

Steps to sustainability- a road-map for WASH

Abstract/Summary.

This paper presents a strategy for achievement of Sustainable Development Goals 6.1 and 6.2 (universal access to clean water and to adequate sanitation and hygiene) in the context of rural Uganda. With participation of the Ministry of Water and Environment, a group of local government representatives have consulted in a series of workshops and meetings over the past 5 years. This “Learning Alliance” has been hosted by a Ugandan social enterprise, Whave Solutions. The alliance undertook a systems analysis which identified key barriers to effective WASH delivery, such as financial disincentive for preventive maintenance. A regulatory structure and service delivery public-private partnership (PPP) approach was developed and implemented through practical maintenance contracts in more than two hundred communities. The PPP key elements were performance-payment for preventive maintenance, reliability assurance contracts between a service company and rural communities, proposed new by-laws, standard constitutions, banking and legal status for the management committees of communities, and institutionalised monitoring. The paper describes how staged implementation of these elements has potential to transform prospects for financial viability of reliable and universal water access line with SDG 6.1, and how this process introduces investment in piped supply as a key method of improving sanitation access and hygiene, in line with SDG 6.2.

Background

The Sustainable Development Goal (SDG) 6.1 looks forward to a situation where everyone is assured of a regular supply of clean water. Goal 6.2 projects an equivalent assurance of adequate sanitation. These goals speak of significant change in current water supply, sanitation, and hygiene (WASH) conditions amongst the majority populations in developing countries, both rural and urban. With involvement of local governments and the Ministry of Water and Environment (MWE) of Uganda, Whave Solutions, a Ugandan local social enterprise, hosted a Learning Alliance consisting of stakeholder meetings which combined dialogue with feedback from practical engagement in over two hundred communities in five districts. This collaborative process started in 2011 with conversations with MWE. By 2013 several local governments and stakeholders were engaged in the detailed multi-district workshops, feeding their direct “on the ground” experience and knowledge into a strategy designed to tackle the root causes of barriers to water, sanitation, and hygiene (WASH) effectiveness.

The five districts involved have distinctive cultural, social and economic characteristics (Fig 1). They range from Nakaseke which is close to Kampala, Luganda speaking, and relatively modernised socially and economically, to two districts of Karamoja (Kotido and Kaabong) which are culturally, socially, linguistically and economically lagging in terms of modern WASH expectations. The two others are Kamuli and Kumi, each having differing rural poverty issues and distinctive languages (Lusoga and Ateso respectively). The systems analysis and systems development process undertaken by these five districts reflects varied conditions across Uganda, and therefore the strategy that is formulation process is potentially relevant nationally.

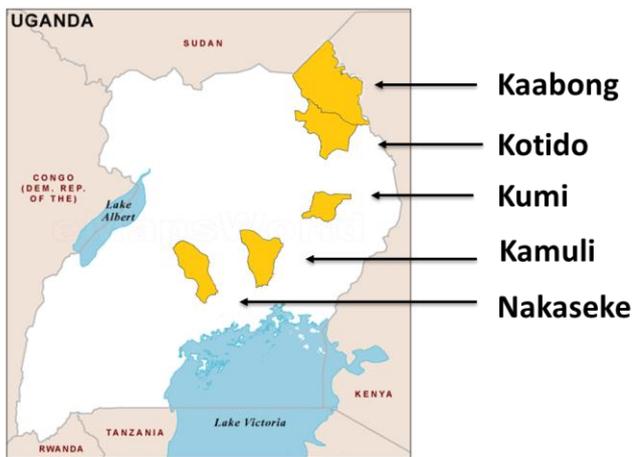


Fig 1. Districts participating in the Sustainable WASH Systems Learning Alliance (*not to scale*)

The Alliance identified fundamental systematic barriers to effective WASH. The first to be explored was the poor level of trust between communities and technicians, and inadequate access to quality parts by local technicians, leading to a “wait-till-it-breaks” attitude which causes frequent breakdowns, prolonged down-times and overly expensive repairs. This was agreed by alliance participants to be a primary issue and indeed appears to be a systems failure globally. A survey of Least Developed Countries (LDCs) indicated an average water source reliability level of 62% (Davis, 2013).

The innovation introduced was to offer local technicians a pay-for-performance contract which rewarded a preventive maintenance approach combined with parts-stocking assistance; over the years since 2013 reliability indicators have been tracked carefully and the results are very promising, with down-time almost disappearing, maintenance costs being very reasonable, and technician-community relationships becoming positive (Harvey A, 2015, 2016).

The second barrier identified was poor quality installation work, and indeed the remaining breakdown occurrences were usually found to be associated with initial installation materials quality and design issues. A third barrier was that local government assistance is generally given “major repairs”, an arrangement which reduces motivation by communities to take preventive steps, encouraging a “wait-till-it-breaks” syndrome. A fourth barrier was low motivation by community water and sanitation committees (WSCs) to undertake the difficult work of fee collection and management of technical aspects and technicians.

These four barriers were together addressed by proposing that a Service Provider Company handled performance-payment of technicians, control of parts quality (refurbishments to higher standard and progressive upgrading of poor installation materials), inclusion of “major repairs” within a preventive maintenance service agreement (PMSA) signed with the WSC, re-motivating the WSC by offering the PMSA which relieves the WSC officers of technical work they are under-resourced for, transferring it to a Service Provider Company, leaving the WSC officers with locally manageable tasks such as controlling theft and abuse of the water source. The effect has been significantly improved source functionality based on regular preventive maintenance.

These steps have been successful in securing reliable operation of water sources in more than two hundred communities in five districts. The improvement in service quality has been rewarded by willingness of water users to pay maintenance dues to their WSCs, who in turn have paid the service company annual fees. However, the fees charged currently do not meet the full costs of the service company. They are at a level sufficient to pay for the technical components of the preventive maintenance and immediate repair services (technicians fees and materials costs) but not for the management and monitoring components. Learning Alliance participants have been unanimous in linking this willingness-to-pay barrier to lack of trust by community members in WSC accountability.

Participants devised the following solutions to the willingness-to-pay barrier, as illustrated in Fig 2: (a) standardisation of community WASH constitutions, so that local government outreach officers know the rules in each community and

can therefore provide assistance (community by-laws annexed to constitutions still being specific to individual communities), (b) registration of WSCs as Community-Based Organizations (CBOs) so that they can open bank accounts, become legally constituted and responsible for their duties, better organised for transparent payment of their executive officers, (c) opening of WSC bank accounts with transaction records being reported regularly to community members, visible publicly and supervised by local authorities and or by local civil society organisations appointed as support monitors, (e) appropriate new by-laws implemented by sub-county, parish and village authorities, (f) establishment of enhanced monitoring services at district level to strengthen existing monitoring of functionality, water quality, and sanitation/hygiene conditions, in order to inform licensing of service companies and steering of sanitation and hygiene interventions, (g) training of local Service Provider Companies, in particular bringing relevant management capacity to existing and new Hand-Pump Mechanics Associations (HPMAs), (h) approvals or licences for Service Provider Companies based on monitored performance.

Practical steps were taken in 2015, 2016 and 2017 to test these measures. In Kumi District for example, forty-eight WSCs were registered as CBOs by sub-county authorities and opened formal bank accounts. By early 2017 fifteen communities had collected and deposited O&M funds averaging \$93 (335,000 UGX) and paid a standardised per-water-source PMSA annual fee of \$83/year (300,000 UGX), drawing from their bank accounts, leaving some funds for internal expenses. In Kamuli and Nakaseke Districts, by early 2017 over eighty communities signed into PMSAs and are paying an equivalent per-household fee as in Kumi, and new by-laws as described below have been formulated by sub-county councils. CBO and bank account registration is underway in mid-2017, while the by-laws are under approval by district councils. The interest displayed in service agreements in Kotido and Kaabong has exceeded expectation given the greater cultural differences and dependency conditions of the Karamojong region, and its very poor water source functionality; an early 2016 survey showed that 50% of sources were non-functional. Subsequently eighty-four sources were rehabilitated with cash contributions from the communities following government guidelines. By mid-2017, several communities had registered as CBOs and paid a PMSA fee of \$55/year (200,000 UGX). In all five districts, monitoring services have been established in respect of source reliability, source and home drinking water quality (exclusively faecal contamination indicators) and community hygiene and sanitation; data is regularly shared with community, parish, sub-county and district authorities.

Elements of Sustainability

The Learning Alliance has generated a list of elements for a coherent and effective WASH structure, and started to implement already, as described above. The elements are very similar to the enabling environment “building blocks” discussed in recent studies (Harvey P et al, 2004; Schouten et al, 2015). The intention is that the Learning Alliance lays practical foundations in model districts which are economically viable and well-proven enough to justify replication and scaling nationally. These elements are illustrated by Fig 2 and listed here, together with notes as to what is already being practised, and what is still under development or projected:

- Local technicians contracted by a Service Provider Company with incentives for preventive maintenance, practised already. Given the shortage of skilled technicians in most rural areas, district-level Hand-Pump Mechanics Association (HPMA) may help to resource, train, and certify local technicians (under development).
- Water and Sanitation Committees (WSCs) are registered as officers of Community Based Organizations (CBOs) and so have status as legal entities; already practised in multiple districts.
- Preventive Maintenance Service Provider Agreements (PMSAs) are signed between WSCs and Service Provider Companies; already practised in multiple districts. The Providers are not necessarily Companies, since the option is open for a sub-county board to carry out the functions, and it is also possible for local technicians to be approved providers of preventive maintenance service agreements (see below). Ultimately the choice of the PPP mode is with each district government and variations are likely to emerge.
- Build-and -Maintain Contracts. Currently the model Service Provider Company undertakes rehabilitations in communities with abandoned sources, and links this financial investment to a commitment by the WSC to preventively maintain for multiple years. The proposed by-laws listed below reflect this linkage; they suggest that no community can receive government or aid-assistance for a capital asset without a commensurate

- commitment to preventive maintenance. This logic implies that the same company that builds, also maintains, so that financial incentive works to achieve “safely managed” access to water in line with SDG 6.1.
- Stocking and quality-control of materials and parts at sub-county and district level. The Service Provider performs this function at local level, as practised already by Whave as a prototype Service Provider. It is also an option for District Water Offices as in Fig. 2, or is shared. The Learning Alliance and many District Water Officers are calling on MWE for active oversight at national level.
 - Bank accounts for WSCs which are monitored and open for public scrutiny (practised already), to build confidence in accountability and therefore to solve the problem of willingness-to-pay (alongside reliable service delivery). Digital bank accounts using phone networks are expected to facilitate supervision; under development.
 - New by-laws supported by consensus and social acceptance amongst public, opinion leaders and politicians stimulated by radio talk-shows and community meetings. Radio talk shows have already proved successful and are being further developed. The by-laws are to be implemented through existing local government budget disbursement, and possibly through adjustments to disbursement modes. For example, Operation and Maintenance (O&M) budgets currently spent on rehabilitation become available for implementing the by-laws, because preventive maintenance reduces need for rehabilitation. Participants in the 2017 Learning Alliance workshops, commented that current government budgets and staff capabilities are sufficient to implement the proposed new by-laws. As of early 2017 new by-laws proposed by several sub-county councils are under development as follows:
 - Every water source shared by a community has a preventive maintenance service agreement, signed between a Water and Sanitation Committee and an approved service provider. The service agreement must include at least 4 checks per year (one major overhaul, and 3 minor).
 - Every committee must collect at least [50.3]1000 UGX/household/month or equivalent per year [expectation is that this mandatory minimum level will increase in forthcoming years]
 - Every committee registers as a Community Based Organization (CBO) with the Sub-County, adopts an approved standardized constitution and operates an O&M bank account open to public scrutiny and shares transaction details with subscribers at least quarterly
 - Sources are not eligible for rehabilitation within 10 years of a previous rehabilitation, assuming an approved level of upgrade
 - Enhanced monitoring, as described above. This initiative realizes in practice recommendations made by WASH studies (Schouten et al, 2015). Currently monitoring is carried out by MWE and district water officers following a set of “Golden Indicators” and results published both on-line (MWE, 2017) and in annual sector performance reports (MWE, 2016). This professionalism provides a strong base for enhanced monitoring by local government officers, or by local CSOs appointed by government to the role of monitoring support agents. Whave already operates a monitoring team which samples in each community serviced at least quarterly, the following indicators: source operational reliability, source water quality, community hygiene, water quality in home drinking water containers. Data is shared with government and communities regularly.
 - Basket funding is under development. This reflects recommendations of previous studies (Biteete, 2013). In so far as sponsors (development partners, NGOs, local benefactors, politicians) continue to contribute funds, the monitoring can be linked to coordinated basket finance at district level, with the sponsors co-ordinating both funds and also their activities in compliance with the District’s regulatory structure.

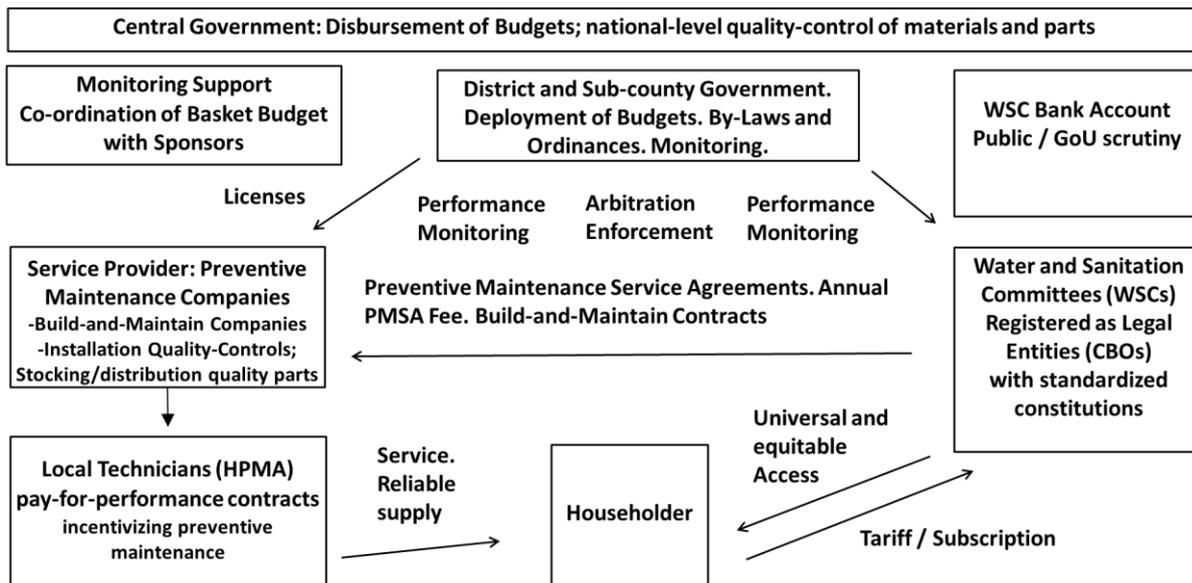


Fig 2: Regulatory Framework Option/stage 1

Fig 3 shows the same PPP regulatory structure with the difference that the Service Provider function is not carried out by a Company but by a Sub-County Water and Sanitation Board (SWSSB). WSCs pay service fees to the Board. Some districts may prefer this approach and this option is therefore retained in the on-going Learning Alliance dialogue. Some participants commented that the existing executive council of the sub-county is already effectively a SWSSB, especially if a salary for a WASH executive officer is added to sub-county staffing. The dominant opinion since 2013 has been that similar approaches have been tried and failed, and that a board cannot carry out the transactional and specialist functions of Service Company, only regulatory tasks. However, some progress has been made in non-participating districts with a version of this arrangement (IRC, 2015); uptake was reported as limited due to “fear of handing over control of user fees to higher level/distant structures and inadequate understanding of the concept and lack of buy in from leadership in some sub counties” The limited uptake may be partly because the various enabling conditions projected in Fig 3 (WSC bank accounts, performance-paid technicians, monitoring of performance and service agreements) are not yet active in current trials of the SWSSB; the full regulatory structure needs to be built, before Option 2 is ready to prove its value.

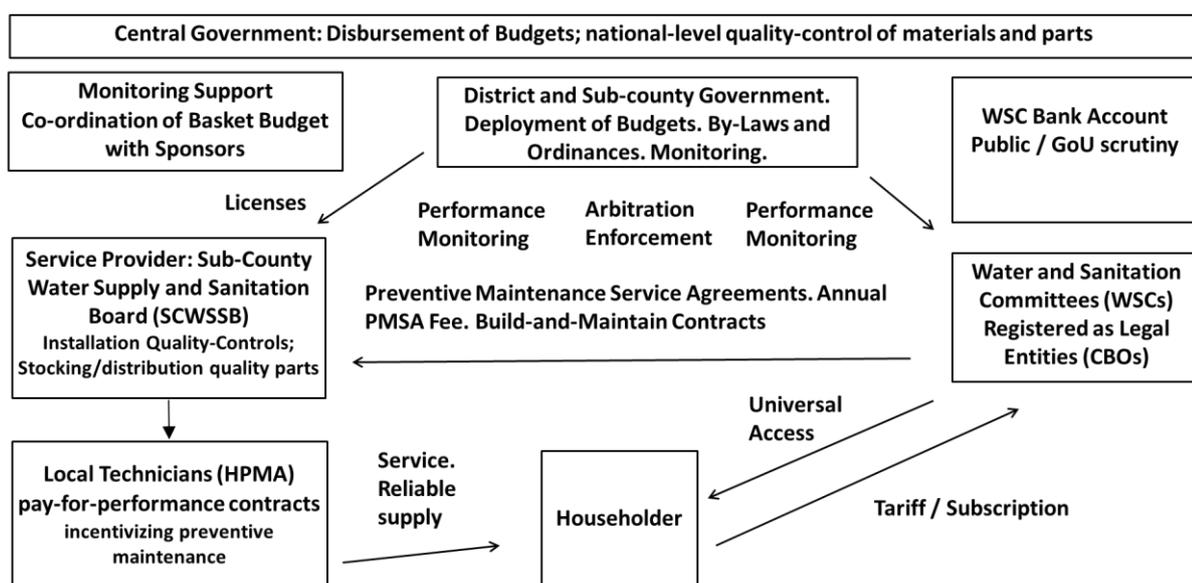


Fig 3: Regulatory Framework Option/stage 2 (more public sector and less large-scale private sector)

This “Option/stage 2” of the PPP structure leads to a potential “Option/stage 2b” where local technicians take the transactional role of the Service Provider Company, as “Individual/Local Service Providers (ISPs)” – in other words, they sign PMSAs with the WSCs and are paid directly for preventive maintenance by the WSCs. This is possible if the SWSSB provides adequate regulation along with the HPMA. Participants in the Learning Alliance including MWE have not favoured this “ISP” approach due to the risk involved, for example the local technician-WSC relations revert to current patterns, regulatory loading becomes too onerous, and unsuitability for a shift to Build-and-Maintain modality. However, if preventive maintenance becomes mandatory, and HPMA take on the Build-and-Maintain role, this option/stage may become cost-effective in some districts with strong government regulation capacity.

Viability

Learning Alliance participants take the view that maintenance dues are at this moment in time, mid-2017, are only acceptable if limited to \$0.3/hh/month (1000 UGX), or its annual equivalent (since in most communities fees are best collected once or twice a year at harvest times). However, practical experience of servicing sources in the five districts has indicated that if cost-recovery from users meet the Service Provider management and technical costs (local technicians’ fees, transport, tooling and materials costs), fees would have to be at least double this, or in smaller communities where less people share a source, more than double.

Considering hand-pumped water sources, the evidence so far is that a reliability assurance Service Provider with economically viable customer volume would incur costs averaging \$280/year/source (1 million UGX). The sum of \$280/year (1 million UGX) would be the annual “service fee”, an out-of-community payment to a service company. Communities retain freedom to decide their internal community-by-laws, and most communities are expected to collect another \$70 (0.25 million UGX) into their WSC bank account each year, to cover in-community earnings by caretakers and fee collectors. The total amount collected therefore becomes \$350 (1.25 million UGX) per year, for both PMSA fees and in-community expenses.

When this annual fund is divided between households, a critical factor is the number of homes sharing one source. Some of the sources engaged in Learning Alliance, in Ongino sub-county n Kumi District for example, have around sixty households sharing one source. Assuming conservatively that the \$350/year is met from subscriptions in communities of this size, the household subscription becomes \$0.5/hh/month (1,750 UGX). This means that \$6 (21,000 UGX) per month is available for caretaking and fee collection (remuneration could be tied to fees collected). Communities may decide to collect more or less for caretaking and management remuneration purposes.

Household subscriptions are not the only source of finance available to WSCs. It is common in Kumi for people arriving from outside the community to be charged per jerry-can fill, and for brick-makers and constructors to pay higher-level business-user contributions. The \$350 annual requirement is therefore partially met by user-household subscriptions and partly by these other contributions. Some households may pay less than an equal contribution due to bereavement or extreme poverty, and some may simply be non-compliant while still taking water.

Difficulties arise when fewer homes share one source. In Kamuli District for example, the average number of homes per rural source is 35, which implies subscription fees (neglecting the extra revenue) of \$0.8/hh/month (3,000 UGX), or somewhat less when extra revenue from business-users or visitors is taken into account. This conclusion matches with earlier studies carried out in areas where few homes share one water source (Biteete, 2013).

Census figures indicate an average monthly household rural income of \$90 nominal and \$45 real (163,000 UGX). A water fee range of \$0.5 - \$0.8 (1,750-3,000 UGX) is therefore 1.1% to 1.8% of average real income (UBOS, 2014).

A rural household monthly fee level of \$0.5 - \$0.8 is small and promises to be feasible, if the situation in rural trading centres is considered. The markets are frequently visited by rural families, and they know that acquaintances and relatives living in the trading area are paying 100 UGX/jerry-can fill, sometimes even 200 UGX or more, implying family expenditure of between 15,000 UGX and 30,000 UGX per month (\$4 to \$8). In some cases, the water sources are

privately owned and in some they are public stand pipes installed by NWSC, who have been trying to control these high prices (Eyotaru and Namuloki, 2017). These rates are significantly costlier than the \$0.5 - \$0.8 subscriptions projected for cost-recovery for reliability assurance arrangements.

Despite this huge disparity between rates at stand-pipes and subscriptions required in shared-source communities, stakeholders in the Learning Alliance meetings of 2016 – 2017, most of whom are politicians seeking votes, are certain that it is not feasible currently to suggest that rural households pay monthly fees in the range \$0.5 - \$0.8. Their view is that improved service from Companies, reliable supply, banking of subscriptions, and implementation of the proposed by-laws will change the situation in coming years; fees cannot be set high now, but can increase in coming years as the sustainability elements are activated and scaled.

The above service fee projections are based on a Service Provider Company having enough customers to be economically viable. Engagement of between 400 and 1000 WSCs (Harvey A, 2016) is needed to cover technical as well as management and administrative costs including salaries for a manager, engineer, and administrator. The large variation is due to uncertainty as to extent of regulatory support – a lower breakeven is achieved with strong regulation and vice versa. This implies that the Service Provider would operate in more than one district, since the average number of rural water sources per district is just over 1000. Kumi District for example has 700 rural water sources and Kamuli 1,400.

The projected \$280 service fee is calculated as sufficient to meet the core cost of reliability tracking by a monitoring support agent or government office; this could be paid by the service company as a licence fee. However, there is a suite of costs which service companies cannot be expected to cover with community fees, and which fall to government, such as by-law implementation and attention to structural issues such as aquifer yield, re-siting, and source contamination. Current central government budgetary assistance to sub-counties and districts is considered sufficient by some members of the Learning Alliance but not all, and budget augmentation may be needed.

Viability is therefore determined not only by communities being willing to pay for external service fees and internal costs, but also on whether government budgets, resources, and capabilities are in place. Figs. 1, 2, and 3 illustrate different options for government support. The viability strategy suggested is that each district considers these options and chooses the most suitable, or designs a variation. It is suggested that option 1 is seen as a front-runner which paves the way with potential for a shift over time to option 2 (or 2b) or 3, depending on conditions in individual districts.

The costs of monitoring related to improved sanitation and hygiene (water quality monitoring in homes and community hygiene sampling) cannot realistically be included in a license fee, as these aspects of WASH are largely outside the practical remit of a local service company and they would raise service fees. They require public health and O&M budgets, which are also needed to address the issues exposed by the monitoring data. Leading the practical field work of the Learning Alliance, a Whave monitoring team has over the past four years collected information on this topic in order to help plan for district monitoring support agents within the regulatory structure (Figs. 1, 2, 3). The data collected has revealed endemic levels of faecal contamination of drinking water in homes. Solutions have been developed and continuous community hygiene monitoring has proved a useful behaviour-change mechanism (Harvey A, 2016).

Business or Community Management or both?

Currently rural communities are largely free to negotiate repair prices with local private technicians. The current government policy of Community Based Maintenance (CBM) requires each community to have a functioning Water and Sanitation Committee (WSC) and to independently decide how much water users should contribute to maintenance. In some ways this is a business model for WASH services, since the private sector and customer are interacting with relatively little regulation. However, the CBM system requires government to continuously undertake major repairs and rehabilitations of abandoned sources. When regulation is imposed, as is occasionally the case when district authorities standardise repair prices and accredit hand-pump mechanics through HPMAAs, the CBM approach is

a form of Public-Private Partnership (PPP) since the private sector operates within regulations, and government plays a key role in major repairs, so acts as a partner to the private sector.

As mentioned earlier, the current CBM approach is failing to deliver reliable supply, partly because it demotivates maintenance by communities by calling on government undertake major repairs, so encouraging a “wait-till-it-breaks” mind-set. It also requires local committee (WSC) members to take on tasks and responsibilities which are not feasible given village resources, such as transacting with technicians and controlling spare parts quality.

Fig 4 shows a more business-orientated version of the regulatory framework proposed which removes the WSC role. The Service Provider would appoint a local agent in each community to collect service fees directly from each user and to protect the source from theft and abuse. This removes the need for a WSC and a WSC bank account and so reduces scaling costs and complexity. Public oversight and authority would still be needed both at village and at district/higher level to control the quality of the Service Provider Company’s work and to lease the source. It would also be needed to arbitrate in cases of provider-community disputes, to ensure that the “universal and equitable” clause of SDG 6.1 is met, that is, poor or bereaved families are not excluded from water access by the provider (with wealthier families and businesses paying for excess consumption to compensate). Most of this regulation would be the responsibility of the government authority already in existence in the village, the Chair of the Local Council 1, commonly referred to as the “LC1”; his authority would be necessary to ensure that water supply was not for the rich only, and that the provider acted according to performance expectations and by-laws.

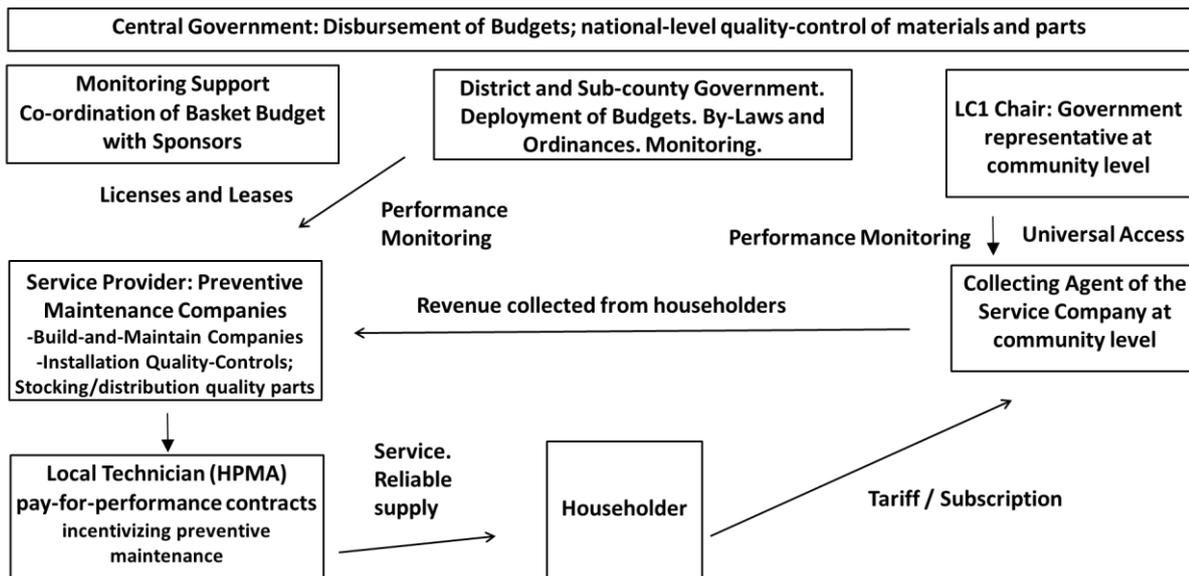


Fig 4: Regulatory Framework Option/stage 3, the “Business version”: less public and more private sector

Reduction of cost and complexity is necessary for scaling nationwide, and so this business-weighted version of the PPP may be important step in universalizing effective and sustainable WASH. Current thinking in the Learning Alliance is that it is not feasible in the short-term. In order to build willingness-to-pay, the first stage/version (Fig 2) involving a WSC with a bank account, is necessary. Once these measures have established enabling conditions for preventive maintenance and willingness-to-pay, the “business version” could be adopted.

It is possible however that the enabling conditions for willingness-to-pay-for reliable-water induced by Stage/option 1, will emerge as equally valuable for other rural development advances such as community-organized irrigation and financial services to support investment and training in climate-smart agricultural approaches and livelihood diversification. It may be that they will underpin wider uptake of Village Savings and Loan Associations (VSLAs), which work well for economic uplift and have potential for acting as water fee collectors, but so far fail to reach scale. If the enabling conditions grow in value, it may turn out most districts choose to retain the stage 1 option in fig. 1, and not

move to option 2, which carries risk of the LC1 being over-loaded with responsibilities and unable to prevent exclusive service for the rich.

The option 3 (business version) of the regulatory framework could be seen as falling under a policy titled CBM or Improved CBM (ICBM), since in principle the community retains a role, especially as the LC1 is a member of the community, government by-laws and their implementation will be key to ensuring equal access, arbitration, leasing of water sources, performance monitoring and licensing of service companies; and because communities have choice of provider. Equally, this approach can be seen as non-CBM and non-ICBM since annual source service fees would not be decided by the communities, no WSC would be active, and government partnership and regulation would be limited: for example, the LC1 may not be able to regulate sufficiently, leasing of water sources to service companies may be difficult in practice, and while in principle communities may keep freedom to choose which service company they employ, in practice they may not have choice.

Options 1 and 2 are easier to acknowledge as revised CBM or ICBM since the WSC retains a key role. But option 3 still has an element of community management and regulation, so all options within the broad regulatory framework proposed are potentially ICBM. The common feature is the partnership of public and private sectors (PPP). In the words of one recent study "...the implication is not that community management is irrelevant but that risks and responsibilities in water service delivery could be more effectively allocated..." (Hope, 2015).

The larger towns of Uganda and some smaller towns have metered water connections piped to each home by the National Water and Sewerage Company (NWSC); also semi-rural areas have a number of public stand pipes (PSPs) installed by NWSC. Ultimately all homes in Uganda could be served under NWSC management, and in many ways the structures described here are a preparatory stage.

Achieving SDG 6.2: Building a base for piped supply

Many Learning Alliance members have commented that attention must be paid to two key aspects of WASH equally: reliable supply of clean water, and safe handling without human contamination (the safe water chain). Since 2013 the practical field work of the Learning Alliance has included equal attention to both aspects. Several practical solutions for sanitation and hygiene are being tested. These include training local potters to make and sell storage pots which prevent finger dipping, revival of traditional cleansing methods, revising conventional outreach documentation, monitoring of water quality in homes and community hygiene, village health clubs, promoting competition, developing an alternative tip-tap, marketing slow release purification blocks, and chlorine dispensers; the outcomes so far are recorded elsewhere (Harvey A 2015, 2016). In this paper discussion of improved hygiene and sanitation is confined to one solution: piped water. Studies have shown that hygiene and sanitation conditions improve significantly once water supply is not only reliable but also close-by, which in practice means a tap should be less than a hundred metres from home (Howard, 2003).

The strategy described here is therefore focused on taking steps toward universal piped supply in rural communities. Although more expense is involved, it is possible that this represents a route to viable and therefore sustained supply for everyone, on the premise that willingness-to-pay is best addressed by improving quality of service. Piped supply can be introduced as a quality-of-service lift available to communities proving themselves capable of regular payment of dues. Hence, the structure described in Fig. 1 is seen as key step toward piped supply.

Bringing clean water closer to home is not only achieved by piping from mechanised ground-water pumps such as solar pumps, gravity systems, or human-powered (treadle pumps) and animal-powered pumps. Roof water harvesting is a cost-effective solution in Uganda and purification methods are improving in acceptance and cost-effectiveness. All these require the organizational and regulatory approach described here to realise their potential as for universal access in a community, to avoid the risk of satisfying the needs of a few wealthy families, who then have less motivation to support a community supply system allowing for the "universal and equitable access for all" clauses of SDG 6.1/2.

Piped supply requires more sophisticated maintenance arrangements than walk-to systems such as hand-pumping. The strategy adopted by the Learning Alliance is therefore to design the maintenance structure which suitable for both piped supply (and other close-to-home shared supply such as communal roof-water) and walk-to sources; hence the structure shown in Fig 1, which is designed for all rural source technologies. As it becomes clear that simpler technologies can in practice work reliably and recover their costs from user dues, investment in piped systems becomes attractive. Some of the communities currently paying annual reliability-assurance fees are already well-organised enough to qualify for a solar-pump and piped system. With legal registration and bank accounts and a track record of collecting dues, they are being invited to make capital investments by raising local contributions and borrowing from a development bank. MWE are proposing to budget for regional solar-pump engineers to support this approach, and require private sector partners to operate as Build-and-Maintain Companies. As the government promotes solar, the regulatory framework described here becomes a necessity.

Replication and Scaling

The questions now challenging the Learning Alliance are: how expensive is it to test this proposed PPP structure on a larger scale? Could the structure be established in pilot sub-counties first, then in pilot districts to achieve financial viability and economy of scale of service companies? How costly would that be, and if proving to cost-effective and self-sustaining, how costly would it be to replicate nationally?

Government budgets are unlikely to be sufficient to pay the full cost of a national roll-out, and for rural water users to contribute, there is need for a better “ownership” of their sources. Whichever roll-out strategy is adopted, it must not only be affordable within government budgets with development assistance, but must also elicit significant buy-in through cash contribution from rural water users. Some participants have asked that communities are consulted extensively, and also have mentioned that parliament usually insists that government budgets are disbursed equally amongst all districts and sub-counties. Others commented that as elected leaders they have responsibility to act decisively on behalf of their voters. One participant of a 2017 workshop mentioned that when he took tough action on households contravening by-laws on latrines, he later found that the same people he had arrested were the ones who voted for him because they appreciated firm leadership.

One example of a strategy which is under discussion and which takes into account limited budgets, prioritisation of community buy-in, and the firm governance stance described in the alliance meetings, is roughly sketched out as follows: a group of pilot districts would be selected in which standard constitutions, banking facilities, relevant sub-county by-laws, preventive maintenance and monitoring services are prepared in a set of pilot sub-counties. This would include template licences for pilot service companies, approval of standardised reliability assurance service contracts, and enforcement of by-laws such those described above.

In early years, the first service companies would have too few customers to be financially viable. Part of the budget in pilot districts would be devoted to growing their customer base. Once early-starter service companies reach economic scale, they become contenders for providing service in roll-out districts on the basis of smaller roll-out budgets, or they may be under contractual obligation to train replicate companies in other areas of the country.

Standard constitutions would be distributed in pilot sub-counties and the WSCs required to adopt them, while annexing individual community by-laws. Dates would be set for groups of WSCs to register as CBOs and to open bank accounts. The key motivation would be the wish to receive preventive maintenance services, stimulated by information received from neighbours and radio programmes. The scaling programme would devise additional incentives to make it worthwhile for the communities to collect funds before the due date, travel to the sub-county office to register and deposit the funds in freshly opened bank accounts. Some districts may support this process through by-law enforcement, for example by penalising failure to register before designated dates.

A year-by-year rising service fee scale would be publicised, for example in the first year it could be \$140 (500,000 UGX) for preventive maintenance service for one year, then the second year would be priced at \$200 (700,000 UGX) and so

on, until the fee reached the service company viability level in the order of \$280/source/year (1 million UGX) as discussed above. WSC members would be required to travel to the local service utilities officer to sign contracts for preventive maintenance. Radio marketing of the programme, combined with application of the sub-county by-law system, would reduce costs of government and service provider staff travel.

An initial by-law that obliged communities to collect subscriptions of 1000 UGX/hh/month would enable a WSC in a community of sixty homes to collect \$200 toward service fee payment, so in the first year, if the rising fee scale suggested above is followed, \$60 would be available to pay internal costs such as WSC executive officer fees, and to contribute to rehabilitation where needed. A follow-up by-law that then raised mandatory minimum collection levels to \$2000 UGX/hh/month would make it possible for the full service fee to be paid alongside internal costs.

These rates can be compared to current efforts by NWSC to control fees charged at public stand pipes. Customers are paying between 100 and 200 UGX (and more) in practice, while NWSC is developing consensus around a fair fee for low income families at 25 UGX/jerry can (Eyotaru and Namuloki, 2017). If it is assumed that most families use five jerry-cans/day (twenty litres), the implication is that the proposed universal fair rate would be 3,600 UGX/hh/month (\$1). A complementarity of this sort with NWSC policy may mean that by -laws mandating a minimum subscription of 3,600 UGX/hh/month (\$1) are feasible and enforceable.

In a district with low population density where for example the average was 30 households per source, a graduation toward a service fee of \$280/source years would require by-law mandated fees to eventually arrive at 3,600 UGX/family/month. An initial by-law that obliged communities to collect minimum subscriptions of 1,000 UGX/hh/month would generate \$100, 2,000 UGX \$200, and 3,600 UGX/hh/month would generate \$360, enough to cover \$280 for the service fee and sufficient additionally for internal costs.

Early adopter WSCs would participate in a series of radio talk shows, involving district authorities, politicians, and MWE. This would help stimulate community compliance. Template contracts tested in the front-runner sub-counties would be improved in the light of experience such that a sound regulatory structure would be tested in several pilot districts.

The strategy would be to develop the regulatory structure and payment compliance in a set of model districts, not rolling out nationally until the structure was well developed and proven. This would take four to five years following the numbers calculated above. The template contracts and professional capacity developed would then be available to further districts, focusing first on those districts meeting eligibility criteria. The cost of establishing compliance would be significantly less than in pilot districts, because a coherent system and proven templates would be available. The HPMAAs, politicians, and government officers in the follow-on districts would be engaged in workshops where the templates were fully explained, and would be tasked to implement, with back-stopping support available from officials experienced in the pilot districts. The HPMAAs could take the leading role of familiarising local communities with the new laws and service arrangements on the basis of local technicians being incentivised by the prospect of stable incomes. The service provider would start operations only after sufficient numbers of service agreements had been signed by WSCs. This approach would minimise roll-out costs.

Once the regulatory system is fully developed and proven in pilot districts, variations to the structure, such as the options 2, 2b, and 3 described above, would be debated and considered in advance of replication nationally.

Some of the WSCs successfully engaged will have rehabilitation needs and therefore the service company licences would be extended to include a "Build-and-Maintain" clauses. These would be extended to include new installations so as to meet the demand for more water sources for 34% unserved population. Criteria for eligibility for solar-driven piped water distribution would be devised, and some of the early-adopter WSCs would satisfy these criteria through collection of funds, borrowing and evidence of competence to manage more sophisticated sources and pay back

loans. The strategy would therefore maximise the potential for shift at least cost from walk-to sources to piped water distribution.

References

- Davis, S. (2014). Guidelines for Resolution of Problems with Water Systems. Available at: <http://www.issuelab.org/resources/19492/19492.pdf> [21 May 2017]
- Eyotaru, O. and Namuloki, J. (2017). Uganda: National Water, Govt Plan to cut prices of water. *The Observer*. Available at: <http://allafrica.com/stories/201705100404.html> [21 May 2017]
- Harvey, A. and Mukanga, J. and Waibi, J. (2015). Public-Private Partnership Model for WASH Effectiveness. *38th WEDC International Conference*. Loughborough, UK. Available at: <http://wedc.lboro.ac.uk/resources/conference/38/Harvey-2271.pdf> [21 May 2017]
- Harvey, A. (2015), Effective WASH: A results-driven approach to improved reliability and hygiene. Available at: <http://whave.org/assets/docs/WASH%20effectiveness-OnePageBrief-WHAVE-October%202015.pdf> [21 May 2017]
- Harvey A, Mukanga J, Goring E. (2016) Steps to Sustainability: Public-Private Partnership in WASH. Available at: https://rwsnforum7.files.wordpress.com/2016/11/full_paper_0194_submitter_0250_goring_emma.pdf [21 May 2017]
- Harvey, P. and Reed, B. (2004). Rural water supply in Africa: Building blocks for hand-pump sustainability. *WEDC, Loughborough University*. Available at: http://wedc.lboro.ac.uk/resources/books/Rural_Water_Supply_in_Africa_-_Complete.pdf [21 May 2017]
- Hope, R. (2015). Is community water management the community's choice? Implications for water and development policy in Africa. *Water Policy*, 17(4), 664-678. Available at: http://www.smithschool.ox.ac.uk/research-programmes/water-programme/WPOL_RobHope_August2015.pdf [21 May 2017]
- Howard, G. & Bartram, J. (2003) Domestic Water Quantity, Service, Level and Health. World Health Organisation, Available at http://www.who.int/water_sanitation_health/diseases/WSH03.02.pdf [21 May 2017]
- IRC (2015) Progress report on roll out of Sub-County Water Supply and Sanitation Boards in Lira. Kampala, Uganda. Available at: https://www.ircwash.org/sites/default/files/20150427_swssb_progress_report_april_2015.pdf [21 May 2017]
- MWE (2016) Water and Environment Sector Performance Report 2016. *Ministry of Water and Environment, Government of Uganda*. http://envalert.org/wp-content/uploads/2016/09/SPR-2016_final.pdf [21 May 2017]
- MWE (2017) Uganda Water Atlas. *Ministry of Water and Environment, Government of Uganda* Available at <http://www.wateruganda.com/> [21 May 2017]
- Schouten, T., Smits, S. and Butterworth, J. A. (Eds.). (2015). From infrastructure to services: trends in monitoring sustainable water, sanitation and hygiene services. Available at: <http://www.developmentbookshelf.com/doi/pdf/10.3362/9781780448138> [21 May 2017]
- UBOS (2014) Uganda Bureau of Statistics: Uganda National Household Survey 2012/2013. Available at: http://www.ubos.org/onlinefiles/uploads/ubos/UNHS_12_13/2012_13%20UNHS%20Final%20Report.pdf [21 May 2017]

Whave Solutions

Whave Solutions (www.whave.org) is a non-profit social enterprise registered in Uganda with forty-three employees in 2017, operating from four regional offices and a headquarters in Kampala. Activity is focused on its Sustainable WASH Systems and Learning Alliance programme, previously called Safe Water Security, which is steered through continuous workshops and meetings with local and central government and other stakeholders. The mission is to support the Government of Uganda's National Development Plans and the SDGs 6.1 and 6.12. Whave was registered in 2012 after work started in 2011 with a commitment to solving irregular and insufficient rural water supplies in Uganda through performance-payment and public-private partnership approaches (the motto on the web-site was "water for everyone every-day, every year"). Whave functions in four modes: (a) it acts as a model rural water preventive maintenance service provider and prototype "Build-and-Maintain" Company generating cost and performance benchmark information and stimulating other companies to emerge (b) it trains and establishes local service providers, whether companies, government boards, or individuals (c) it establishes monitoring services in water supply and sanitation/hygiene to enhance local government regulatory capacity (d) it provides consulting services and action-research services in partnership with government offices focused on improved hygiene and sanitation and on new regulation and revision of the Community Based Management system.

Funding

The Sustainable WASH Systems and Learning Alliance programme was funded between 2013 and 2015 by the Climate Development and Knowledge Network (CDKN), in 2016 to 2017 by the Austrian Government's Development Agency (ADA), by Mercy Corps under the USAID Growth Health Governance project and in 2017 by USAID's Sustainable WASH Systems Initiative.