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Paying for Water in Uganda: Is Paying Upstream Land Users a Possible Solution?

**by Tom Sengalama and
Emmanuelle Quillérrou**

IAEA

Chuhu Springs, located north of Kisoro town in southwestern Uganda, are being tapped as a local water supply.

In Brief

The Millennium Ecosystem Assessment has generated greater official recognition that ecosystems provide valuable services to humankind. For example, watersheds provide water supply and water purification services by acting as primary receivers of rainwater and channeling water flows within water basins. Traditional economic markets however fail to capture the full value of such services, limiting the effectiveness of market-based projects for improved natural watersheds management. Market-based instruments can help to rationalize the benefits provided by ecosystems against the cost of natural resource conservation, but only when encompassing the full range of ecosystem services provided.

The Chuhu springs watershed in Kisoro District, Uganda presents an example of upstream land degradation due to intensive agricultural practices. Such upstream land degradation results in a lowered water supply to downstream users. The objective of this study is to assess the potential for the establishment of a payment for ecosystem services (PES) approach, with downstream water users paying upstream land users for improved water supply. Such a PES approach would ensure that upstream land users have an incentive to adapt their agricultural practices so as to allow for an improved water supply downstream and indirectly contributing to reduce upstream land degradation.

This assessment is based on responses from focus groups with respondents selected from official local project documents and population registers. Trends and patterns are identified in the group discussions after coding and frequency analysis. While the study revealed clear potential for PES establishment, the fragmented landscape and historical lack of collaboration between the upstream and downstream communities would hinder successful implementation. A possible solution could be to use intermediaries to represent each group. Such a set up would have upstream land users selling improved practices, possibly through NGOs already working with the users acting as intermediaries, to only one buyer representing downstream consumers such as the National Water and Sewerage Corporation.

The Millennium Ecosystem Assessment defines ecosystem services as the benefits people obtain from ecosystems.¹ They are the multiple commodities that are supplied by ecosystems and constitute the natural processes by which nature sustains human life.² They not only provide direct satisfaction such as clean water to humans but also contribute to its renewal—in the case of clean water through continued water recharge from natural watersheds.¹ To sustain such benefits, there is a need to include the value of such services into the cost of goods and services provided by ecosystems.

Payment for ecosystem services (PES) seeks to rationalize incentives associated with ecosystem management by explicitly specifying the benefits and giving an indication of their “true” economic value to ecosystem service providers and users.² In this case, the benefit that downstream water users would expect as a result of a well-managed watershed would be an improved water supply. In return, the upstream land users would receive payment for undertaking agricultural practices that help better conserve the watershed structure and functioning, thereby indirectly leading to an improved water supply downstream. These practices would be in addition to their current agricultural practices. This differs from other policy instruments such as taxes and subsidies that address only one side of a problem at a time. PES allows for additional-ity to enhance ecosystem service availability: one payment based on downstream users’ willingness to pay for an improved water supply is made to upstream users to deliver such a service through adopting specific practices *additional* to their current ones.³ When contributing to reduce erosion and improve water infiltration, such add-on practices could not only help improve water supply downstream but also reduce upstream land degradation.

Establishing a payment for ecosystem services requires meeting five criteria (Figure 1):

- Criterion 1. Well-defined environmental services
- Criterion 2. At least one buyer
- Criterion 3. At least one environmental service in the transaction
- Criterion 4. At least one service provider
- Criterion 5. Conditionality

Key Concepts

• Water management is key for Uganda’s livelihood sustainability.

• The Chuho watershed catchment in Kisoro, Uganda is affected by land degradation, impacting the water supply available to downstream users.

• A PES approach could be implemented as a possible solution for improved water management in the Chuho watershed.

• Representatives of upstream and downstream users acting as intermediaries could facilitate interaction between the two communities.

• Chuho’s communities have existing institutional capacity that could be adapted to support the implementation of a PES scheme.

In this study, the downstream communities would need to pay the upstream communities, especially around Kigezi wetland, to implement land use practices that enhance downstream water supply. Such practices include, for example, zero tillage, terracing, agroforestry, and improved fallow. Under such land use practices, Chuho water springs would have a stable source of water recharge and greater downstream water supply to water users. The provision of improved water supply through additional upstream land

use practices would meet Criterion 1, as a well-defined environmental service. Criterion 2 and 4 would be met if at least one upstream farmer and one downstream user complete a transaction, which would be assessed based on research results. The PES agreements would detail the practices implemented by the upstream community in addition to current land management practices as a payment precondition. The payment would correspond to demonstrable adoption based on agreed indicators. Criterion 3 would be met with at least one environmental service in the transaction, which would be the payment for additional land use practices under the Chuho PES approach to enhance water supply. Criterion 5 would be met as part of PES agreement implementation. Conditionality refers to a business-like principle where the beneficiaries would be required to pay only if the service is actually delivered. This is considered the most innovative feature of PES vis-à-vis traditional conservation tools.³

In Uganda, ecosystem services are critical for over 90 percent of the population, who directly depend on natural resources for their livelihoods, with natural resources contributing over 50 percent of Uganda’s GDP.⁴ Regarding water supply services, 61 percent of the water is from ground water sources accessed through springs and boreholes.⁵ This is particularly significant in the Kisoro district, where all of the water supply to the municipality and townships is from natural springs. However, there is evidence that almost all the landscape outside national parks in Kisoro district have been transformed into agriculture land and 64 percent of the district wetlands had been drained by 1999.⁶ To respond to the declining watershed functions, a sustainable financing approach for improved management of watersheds in Kisoro is critical. Figure 2 indicates the extent to which the landscape and the watershed has

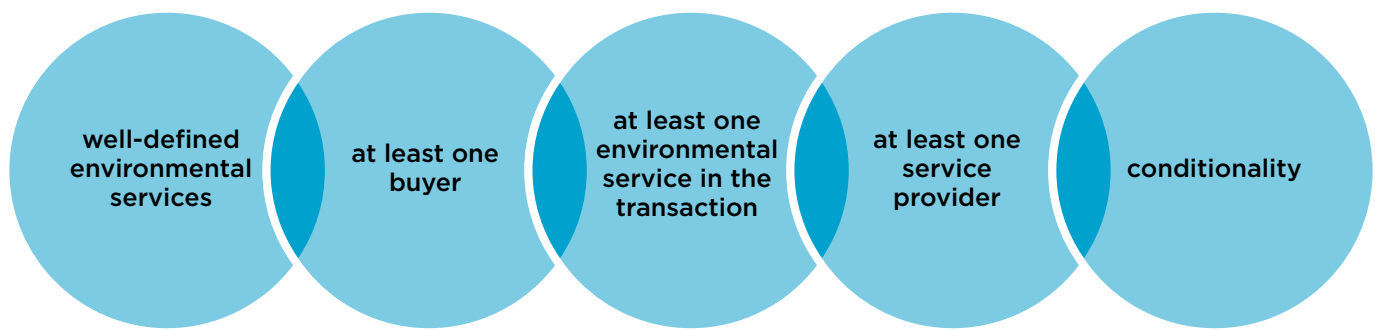


Figure 1. Components of a PES scheme.

Adapted from Wunder (2005) and Khanal and Paudel (2012).^{3,14}

been transformed, requiring land management approaches that enhance water retention, purification, and recharge functions in order to sustain the supply of water to Chuho springs.

Chuho water is found in Kisoro District at an elevation of 1,829 meters above sea level, about four kilometers north of Kisoro town. Based on the isotope and hydrochemical results, the water from Chuho has similar characteristics to that of the Kigezi wetland.⁷ This report indicates that the stable oxygen and hydrogen isotope data eliminated Muhavura Crater Lake and the Cyahafi and Kayumbu lakes as possible sources of water to Chuho water, confirming that Kigezi wetland acts as the recharge for Chuho water springs. Chuho water has six springlets that deliver water to a basin-like depression from where a small river flows northwards towards Lake Mutanda (Figure 3).

The need to conserve Chuho watershed functions cannot be over-emphasized, given that it is the only viable source of water supply to the 151,679 inhabitants of the Kisoro town council and the surrounding nine rural parishes in Kisoro District,⁸ yet it has been threatened by unsustainable land use practices. The communities in the upstream watershed are engaged in subsistence farming where seasonal crops are grown on steep slopes and marginal land with no soil and water conservation measures. The

terracing and strip cropping that once characterized the landscape are no longer practiced, leaving a degraded watershed with bare hills, scattered settlements, and no established farming system.⁹ This form of land use threatens the sustainable supply of water to Chuho water springs and the downstream water users.

While the hydrological studies indicate that the sustainability of the water supply to Chuho depends on how well the upper watershed is managed,¹⁰ these observations are not currently considered as part of sustainable water management by the National Water and Sewerage Corporation (NWSC). This government parastatal manages the collection and distribution of water to downstream water users, but does not have a program for negotiating land use practices that enhance watershed services.

The study aims to assess whether a PES approach could be a solution for improved management of the Chuho water catchment. Payment for upstream land use practices requires a clear understanding of the different factors that influence the integrity of the watershed, hence impacting the functions of water purification, flood risk mitigation, aquifer recharge, and erosion minimization that are offered by watersheds.¹¹

The conceptualization of the PES approach envisaged for Chuho and

the criteria for assessing existing institutional and community capacity are detailed in the research design section. Results from analysis of focus group discussions are presented in the Results section, followed by a section discussing whether favorable conditions—including current institutional and community capacity—exist in Chuho for the establishment of the proposed PES approach.

Research Design

This study is based on an assessment of whether there are conditions favorable to PES establishment and to determine whether there is sufficient existing institutional and community capacity to implement such a PES approach. The study relies on three main sources of information: 1) a review of project documents, 2) focus group discussions with community groups, and 3) questionnaire interviews with key informants including representatives from 22 villages upstream. These include members of tap-stand committees and the subcounty agricultural farmers' forum members.

Project documents on the Chuho water supply and unpublished reports from the NWSC-Kisoro district office provide information that help to establish the importance attached to the Chuho water supply by downstream beneficiaries.⁸ The level of dependence on the water from Chuho water springs and



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Figure 2. Densely populated rural landscape with diminished vegetation cover in Chuho watershed, Kisoro District, Uganda.

presence of a payment structure with recognized water supply buyers and sellers are assessed from the report on the design of the Chuho water supply. This information is complemented by interviews with households and key informants. Discussions with district officials, NWSC representatives, and nongovernment organizations (NGOs) reveal useful information about the existing conditions that would facilitate the implementation of a PES for land use practices, enhancing water supply services to downstream users.

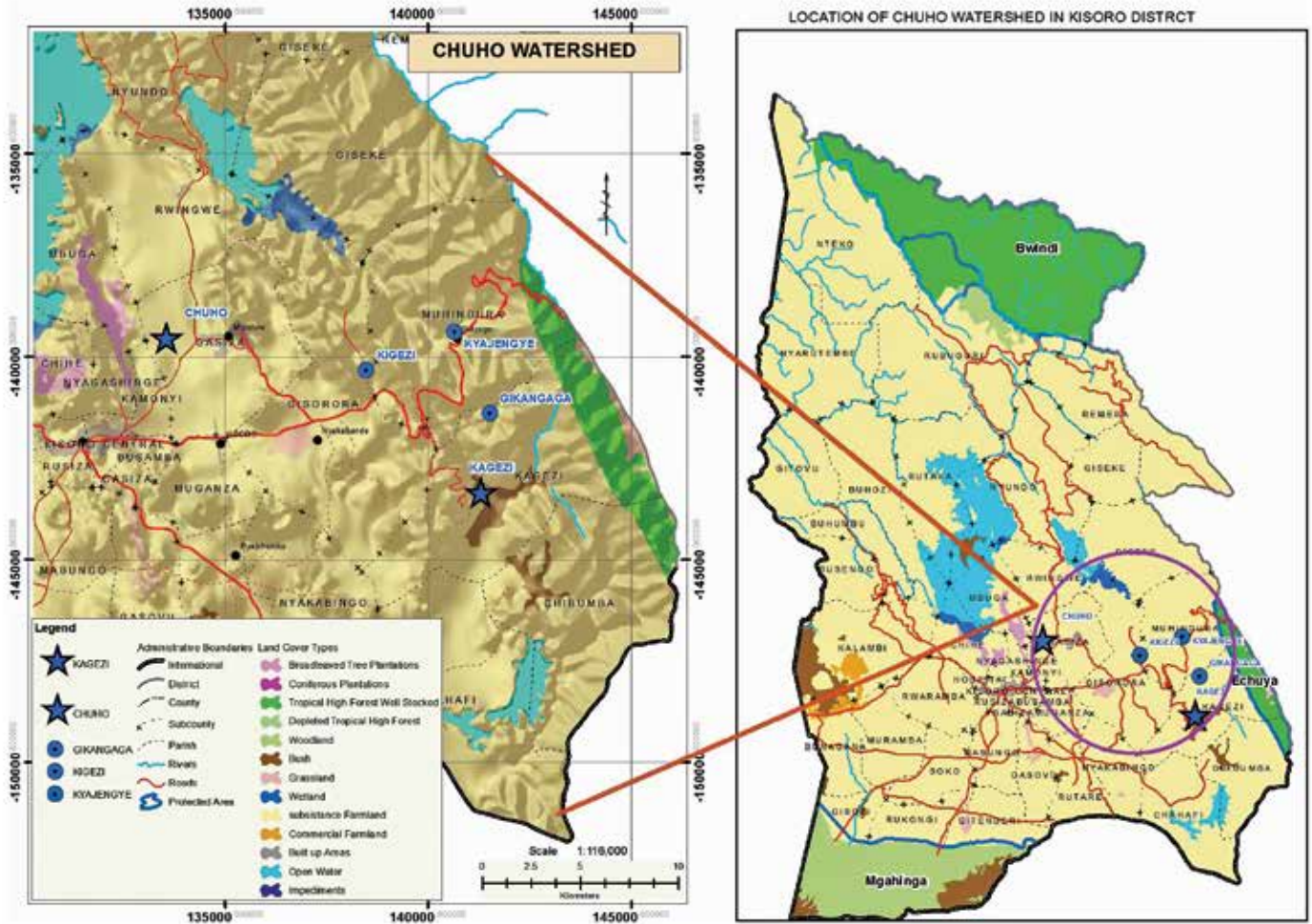
Focus group discussions with water user groups (tap-stand committees)

were conducted in May 2015 to gain insights into their understanding of the links between upstream land management and downstream water supply. Such information is important in understanding the community appreciation of the link between watershed protection and the continued water supply, and what they considered an acceptable payment arrangement for land use practices that would enhance water supply services to downstream users. Interviews with key informants on existing upstream land use practices were also conducted to understand existing upstream threats to

sustainable downstream water supply. Group discussions and responses from household interviews were analyzed to identify patterns and similarities in terms of conditions favorable to PES establishment, and institutional and community capacity.

Results

The Chuho water springs is a critical source of water for the residents of Kisoro District.⁸ The NWSC is responsible for the overall water management, and beneficiaries pay per volume of water consumed. Figure 4 shows the percentage distribution of the direct beneficiaries,



Adapted from the National Forestry Authority

Figure 3. Study area with Chuho spring water basin, Kisoro District.

both local residents and institutions including schools, hospitals, prisons, and barracks, among others.

The results of key informants recognize that the current land use practices upstream do not support long-term and sustainable water catchment service provision. Upstream communities highlighted soil erosion as the biggest driver of catchment clearance as it quickly renders farmland unproductive, leading to the clearing of fresh land and encroachment of marginal areas, including wetlands. Figure 5 shows how drivers of land degradation are ranked, while Figure 6 shows the suggested solutions to improve the functionality of Chuho watershed.

The upstream communities recognize the responsibility of the government to fund practices for sustainable watershed management (Figure 8). The current practices are largely financed through NGOs and focus on improving livelihoods without any consideration for watershed-wide connections (Figure 9). Since the government (NWSC) is already managing water supply downstream, it could engage the upstream land users to discuss practices that could enhance downstream water supply that are additional to what communities are currently implementing, then negotiate payment arrangements.

The financing of livelihood initiatives by both government and NGOs must be based on how much one is willing to implement practices that enhance watershed services. Clear indicators to measure the additional effort to enhance watershed services as a condition for continued payment need to be included in the PES negotiations.

Use of the Chuho water supply is outlined by clear rules and procedures regarding water access and payment systems. In addition, there are national laws and procedures on land tenure systems that explain how land use change and land use rights are managed. The presence of NGOs already

working with upstream land users provides another institutional mechanism for the implementation of a PES approach, as they can easily mobilize communities and act as intermediaries in PES negotiations.

Local communities are able to identify watershed management challenges and are aware of the practices required to conserve watersheds through changing land management practices. The scientific recommendations that link the sustainable water supply to the improved management of the upstream watershed could be another good basis for establishing a PES approach.¹⁰

While there is no formal collaboration or coordination between the downstream water users and upstream land users, as confirmed by 80 percent of respondents, the results of focus group discussions and key informants express support for sustainable land use management through the promotion of agroforestry initiatives and the implementation of income generating practices that support watershed services. This could be a good starting point for PES negotiations.

Discussion: PES as a Possible Solution for Improved Water Management in Chuho?

In current land use practices, institutional and community capacity have direct influence on the sustainability of the Chuho water supply. Poor land use practices have led to increased watershed degradation, with communities driven to marginal lands, including wetlands. The draining of wetlands for agriculture has the potential to reduce the amount and quality of water available at Chuho water springs, as the Kigezi wetland acts as the main recharge for Chuho water.¹⁰ Therefore, there is a direct relationship between land use practices upstream and the long-term and sustainable availability of water at Chuho. While the upstream communities understand their land

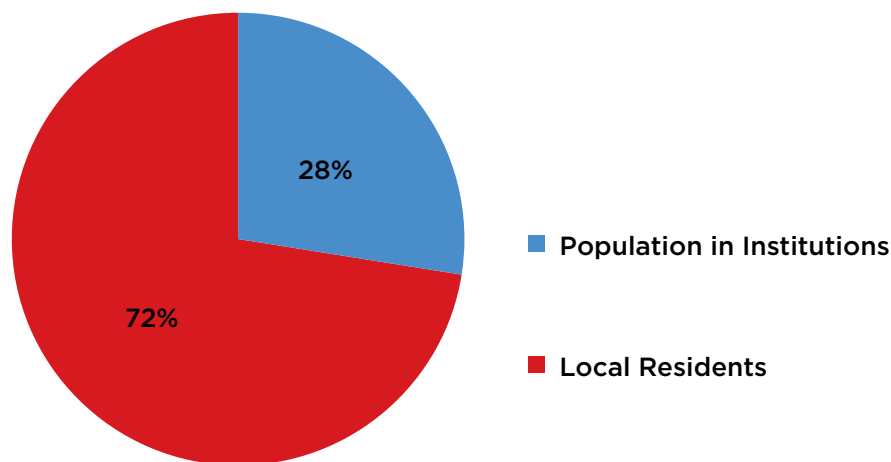


Figure 4. Distribution of water supply from Chuho.

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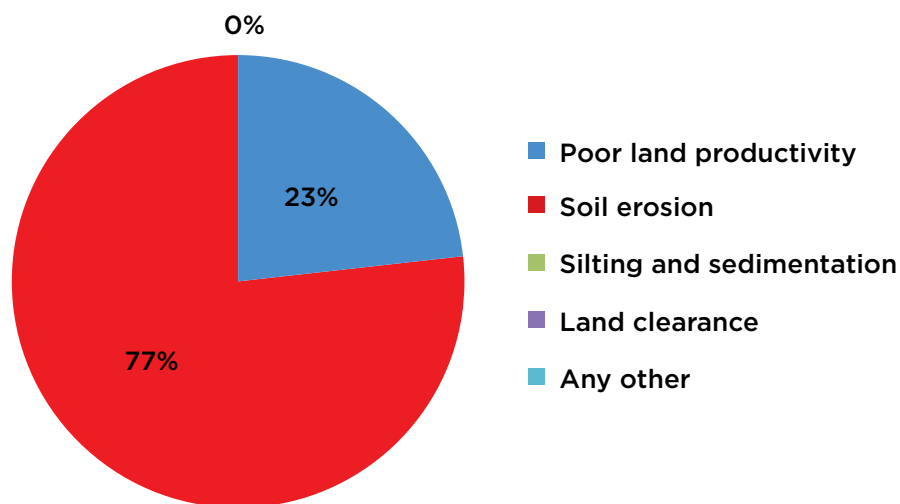


Figure 5. How communities rated the problems associated with the Chuho current watershed.

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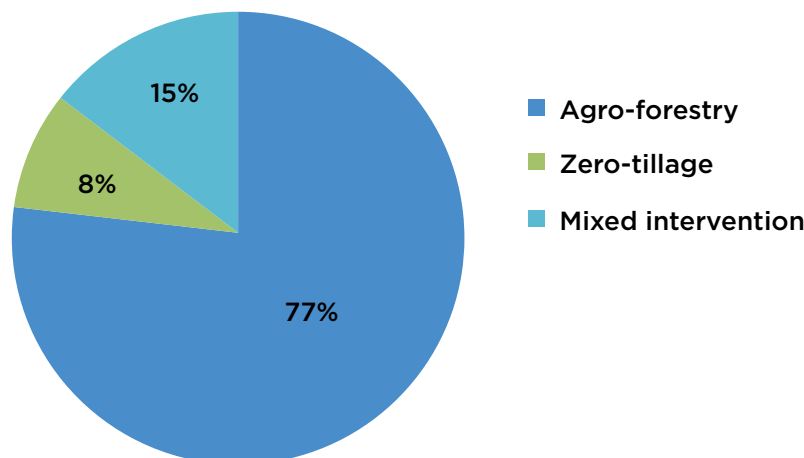
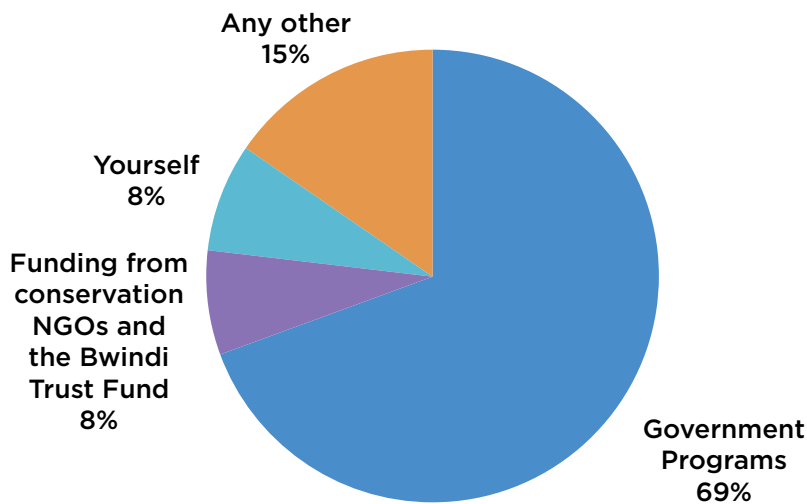


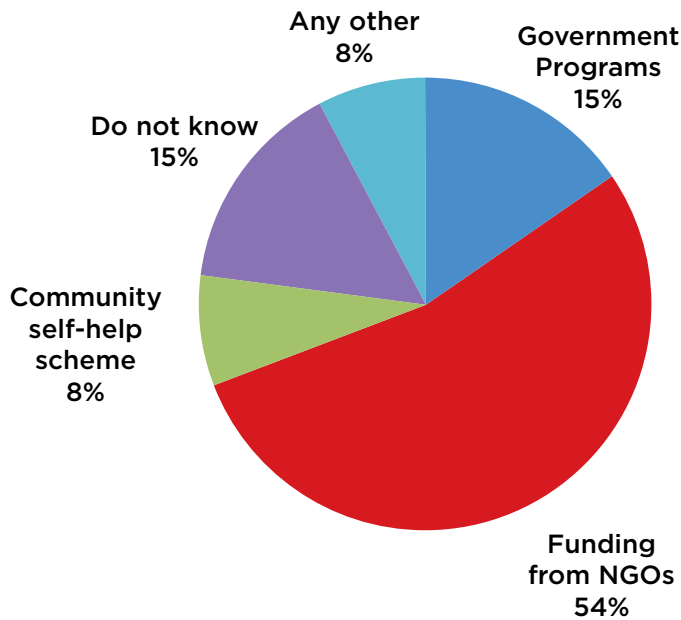
Figure 6. Proposed activities for watershed conservation.

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Figure 7. Perceived responsibility for funding of sustainable water management.



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Figure 8. Actual current sources of funding for water management.

use challenges, they are not aware of the long-term impact of their practices on the sustainable water supply to downstream communities. Implementation of a PES approach would need a facilitated negotiation between the upstream and downstream communities to enable them to understand their interdependence, and agree on how they can mutually benefit from improved watershed

management upstream. The problem with the current arrangement is that the NWSC is only abstracting water from the Chuho water springs and distributing it to end users. There is no focus on watershed management for its long-term supply, yet there is documented evidence that the sustainability of the supply will depend on how well the upstream water catchment, especially around

Kigezi wetland, is conserved.¹⁰ This clearly justifies the need for a negotiated arrangement to implement land use practices upstream that enhance water supply downstream.

The right conditions for the establishment of a PES for water supply services do exist within the Chuho water supply arrangements, with Criteria 1 through 4 met: well-defined environmental services, at least one buyer, at least one environmental service in the transaction, and at least one service provider. A possible starting point in implementing a PES approach is understanding the costs and benefits of land use change. A PES approach will only be adopted when the benefits of land use change (from the payment plus other by-products such as reduced erosion) exceed the costs of adoption—a condition for upstream users to participate—and when the cost of water access is less than the payments required to effect land use change—a condition for downstream user participation. This information will be required as the starting point to PES establishment.

While there is a challenge of implementing a PES approach amongst small and fragmented land users, the upstream communities expressed interest in implementing land use practices that contribute to improved watershed management, and it is in the interest of downstream water users to secure a sustainable water source. Chuho has existing institutions and institutional structures for water management that could facilitate negotiations between the upstream land users and downstream water users. These institutions and structures include defined downstream water users represented by the NWSC with a clear payment system for water, national and district level water management institutions (the District Water Office), clearly defined land ownership upstream, and the presence of national and district land



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The author at work at the Chuho watershed catchment in Kisoro, Uganda.

use policies to guide land use change. There are also NGOs with experience in engaging governments and local communities in natural resource use negotiations and land use planning.

The main focus of current water management institutions currently seems to be water supply and the collection of revenue, with less attention to watershed management. The assessment report on the water source recognizes the threats from unsustainable land use practices in the upper catchment, but no action plan has been established.¹⁰ Policy provisions for watershed management exist, although they are not implemented in the Chuho watershed. The current legal framework for

selling and buying land use rights has been designed to facilitate easy land use transactions under willing seller–willing buyer arrangements, although discussions with the district and subcounty leadership indicated that government would be concerned if a land use change plan would lead to mass displacement of the local population. This means that land rights would seem to be clearly defined and secure for the Chuho communities.

While the practices of upstream communities have a potential negative impact on the water supply to downstream communities, there is no coordination between the two and there is no defined organizational structure for water-catchment

protection. The upstream communities, however, recognize that poor watershed management impacts their land productivity and are willing to accept land use change practices. This is a good opportunity for negotiating land use change practices that enhance watershed services despite the challenge of dealing with smallholder farms in a fragmented landscape. One challenge is the community's ability to understand their interests and expectations and to be able to finance transaction costs of their participation in PES transactions.¹⁰ Such capacity may include the ability to define their roles in improved watershed management and benefits of their actions to themselves and others.

Since the downstream water users already pay for water, there is a starting point for negotiating a payment to upstream land users. The current drawback is that the mode of payments by the water users is treated as a commercial transaction with no link between the payment and implementation of land use practices that enhance water supply services. This unlinks the ultimate beneficiaries of the water supply services from the actual water providers, leaving upstream communities unaware of the influence their practices have on the water supply to the downstream communities. In addition, the NWSC does not consider the upstream communities to be influential partners in the sustainable water supply. This does not provide incentives for responsible watershed management. A shift to a PES approach may, however, raise concerns with downstream water users. There would need to be very clear communication to downstream users over the transaction costs involved in linking upstream and downstream communities through a PES approach. Not all costs should be borne by the consumers, as upstream farmers would also benefit themselves from additional farming practices. Water is considered a utility service that should be accessible by all, rather than a commodity,¹³ thereby lowering payment levels that are socially acceptable.

Since NWSC already manages the water supply to the downstream users, it could be envisaged that NWSC negotiate on their behalf with upstream land users, directly or through an intermediary representing upstream smallholder farmers, to agree on payments for additional land use practices in order to protect the downstream water supply sustainably. Such an approach would rely on a one (downstream) buyer–many (upstream) sellers' model. The buyer could be the NWSC, and the many sellers the

upstream smallholder farmers. NGOs already operating upstream and trusted by the communities could act as intermediaries mandated by upstream farmers. This means that the NWSC or government would have to make an annual budget commitment for the management of the watershed if it is to deliver payments to the communities in the upper watershed areas for restoration of wetlands and adoption of additional agricultural practices that conserve the watershed.

In return for the payment, the upstream communities (as ecosystem services providers) would need to demonstrate improved management practices that guarantee continued flow of water downstream. Being smallholder farmers in a fragmented landscape however, an intermediary to negotiate on the behalf of upstream communities would facilitate the negotiation process, as well as help bring them to agree on a common set of additional land use practices. Figure 9 provides a summary of how a possible PES for Chuho may be established.

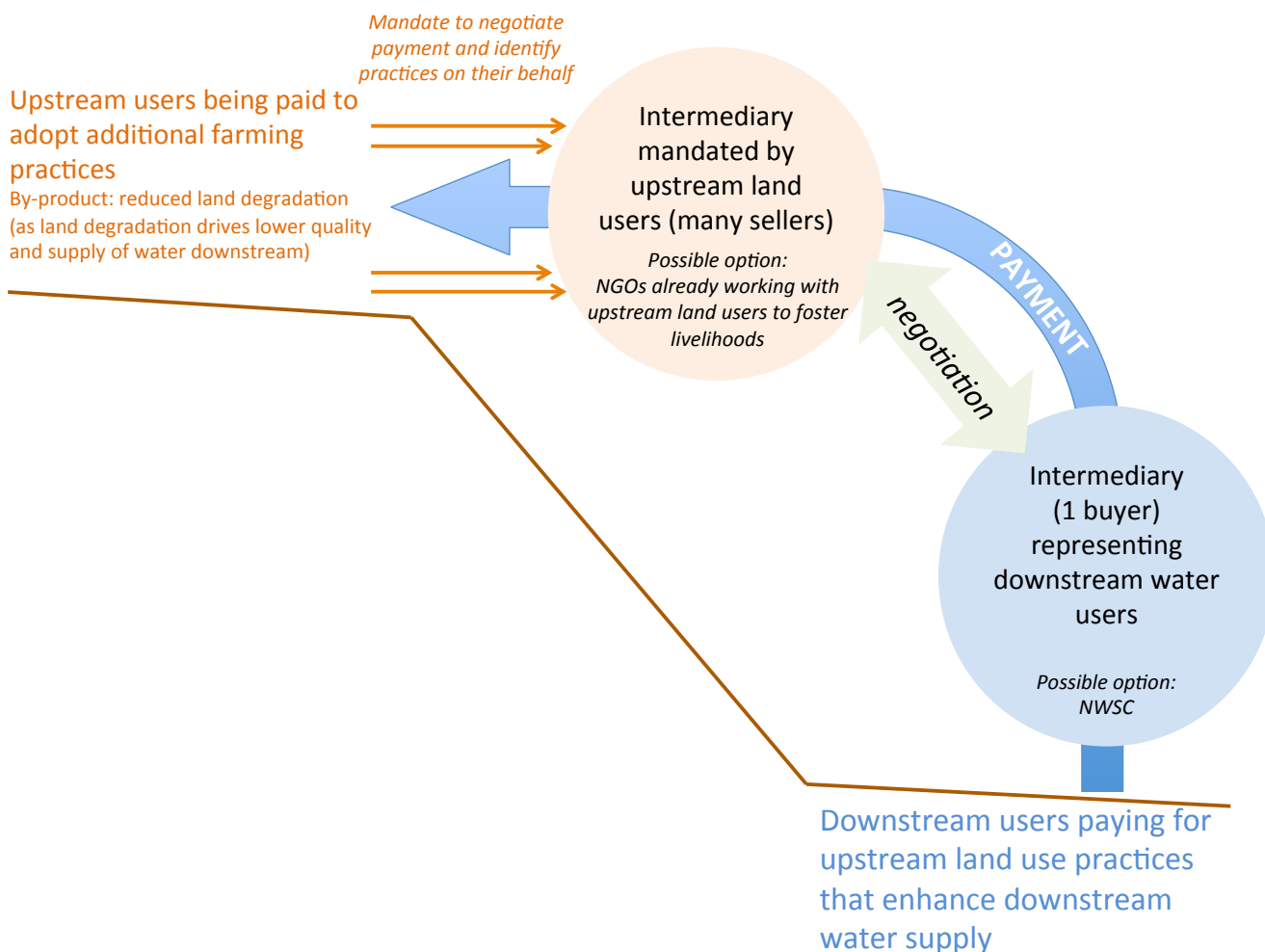
Conclusions and Recommendations

This study identified an ecosystem service of interest with clear buyers and sellers. The existing set up, however, is not aligned to support a PES approach, and the organizations involved in current water management do not have plans for supporting land use practices that enhance water supply services. It is clearly documented that the sustainability of Chuho water springs depends on how well the watershed services are conserved, but no plan has been established to implement land use practices that enhance the watershed function. Establishing a PES approach is, however, possible, considering that the district leadership and water utility organizations recognize the importance of protecting the water catchment.

To better monitor the impact of such a PES approach, future studies could focus on trends analysis to study changes in watershed characteristics resulting from PES implementation. This study could also be repeated with a larger sample size, or to compare different watersheds in Uganda in order to generate firm recommendations for national policy on payment for water supply services. A study that interviews both downstream water users and upstream land users will enable a comparison of perceptions and willingness to pay for land use change. Considering that this water flows through the subsurface, there is also a need to study the pathways through which the water is delivered to Chuho water springs and develop a plan for its protection. **S**

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Figure 9. Suggested model for the Chuho water supply PES establishment.

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