Donors' Guide to Rural Water Service Delivery

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Introduction

A well-known barrier to economic development in sub-Saharan Africa and lesser-developed countries globally, is the lack of basic services in rural areas, including access to reliable safe water supplies. Water shortages and problems accessing water limit agricultural potential, drive migration and associated social issues, and are a principal cause of rapidly rising urban populations.

In the case of Uganda, safe drinking water technologies have reached 60 to 70 percent of rural populations but the frequent occurrence of long periods of non-functionality in each community, even where the necessary technology is installed, forces people to revert to unsafe water sources or walk long distances to fetch water. This failure of reliable access is evident from studies such as the Overseas Development Institute (ODI) "Hidden Crisis" survey.[1]

The paper summarizes modifications that aid donors can make to program design and budgeting to achieve better social and economic returns on their investments through assured and universal service delivery. These modifications are divided into two categories:

- Capital Investments which are compliant to policy for reliability assurance
- System Investments which implement the policy:
    - System Instruments
    - Temporary Subsidies

The paper presents data from Ugandan government reports on current spend on rural water, which in the period mid-2020 to mid-2021 was around 40 million USD/year equivalent to 800 million in the next 20 years. It compares this spend rate with a new mode of capital expenditure "Compliant Capital" with estimates of 250 million to reach the unserved 30% of the population with modest safe water technology and 140 million to restore dilapidated technology used by 70% of the population. It then estimates (see Table 3) the cost of System Investments needed to implement the O&M policy at 200 million, resolving with a saving of 800 minus 590 = 210 million USD, available for increased extension of large scale piped networks into rural areas.

The Good News

Uganda is a country with an appropriate government policy to secure rural water service delivery. In 2020 and 2021, the Ugandan government started to disseminate policy documents and operational manuals which outline a system for effective and professionalized assurance of daily supply of safe water in rural areas.[2] These are known locally as the "O&M framework".

These documents address the failure of reliable access, and go a step further: they address also the issue the large populations having no modernized water supply installation at all, the issue of

[1] Owor, M., MacDonald, A.M., Bonsor, H.C., Okullo, J., Katusiime, F., Alupo, G., Berochan, G., Tumusiime, C., Lapworth, D., Whaley, L., Lark, R.M. 2017. *UPGro Hidden Crisis Research Consortium – Survey 1 Country Report – Uganda. British Geological Survey (BGS) Open Report*.

[2] Ministry for Water and Environment (MWE), Uganda. 2019. National Framework for O&M of Rural Water Infrastructure. Available at: https://www.mwe.go.ug/library/national-framework-operation-and-maintenance-rural-water-infrastructure-uganda

failed coverage.

These documents serve as a useful model for other countries, once they have been refined through effective application. However, their practical application is a significant challenge needing aid assistance. The O&M framework implies modification of the current practices of multiple organizations including international aid donors, local and central government, local and international NGOs and actors such as politicians seeking local council or national parliamentary positions.

This challenge requires communication and coordination between government and between multiple actors, at a level which is beyond the resources of government acting alone, but comfortably within the current expenditure limits of aid donors, indeed with less aid expenditure than is current. The savings made while implementing the O&M framework release sufficient funds to bring safe water to the large segments of rural populations remaining unserved by modernized supply. There is a double win: rural water supply for everyone, and reliable access to safe water, for everyone.

Purpose of this Guide

This paper focuses on the cost of securing reliable safe water delivery in rural areas of sub-Saharan Africa and lesser-developed countries. It is written for donors such as bilateral and multilateral aid agencies, foundations, international NGOs, and religious organizations financing development in Africa.

The recommendations of this paper are supported by evidence collected formally by the Ministry of Water and Environment of Uganda, also by the Civil Society Organizations Network in Uganda, and by Whave Solutions and its local government and community partners since 2011 in 10 districts of Uganda. Finance is focused on increasing cost recovery from local communities paying for O&M service, supported by services from local and central government. To support the system-change trajectory to cost-recovery, Whave received Result-Based Finance from the UpTime Catalyst Facility. System investors included the German Government (BMZ), Siemens Foundation, Osprey Foundation, the United States Agency for International Development (USAID), the Austrian Development Agency, Woord en Daad, Waterloo Foundation and the Climate and Development Knowledge Network.

Compliant Capital

Aid assistance is essential to meet the capital cost of water supply technology. However, donors need clarity on which types of technology should be installed, how much of each, where, and what procedures are necessary to make sure a water supply installation does not fail prematurely. The question as to “where” to spend capital comes first. Table 1 shows that a third of Uganda’s rural population[3] needs capital investment in water supply. Box 1 provides a guide to the technology types available to serve this population.
Useful terms in water supply planning are given in Box 2. In Uganda, the government prioritizes piped water but recognizes that in a context of rising population, availability of capital, and

Box 1. Technology

a. **Mini and macro piped,** large-scale piped water networks in /around small towns (mini) and cities (macro)

b. **Micro piped**, rural water points supplying to tap-stands or premises, including solar and grid-motorized boreholes, roof-water tanks, and small gravity flow schemes

c. **Manual**, principally hand pumps and protected springs

[3] Ministry for Water and Environment (MWE) Sector Performance Reports 2016 to 2021, https://www.mwe.go.ug/library/sector-performance-reports

Box 2. Useful terms in water supply planning

- **Coverage.** The percentage of the rural population supplied by a modernized safe water installation such as a protected spring, manual hand pump or higher levels up to a macro piped supply. In Uganda, the coverage in 2021 was 68%, a decrease since 2017 when the coverage was 70%.
- **Upgrading.** The process of replacing a hand pump by an electrical pump is called Upgrading, resulting in a micro-piped supply serving more people than served by the hand pump. Only a portion of hand pump boreholes can be upgraded since many do not have a sufficient water yield. "Upgrading" is a term used also sometimes to mean retro-fitting low-quality rising mains of hand pumps with stainless steel.
- **Restoration.** The process of rehabilitating a broken hand pump (or other manual or micro piped system) and installing fresh parts such that major parts are replaced.
- **Access.** Often mistakenly used by itself to mean the same thing as Coverage (installation of a safe water technology). With growing awareness of unreliable access due to low functionality, this use of the word access has ceased to be useful and is replaced with "**reliable access**" assured by the new maintenance structure, while installation of safe water technology is defined by the single term, **Coverage**.

hydrogeological constraints, pipes will not reach everyone and hand pumps will serve about half the population in future decades.

An exclusive focus by aid programs on funding piped water would deny this population — currently the poorest and vital to the agricultural and socio-economic development of the country — access to a reliable safe water source, the hand pump. Therefore, a focus on the humble hand pump, simultaneously with micro piped supply, is fundamental to capital assistance by donors. This paper focuses on how to maximize piped water while ensuring that those who are not connected will also have a reliable safe water supply.

Table 1 shows calculations indicating a projected capital cost of almost $250 million for manual/micro technology if an ambitious percentage of the population is reached by mini and macro piped supply, taking into account a continuing rapid population rise. The distribution of spend between hand pumps and micro-piped is in practiced influenced by hydrogeological constraint (low-yielding boreholes) and capital flow, such that the per-capita advantage of motorized boreholes does not determine a high percentage of micro-piped systems.

Is this $250 million available over the next 10 or 20 years, if we assume that aid expenditure remains constant? This question is answered by looking at current expenditure rates.

Table 1 Capital investment required to solve coverage issue

2021 Rural Population	**35,000,000**	people	2021: 8% connected to macro-mini piped networks			
People/micro	**2,000**	Cap USD/micro	**$40,000**	USD/capita	$20	
People/manual	**300**	Cap USD/manual	**$8,500**	USD/capita	$28	
% coverage	**68%**					
Rural people currently without coverage (without capital investment)					11,200,000	
Rural population growth over 10 yrs and # people needing new coverage				**30%**	14,560,000	
		% People projected to receive mini/macro-piped			**30%**	**30%**
Over next 10 years:		% People projected to receive micro-piped			**50%**	**20%**
Remaining % people receiving manual water-points (hand-pumps and similar)					20%	50%
# people micro-piped	7,280,000		Capital required for micro-piped		$145,600,000	$58,240,000
# people manual	2,912,000		Capital required for manual		$82,506,667	$206,266,667
		Total capital required fr micro/manual component			$228,106,667	$264,506,667
				Average	**$246,306,667**	

Business-as-usual; 800 million USD

The amount spent on rural water coverage, upgrading, and restoration in Uganda reported by a sample of civil society organizations (CSOs), principally NGOs, over a recent 12-month period (July 2020-June 2021) was $16.5 million[4]. Slightly less than half of the CSOs active in rural water supply contributed data,[5] so the CSO network organization collecting data suggested a possible total spend of $33 million. Spend by local and central government departments on rural water supply in the same period was reported to be $9.4 million.[6] Expenditure by major bilateral and multilateral programs may not have been captured in these two reports. As a result, a conservative total estimate is $40 million over the one year. The cited reports indicate that most of this is spent on restoration of existing hand pumps, with some spent on drilling and construction of new hand pumps, and some on upgrading or drilling of new micro-piped installations. The estimate includes some coverage improvement, although it is not sufficient to match the rising population (as previously mentioned, national coverage reduced from 70 percent in 2017 to 68 percent in 2021[7]).

Looking forward to coming decades, this annual $40 million implies that $800 million will be spent over the next 20 years. Since in recent years the spending has not improved coverage, it is reasonable to assume that no impact will be made on coverage in the future, in other words some 30 percent of the population have no safe water source installed. This is the "business-as-usual" scenario.

Implementing the national O&M policy

The new national O&M policy gives donors an opportunity to fund full coverage. The cost of doing this, is well within the limits of what is already being spent, assuming that it is possible to save some of the 800 million business-as-usual spend, and use the savings to fund the 200 million needed for coverage, alongside funding of 24/7 functionality (O&M policy implementation, or "reliable access").

The O&M framework maintenance policy[8] issued by the Ugandan government requires professional maintenance bodies to assure functionality of rural water points. A rural utility (or "Area Service Provider" in the policy's terminology, or "ASP") services both manual and micro-piped water points. The utilities are appointed by district governments and are expected to operate in service areas comprising at least 1 million people, implying clusters of five or more districts, for optimum economic scaling. They may not be the same utilities that manage mini and macro piped networks in towns and peri-urban areas (e.g., in Uganda, the National Water and Sewerage Corporation and Umbrella Authorities). It is hoped that local organizations, with assistance from donors and NGOs, will take on the ASP role of manual and micro piped technology-focused utilities in rural areas until such time that mini and macro piped networks cover all populations.

Table 2 looks at the 68 percent of the population that already has safe water supply. Over the next 10 years, almost all the water points will fail or malfunction in absence of professionalized servicing, and either be replaced by mini or macro piped supply, be upgraded, or be restored as functional hand pumps and micro water points. We ambitiously assume that capital will be available for replacement of hand pumps by mini or macro piped systems. The table then calculates the capital spend required for an ambitious level of construction or upgrading to micro

[4] Uganda WASH CSO Network (UWASNET), 2021 Annual CSO Report, https://uwasnet.org/the-2020-annual-uwasnet-cso-performance-report
[5] Ibid.
[6] Ministry for Water and Environment (MWE), October 2021 Natural Resources, Environment, Climate Change, Land and Water Management Programme Performance Report 2021
[7] MWE, see footnote 4.
[8] See footnote 2

piped supply, so that hand pumps are decommissioned to the maximum extent. It also calculates the cost of restoring the remaining hand pumps (and constructing new ones) where no other technology is feasible. The outcome is that $140 million over a 10-year period, is needed to cover the cost of upgrading, restoration, and new coverage by manual and micro-piped water points.

Table 2 Capital investment required to provide "last-time" restoration and upgrades

2021 Rural Population	35,000,000	people				
People/micro	2,000	Upgrade to micro	**$25,000**	USD/capita	$13	
People/manual	250	Restore manual	**$500**	USD/capita	$2	
% coverage	68%					
People already covered: currently with capital investment in water supply					23,800,000	
Over next 10 years:	% People projected to receive new mini/macro-piped				20%	20%
% People projected to receive upgrade to micro-piped conditional on O&M					**40%**	**20%**
% People projected to receive one-time restoration of manual conditional on O&M					40%	60%
# people upgrading to micro-piped		9,520,000	Capital required for micro-piped		$119,000,000	$59,500,000
# people "last-time" restoration hand-pump		9,520,000	Capital required for manual		$19,040,000	$28,560,000
		Total micro and manual capital required			**$138,040,000**	**$88,060,000**
		Conservative estimate ovr next 10 years			**$140,000,000**	

Last-time Capital: 140 million USD

If the national O&M policy is implemented, this $140 million is a "last-time" capital spend, because the O&M policy requires that all components at end-of-service-life are progressively renewed using fee revenues, not repeated capital investment. Major parts replacement is formally registered as recurrent cost within transparently declared maintenance accounts and included in calculation of appropriate maintenance fees. Whave tested this approach over the 10-year research period and found it to be feasible within the scope of affordable and socially acceptable maintenance tariffs,[9] supported by central and local government water authorities.[10]

Table 2 shows that it is feasible to achieve full coverage at a fraction of the current amount spent on rural water supply, $140 million followed by maintenance (the O&M implementation case) instead of $200 million repeated each year without assurance of reliable 24/7 access and without coverage (the business-as-usual case). This finding is summarized in Table 3 below.

This new mode of capital spending is compliant to the national O&M framework. When capital is spent on new coverage, upgrades, and restoration, the national maintenance structure is implemented in parallel in the targeted communities. Because the maintenance structure integrates major parts replacement in cost-recovery tariffs, each water supply installation consumes capital the "last time."

A transition to a "last time" capital spending mode cannot be instant because the maintenance structure must first be established at ground level by system investors. System investors are donors who help government bodies, programs, and NGOs implement coordination with infrastructure investors (government departments, NGOs and politicians spending capital on installations and restorations). It is a reality that donors and the NGOs they fund, and not local or central government authorities, have the leverage necessary to communicate to communities that "capital is offered on the understanding that you first sign into the new maintenance structure, in compliance with national policy".

Table 2 shows that if hand pumps supply more people, the overall cost is less, since hand pump

[9] Ten Factors for Viable Rural Water Services, SWS 2021, https://www.globalwaters.org/sites/default/files/whave-_ten_factors_final.pdf

[10] Observer, October 2021, https://observer.ug/news/headlines/71532-govt-lauds-civil-society-shs-96bn-investment-in-water-sector

restoration is relatively inexpensive in the context of a maintenance structure handling major parts replacement. Where there is no maintenance structure inclusive of major parts replacement, restorations are more expensive due to premature replacement of not-yet-worn parts, in addition to other factors that prompt inflated costs and excessive expenditure in a no-maintenance context. This represents a significant saving in funds and increase in value for money.

Pre-Works Maintenance Procedure

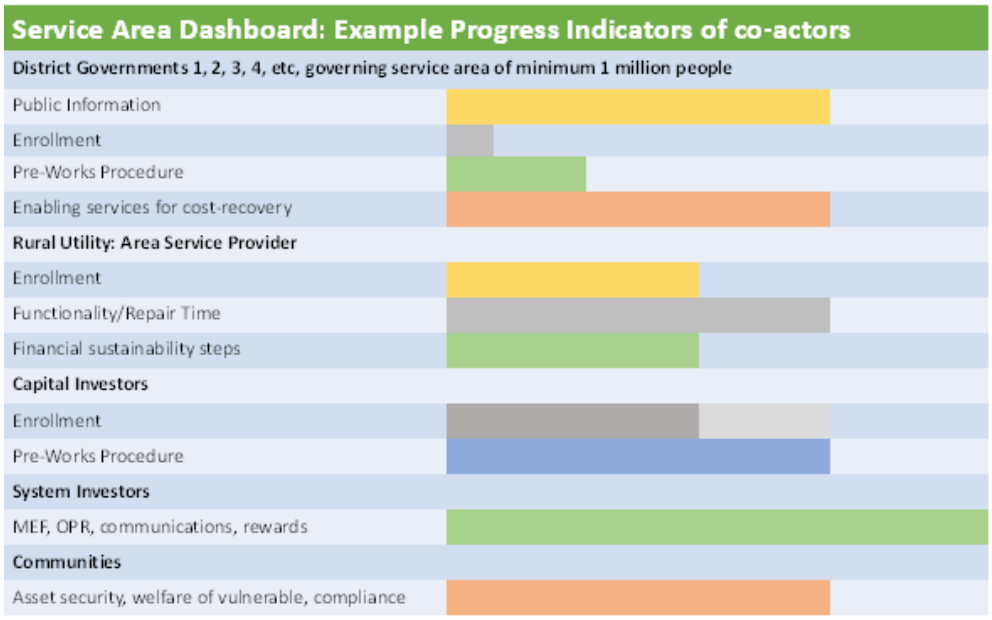
Some district governments in Uganda have already formally adopted "last time" capital spending mode by issuing a "Pre-Works Maintenance Procedure" to investors such as NGOs. This procedure requires an appointed rural water utility (the "ASP") to ensure the maintenance structure is already established in the communities targeted for investment, prior to works being conducted. In practical terms, the communities sign into maintenance agreements and pay initial fee deposits before the works start. On the investor side, this means waiting typically 2 or 3 weeks for the utility and local government to make the necessary community engagement and contracting arrangements, before bringing their tools, materials, and contractors.

The pre-works procedure is a major challenge to system change for two principal reasons. First, because investors' financial contributions in each district are so vital to meeting local needs, local governments are afraid to strictly impose the pre-works procedure in case field staff have fast-spend pressures and are tempted to find alternative districts where they can spend faster. Donors therefore must replace the current convention of fast-spend pressure, with reward to implementing staff and local government field officers for pre-enrollment into maintenance. Second, the cost of construction and restoration is typically inflated in the current business-as-usual case with benefits accruing to contractors, NGO staff, and government procurement officers. In contrast, maintenance arrangements prompt a general appreciation and knowledge of optimized expenditure, which reduces the opportunity for inflation. Again, donors and their implementing organizations have the responsibility to reward field staff and government officers supportive of the transition. This means, for example, having a flexible approach to geographic location of investment to compliant government areas, while also measuring performance of NGO ground teams and moving finance to high-performance compliant teams.

System Instruments: 60 million USD

Single Dashboard. Whave's research found that organizations active in rural water operations are generally not aware of the progress indicators set out in the national policy. A key recommendation therefore is that donors ensure that their staff, contractors, and sub-awardees become conversant and accountable to national dashboard indicators and progress markers. These markers apply to co-actors operating in each service area, defined as an area where only one rural water utility is appointed by the government. The Ugandan government recognizes this exclusivity as necessary for financial sustainability. Figure 1 illustrates how each service area has co-actors, all contributing to the same set of progress markers. At the national level, this dashboard is repeated to allow for comparison of service areas and cross-learning. The financial sustainability indicator embedded in the national O&M model requires transparent declaration by the rural utilities of their costs — including for major parts replacement — and revenues. This provides accountability to water users, donors, and government of functionality assurance, cost-efficiency, moving to breakeven between maintenance costs and revenue, ensuring that the baseline convention of repetitive capital spend is not resumed.

Figure 1 Each service area has a dashboard and dashboards are compared nationally



Professional M&E facilitators. The research found that when stakeholders are introduced to these indicators, there is considerable uncertainty as to how they are monitored, and how progress can be recorded and shared so that coordinated action is possible. Continuous visibility of these indicators to stakeholders and facilitation of their tracking collectively is an essential system instrument. The research recommends that donors fund and support a group of professional monitoring and evaluation facilitators (M&E facilitators or "MEFs") helping co-actors in each service area (see Figure 2), rotating among service areas to exchange lessons learned across the country. The co-actors include government regulation officers to whom this support from donors will be invaluable. The facilitators become effective once they conduct regular O&M performance reviews with active participation from all actors. Donor assistance to ensure participation will be essential to cover salaries and running costs of O&M performance reviews.

The importance of dashboard visibility and MEF activity cannot be overestimated. Experience and analysis found that this approach, together with compliant capital, would address the willingness-to-pay barrier which is discussed in the section below on discount subsidy.

Professional communication and coordination. Knowledge of the national policy and its implementation details, such as tariff levels agreed with communities and endorsed by government, is severely lacking among a wider group of stakeholders whose activities are influential. These stakeholders include candidates for election to parliament and councilor roles, NGO field staff, procurement officials, and church and opinion leaders. Effectively disseminating knowledge to this wider group is likely beyond government resources, so donor assistance is essential. Placing a technical expert in both the CSO coordination group and the central government, supporting a staff team of mentors training local government and NGO champions, is also essential. Additionally, a fund for a public information campaign conducted by a proven public relations company is recommended.

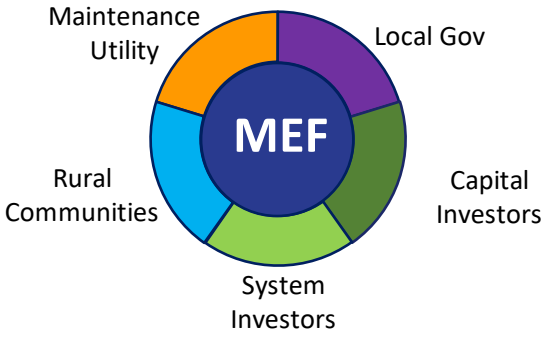


Figure 2 System actors are coordinated by a M&E Facilitator (MEF) operating in each service area

Whave held meetings with election candidates and found that many aspiring and incumbent members of parliament lacked information. They became supportive of the national maintenance policy once it was communicated to them. They were sometimes eager to break the convention of votes-for-water point-investment since construction and restoration activities often led to demands for follow-up repairs. Once they learned about the official maintenance policy, they could decide how to reach more voters by supporting it, and some suggested they "topped up" community fee payments. The emergence of maintenance utilities which publicly and transparently declare their financial data for reliable functionality avoids the interpretation of service fees as taxes.

Multi-actor O&M performance reviews. The coordination of maintenance operations with capital investment works was identified as vital. In general, construction and restoration works are conducted by contractors, NGOs, and local government departments, without reference to a uniform maintenance tariff set by government or service agreements which set out clear roles and responsibilities for communities and maintenance utilities. Accordingly, local government directs capital investors to establish a memorandum of understanding with the appointed maintenance utility, and to ensure that the communities they invest in have service agreements in place as a pre-condition of capital investment. This is only achieved with a regular performance review process to remind investors to exercise this pre-condition and check on performance.

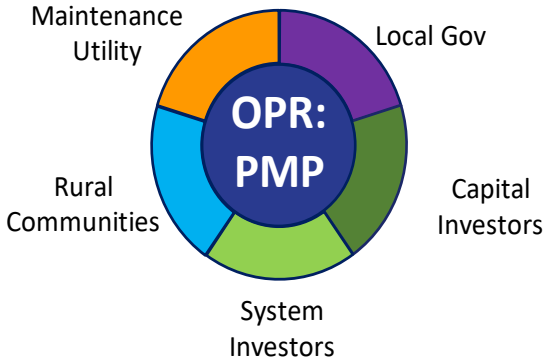


Figure 3 Regular O&M performance reviews, for example quarterly, allow M&E facilitators to prompt compliance to the Pre-works Maintenance Procedure

The research found that regular multi-actor reviews were essential to address the problem of fast-spend pressure from donors and local government fear of losing investors' interest due to the 2-week pre-works maintenance procedure or "PMP". Performance reviews were identified as necessary also to prevent reversion to ad-hoc repetitive capital spending by infrastructure investors, by supporting them to implement O&M policy in cases of community fee arrears. The introduction of top-up-fees, sponsorships and supply of hardware or finance to ASPs to cover for "non-revenue water" requires input from all parties and coordination in regular performance reviews. This compliant capital practice does not occur without pro-active influence from donors at the program design stage, due to the predominant influence of funding from capital investors. Therefore, donors should devote resources to helping local government issue and oversee effective pre-works maintenance procedures and ensure their teams and implementing contractors have the necessary skills. Resources are also needed to establish regular O&M performance reviews or "OPRs" (see Figure 3) in which progress markers on pre-works maintenance procedures and other requirements are shared.

Enrollment incentives. The research found that regular communication with actors is essential to compliance with national policy, but incentives are also required. A key recommendation to donors is to provide financial and reputational rewards, such as public acclamation, for local government councilors and staff and NGO staff, reflecting their performance in implementing service delivery and managing the incentive structures to ensure they are progressively replaced by locally-funded incentives.

Budget allocation. The following is an estimate of the budget required to fund the above system instruments:

- **Knowledge dissemination, $10 million**. Accomplishment of a 10-year public knowledge transition. This figure assumes 1,000 relevant personnel of NGO, government departments, and development partner programs, with one expert mentor allocated to groups of 20 people for an initial communication period and expenses for field work combined with radio, finance of the order of 3 million USD is needed, after which a budget of 2 million for follow-up would be enough to complete a 10-year knowledge transition. An additional 5 million can be earmarked for professional communication contractors working to international standards.
- **Enrollment incentives, $10 million**. To design and provide suitable incentives.
- **M&E facilitators, $10 million.** To conduct regular performance reviews, verification of monitored data, develop enrollment incentives and regulate their application, exchange knowledge between service areas, and chase actions agreed by stakeholders. A team working in 3 to 4 service areas, would cost approximately $100,000 per year initially. For 10 facilitation teams to cover the whole rural population, the cost to donors would be $10 million over 10 years.

Table 3 below captures this total estimate of $30 million over 10 years. To be conservative, we project the same sum is needed again for a further 10 years to overcome system inertia. The co-actors involved are local and central government and donors, who together hire and supervise a public relations company to undertake public communication, and a team of experts taking the M&E facilitator role. After this initial period of capacity building and normalization, the recurrent cost would be met by government budget.

Growth subsidy: 70 million

Figure 4 shows how the service cost of manual water points is dependent on the number of people being serviced in a service area at high functionality rates. The blue bars show the number of people enrolled in service agreements and experiencing reliable functionality. The decline in people enrolled in 2020 was due to national election campaigns, because vote-seekers promised and gave free repairs, thus disincentivizing fee payment, which in turn resulted in suspension by Whave of non-paying communities. Shortly after the elections in early 2021, most of the suspended communities re-enrolled.

The solid line shows the yearly service cost per hand pump. The general reduction over 4 years is due to management cost staying relatively fixed while volume of business grows. Hardware replacement and local technician fees are constants per hand pump and so increase in line with increasing number of communities served. Major and minor hardware parts are continuously replaced, such that the hand pump does not at any time reach an "end-of-service-life" and the capital expenditure utilized for new construction and restoration therefore follows the "last time" approach.

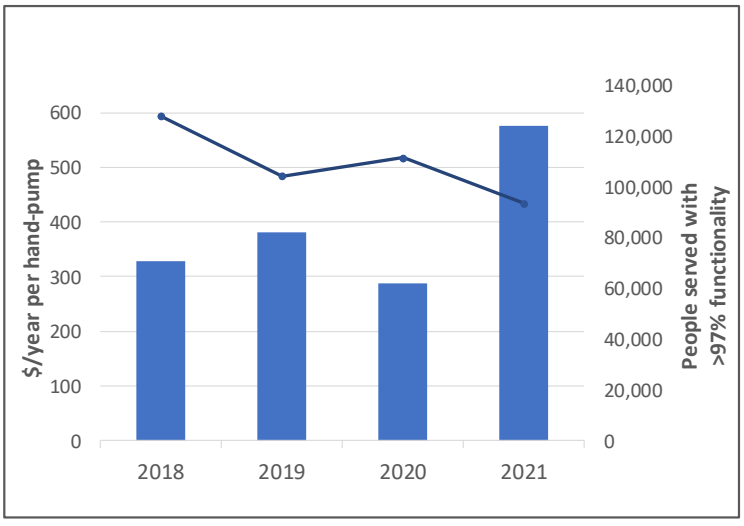


Figure 4 Whave data on hand pump maintenance cost against rising number of people served at high functionality rates of above 97 percent

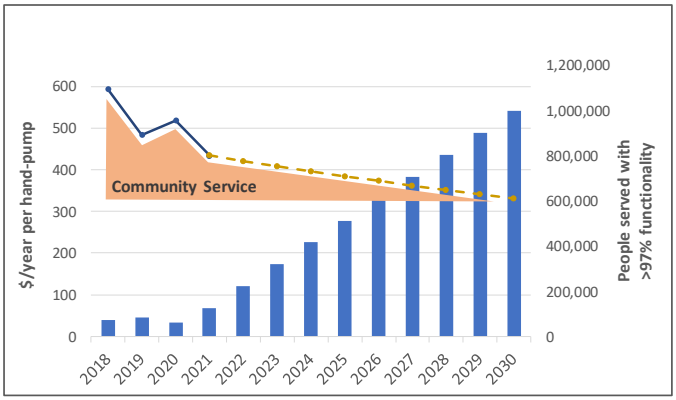


Figure 5 A projected economic cost of $325 per year per hand pump matches the socially accepted fee of 2,000 UGX ($0.50) per home per month because hand pumps serve an average of 50 homes

Figure 5 projects the service cost forward 10 years, continuing the trend of reducing unit cost with increasing volume of serviced communities. This is because the management cost increases at a lesser rate than volume. At an efficient scale of business, the projected economic cost of functionality assurance of a manual water point is $325, implying just approximately $1/year/person assured (since on average 300 people share a hand pump). The projected economic cost of running micro-piped water points with high functionality assurance is not yet known, as there are relatively few operational installations and less data is available. The best estimate is $2000/year/ water point equivalent to an equal annual cost per person.

Fig 6 shows the geographic location of the data displayed in Figures 4 and 5. Ten local governments so far have signed public-private partnership contracts with Whave and have promoted service agreements between Whave and rural communities that stipulate 1.2 million UGX ($325) as the annual community service fee (CSF). This approach allows the community to distribute payment across the harvest seasons and across water users; for example, asking wealthy families who consume large volumes of water to contribute extra to cover for vulnerable or cash-poor individuals who consume small volumes. Water vendors, commercial users, and institutions such as schools or clinics also often contribute.

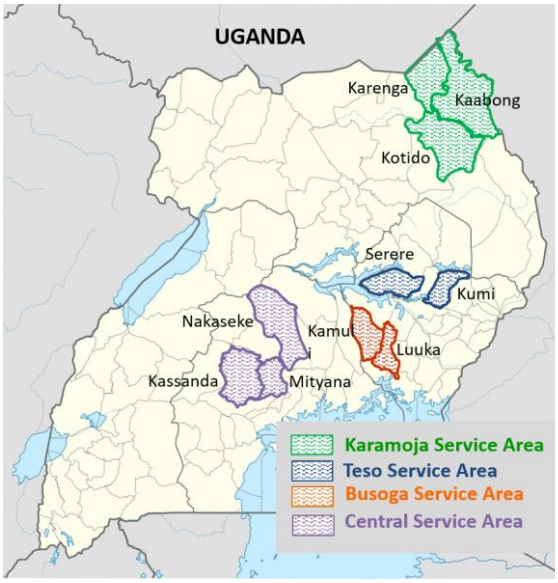


Figure 6 In 2021, Whave services 200,000 people in over 800 communities in four regions, under 10 district government contracts

Most stakeholders discuss tariffs in terms of fees paid per family per month, instead of a bulk annual fee for hand pump service. The $325 bulk fee corresponds to 2,000 UGX ($0.50) per family per month, on basis of 50 families, or 300 people, sharing one hand pump. This is less than 2 percent of average rural household income so meets the United Nations' recommendation that water costs should not exceed 3 percent of household income. The Ugandan government has publicly recommended this fee level[11]. Many district governments have already adopted it already and many NGOs advise communities to collect O&M revenues at this rate.

Figure 5 shows the projected actual service cost incurred by Whave compared to this CSF, scaled to a service area volume of 1 million people. This illustrates a major cost burden for donors promoting viable service delivery, the shortfall between the fee charged and the cost of delivering

[11] Observer, October 2021, see footnote 11

full functionality. This shortfall is the area under the cost line. Uganda has a rural population of some 35 million people, so the financial analysis must consider the cost of scaling 35 times.

The projection in Figure 5 indicates a shortfall of $1.6 million before economic breakeven is achieved in a pilot service area. Since most service areas will benefit from growth in neighboring districts, the average shortfall per service area is conservatively estimated at $1 million, so a projection of 35 million is made for national growth subsidy cost. To be more conservative, it can be assumed that this expense may repeat for a further 10 years.

Discount subsidy: 70 million

Figure 7 data indicates that compliance with maintenance tariffs is influenced by electioneering practices. The most common method used to build popularity by election candidates is provision and promise of free-of-charge water point restoration and construction, a convention which disincentives fee payment. Another influence is a general aversion in rural areas to any service charge that can be interpreted as a tax, however beneficial (e.g., small water maintenance service fees have a net cash benefit and also empower rural families to exercise their right to a reliable water supply).

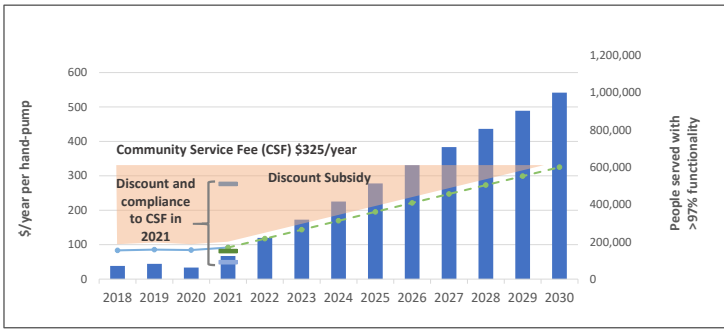


Figure 7 Whave data on fee compliance from 2018 to 2021. Suppressed willingness-to-pay is compensated for by promotional discounts on service fees that decline over the next 10 years, based on funders adopting system change instruments.

Willingness-to-pay was also found to be suppressed by organizations and local government offices providing free-of-charge restoration and construction of water points to a sample of communities, raising the expectation of other communities. This free gifting approach has a disempowering effect for low-income farming families, as it prevents them from paying fees to regulated service providers from whom they can exercise a right to reliable service delivery. In other words, they are denied their right to safe water. Regulated fees recommended by the Ugandan government are affordable and much cheaper than the current ad-hoc fees which are commonly charged for rural water.[12]

Donors often require program staff to spend budgets within a limited time period, which prevents them from first ensuring that secure maintenance arrangements are established. It also reduces the quality and durability of the investments since payment contractors are not held strictly to warranties.

Figure 7 also shows the effect of suppressed willingness-to-pay. From 2018 to 2021, Whave's average revenue rose from $83 to $92 per year per hand pump, only 26 to 28 percent of the CSF of $325, although the CSF value is generally recognized as affordable and socially acceptable. To transition through the situation of suppressed willingness-to-pay, Whave offers temporary discount subsidies. Figure 7 shows discount values combined with compliance rates. Most communities are discounted more than 50 percent and comply between 70 and 80 percent to the reduced CSF. Attempts to remove these discounts have met with little success, with the exception of Kassanda District, which appointed Whave as its area service provider in 2021. Communities

[12] Observer, Oct 2021, see footnote 11

were offered a 15 percent rebate if the full CSF was paid in the first 3 months, but no discount. Compliance to date has been promising and as the volume of service agreements in Kassanda grows, the district is acting as a precedent paving the way for discount removal. At the very least, the experience in Kassanda suggests that communities are willing to pay the full projected economic cost of a professionalized service.

Figure 7 projects increasing compliance to the CSF, reaching full cost recovery within 10 years. This projection assumes increased willingness-to-pay based on the deployment of the system instruments described in the previous section. The cost of declining discount over 10 years in pilot service areas is $1.8 million. Discounts will reduce as the process normalizes, so a conservative estimate for average discount subsidy is $1 million. To reach 35 service areas, the total subsidy is $35 million. To be more conservative, it can be assumed that this expense will repeat for a further 10 years.

Comparing the numbers

Table 3 illustrates the investment analysis described above. The table compares business-as-usual with implementation of the national O&M policy. The former approach promises a continuing failure of safe water service delivery, and continuing failure to provide suitable technologies for 30% of the population. The latter approach promises reliable safe water 24 hours 7 days a week, with the added bonus that donor finance is released for full coverage with micro-piped and manual technologies, with a bonus of a surplus for extensions of macro and mini piped networks.

Table 3 Implementation of maintenance policy by donors releases funds for full coverage and ensures reliable 24/7 access for everyone, providing a surplus for extension of piped water networks

DONOR OPTIONS FOR NEXT TWO DECADES		**2022 to 2032**	**2032 to 2042**	**20 years**
		million USD		
1. Business-as-usual				
Repetitive capital investment continues		**400**	**400**	**800**
Impact:				
Coverage stays below 70%				
Functionality rates remain low; reliable access is not achieved				
2. Implement national maintenance policy				
Address coverage gap applying Pre-Works Maintenance Procedure (PMP) integrating major parts		125	125	250
Adopt last-time capital approach to delapidated technology and upgrading with PMP as above		140	Zero	140
Deploy System Investments coordnating with co-actors:				
> System Instruments (eg dashboard, MEFs/OPRs)		30 mill	30 mill	60
> Temporary Growth Subsidy		35 mill	35 mill	70
> Temporary Discount subsidy		35 mill	35 mill	70
Impact:	Total	**365 mill**	**225 mill**	590
Savings on the Business-as-Usual capital investment		**Saved : 35 mill**	**Saved : 175 mill**	**Saved: 210 mill**
Coverage rises to 100% inclusive of maximised micro-piped systems with savings available				
Functionality rises to above 97% for all rural water insatllations: SDG 6.1 reliable access is achieved				
Water Users pay affordable fees at approx 0.5 $/month/family on average				

Designing WASH programs for 24/7 service delivery

In countries where a robust national O&M policy is already in place, aid should focus on implementing the policy, following the funding approaches described above. Where a policy is not yet in place, the same approaches can be used to introduce one. In both cases, conventional program design and budgeting templates are a barrier, and new ones must be adopted as follows:

- **Choose the right geographic location.** If an aid program is mainly focused on capital spend

on water supply technology installation, then it must focus on geographies where maintenance structures are already operational to ensure social and economic return. Otherwise, it must prioritize system instruments to prepare for capital investment.

- **Be flexible to changing the geographic location during the program period.** Funds should be allocated where they are most effective and moved away from areas of strong resistance, to fit with a results-incentive approach.
- **Allow local staff to use the standard calendar quarters**. Coordination of aid programs with government and civil society co-actors is commonly hampered by different actors following different calendars. For example, Quarter 1 may be October to December in some programs but government may be simultaneously in its fiscal Quarter 2 and other organizations in their Quarter 4. It is strongly recommended to use the standard calendar where the first quarter is January to March; translation to the donor's unique calendar can be done more efficiently in the donor country.
- **Use local terminology.** To ensure efficient and effective communication between the program and co-actors, all activities, spending rules, communications should use the terminology of the beneficiary country's O&M policy and operational manuals.
- **Study and integrate to national plan status.** Design programs that understand and build on the up-to-date status of national implementation effort. Study that status in detail and take advice from local practitioners. The log-frame and theory of change should include a clear picture of service delivery progress markers (for example enrollment, functionality, pre-works maintenance coordination, and financial sustainability) at the start of intervention.
- **Target skills to professional utility outreach.** To win the trust of local farmers, program staff need to be skilled in business and marketing and adept at translating complex financial and technical language to "value for money" discussions.
- **Coordinate with co-actors to undertake complementary activities.** The program should demonstrate a clear understanding of the contributions of all O&M actors working in parallel during the program. Partnerships should be established beforehand to help with this, and to help with coordinated progress and funding. The complementary activities of co-actors expected to continue subsequent to the program should also be described. Your project budget should be described in program documents as a contribution to overall national budget for system investment, combined with a timeline for recovering maintenance costs from fee revenue and with an estimation of co-actors' financial contributions.
- **Follow the compliant capital approach.**
- **Invest in the systems instruments described above**
- **Prioritize enrollment, not capital spend.** Enrollment of people into effective maintenance contracts and service delivery should be the key deliverable. This replaces the current convention of capital expenditure by deadline dates which prevents community willingness to pay fees and enroll in maintenance contracts.
- **Define quality performance thresholds for enrollment.** Program documentation should specify quality thresholds, principally functionality, repair time, and financial sustainability and ensure coordination between co-actors. These thresholds may exceed national targets.
- **Adopt result-based financing.** Contract local implementing organizations on a pay-for-deliverables basis that includes high-functionality and low-service-cost performance enrollment and delivery of system instruments.

Conclusion and Recommendations

Assuming the country targeted for assistance already has an appropriate policy for functionality assurance, as in the case of Uganda, recommendations for best practice are as follows:

1. Adopt the compliant capital approach

- Follow the "last time" approach to capital spend on installations, such that future expenditure in each installation is included as major parts replacement in the maintenance structure.
- Support the Pre-Works Maintenance Procedure, and locate investment flexibly during the program period to reward compliant local government and partners

2. System instruments

- Design your program around service areas and a single dashboard of progress markers, and support M&E facilitators to ensure co-actors coordinate their performance and follow pre-works maintenance procedures
- Finance communication of the national policy to all actors, and incentives for enrollment
- Provide growth and discount subsidies for emerging maintenance utilities, linked to incentives for your program staff and partners for convergence of cost and revenue

3. Engage stakeholders in the numbers comparison

- Discuss the financial reports on repetitive capital, low functionality and failed improvement of coverage
- Discuss the cost of national policy communication, enrollment incentives for local government and NGO staff, M&E facilitation
- Is Table 3 confirmed by your discussions and analysis? What practical methods are needed to ensure that maintenance arrangements are inclusive of major-parts and generate sustained 24/7 service delivery (reliable access), as well as significant cost savings available for improved coverage?:

4. Design WASH programs for 24/7 service delivery and full coverage

- Prioritize maintenance enrollment in place of capital spend on installations
- Build on national baseline of co-actors' contributions and O&M performance quality levels,
- Ensure staff have marketing, communication and business skills, and contribute to costs of professional public communication contractors
- Use the national terminology, calendar, single performance dashboard, to ensure local implementers coordinate efficiently
- Switch to result-based funding to reward high-functionality/low-service-cost enrollment and to reward accomplishment of system instruments
- Adopt the system instruments and compliant capital "last-time" approach