Source water protection is an important part of ensuring the sustainability of WASH systems and maintaining healthy and resilient ecosystems, especially in light of these trends. Source water protection seeks to improve and maintain surface and groundwater that are important for drinking and municipal water systems by using a variety of measures, including nature-based solutions, gray infrastructure, and governance. Source water protection can help improve WASH outcomes by making freshwater more reliable and reducing potential treatment costs incurred by service providers. Source water protection can also help improve the overall sustainability of the watershed through improved recharge and sustained environmental flows.[1]

Source water protection is increasingly critical in developing contexts, particularly where water resources are becoming scarcer or more degraded, and where capacity and funds to protect water may be limited. As of 2021, 2 billion people still lacked access to safely managed drinking water, and 3.6 billion lacked access to safely managed sanitation services.[2] Freshwater rivers, lakes, and wetlands are also showing particularly high rates of decline.[3] Competition for water among users across multiple sectors, unsustainable land use practices, pollution, and lack of sanitation can seriously degrade water sources used to supply drinking water. For example, heavy or unregulated agricultural and industrial abstractions can stress surface or groundwater and contaminate water resources with effluent or runoff laden with sediment or agrochemicals. Competition for water may increase abstraction and treatment costs for WASH providers, disrupt WASH service delivery, and have follow-on impacts to economic activities. Overabstraction can also harm environmental flows, which are essential for supporting freshwater biodiversity, as well as fisheries and other resources that downstream communities rely upon.

In light of these challenges, approaches to strengthen WASH systems have increasingly acknowledged the importance of protecting source waters. A number of programs are piloting efforts in Latin America, sub-Saharan Africa, and Asia to integrate source water protection into district-level WASH systems.[4] These initiatives have provided valuable lessons and recommendations for strengthening WASH systems in developing contexts. This paper presents additional recommendations for making source water protection a shared priority among WASH and water resources managers in developing contexts. The recommendations are derived from five recent and ongoing source water protection efforts in Latin America and sub-Saharan Africa. These are illustrated in a series of case studies prepared by the USAID-funded Sustainable Water Partnership; the Natural Infrastructure for Water Security in Peru project, funded by USAID and the government of Canada; The Nature Conservancy; and Water For People. This paper and the included case studies are the culmination of a series of discussions and workshops between the implementers of the source water protection activities and with USAID.

The paper begins with a brief overview of challenges to source water protection followed by a discussion of recommendations for integrating source water protection into WASH. Following this overview, the paper

1 Environmental flows describe the volumes, timing, quality, and linkages of surface and groundwater flows needed to sustain river, wetland, and estuarine ecosystems and the communities, economies, and livelihoods that depend on them. See USAID Environmental Flows Technical Guidance Manual for more information.

2 Progress on household drinking water, sanitation and hygiene 2000-2020: five years into the SDGs. Geneva: World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), 2021. License: CC BY-NC-SA 3.0 IGO (link).

3 WWF (2020). *Living Planet Report 2020—Bending the curve of biodiversity loss*. Almond, R.E.A., Grooten M. and Petersen, T. (Eds). WWF, Gland, Switzerland (link).

4 See, for example: IRC WASH Building Blocks, FIETS Sustainability Framework, USAID ABCG Freshwater Conservation and WASH, Watershed's WASH and WRM, and WWF Blue Heart of Africa.

presents five case studies on advancing source water protection and WASH integration in the field from Peru, Honduras, Uganda, Malawi, and the Mara River Basin in Kenya and Tanzania. Each case study describes the context for the work, the interventions undertaken, key lessons learned, and recommendations for future work to deepen source water protection and WASH integration.

Challenges to Source Water Protection

Despite the clear connections between WASH and source water protection, it remains challenging in practice to elevate source water protection as a core component of achieving sustainable, resilient, and inclusive WASH systems.

First, basin managers and WASH service providers often operate in silos due to different geographic and institutional mandates, competing priorities, and inadequate resources. Enabling effective and adaptive collaboration between water resources and WASH actors is challenged by conflicting mandates, differences in management scales, financial constraints, and the lack of engagement platforms. On the water management side, basin-level managers have a number of competing responsibilities, including planning for water use and allocations, monitoring water availability and water quality, and permitting water abstraction and wastewater discharge among domestic and municipal, agricultural, industrial, and other economic sectors. In other words, WASH is not always the largest or most important water use consideration within a basin, and basin managers may not always have the resources available to prioritize and protect water resources. WASH service providers can also play an integral part in the planning, financing, and implementation of source water protection, but this requires increased resources and better coordination and collaboration with water resource managers. Without better and more formal linkages, these groups will miss synergies and cost efficiencies and risk creating unintended harms, particularly as the effects of increasing water demands and climate change become more severe.

Second, the business case for source water protection is not always clear. WASH service providers already struggle to cover the costs of new infrastructure, capital replacement, and ongoing operation and maintenance, and basin managers may lack the funds to properly track water users and manage effluents. Source water protection measures can be expensive, particularly when engineering solutions are prioritized for augmenting water supply and treatment systems. Funding source water protection is also difficult because it requires political will and stakeholder commitment, as well as clear pathways for sustained mobilization and efficient allocation of resources.

Third, the physical characteristics of surface and groundwater can influence stakeholder interest, cost, and possible protection measures. Surface water, for example, can be highly seasonal, and its ambient water quality is generally worse than groundwater due to sedimentation from unsustainable land use practices and pollution from agricultural, industrial, and municipal water users. The sustainability of groundwater, on the other hand, depends on abstraction and recharge rates, as well as protection of infiltration areas and wells from contamination that derives from the surface.

Surface and groundwater systems can also interact through inflow replenishment and outflows, affecting water availability and water quality for different types of water users and service providers. The state of *natural* infrastructure in the larger watershed—forests, wetlands, and other types of ecosystems that help regulate water flows and quality, as well as support biodiversity and deliver additional co-benefits to people—also plays an instrumental role in determining the condition of surface and groundwater resources. For example, destruction of wetlands or overabstraction of surface water may reduce groundwater recharge; similarly, overabstraction of groundwater may deplete water in streams, lakes, and wetlands.

Key Recommendations for Integrating Source Water Protection into WASH

While the business case for investing in source water protection has become increasingly clearer, there are many hurdles that need to be addressed by basin and WASH managers, affected communities and the private sector, and local government officials. In light of these challenges, source water protection requires more than resource mobilization. Four crosscutting and interrelated recommendations for mitigating challenges to elevating source water protection within WASH emerged from our case studies.

1. Basin managers and WASH providers need to define shared goals for source water protection.

Basin managers and WASH service providers can overcome challenges related to siloed implementation and different geographic and institutional mandates by defining shared goals around source water protection. This can be achieved by assessing WASH district needs within the broader basin management priorities and considering solutions that can deliver benefits across district- and basin-level scales. Efforts to bridge institutional gaps should focus on tangible opportunities for collaboration, such as joint assessment and planning exercises.

2. Source water protection efforts should be informed by the sources of demand and types of water users within the WASH district and basin.

Source water protection measures need to address the sources of water availability and water quality risks. One recommendation is to map the specific risks within the WASH district and broader basin to specific sources of demand and water and land use practices. In doing so, basin managers and WASH providers can clarify the potential costs and benefits of source water protection measures, as well as potential opportunities to leverage input and involvement from industry, agriculture, and other water and land users that can impact water quality, quantity, and flow.

3. Multisector stakeholder collaboration can make source water protection measures more sustainable

Effective cross-sector collaboration can lead to new, innovative, and tailored solutions that address WASH needs, livelihood considerations, and private sector interests, and that are responsive to environmental conditions in source watersheds. Stakeholder involvement by national ministries, WASH service providers, basin managers, community organizations, civil society groups, and the private sector, which may be mandated by legal and regulatory frameworks, can ensure consideration of diverse perspectives in assessing, planning, and implementing source water protection measures. Targeted activities like joint assessments, site inspections, or planning exercises can help leverage complementary technical capacity, ensure efficient use of resources, and create actionable opportunities for stakeholders to engage and foster collaboration for source water protection.

4. Funding must be sustained and resources effectively allocated for sustainable source water protection

Investing in source water protection can help improve ambient water quality, reduce drinking water treatment costs, and deliver environmental benefits that help sustain local livelihoods, agriculture, and industry. The feasibility of funding options will depend on a number of factors. Innovative funding models, such as water funds, payment for ecosystem services, and new taxes and fees, need to be analyzed for short- and long-term benefits. Community buy-in is critical to mobilizing political will for source water protection and ensuring commitment to sustained funding. Geographical and environmental contexts also matter for source water protection investments, particularly when source water resources are located beyond the WASH district. Public policies, regulations, and laws can influence resource mobilization and management frameworks, as well as govern how funds are allocated to natural and gray infrastructure solutions.

Case Study Abstracts

The case studies, summarized here and elaborated below, are contextually unique but highlight common challenges to source water protection efforts. They feature urban and rural contexts and showcase how stakeholders have come together to plan, fund, and implement surface and groundwater protection to support long-term sustainability of drinking water systems. Each case study also reflects different points in the project or implementation cycle. The case studies from Honduras and Uganda reflect nearly a decade of work led by local communities and Water For People to improve WASH outcomes. Similarly, in Peru, technical assistance provided by the Natural Infrastructure for Water Security Project is building on several years of important advancements in the water sector's efforts to improve sustainable funding mechanisms. The work by the USAID Sustainable Water Partnership (SWP) in the Mara River Basin was a three-year pilot activity that concluded in late 2020, whereas the collaboration between The Nature Conservancy and Water For People in Malawi is in the early feasibility assessment stage.

Wetland Restoration Work in Kamwenge District, Uganda: Eleven percent of Uganda's land area is covered by wetlands, yet despite their benefits, they have been degraded. This case study describes efforts led by Water For People and district partners to address the degradation of wetlands, which are within the recharge areas of existing and planned piped water supply systems in Biguli, a subcounty in Kamwenge District. The degradation was found to be a major threat to the sustainability of water supplies. Activities such as agriculture, animal rearing, sand mining, brick making, and commercial tree planting (with high water consuming trees) were reducing the quality and quantity of water for communities in the catchment area. This case study describes how Water For People and partners worked across district and catchment scales to facilitate stakeholder participation to assess, plan, and implement measures to restore the wetlands and protect communities' drinking and domestic water supplies.

Fostering Collaboration Between Water Resources Management and WASH Institutions to Protect Freshwater Springs in the Mara River Basin, Kenya and Tanzania: Rural communities in the Mara River Basin, where more than a million people across Kenya and Tanzania reside, depend on multiple sources of water for drinking and domestic needs and to support livelihoods. The Mara River Basin also contains key tourist and conservation areas, such as the Maasai Mara National Reserve and Serengeti National Park. Access to water for many of the communities in the Mara River Basin is a challenge. Boreholes can be expensive and often fall into disrepair, while abstraction of surface water can be costly for rural communities and requires treatment. Freshwater springs, on the other hand, are generally accessible to local communities, and the perennial nature of the springs ensures water availability during the dry season. Freshwater springs, however, are often severely degraded and can pose health risks to communities that depend on them because of lack of protection of the spring catchment area and spring eye. This case study highlights the USAID SWP's efforts to facilitate collaboration and coordination between WASH, water resources management, and community stakeholders to protect and rehabilitate degraded freshwater springs in the Mara River Basin. Water user characteristics are critical for designing the protection measures, while targeted activities help create opportunities for targeted collaboration between stakeholders.

Teaming Up to Protect Blantyre's Source Water Supply, Malawi: The city of Blantyre, located in the southern region of Malawi, is a major commercial, financial, and industrial hub for the country. While the current available water supply exceeds demand, the city nonetheless faces multiple challenges in managing sustainable water supplies due to multiple factors, such as variability in supply across dry and wet seasons. Recognizing the linked ecological, infrastructure, and financial challenges facing Blantyre's water supplies, the Blantyre Water Board (service provider), Water For People (WASH), and The Nature Conservancy (environment) have come together to pursue an integrated approach to linking source water management and WASH service delivery. This case study illustrates how the Blantyre Water Board, Water For People, and The Nature Conservancy are addressing issues of geography and scale, as well as sustainable funding for source water protection.

Bringing Sustainable Financing to the Ground for Source Water Protection, Natural Infrastructure for Water Security, Peru: Home to one of the driest deserts on Earth, dramatic Andean watersheds, and Amazonian headwaters, Peru is highly vulnerable to water risks. Since 2009, Peru has gone from having its water utilities prohibited from investing upstream of their intakes to passing its first law for ecosystem services. Through the Compensation Mechanisms for Ecosystem Services law (MRSE for its Spanish acronym), over USD 40 million has been assigned from drinking water tariffs. The program is renewable through local water tariffs, ensuring future funding for source water protection. Nevertheless, persistent barriers have prevented these funds from being implemented at the scale envisioned; for example, only seven of the 37 water utilities with MRSE tariffs have begun implementation, and those that have are spending far less than they are collecting on average. This case study highlights efforts by the Natural Infrastructure for Water Security project, led by Forest Trends with funding from USAID and the government of Canada, to address these challenges by building capacity and providing technical assistance to build a pipeline of bankable projects, develop key tools and guidance documents, and address regulatory and institution barriers to effective investments in natural infrastructure.

Establishment of a Municipal Committee and Fund to Invest in Priority Microwatersheds for Domestic Water Supplies, Honduras: This case study describes the work of local communities in the municipality of El Negrito, Honduras, to strengthen the sustainability of water services through the Community Association for the Purchase and Protection of Microwatersheds. While there has been significant interest in protecting water-producing microwatersheds, support from the municipality was critical to addressing persistent funding gaps. This case study describes how the local community worked with Water For People and additional stakeholders to overcome challenges to mobilize funding for the protection of important microwatersheds through engagement with key stakeholders and the municipality.

Credit: Andre Silva Pinto/Shutterstock

Case Study: Wetland Restoration Work in Kamwenge District, Uganda

Project Context

Eleven percent of Uganda's land area is covered by wetlands, but despite their benefits, they have been degraded and seen as wasteland by most who live nearby. The work covered in this case study includes wetlands that serve as a source of drinking water for the 43,000 inhabitants of Biguli subcounty in Kamwenge district. The lack of protection of this land was harming the source for drinking water for those nearby. The degradation, especially human activity, was a major factor in the threat to water supply sustainability. Activities including agriculture, animal rearing, sand-mining, brick-making, and commercial tree planting (with high water consuming trees) were heavily impacting the quality and the quantity of water for the communities in the catchment area. One critical element of this work was to align district WASH-related efforts with the catchment area (both of which have different boundaries and governance structures). While most of Kamwenge District falls under the Albert Water Management Zone, one section of Biguli subcounty falls under the Victoria Water Management Zone (Figure 1). The water resources management zones are based on hydrological flows, while district and subcounty local government units are politically delineated. Because of these differing boundaries, it is often difficult to understand clearly which areas of a politically defined subcounty fall under a specific water management zone and which body should be engaged to implement protection measures.

Prior to Water For People's intervention in Kamwenge District 2013, there was severe degradation of wetlands in Biguli. The degraded ecosystems were within the recharge areas of the existing and planned piped water supply systems, which posed a significant threat to the reliability and sustainability of the systems that depend on groundwater. The wetlands were degraded through human activities, mainly crop agriculture, brick-making, sand-mining, and forestry, with water-draining tree species, such as eucalyptus, that were planted and thriving in the fragile ecosystems. Safe water coverage in Biguli was only at 23% because handpumps installed by the district had failed; they required better technologies since the water table was too low to support shallow wells.

FIGURE 1: MAP OF UGANDA SHOWING THE 4 MAJOR BASINS ON WHOSE HYDROLOGICAL FLOW THE ALBERT, VICTORIA, UPPER NILE, AND KYOGA WATER MANAGEMENT ZONES DELINEATION IS BASED

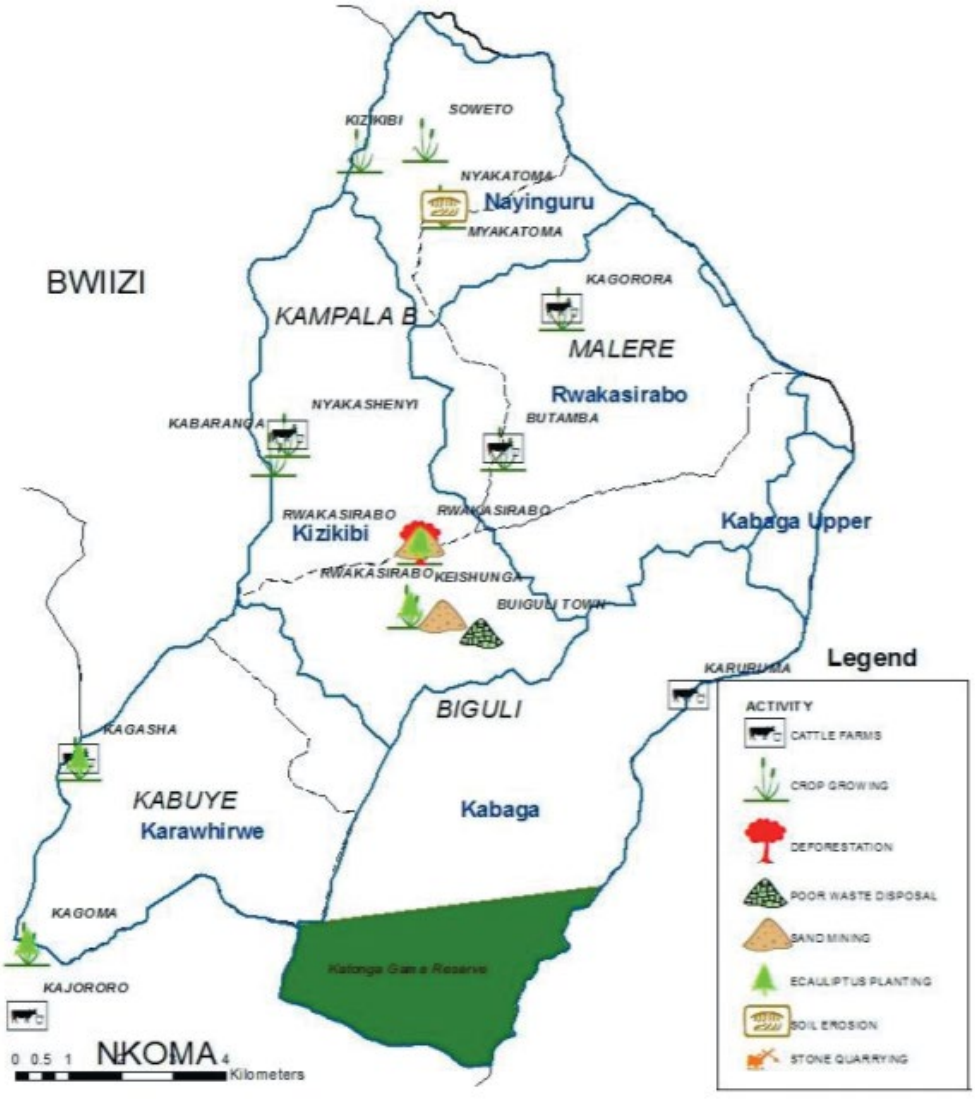
Water For People's *Everyone Forever* model focuses on the sustainability of WASH interventions for every household, school, and clinic to ensure that access to services is not only universal but also long-lasting. To ensure that the infrastructure, policy, regulatory, and governance interventions could succeed in providing long-lasting services to the people across Kamwenge District, it became clear that there was a critical need to engage with the watershed management bodies in the region, too, as a result of the wetlands' degradation. The conservation and protection of watersheds is critical to ensuring universal services that can last over time.

The Intervention

In order to ensure the protection and conservation of the watershed, Water For People, along with district partners, began engaging in conversations with the Albert and Victoria water management zones to address the degradation of key wetlands that serve the many water users in Biguli. The success of this work depended on the close collaboration of many stakeholders with social and economic interests in the catchment area. Given the seasonal drops in groundwater levels in specific subcounties of the district and their impact on sustainable water service delivery, it was critical to consider the impact of various activities on each group of stakeholders. As mentioned above, the Kamwenge District local government and Water For People collaborated to implement the Everyone Forever model, which aims to achieve universal and sustainable access to WASH services across the entire district. In addition, the Albert and Victoria water management zones of the Directorate of Water Resources Management of the Ministry of Water and Environment provide technical support in ensuring the approach includes catchment-based water resources management (WRM). Finally, academics and consultants conducted water resource studies and assessments in collaboration with the local government to inform the planning and decision-making for the district.

Water for People worked as a facilitator to ensure the different stakeholders

FIGURE 2: MAP OF BIGULI SHOWING SPATIAL DISTRIBUTION OF POTENTIAL WATER RESOURCES THREATS IN WETLAND CATCHMENT AREAS



Source: Biguli Water Resources Assessment Report (Water For People, 2017)

worked together in a coordinated way to restore the wetland ecosystem. This included working with the water management zone and a private sector consultant to conduct an area water resources assessment and map hotspots, as well as working with the district (led by the Natural Resources Department team) to engage the community and lower local government stakeholders to appreciate the wetland degradation issues and participate in restoration initiatives.

In addition to conducting an assessment and mapping hotspots, other activities included mobilizing and sensitizing community leaders on the long-term impact of wetland degradation. This included many meetings with community leaders from the very beginning so that their important voices could become champions of the change from the start. We supported community meetings where these leaders could in turn encourage all community members to understand the impact of these interventions and why their support of this work was critical to its success. Leaders, including the district chairperson, the District Natural Resources Officer from the Environmental office, and other respected and trusted voices, were engaged early and fully supported the programming.

Clear delineation and demarcation of wetland boundaries was another important activity that led to a better understanding by the stakeholders of the value of healthy wetlands. Through this understanding, leaders and community members could understand the impact of seemingly unrelated activities on the groundwater supply of a much broader area. A field visit with key stakeholders to another district allowed everyone to see what is involved in protecting a wetland. They could see a system with an increased supply of high-quality water, basins and sub-basins that were not negatively impacted by human activities, and the benefit of appropriate agricultural practices to improve the land and soil.

Community members adversely impacted by losing access to the wetlands were included in livelihood improvement initiatives to ensure longer-term buy-in and compliance with the now-protected wetland area. The Office of the Prime Minister and district officials supported the livelihood activities by supporting new job creation and restoring agricultural work that was less harmful and more appropriate to the land.

The noncompliance by some community members to remove degrading activities was counteracted by enforcement done by the police with the lead of the resource department commissioner and the district police commissioner. Technical support of the area included groundwater level monitoring using divers, regular water quality testing and treatment of piped water supply systems. Critical to the success of this intervention was the close coordination and cooperation of the District Natural Resources Department, the Albert Water Management Zone authorities, and the Directorate of Water Resources Management. These entities are not accustomed to working so closely together, but this experience showed that the outcomes of such coordination are good for all involved. Facilitated by Water For People, the collaboration continues and is becoming built into ongoing practices and processes across the district.

After just one year of the intervention, five wetlands (98.34 acres) had been restored. This work had raised the priority of wetland conservation among decision-makers, and it had highlighted the need for continued water resource planning and communication of the issues. Disrupted livelihoods had begun to be restored in the communities nearby, and there have been ongoing socioeconomic and health benefits, including a reintroduction and thriving mudfish ecosystem. Ongoing groundwater monitoring has improved overall understanding of natural fluctuations throughout the year and of the role wetlands play in improving recharge and long-term system sustainability.

After two years of this work, the number of water sources that met the adequate quantity requirement increased from 36.8% to 68.4%. In addition, local government institutions are stronger and better equipped to sustain and expand wetland rehabilitation work across Kamwenge District.

Kizikibi Wetland before (left) and after (right) restoration activities. Credit: Water For People, Uganda

What Worked Well and Challenges to the Process

The buy-in from all stakeholders early in the process was one of the main drivers of success of this work. With many actors engaged, the profile of groundwater monitoring increased nationally and learning exchanges were planned with other catchment areas to replicate this model. The involvement of sector actors outside of WASH and conservation—including agriculture and fisheries, and political actors—was also important to the success of this work. Strong local leadership ensured compliance from the communities, as well as an understanding of *why* protecting the ecosystem is so critical for long-term sustainability of the water source.

Some of the initial challenges were the disruption to the livelihoods of those in the community that depend on the wetland area. Participatory planning and sensitization were core to the rollout of all activities and adaptations, and options were considered for anyone disrupted by the conservation efforts.

Next Steps

Next steps are to continue the capacity building across government institutions so that collaboration becomes a more natural way to do this work in the future. (This effort includes breaking down siloed work that doesn't consider the broader impact of interventions.) There is also a need for additional monitoring to understand the impact of this work and to track it over time, as well as to use data to support expanding the project in other districts with similar wetland challenges. In addition, there are more wetlands to demarcate, monitor, and protect; more farmers and upstream land users to bring on board with alternative activities that impact wetland health; and more communities to engage in this impactful work. Water For People and partner entities are committed to a technical documentation of this entire process to ease replication of efforts.

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Case Study: Fostering Collaboration Between Water Resources Management and WASH Institutions to Protect Freshwater Springs in the Mara River Basin, Kenya and Tanzania

Project Context

Rural communities in the Mara River Basin, where more than a million people across Kenya and Tanzania reside, depend on multiple sources of water for drinking and domestic needs and for their livelihoods. The Mara River Basin also contains key tourist and conservation areas, such as the Maasai Mara National Reserve and Serengeti National Park. Access to water for many of the communities in the Mara River Basin is a challenge. Boreholes can be expensive and often fall into disrepair, while abstraction of surface water can be costly for rural communities and requires treatment. Freshwater springs, on the other hand, are generally accessible to local communities, and the perennial nature of the springs ensures water availability during the dry season.

Freshwater springs in the Mara River Basin, however, are severely degraded and can pose health risks to communities that depend on them. A USAID climate vulnerability assessment (CVA) found that approximately 20% of the residents in the Nyangores subcatchment in Kenya collect water from unprotected wells and springs. The assessment also noted that 23% of the households in the Mara Wetlands in Tanzania rely on unprotected

USAID Sustainable Water Partnership staff and local stakeholders inspect a retaining wall at a spring in the Mara Wetlands, Tanzania. Credit: USAID Sustainable Water Partnership

springs as a primary source of drinking water. However, habitat loss and mixed uses, such as onsite washing, livestock watering, and agriculture, have caused degradation of the catchments surrounding the spring and exposed the springs to water quality risks. Further, extreme flooding caused by more irregular and intense precipitation due to climate change inundates the springs and increases risk of contamination. According to the USAID CVA, nearly half of the 500 freshwater springs in the Nyangores subcatchment are in need of rehabilitation, but only 22 have been protected.

Natural and gray infrastructure can limit the potential harm to the spring and surrounding habitat caused by humans and livestock and reduce risks of contamination from runoff. Protection measures can improve water quality and reduce public health risks from drinking contaminated water and ensuring that water is sufficient for different uses, especially drinking, sanitation, and hygiene needs. Spring protection efforts that address WASH needs and other uses, like livestock watering and washing, require involvement from local communities, WASH entities, and WRM institutions to ensure that design, accessibility, and management considerations accommodate these multiple uses. In the Mara River Basin, communities are at the forefront of managing WASH infrastructure, but WRM and WASH entities have distinct mandates and do not always have the human and financial resources to coordinate source water protection efforts.

Between 2018 and 2020, the USAID SWP used SWP's Water Security Improvement (WSI) process to facilitate a stakeholder-driven collaboration to address water security risks in the Mara River Basin. This three-year pilot activity, called Sustainable Water for the Mara, supported local stakeholders with water security assessments, planning, evidence-based decision-making, and community-based interventions to improve water security. Through the WSI process, stakeholders prioritized spring protection efforts in the Nyangores subcatchment and Mara Wetlands, a low-cost and quick impact measure that would improve water availability and water quality and strengthen the water security of local communities that rely on them for domestic and livelihood activities.

To ensure spring protection efforts responded to domestic and livelihood needs as well as followed key national standards for WASH infrastructure, SWP coordinated community, WRM, and WASH stakeholder involvement in site assessments and incorporated their inputs into plans and designs. SWP provided technical and financial support; facilitated joint planning exercises, site assessments, and water quality testing; and prepared site designs. Table 1 highlights the stakeholders SWP engaged in Kenya and Tanzania. In Kenya, springs are managed by spring committees comprising local community members and overseen by the Water Resources Authority (WRA) and the Water Resources Users Associations (WRUA). In Tanzania, the Lake Victoria Basin Water Board (LVBWB) and the Mara North and Mara South Water User Associations manage water resources, while the village water committees manage WASH infrastructure at the springs. The village water committees are supported by the Rural Water and Sanitation Agency (RUWASA), a national-level institution that oversees rural WASH systems and service delivery. The following sections explain how SWP built the capacity of WRM and WASH stakeholders to protect springs.

Assessing Source Water Protection Options

In Kenya, SWP convened county-level environment, water, forestry, agriculture officials, and representatives from the Nyangores WRUA to discuss water security risks and assess spring protection options. SWP and the stakeholders reviewed and updated the Nyangores subcatchment management plan, an evidence-based planning tool that guides source water protection and catchment rehabilitation efforts. SWP organized transect walks, or walking tours, to inspect springs highlighted in the plan. Six freshwater springs were selected in the process, based on the number of communities that depend on the spring, the spring's flow rate, and level of degradation around the spring.

TABLE 1. WATER MANAGEMENT AND WASH ENTITIES IN KENYA AND TANZANIA

Institution	Kenya	Tanzania
Basin Management Institutions	**Water Resources Authority** *Role: Manage water resources, including water quality testing*	**Lake Victoria Basin Water Board** *Role: Manage and protect water resources* **Rural Water and Sanitation Agency** *Role: Regulate, manage, and develop water supply and sanitation services*
Water User Associations	**Nyangores Water Resources Users Association** *Role: Manage conflicts between water users and support catchment conservation efforts*	**Mara North and Mara South Water User Associations** *Role: Manage conflicts between water users and support catchment conservation efforts*
Water Point Managers	**Spring Committees** *Role: Manage protected springs*	**Village Water Committees** *Role: Manage WASH infrastructure and mixed uses at springs*

In Tanzania, SWP organized site visits and transect walks with the LVBWB and the Mara North and Mara South water user associations to 20 communities in the Mara Wetlands. During these visits, SWP met with local stakeholders to discuss community water security priorities and confirmed that overgrazing, deforestation, and land conversion for agriculture were degrading freshwater springs. In consultation with the LVBWB, the water user associations, and local communities, SWP selected four freshwater springs and two boreholes for protection and rehabilitation based on their vulnerability to climate change, level of degradation, and community needs.

Evaluating Site Conditions and Capacity Building Needs

SWP facilitated site assessments to evaluate the conditions at each spring location. The stakeholders jointly examined the state of vegetation and the surrounding landscape to assess environmental risks to the water source. Some springs were surrounded by invasive and water-intensive plants, raising the risk of overabstraction. Water uses around the springs, including domestic washing and livestock watering, increased the risk of contaminants and sediment flowing into the spring eye. At some of the springs, previously installed water storage, livestock troughs, and washing bays were no longer functional due to cracks and sediment buildup. As a result, many communities sourced water directly from the spring eye, risking their health and the environmental conditions of the spring. Water quality tests indicated the presence of bacteriological contamination at nearly all of the springs.

SWP validated the site assessments through community focus group discussions led by the water user associations. The discussions focused on household water security, including water access and storage; use of water for hygiene, drinking, and other domestic needs; and livelihood uses such as gardening and livestock watering. The group discussions revealed that the local communities depended significantly on the freshwater springs, particularly during the dry season.

SWP also adapted its institutional capacity tool to assess each committee's capacity for governance, planning, and service delivery of the WASH infrastructure and management of the spring. This was important to understand training needs as well as the potential for long-term sustainability. In Kenya, spring committees were new entities and required support to organize and fulfill their management responsibilities. In Tanzania,

long-standing village water committees lacked the technical and financial resources to properly manage and maintain the protected sites. The assessments also reiterated the need for management support from the Water Resources Authority in Kenya and RUWASA in Tanzania to the spring and village water committees.

Implementing Source Water Protection Measures and Capacity Improvements

Drawing on the results of the site assessments and focus groups, SWP prepared site designs that reflected the water security needs of local communities and accounted for the specific conditions of each spring. The designs included retaining walls and water tanks to capture and store water from the spring, and taps where residents could collect water for drinking and other uses. Washing bays and livestock watering troughs were added downstream of the collection points to minimize risk of contamination to the water taps and stored water. The site designs also included landscape restoration measures such as planting of indigenous vegetation around the spring and installation of fencing to limit access to the spring eye.

The designs were reviewed and validated by the WRA in Kenya and the LVBWB and RUWASA in Tanzania to ensure compliance with national-level WRM and WASH standards. SWP hired a contractor in each country to complete the site rehabilitation and infrastructure improvements and facilitated joint site inspections with the WRA, LVBWB, and RUWASA before handing over the facilities to the village water committees and spring committees.

Using capacity assessment findings, SWP worked with the WRA and RUWASA to organize trainings tailored to the needs of each committee. In Kenya, the training focused on defining roles and responsibilities, outlining financial management tasks, and describing community outreach. In Tanzania, RUWASA designed training that met the national requirements for rural water service provision. For one of the committees, RUWASA also explored the possibility of registering the village water community as a community-based water supply organization, which would formally recognize the committee as a rural service provider. Spring and village water committees also received onsite training on management and maintenance of the installed infrastructure and vegetation around the spring.

What Worked Well and Challenges to the Process

Overall, six springs in Kenya were protected, and three springs along with two boreholes were protected and rehabilitated in Tanzania. Approximately 21,000 residents now have improved access to water.

Water quality tests performed after the spring protection activities showed significant reductions in pathogenic contamination. Concentrations of pathogens, likely caused by livestock, remained high at a few of the springs. To address this, SWP worked with the WRA, RUWASA, and the LVBWB to perform shock chlorination, which reduced concentrations of pathogens to within national water quality standards. RUWASA and the WRA committed to regular water quality testing and to working with spring and village water committees to notify local water users if pathogenic contamination increases.

One of the springs in the Mara Wetlands also showed high concentrations of arsenic. After the initial results were confirmed through multiple rounds of subsequent testing, SWP worked with the LVBWB and community leaders to close the spring for domestic consumption and notify local water users of the potential health risks of using the spring. Given the nature of water access in the Mara Wetlands, the springs represented one of several resources available to the community to meet their WASH, domestic, and livelihood needs. SWP and the LVBWB tested the alternative sources used by the local community and confirmed that the other water sources were safe for public use.

Last, more than 50 committee members in Kenya and Tanzania received training from the Water Resources Authority and RUWASA. While the committee members would have benefited from longer and more extensive capacity building, these trainings allowed the WRA and RUWASA to strengthen their relationships with the committees for long-term engagement. In Tanzania, this was particularly important as RUWASA is a new institution and reflects a renewed effort by the government to strengthen rural water service delivery.

Lessons Learned

There are three lessons learned from SWP's experience with spring protection in the Mara River Basin.

First, a precise definition of water security risks helps ensure appropriate design of water security improvement activities. The WSI assessments confirmed that springs were key sources of water for community domestic, WASH, and livelihood needs. The assessments and focus group discussions, however, confirmed that poor water quality posed public health risks while degradation around the spring and water and land use practices threatened the long-term viability of the springs. SWP and its WRM and WASH partners used this information to prepare site-specific designs that met local community needs and national guidelines and standards.

Second, targeted activities help WASH and WRM stakeholders overcome barriers to collaboration and coordination around source water protection. Different institutional mandates and a lack of resources to fulfill their mandates can impede efforts by WRM and WASH entities to integrate source water protection measures and WASH improvements. Community, WASH, and WRM stakeholder involvement in the transect walks and community discussions, site assessments, and planning activities provided opportunities for WRM and WASH stakeholders to jointly evaluate risks and design appropriate source water protection measures.

Third, the WSI process requires time to learn from, adapt, and scale water security interventions. The spring protection measures addressed a small subset of water security risks in the basin. These tangible steps provided a strong foundation for long-term collaboration between local communities, WRM, and WASH entities for managing the protected springs and planning for other source water protection measures. Being able to show results as part of the iterative WSI process is essential to mobilize and motivate stakeholders, propose more ambitious future activities, and adapt interventions to the evolving context.

Case Study: Teaming Up to Protect Blantyre's Source Water Supply, Malawi

Project Context

The city of Blantyre, located in the southern region of Malawi, is a major commercial, financial, and industrial hub for the country. Home to nearly a million people in the larger metropolitan area, the city relies on three source water areas:

- Shire River at Walkers Ferry intake: 40 km away, with a capacity of 96,000 cubic meters per day (m^3/day)
- Likhubula River intake: 60 km away in Mulanje, with a capacity of 20,000 m^3/day
- Mudi Dam: In the city, with a capacity of 5,000 m^3/day

The available water supply exceeds demand, yet the city faces multiple challenges in managing water supplies because of varying factors across dry and wet seasons. Recurring reasons for water supply interruptions include low water levels causing low pressure during dry seasons; siltation from surrounding lands that cause clogs at intake points; high water turbidity driving increased water treatment costs; high energy costs used to pump water from the Shire River; and power outages that prevent pumping from the Shire River.

Compounding these challenges are threats to the ecological health of upstream catchment areas, namely deforestation, invasive plant species, land use conversion, and unsustainable farming practices. This degradation of natural infrastructure exacerbates the challenges of managing water supply infrastructure by increasing the

Water intake point on Likhubula River downstream from Dziwe la Nkhalamba. Credit: Blantyre Water Board

risk of supply shortages, which is of particular concern during low-flow summer months, and reducing water quality, particularly through sediment loading, which in turn increases municipal treatment costs.

Recognizing the linked ecological, infrastructure, and financial challenges facing Blantyre's water supplies, three partners have come together to pursue an integrated approach to linking source water management and WASH service delivery:

- Blantyre Water Board (BWB) as the water service provider;
- Water For People (WFP) from the WASH sector; and
- The Nature Conservancy (TNC) from the conservation sector.

The focus of this collaboration is to implement a holistic approach linking source water management with WASH service delivery to ensure reliable access to high quality drinking water for city residents. Doing this in a way that protects the forests and other natural infrastructure that underpin water supplies and support the region's biodiversity will set a new precedent for all stakeholders to follow.

The Intervention

Since 2008, WFP has supported BWB's work to extend WASH services to unplanned areas of Blantyre City through the construction of water kiosks, rehabilitation of existing kiosks, establishing a management model for communal water points, and implementing a sustainable sanitation business model. Results from WFP's 2018 annual monitoring data showed that all residents have access to a safe water point, yet intermittent water supply remains a persistent challenge and is usually caused by siltation at intake points or the inability to pump enough water to supply all users.

To address this problem, WFP, BWB, and TNC are partnering to create a water fund to protect source water areas—both current and planned—for Blantyre City and surrounding towns. A water funds is a financial and governance mechanism that provides a platform to organize public, private, and civil society stakeholders with the goal of contributing to water security and the sustainable management of a focal basin. The water fund draws capital contributions from large water users, such as water supply companies, hydroelectric plants, beverage companies, irrigation districts, and agricultural associations, in an organized and transparent manner, and adequately invests these resources in ecosystem conservation to maximize their return on investment in support of more sustainable and reliable water provision needed to sustain municipalities and business operations. With 43 water funds established and 35 more in development across four continents, the process for designing and implementing new programs is well established and provides a blueprint for how stakeholders can work together to create the Blantyre Water Fund (https://waterfundstoolbox.org). In addition to the core partners (BWB, WFP, and TNC), additional key stakeholders include local conservation groups implementing payment for ecosystem services programs in the source water areas: Mulanje Mountain Conservation Trust, Shire BEST, tea growers, and the Electricity Generation Company.

Initial meetings to discuss the partnership started in August 2018. The first year was spent learning about each organization's philosophies, motivations, approaches, and ability to make a joint commitment. The initial commitments were in the form of investing time and resources into learning and establishing a common language for working together. In November 2019, the partners participated in a series of training courses and meetings that increased their understanding of source water protection, as well as their collective interest for establishing the Blantyre Water Fund. The partnership's focus now is on a jointly financed prefeasibility study. The draft Terms of Reference for engaging a consultant to conduct a feasibility study have been jointly developed to better understand the specific technical, governance, and financial factors that influence the likelihood of and provide the baseline data for developing a strong business case for source protection through a water fund.

Such studies have been instrumental in past efforts to enable partners engaged in water fund development to test and validate the shared value proposition. The advance being made in this project is to conduct this study in a way that explicitly considers the connections between upstream source water areas and downstream sustainable WASH service delivery.

Stream running in the source watershed, Mulanje Mountain Forest Reserve. Credit: Kate Harawa

What Worked Well and Challenges to the Process

The initial phases of developing a water fund in partnership with TNC, BWB, and WFP have been mutually beneficial because of the shared goals and readiness to take time to understand each other's perspectives and how best to work together. In bridging sectors, the partners have addressed, or are continuing to address, several challenges:

- Establishing a common understanding and terminology to enable productive conversations about whether there is a mutually beneficial opportunity to pursue.
- Working across organizations that each have their own planning cycles and budgeting processes, which in turn influences the pace of work and time points for key decisions between partners.
- As this is the first water fund being explored in Malawi, determining what are the best data sources available and how those data can best inform sequential go/no-go decisions by the partners.
- Determining the right focus for the water fund given the multiple current and potential future water source areas for Blantyre, which in turn affects the larger set of partners that should be engaged in project design.
- Integrating existing payment for ecosystem services schemes in the source water areas (including Shire BEST and Mulanje Mountain Conservation Trust).
- Advancing relationships with government partners amid a changing political landscape, which causes leadership and personnel changes.

Taken as a whole, the challenges that have been or continue to be experienced are minor compared with the compelling opportunity to address the bigger challenge of degrading water sources, which requires collective action. It is clear that no one organization could achieve the desired outcome of the water fund without its reliance on the others, one of the key lessons learned.

Lessons Learned

Protecting source water supplies that are fed by large catchment areas spanning many communities and districts is possible only through strong partnerships. Different perspectives that span different sectors and areas of expertise are essential. The unique contributions of each partner in this case include:

Partner	Unique Contribution
Blantyre Water Board	• Critical data for mapping and understanding current and planned water sources • Perspective on historical and political contexts • Awareness of key stakeholders
The Nature Conservancy	• Expertise in nature-based solutions and catchment management, as implemented through the water fund model • Access to data and expertise in hydrologic modeling • Training resources on developing water funds that are accessible by all partners in different languages • Financial resources to invest in the initial planning phase • Access to conservation and environmental networks
Water For People	• Systems approach to WASH that facilitates operational linkage to sustainability of source water sources • Experienced staff based in Blantyre • Working relationship with the water utility • Institutional relationships with various stakeholders beyond the water utility

One of the key outcomes of the initial planning phase is recognizing the values each organization brings to the partnership. This recognition combined with the shared goal to address the linked ecological, infrastructure, and financial challenges in sustaining the drinking water supply for Blantyre creates a true win-win opportunity that is at the heart of any strong partnership.

Case Study: Bringing Sustainable Financing to the Ground for Source Water Protection, Natural Infrastructure for Water Security, Peru

Project Context

Home to one of the driest deserts on Earth, dramatic Andean watersheds, and Amazonian headwaters, Peru is highly vulnerable to water risks. Population growth, fractured governance, climate change, and changing land use are all exacerbating these risks. However, in recent years, Peruvian leaders have initiated a paradigm shift in water governance that aims to gain traction against these threats. The shift promotes source water protection as a critical complement to traditional gray infrastructure in water management, and it has been led by water utilities.

Since 2009, Peru has gone from having its water utilities prohibited from investing upstream of their intakes to passing its first law for ecosystem services. Through the Compensation Mechanisms for Ecosystem Services law (MRSE for its Spanish acronym), over USD 40 million has been assigned from drinking water tariffs. The program is renewable through local water tariffs, ensuring future funding for source water protection.

A major milestone in this history was in June 2015, when the water utility servicing Peru's capital, SEDAPAL—larger than all other utilities in Peru combined—approved a 1% tariff allocation for protecting its source waters.

At more than 4,500 meters above sea level, Raúl Márquez, a member of the Carampoma community in the upper Rimac watershed that supplies Lima, Peru, leads the team tasked with restoring local wetlands. This wetlands restoration project is the first to be implemented with funding from Lima's water utility. Credit: Bruno Bernal, Forest Trends

That same period saw the development of a set of new laws and regulations that permit and promote public funds to be invested in natural infrastructure for water, through MRSE programs led by water utilities and through traditional taxpayer-funded public investments. Many proponents of source water protection heralded these shifts as the beginning of a new era for water management in Peru.

Nevertheless, persistent barriers have prevented these funds from being implemented at the scale envisioned; for example, only seven of the 37 water utilities with MRSE tariffs have begun implementation, and those that have begun are spending far less than they are collecting on average. As a result, natural infrastructure has not yet demonstrated its potential to enhance water security and resilience for Peru's drinking water sector.

The Intervention: Building a Robust Pipeline of Source Water Protection Projects

The Natural Infrastructure for Water Security project (NIWS), funded by USAID and the government of Canada, and implemented by a consortium led by Forest Trends, entered the scene in 2018 with the aim of addressing the barriers to scaled, effective, sustainable, and gender-equitable investments in natural water infrastructure.

The NIWS project design highlighted as a key barrier to MRSE tariff implementation the lack of a robust pipeline of viable projects that could execute the funds. To this end, since 2018, NIWS has worked with water utilities in its priority watersheds to refine and develop new project ideas; develop a suite of new tools to support project identification, prioritization, design, and evaluation; build professional capacities to design, evaluate, manage, and communicate natural infrastructure investments; and provide direct technical and financial support to a select number of utilities to directly develop new projects.

As a result, NIWS has built the capacities of more than 1,500 professionals and a portfolio of more than 28 projects for MRSE tariff funds across seven watersheds, advancing through various stages of development and approvals. In March 2021, NIWS celebrated a critical milestone with the implementation of SEDAPAL's first MRSE project, which aims to protect and restore a wetland complex in its source waters.

Lessons Learned: Institutional and Social Lock-Ins

Significant institutional lock-ins and social barriers have prevented Peruvian water utilities from implementing new funds for source water protection at the full scale needed. Remaining barriers identified by NIWS include:

1. **Institutional capacities to manage source water protection portfolios:** Beyond individual capacities to develop and evaluate individual projects, NIWS found that significant *institutional* capacity development is necessary for water utilities to manage the full cycle of project development and execution, as well as to monitor and adaptively manage investments at a portfolio scale. Additionally, SEDAPAL may need partnerships with other institutions better positioned to manage source water protection efforts in order to bridge institutional capacity gaps.

2. **Barriers to investing appropriately in natural infrastructure because of bias in the overall public investment system:** Peru's system requires investments to be channeled through an inflexible public investment system designed for building gray infrastructure—not protecting and restoring natural infrastructure in partnership with local communities. These public investment projects for source water protection can therefore take over seven years to develop. In some cases, NIWS successfully worked with government partners to create and apply an asset management framework analogous to gray infrastructure to natural infrastructure, thereby making some "shortcuts" for infrastructure maintenance and restoration available to nature-based solutions. However, NIWS has also found that more significant regulatory changes are still needed to assure the effectiveness, efficiency, and sustainability of these efforts.

3. **Remaining skepticism in water utility professionals about the importance of source water protection:** In many cases, the available scientific evidence on the benefits of natural infrastructure or the existence of a new law is not enough to convince practitioners to change course from conventional approaches. NIWS found that including peer-to-peer exchanges, building a community of practice based in applying rigorous science to natural infrastructure interventions, and highlighting the co-benefits of natural infrastructure also of high interest to the parties involved have helped to address these cultural barriers to adopting nature-based approaches in the water sector. However, this process is likely to require much more time to shift the narrative, as it is likely to be more of a generational shift in water management.

4. **Distrust between utilities and upstream communities:** There are concerns and skepticism on the part of local communities where source water protection projects would be sited. Historical conflicts between these communities and the government or large companies, including at times the water utilities themselves, are superimposed on source water protection efforts. Addressing these concerns and building trust with upstream communities requires skills that water utilities are likewise just beginning to develop. Moreover, with more experience and clarity about the processes by which MRSE funds are implemented, local communities should also be able to build their own capacities to propose project ideas and engage more in MRSE program development and management.

Next Steps

With these lessons in mind, NIWS is working closely with water utility partners, with an emphasis on SEDAPAL, to build their institutional capacities, both to support internal management of natural infrastructure as well as to effectively partner with ally institutions and upstream communities. For example, NIWS is working with SEDAPAL to create a personnel development plan, internal manuals to guide the development and evaluation of projects, and a monitoring and evaluation system for its MRSE portfolio. NIWS and USAID are working with SEDAPAL to evaluate and develop options for improving the efficiency of portfolio management and execution of initiatives through partnerships with public agricultural extension programs, regional and local governments, and even the private sector. NIWS is also supporting water utilities to develop, pilot, and implement a community relations strategy to improve transparency, trust, and governance with upstream partners. Finally, NIWS is developing proposals for MRSE execution through goods and services contracts, as an alternative to the time- and resource-intensive public investment projects. NIWS aims to accelerate implementation by adapting this window for public spending to source water protection efforts, and ideally to include a performance-based component to contracts for source water protection that could ultimately compensate local communities for maintaining critical ecosystems and land use practices, thereby addressing a critical consideration for the effectiveness, equity and sustainability of source water protection efforts.

Case Study: Establishment of a Municipal Committee and Fund to Invest in Priority Microwatersheds for Domestic Water Supplies, Honduras

Project Context

Over the years, communities have been facing increasing challenges related to water scarcity and water quality. This situation has encouraged people in the municipality of El Negrito, Honduras, to strengthen the sustainability of water services and prepare its communities to face any adversity.

El Negrito is a municipality located in the department of Yoro. It has a population of around 52,000 and is subdivided into three zones: Oloman Valley Sector, Mountain Sector, and Guaymas Sector. The Guaymas Sector makes up nearly half of the communities in the municipality. The main economic activity is the cultivation of African oil palm trees, which has spread to the main water sources.

The degradation of water sources in this municipality is becoming more and more noticeable. The 2015 water inventory conducted in the municipality found that about 46% of the microwatersheds faced numerous threats, including agriculture, livestock, coffee farming, and some human settlements. These land uses degrade water quality through erosion, dumping of debris, and the use of chemicals, such as herbicides and fertilizers.

A march to promote the protection of microwatersheds in El Negrito, Honduras, with participants from local institutions, civil society, and municipal officials. Credit: Water For People, Honduras

According to 2019 data from Water For People's annual monitoring, 44% of inhabitants said they had a limited availability of water due to seasonal scarcity; this has been decreasing, but not by much—just down to 40%—which is why the residents, especially those in the valley, are opting to exploit underground sources.

Given this trend, the municipality of El Negrito started wondering how to keep sources from degrading over the years, especially since the existence of national laws for the protection of forests mean nothing to the owners of the property where the main sources of water supply are located.

This reality inspired the initiative to create the Community Association for the Purchase and Protection of Microwatersheds (ACOMIC) in 2013. ACOMIC's vision is to continue conserving forests by transferring ownership of the microwatersheds to communities benefiting from the protection of the drinking water sources and thus ensuring sustainability and increasing community resilience. ACOMIC is a community organization that transcends political and financial changes and whose main goal is working for the municipality of El Negrito to protect and ensure water sources. The municipality believed it was more feasible to facilitate these land purchases through an association connected to a solid system such as WASH.

The Intervention

Mindful of this vision, ACOMIC decided that for its organizational and financial sustainability, the intervention process needed to integrate communities and other entities, including the municipality, the Forest Conservation Institute, the Municipal Water and Sanitation Technical Unit, civil society, and churches, because it would foster support with decision-making, for example when deciding which microwatershed is viable in a protection process.

The full protection process includes the following steps:

- **Perform Assessment:** Perform biophysical assessments (with data on land use, slopes, water quality, gaging) to identify vulnerabilities and risks in water quality and quantity and all possible social aspects. This must be done to begin the process of declaring the microwatershed a legally protected area.
- **Declare as a Protected Area:** According to the Forestry, Protected Areas, and Wildlife Law (Decree NO. 156-2007), legal aspects can be established for the correct administration and management of forest resources, protected areas, and wildlife, seeking a kind of development that is in accordance with the social, economic, environmental, and cultural interests of the country.
- **Buy Priority Land:** Ideally a declaration is sufficient to protect the watershed, but that is not the case when the owner is already using the land for their livelihood or business. In these cases, it is necessary to buy the land to compensate the owner.

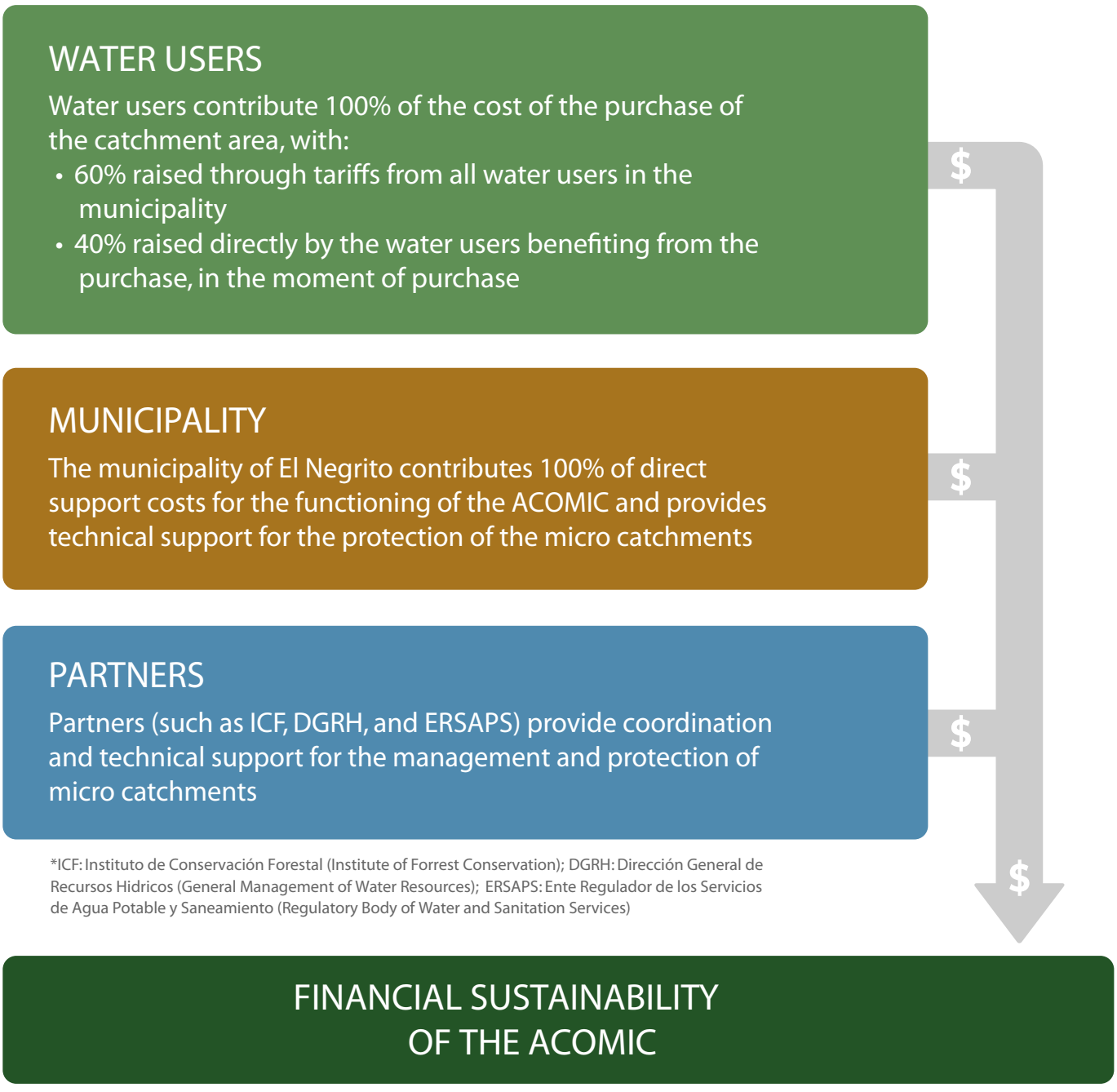
This well-defined process, based on objective data, enables fair and transparent decisions.

ACOMIC also plays the role of collecting the necessary funds for technical assistance in the process and the purchase of the land. At an open meeting with the municipality, ACOMIC established this integration and the incorporation of a fee of Lps 10.00 (USD 0.40) per month for the purchase and protection of microwatersheds. This fee is incorporated within the tariff assessed for drinking water services. This amount represents more an agreement of a willingness of people to pay this specific fee than it does an actual accounting of the amount it will take to fully cover the costs.

Given that these fees would become the main source of financing to achieve the proposed objectives, ACOMIC explained this information to participants in every service provider and community meeting they held.

Over time the municipality found that there is a very high demand for protecting water-producing microwatersheds by purchasing land, but that the amount contributed by the users would not be enough to buy microwatersheds, pay specialists to carry out assessments, and cover operating expenses. The municipality needed to identify other sources of financing, strategically considering that the municipality should become the main source of additional financing through what it receives from the central government as well as the taxes it collects. The municipality could use those funds to provide technical support to ACOMIC, ensuring guidance in the fight to protect the microwatersheds. The municipality also covers 100% of the direct support costs related to ACOMIC's administrative and operational expenses. Figure 1 shows the financial flows to sustain ACOMIC:

FIGURE 1: THE FINANCIAL FLOWS OF ACOMIC



*ICF: Instituto de Conservación Forestal (Institute of Forrest Conservation); DGRH: Dirección General de Recursos Hidricos (General Management of Water Resources); ERSAPS: Ente Regulador de los Servicios de Agua Potable y Saneamiento (Regulatory Body of Water and Sanitation Services)

The figure also shows that some partners such as national entities or nongovernment organizations have also provided technical and financial support to streamline the processes and back up the technical support provided by the municipality.

By identifying these additional sources, ACOMIC could allocate 60% of the financing collected by the entire municipality via a tariff for the purchase of the microwatershed. The remaining 40% would come from the specific community benefiting from the purchase through a collection at the time of purchase.

What Worked Well and Challenges to the Process

ACOMIC has managed to make progress on the sustainability of water-producing sources and also maintain inter-institutional relations with municipal authorities, with the Forest Conservation Institute and Water For People. ACOMIC purchased three microwatersheds and succeeded in having 14 microwatersheds in the municipality declared protected areas. Seven additional microwatersheds are in the process of being declared protected areas.

These microwatersheds are now being guarded more by water users, and surrounding forests are being restored through reforestation campaigns.

Although ACOMIC has been successful, many challenges persist, especially with the private sector, particularly the African palm growers. This sector was not factored in, in the beginning, and as a result differentiated fees were not considered. Water is undervalued, and changing the fee structure is more difficult at this late stage of the initiative.

Although water continues to be undervalued, Palmas Aceiteras de Honduras, an agroindustrial cooperative company of agrarian reform, has established a certification process for the producers of African palm. This certification institutes a height restriction, limiting palm tree caretakers from overexploiting some water sources.

Another challenge is that all communities need to have their microwatersheds secured. That has generated high demand that cannot be met. While this shows how successful ACOMIC has been in promoting protection, the time communities have had to wait for the purchase has led to financial challenges and some loss of credibility with community members wondering if it is truly ever going to happen.

Despite these challenges, ACOMIC continues to carry out and coordinate protection processes to regain credibility and involve more sectors, demonstrating that it is a functioning and sustainable organization.

Lessons Learned

The following are the lessons learned with this intervention model related in particular to the financing required to enable source water protection:

- All stakeholders need to be involved from the start, or at least early enough to determine whether it is possible for them to contribute to this collaborative effort.
- Political will on the part of municipal authorities is essential to support legal and financial processes.
- Core to the model is thinking and planning as a municipality, not as individuals. ACOMIC follows municipal policies and regulations, which facilitate processes and create a conducive environment where everyone gets involved and contributes.
- To build trust among decision-makers, processes need to be transparent, decisions must be based on data, and water service providers should be involved.

- The vision must be realistic to address the challenge of high demand. Perhaps considering a joint use and protection plan with current owners would allow for more protection to happen while still protecting the sources of the microwatersheds. In initiatives such as ACOMIC, which has very flexible processes but had no plan upon implementation of its initiative, it is important to document all the processes carried out—the investments, financing received, and results obtained—in order to learn, adapt, and expand.

Finally, considering all successes and challenges, the overarching lesson learned is that the ACOMIC initiative is capable of consolidating conservation initiatives while also promoting supported community development.

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