Self-supply through small community and household water supplies

Anthony Waterkeyn

Water supplies are often thought of as either traditional – and by implication unsafe – or modern – and thus acceptable. Instead, water supplies of all kinds can be considered on a continuum of acceptability, and governments can help individuals to gradually improve their water supplies and move them up the ladder.

Progress towards achieving the MDG for water supply (to halve, by 2015, the proportion of people without sustainable access to safe drinking water) has been slow in Africa, where approximately 80 per cent of the population live in rural areas. Those without access to safe water have actually increased in the last 10 years, and are now approaching 300 million people. Within central and west Africa alone, of a total rural population of some 197 million, over 66 million people are still taking drinking water from unprotected wells and over 46 million from streams and rivers. Even if the MDG were to be achieved, it would still leave some 150 million rural Africans without access to safe drinking water.

Conventional thinking by many governments and NGOs tends to be dualistic. Either the water source that people are using is 'traditional', 'unimproved', 'unsafe' and hence unacceptable; or it is seen as 'modern', 'improved', 'protected', and thus safe and acceptable. Nothing exists between these two extremes. The so-called 'traditional' water supplies tend to be viewed as liabilities that need to be replaced by more conventional, 'well engineered' solutions. Moreover, in the conventional approach, the ideal would be for a piped, treated, water supply service, delivering water into the yard or house, and paid for by the users. Clearly this is simply not going to happen within the 10 years that remain to achieve the MDGs, and this strongly suggests that alternative strategies urgently need to be considered.

Recent case studies undertaken by RWSN (Rural Water Supply Network) have demonstrated that traditional water sources (scoop-holes, open wells, springs, ponds, streams, etc) tend to be important assets that owners are usually only too willing to upgrade, and whose benefits they tend to share with their neighbours. Low-cost upgrading of such resources can lead to improvements in water quality with significant health and cost benefits. Owning a water supply close to the homestead usually results in greatly improved personal and domestic hygiene as well as opportunities for the productive use of water, all of which are enormously significant. Combined with long-term sustainability (because of family ownership) one can but wonder why this has not become the primary choice of technology for rural water supplies wherever feasible.

Self-supply

This strategy builds on the investment that households and small groups have in fact been making over many generations in order to survive. Self-supply can be broadly defined as: the provision of improved rural water supply and sanitation services, based upon historic

Mrs Toriro of Makoni district in Zimbabwe funded construction of this upgraded family well herself

Upgraded wells such as this provide safe, sustainable drinking water close to the home

practices, simple technologies and low-cost interventions, that brings local knowledge and resources to bear towards achieving progressive improvements in service levels. Past experience has demonstrated that this is indeed possible and even at significant scale (e.g. upgrading traditional water sources in Niger, Mali, Zambia and Uganda; rainwater harvesting and household water treatment in Kenya; upgraded family wells in Zimbabwe, to mention but a few).

Self-supply approaches the provision of drinking water by concentrating intervention and management at the lowest possible level. This is at household or small-group level and should be seen as complementary to more conventional communal supplies. It offers improved water quality, quantity or accessibility where communal approaches may be less sustainable, especially where there are many alternative traditional water supplies (scoop-holes and unlined wells) and among very low-density, and scattered communities. Self-supply is likely to encompass drinking water that is obtained either from shallow groundwater, rainwater harvesting or home water treatment of surface water.

For groundwater that fits the self-supply concept, one may consider four types:

- water hole (<1m deep) on a hill slope or near the valley floor, sometimes protected by earth bunds and/or stone or timber to allow access without entering the water
- valley tank (2–3 m deep) utilizing shallow groundwater from a swamp
- well (3–20m deep) usually brick-lined with rope and bucket, windlass or handpump,
- private borehole with handpump or submersible pump.

It is worth noting that groundwater resources are: often resistant to drought; naturally protected from contamination; can generally be found close to the point of demand; are generally of excellent natural quality and require no prior treatment; can be developed incrementally and are often accessed cheaply.

Millions of traditional sources of drinking water exist across Africa with an average of some 5–8 households relying on them in order to survive. Improvements in quality and access to these traditional sources would lead to a huge increase in safe rural water supply coverage and at very low per capita cost (especially when compared to that of the conventional borehole fitted with handpump).

For example, in Zimbabwe, the upgraded family wells programme started out as a small programme to improve the quality of water drawn from traditional wells. Over the past 15 years it has expanded exponentially with over 100,000 households across the country adopting this ‘modern’ technology by constructing their own upgraded family wells. The upgraded wells consist of: a brick-lined well averaging 5–20 m depth, each with a concrete sanitary seal and lid plus a bucket and windlass (as historically found in many other countries) or a simple rope-washer pump to better irrigate ‘nutrition’ gardens.

Even in urban areas across Africa, one in eight households is using an unprotected well for its water supply and a further one in ten gets water from a vendor or open stream, both of which tend to be contaminated. As a result, at least 25 per cent of urban households are likely to use contaminated drinking water that in many cases results in frequent cholera outbreaks.

A recent RWSN case study[1] from Uganda recognizes a range of technical, management and investment options, each with its own strengths and weaknesses. The study investigated five key characteristics of any given water source, as follows:

- access
- water quality
- reliability

Mrs Toriro’s well waters a flourishing vegetable garden with over 70 different herbs that she uses to treat those suffering from HIV/AIDs. She states that she has now become self reliant.

Table 1. Proposed scoring system for (rural) water sources, from Uganda case study

Characteristic	*Score 0*	*Score 1*	*Score 2*
Access	Distance and/or ascent result in very limited consumption (typically less than about 8 litres per person per day).	Water is close to most users (typically within 0.5 - 1.0 km), but still has to be carried home.	Water is supplied into the yard or house.
Water quality	Water is obviously polluted, reported to taste unacceptable, or is clearly at risk of contamination from pit latrines, livestock or other cause.	Source is well protected but untreated. Any storage is covered, and there are no obvious routes for contamination.	Water is treated (including disinfection), and treatment is managed to a high standard.
Reliability	Source performance fluctuates with season, or dries up with heavy use, such that users have to go elsewhere at certain times. Unreliability or low yield may lead to conflict between users.	Although consumption may be low because of access, the demands of the users can nearly always be met, and queuing times do not cause conflict or recourse to inferior sources.	Water is always available on demand, and consumption rates exceed 20 litres per person per day.
Cost	Cost is high. In the case of some 'traditional' sources there is a high human cost in time, energy and ill health. In the case of some improved sources, capital cost can only be borne by a state or private investor. User fees may cover part or all of O&M costs, or users may pay no user fees.	Typically the users can contribute 10-15% of the capital cost. User fees cover basic maintenance only, when the need arises (and no contribution to capital cost recovery).	Capital cost is such that users can bear at least 50% of the investment. User fees are negligible.
Management	System maintenance is the responsibility of a competent body or person. User contribution to management is purely financial. If the private or public body provides a reliable service, raise score to 1. If the body is permanent, raise to 2.	Long term external support is needed to enable user management to function satisfactorily.	The source, as constructed, can be managed by the users, without external support.

- cost
- management.

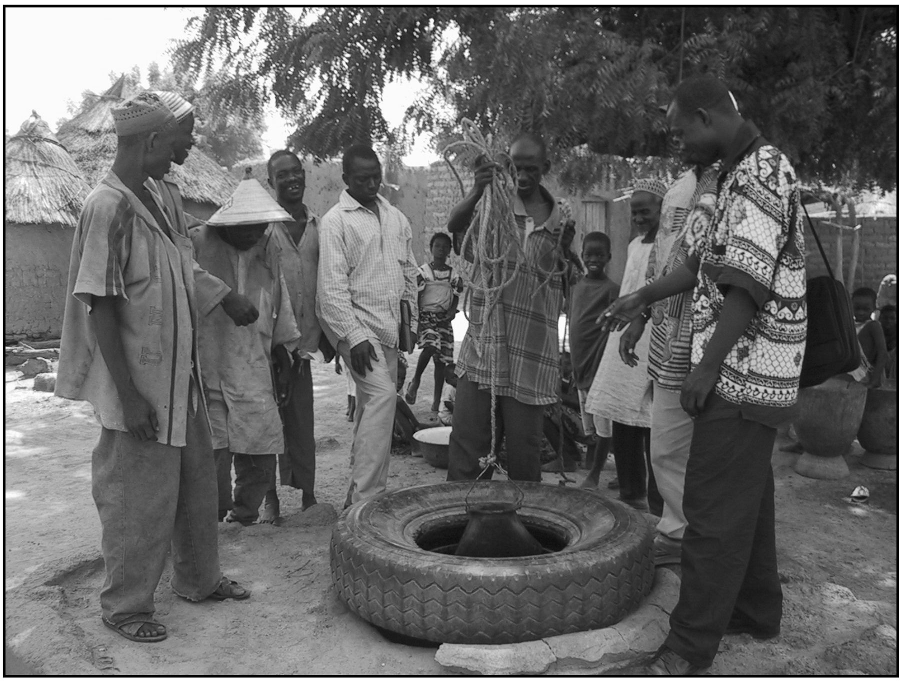
Water quantity was deliberately not included since it is implicit in the issues of access and reliability. An important point to recognize is that there is a trade-off between the first three and the last two. To achieve high standards of access, water quality and reliability implies in most cases high cost and more challenging management. On the other hand, low-cost water supplies that can be easily managed by households or communities are often compromised in terms of access, water quality or reliability.

Conceptualizing rural water supply

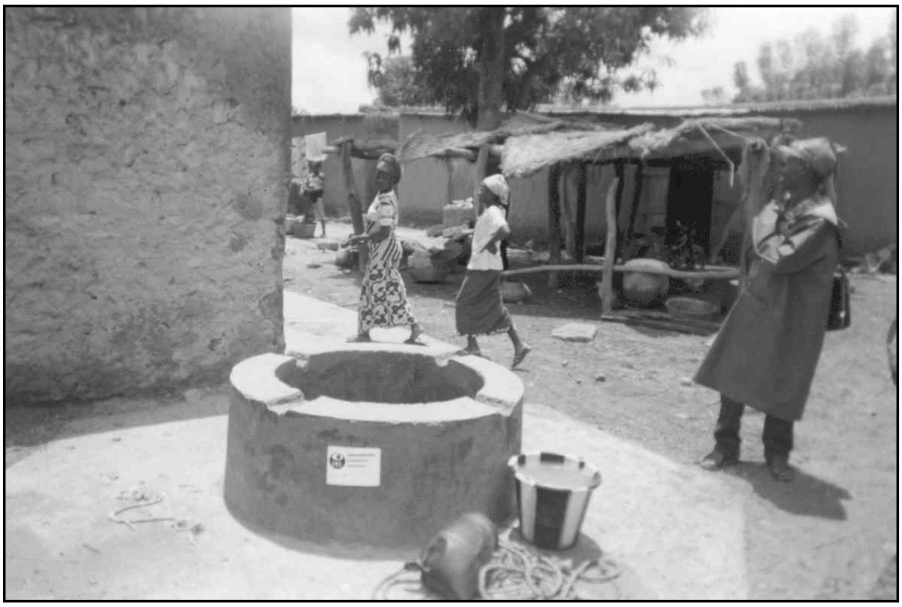
A scoring system for all types of water source, based on the five source characteristics listed above, was developed for the study. The purpose of this scoring system is to synthesize the most important characteristics of various types of water source, and stimulate one to think along the full continuum from traditional unimproved source, through to a protected community source or a piped supply.

Table 1 illustrates how the scoring system works for a range of sources from totally unimproved self-supply through to piped urban water supply. Each characteristic can score 0 (poor), 1 (medium) or 2 (good). The scores for a given water source are then summed to give an overall score which can therefore range in principle from 0 to 10. The scoring system as presented implies that each characteristic has equal weight.

The table has been drawn up assuming that a totally unimproved 'traditional', distant, surface water source (with no protection) should score near to zero (but not zero itself, since people at least have enough water



Improving traditional wells such as this can involve deepening, and protecting the source using locally available materials, fencing or sealing.



This medium-standard well provides water to several neighbouring families

to stay alive); a basic protected rural community source (e.g. a protected spring, shared tap, or handpump) should score around the mid-point of the scale; and treated piped water delivered into the home and managed well should score near to 10 (but not necessarily 10, because high cost and management challenges may reduce the overall score). A self-supply option like a properly constructed upgraded family well should thus achieve a high score proving that low-cost, low-tech options can certainly deliver rural water supplies.

Rural water supply ladder

In order to move from unimproved towards an improved water supply the first option is to identify minimal, low-cost improvements to access, water quality and the reliability of an existing traditional source, and then target technical or financial support to local water users in a planned and incremental manner. Improvements could involve some or all of: deepening shallow groundwater sources, constructing simple source protection using locally available materials, fencing or sealing, and installing a low-lift pump (such as a rower or rope pump). The RWS ladder works on the principle of improving and building upon what already exists and is well understood, and gradually moving up the ladder from unimproved and unsafe drinking water sources to ones that contribute to improved family health and livelihoods.

This medium-standard well has been lined and has a concrete surround

Recommendations

Government agencies and NGOs in Africa should:

- Consider water source improvement as an incremental process, in which unsafe, inconvenient, unreliable, distant and polluted water sources can be transformed step-by-step into safe, convenient, reliable, close, manageable water points. The present dualism of 'unsafe: safe' or 'unimproved: improved' needs to be replaced by a spectrum or ladder of low-cost improvements.
- Recognize that in assisting self-supply, they are not targeting support towards individuals, but on more extensive water-user groups.
- Promote the construction of new self-supply sources, by partial subsidy, technical advice, or other means.
- Consider how to encourage the management of self-supply sources, by community mobilization, technical advice or other means.
- Promote private well diggers (artisans), by training, provision of equipment, access to credit or other means.

Long-term objectives

Based on existing experience, it should be possible to establish self-supply alongside communal supply and for this to be regarded as an acceptable option in water-supply strategies among governments, NGOs and donors.

For this to be achievable, it will be important to make available adequate technical and software information for practitioners and communities to be able to make informed decisions and to improve supplies with minimum subsidy.

Notes

1. Carter, Richard et al. (2005) 'Self-help–initiatives to improve water supplies in eastern and central Uganda, with an emphasis on shallow groundwater', RWSN report.

About the author

Anthony Waterkeyn is a Rural Water and Environmental Health Specialist with WSP-Africa.