Rural Water Supply Network

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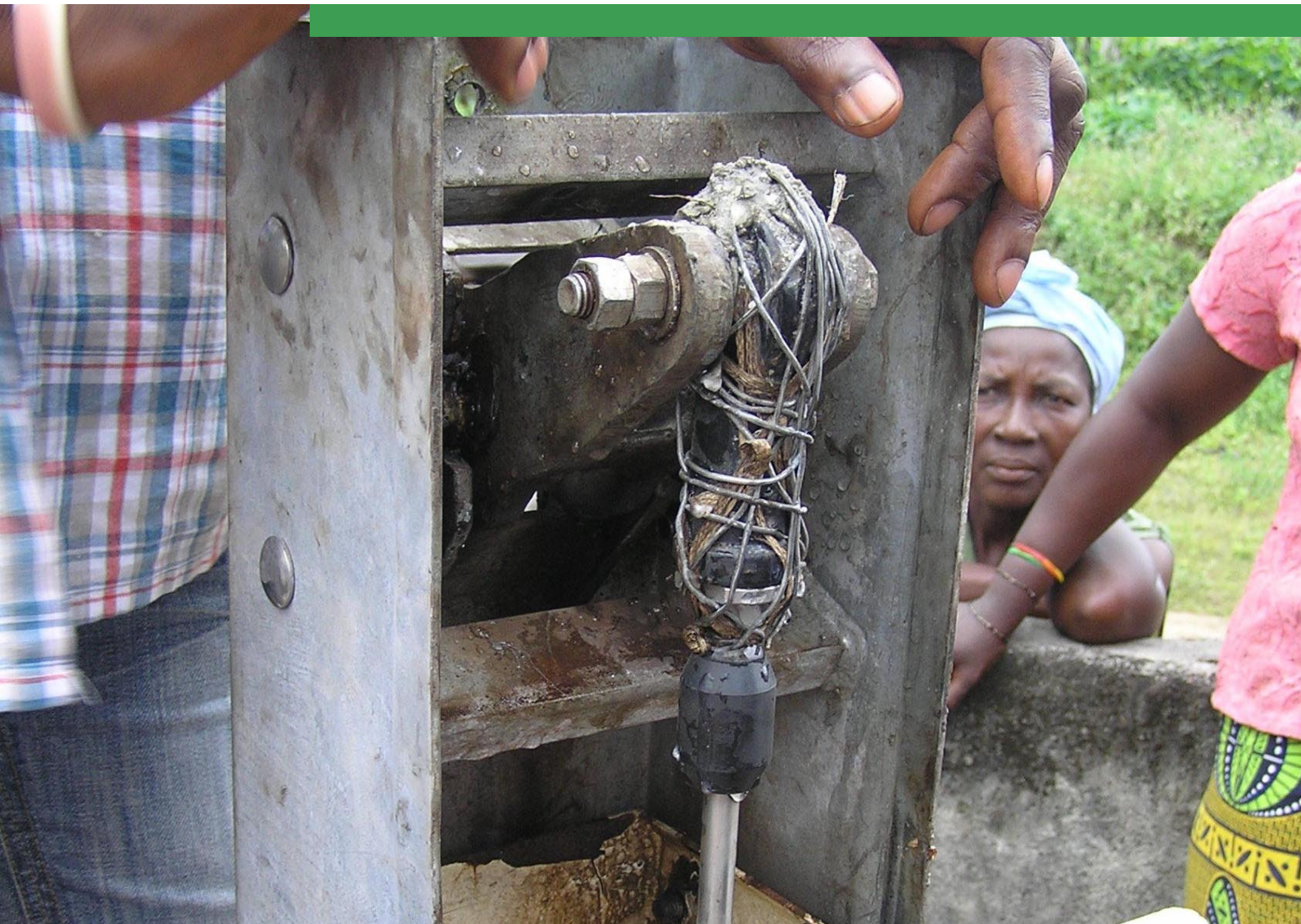
Operation and maintenance of rural water supplies



Challenging the community-based O&M paradigm. It is impossible to be closely involved in rural water supply provision in sub-Saharan Africa and to not fundamentally question the way operation and maintenance (O&M) are thought about and implemented. In the following paragraphs I explore the concept of O&M; I discuss some myths about it; and I suggest some ways to improve it.

Context. I am writing about engineered water supply systems paid for and constructed by Governments and NGOs, with varying degrees of user participation. These are communal systems providing public water points (such as protected springs, handpumps and public taps supplied by pumped or gravity flow systems), with few if any private connections. They are intended to offer improvements in water quality, reliability of supply, and closer access (and consequently increased consumption) than former unprotected and/or distant and/or unreliable sources. There are two significant drawbacks of such improvements – the financial cost to the user, who is expected to contribute revenues for O&M; and the unfamiliar and more complex management of the supply compared to that experienced previously.

O&M: the concept. It is common to refer to operation and maintenance of rural water supplies in a single term, "O&M". However just as with the phrase "water and sanitation", we are wrapping up two very different activities in one piece of shorthand. Operation refers to the direct access to the system by the user (eg operating the handpump), to the activities of any operational staff (eg operators of motorised pumps), and to the rules or by-laws which may be devised to govern who may access the system, when, and under what conditions. Maintenance, on the other hand, is to do with the technical activities, planned or reactive, which are needed to keep the system working. Maintenance ranges from preventive (eg greasing, tightening nuts and bolts), to reactive (repair after failure, requiring tools and spare parts), to major rehabilitation or replacement. Maintenance requires skills, tools and spare parts. The two activities of "operation" and "maintenance" are very different in nature, but I would argue that both need to be combined in an integrated approach to water supply "management". Operation cannot continue if there are major weaknesses in maintenance, and maintenance becomes irrelevant if operation ceases because users find a preferable source of supply.

Prevailing assumptions and myths of O&M. I highlight here four of many common myths or misunderstandings about O&M:

- *Users are always strongly motivated to manage their improved water supply effectively.* This is demonstrably untrue, as many systems fall into disrepair, and users revert readily to their former water sources. This common observation is not because users are incapable. It is because they make a calculated and rational choice that the trouble (financial cost, time involved, conflict between users or within committees) involved in managing an engineered supply outweighs the perceived benefits it provides. The motivation to manage an engineered water supply is much stronger when the alternative source is very distant or unreliable. An important role of organisations external to the user communities is to create and strengthen user demand for close, reliable and high quality water supplies.
- *Rural water supply technologies lend themselves to community management, and users can manage them effectively without external assistance*. Just as the physical 'hardware' of water supply sooner or later falls into disrepair, so too do the community institutions (committees, by-laws, procedures) which are supposed to support operation and maintenance. People lose interest in providing voluntary service, financial irregularities arise, mistrust or conflicts develop, committee members move away. Moving from an unimproved to an engineered water supply actually increases dependence on external organisations to provide support. If that support does not follow, then systems fail.
- *User fees cover the operation and maintenance costs of rural water supply systems*. On the contrary, water charges are usually very small, because they are often determined by the users (according to what they are willing to pay) and not based on real life cycle costs. Furthermore, there are often high numbers of defaulters – those who cannot or will not pay even the small agreed fee. Consequently when a major breakdown occurs, the funds available are insufficient to cover the true costs of repair, perhaps by a specialist technical service.
- *Water users are too poor to pay realistic water charges*. In my experience, people who have benefitted from an engineered (improved) water supply often claim that it is one of the most important aspects of the infrastructure which they enjoy. Those lacking such access often put it as their highest priority need. However, when questioned about household expenditures, water charges frequently come at or near the bottom of the list.
- *Replacement or rehabilitation of the water supply when it comes to the end of its service life is beyond the reach of user communities*. In the case of heavily capital-intensive structures such as boreholes, this may be true. However, I believe that the small amount of money which is needed to cover replacement costs of handpumps, small service reservoirs,

pipes and valves is often affordable – in principle if not in present practice.

- *Maintenance-free or spares-free technologies can be found which will render maintenance obsolete*. It is tempting to believe that a better design of pump or water supply technology can somehow obviate the need for preventive or reactive maintenance. This is a dangerous myth, but a myth nevertheless. Choice of technology does indeed affect the ability of communities or service providers to maintain their water supply systems, but the idea of a maintenance-free technology is akin to the idea of perpetual motion.

Conditions for effective community-based O&M. Community-based O&M will only succeed when three crucial factors coincide: (a) a strong user-perception of need, and consequent high motivation to maintain an improved water supply; (b) strong community-level institutions in which those with the greatest interest in maintaining supply have a powerful voice; and (c) a proactive and responsive support organisation which can provide both technical and software support, and, as necessary, resources which are genuinely beyond the capacity of the users. The reality is that these three factors do not commonly coincide. If Governments and NGOs continue to implement improved rural water supplies, then they need to face the fact that weaknesses in user motivation and/or in community institutions can only be compensated for by even stronger external engagement in O&M.

From community management to asset management. One of many fundamental difficulties with the community-based model of O&M is that every community and every water point is different. Even a handpump, which may have a notional design life of about 8 years, may experience its first breakdown in one village after only a few weeks, and in another after 3 years or more. In urban water supply, the entire set of above- and below-ground assets is managed as a system, by a single public or private utility. Public participation is limited to paying for the water service. Why not take the same approach in rural water supply? This would have the benefit of spreading the varying costs of maintenance evenly across user communities, so resulting in a single averaged tariff. Clearly there would be challenges of raising revenues from dispersed rural communities, but these would be no greater than the challenges of providing O&M support to those same communities. The possibility of entering a virtuous circle of reliable service, cost-reflective tariffs, high revenue recovery rates, and improving standards of service would potentially replace the vicious circle of mostly inadequate, but variable, revenue generation and frequent deterioration of water supply assets. The biggest challenge is to bring about a change of mindset, in which payment of a realistic tariff for a reliable service, and commitment to provide that service – in other words a customer orientation – become the norm.

Trends and needs. I would argue that a number of social and economic trends militate increasingly against community-based maintenance, and I argue for local Government regulation and monitoring of specialized service providers, with water users paying cost-reflective tariffs, differentiated if necessary to allow for cross-subsidy of poorer consumers by wealthier water users. Those trends include the increasing difficulty in making a living from the land, the consequent migration to towns and cities for off-farm employment, weakening of social capital in formerly close-knit communities, and the increasing impoverishment of rural areas. I believe three key things are needed now:

- support strategies to user communities in which explicit efforts are made to ramp up water charges from initial low levels (as people make the transition from no-payment to payment for water) to levels which reflect true O&M costs; this would actually empower communities to better manage their systems;
- research into the actual magnitude of those O&M costs, and how they vary according to local context and technology;
- rural 'utilities' or service providers with a strong customer- and performance-orientation, but with a real commitment to service and a sound understanding of rural development challenges.

If such providers are to succeed, they would need to be managed and regulated by an effective organisation which truly has effective public service at its heart. NGOs are generally unable to provide the necessary long-term commitment; some faith-based organisation could fulfill this task; but truly this is a role for local Government. Is it willing to rise to that challenge?

About the author: "Richard has been involved in the international rural water sector for more than 30 years. He works mainly in sub-Saharan Africa, and his clients range from small NGOs to Governments and international agencies. He is particularly interested in issues of sustainability in water supply services".