Introduction
Uganda has made tremendous achievements towards ensuring reliable rural water by establishing policies and processes for installing rural infrastructure, monitoring performance in the water and environment sector, channeling finance through provincial legislators and regulating service delivery. However, problems still exist, with more than two-thirds of rural water sources being reported as inadequately functional, as found by an international study led by Overseas Development Institute. The consensus among the Ministry of Water and the Environment (MWE), the district governments, local leaders and community members is that there is a need for a single, coherent framework for rural water service delivery that can be applied at the regional and national scale. Whave Solutions is a Ugandan social-enterprise working with local and national government, communities and NGOs, to pioneer a scalable framework and national maintenance model.

Piloting preventative maintenance
Four local governments have established public-private partnerships (PPPs) which position Whave as a maintenance service provider in pioneer Rural Water Utility (RWU) at the district level. Communities sign preventive maintenance agreements with Whave, assuring reliable functionality of their water sources. Whave is developing an evidence base collaboration in communities, government and NGOs to answer the key questions in rural water provision: who does what, what are the costs, and how are the costs met?

Who does what?
This question is answered through the adoption of clearly understood contractual agreements between communities, local government, and the RWU. Figs 1 and 2 show the demarcation of roles that Whave is discussing collaboratively with local and central government. Communities sign service agreements with the RWU (also labeled as a maintenance area service provider) appointed by local government, and the RWU performance-pays local technicians to provide preventive maintenance and full functionality. Fig 1 shows an advanced model that Whave had developed with Mitinya District Government, and Fig 2 shows the model Whave operational under Kamuli, Kumi, and Nakaseke local governments.

Who pays for what?
Whave is working with the international aid community and NGOs active in WASH in Uganda, as well as local and central government to develop a consensus on cost taxonomy. Costs are divided into two main types, permanent recurrent costs and temporary investment costs. Permanent recurrent costs are further subdivided into customer service and enabling service. Customer service costs are the costs associated with keeping rural water sources working reliably. These costs are paid for by the consumers, who agree to pay a tariff fee when they sign maintenance agreements. The tariff level is set by the government in agreement with the service provider at a price which is affordable for all. The regulated tariffs are significantly less than the ad-hoc prices currently charged for water in rural Uganda, providing universal access.

What are the costs?
Recurrent customer service costs: these include hardware replacement, local technicians’ fees, and management. The PPP model corrects a flaw identified in conversations with government experts and observed in the field, which is that community responsibility is limited to minor repairs. This has acted as a perverse incentive, causing neglect of routine servicing and minor repairs in order to shift all maintenance into the “major replacement” category which is paid for by the government, politicians and NGOs, but not reliably nor consistently.

Recurrent enabling services costs: these include the costs of regulation, mobilization, public information, monitoring, and are covered by government budgets. It is acknowledged by the districts engaged in the pilot PPPs that government budgets are more efficiently utilized as supports to the RWU maintenance agreements and recovery rehabilitations, rather than their current focus on rehabilitation of non-functional water sources, in order that the build-operate and functionality-accountability incentive embedded in the RWU contract is activated.

System start-up and capital investment costs: these costs include the cost of restoring pumps to working order prior to signing of service agreements, the upgrading of water sources from hand-pumps to piped supplies, and the costs associated with training government actors and creating contractual frameworks. In the case of the subscription model shown in Fig 2, another start-up investment cost has been the promotional discount pricing of tariffs for communities, in order to facilitate change in attitudes and beliefs in regards to paying for water. This promotional pricing is necessary because NGOs, districts, and politicians commonly offer free repairs, which has led to a wide spread belief that rural water should be free. This belief persists despite the large number of non-functional sources and the long wait time for repairs. Another start-up cost is the compensation needed for to build an economy of scale high fixed costs are subsidized while customer volumes grow.

How are the costs met?
In the baseline situation currently experienced by most rural communities, two methods are used to meet costs, both with severe failings. Theoretically, monthly subscription fees apply in farming communities, and Pay-for-Volume in rural trading and market centers. In practice, it is usual for subscriptions to remain unpaid; and when a pump breaks the community crowdfunds to cover the cost. This leads to frequent and prolonged downtimes, as it is hard for the community to quickly raise the repair funds, and the use of sub-standard materials for repairs is common. When Pay-for-Volume is used, water sellers are incentivized to keep pumps working, however, the ad-hoc prices are prohibitively high for most people who resort to using unsafe and unimproved water sources.

In the PPP models shown in Fig 1 and Fig 2, recurrent costs are met by tariff revenues through subscription or Pay-for-Volume or a combination, so emedding financial sustainability. Scaling, saturation, and feasibility
Uganda’s National Development Plan positions Uganda as a middle-income country by the year 2040, with reliable access to rural services including water. To achieve this, government and other actors working towards SDGs 6.1 and 6.2 must join forces to create defined service areas for reliable water provision and plan for conversion to piped supply, based on a single contractual framework and financing approach.

Whave estimates that rural water maintenance providers can achieve financial breakeven when servicing one million people, assuming “saturation” of the service area. The concept of saturation is simply that people pay tariffs willingly if they see that all their neighbours are paying; it is key enabling role of government provide public information by radio and to train its extension staff to mobilize communities by generating understanding of the cost savings of full functionality.

The establishment of a national Operation and Maintenance (O&M) framework will regulate maintenance service providers and ensure that hand-pumps function reliably. The adoption of the framework will trigger interest by investors who see the social and economic return arising from reliable functionality. This will also accelerate investment in conversion of hand-pumps to piped supply and tap-stands. Whave and partner stakeholders are collaborating on operational details of the framework to assist with formal adoption by 2021, paving the way to universal access to water and improved health and productivity.