Upgrading family wells in Zimbabwe

by Peter Morgan and Ephraim Chimbunde

Sustainable programmes based on the traditional bucket and windlass systems have flourished in Zimbabwe by incorporating them into upgrading family well projects. A manual has been produced for fieldworkers.

AS THE YEARS of the International Decade for Drinking Water Supply and Sanitation passed by, it has become increasingly apparent that the long-term success of all development work in this sector depends on at least one important factor — sustainability. Sustainable programmes grow and multiply because they use techniques which are understandable, affordable and maintainable, and thus harmonize well with the world in which they are placed.

Many of the sustainable techniques which have wide application in this sector already exist in traditional practice, many of them with long histories of success. The survival of such techniques surely reflects their strength, and their worthiness for increased attention. Sadly, however, such techniques have often been overlooked by governments and development agencies because they are regarded as primitive, and therefore unworthy of attention. The bucket and windlass is an example.

The bucket and windlass

The use of a bucket and rope, often in conjunction with a windlass, is one of the oldest and most dependable methods of raising water from shallow wells known, and it has been used in a variety of forms since ancient times. Even today, in Zimbabwe, it remains the most common method of raising water from shallow wells in the communal lands, where over 50 000, and possibly nearer to 100 000 are known to operate, most of them on family-owned wells.

There are two main disadvantages associated with the common bucket and windlass system: pollution, and a low rate of discharge. Wells fitted with a bucket and windlass are not sealed at the top, and the bucket is raised and lowered through an open headwork. Very often the bucket is raised by hand on a rope without a windlass, and bacteria can be carried on the rope and bucket from the wet and often contaminated ground around the well-head into the well itself. Furthermore contaminated water, including rainwater run-off, can drain directly into unimproved wells which leads to further pollution. For these reasons inadequately protected wells are known to offer water of poor quality, especially during the rainy season. Perhaps it is for this reason that this simple technology has so often been ignored in the past.

Observations made in the communal lands, however, reveal that while handpumps, which are often used to protect wells, are subject to failure, the traditional bucket and windlass system rarely fails, and this is a considerable advantage. While its rate of discharge is low, it is certainly adequate for families and even extended families. The bucket and windlass is well understood in traditional practice and is easily managed at village level. Indeed it could be argued that far from being a system which should be overlooked, it should form the hub of a renewed development programme, especially for areas where shallow wells are common. Where the groundwater lies deep in the ground or where water-points may be used by larger communities, heavy-duty hand or motorized pumps will always be required, with appropriate systems of maintenance to back them up.

In recent years the bucket and windlass system has been studied in greater detail in Zimbabwe. The

An upgraded family well showing the windlass mounted on stout poles, a raised collar forming part of the cover slab, and the tin lid provided in the 'subsidy'. Part of the apron and the water run-off can also be seen. The owners and users find this technology very acceptable.

aim is to improve the quality of water taken from traditional sources, while retaining features which make maintenance easy for the users, thus providing the essential ingredient of sustainability. The upgraded well is one such system.

The upgraded well

Work on the upgrading of the design of traditional wells has shown that significant improvements in water quality can be introduced by lining the well with bricks, adding a strong concrete apron and a water run-off around the well head, fitting a hygienic bucket and windlass, and fitting a raised collar and tin lid on the well cover-slab. The result is a unit called an upgraded well. A manual has been produced by the Blair Research Laboratory to guide fieldworkers, from which Figures 1 and 2 have been reproduced.

Most shallow wells are owned by families, and there are tens of thousands in existence, many partly improved already. Clearly, very large numbers of wells could be upgraded in this way, not only in Zimbabwe, but also in the Southern African sub-region, and most probably in many other parts of the world.

Experiments with family subsidies

Experiments are now under way testing the success of providing a subsidy for upgrading family wells. In Zimbabwe this system has already been tried with success in the rural sanitation programme, where families are given a subsidy to build their own Blair VIP Latrine. The subsidy acts as a catalyst and promotes widespread efforts by the families concerned to put physical effort and cash into developing their own facilities.

It is accepted that sustainable programmes, as a matter of definition, cannot depend on subsidies for any extended period, at least not from foreign sources. Thus the medium- to long-term hope is that the advantages of both the upgraded well and the Blair Latrine will become so well known and established that their construction will be preferred by the users, and will form the starting point from which more sophisticated systems might be developed. The widespread use and acceptance of the windlass, which was itself introduced in a bygone era, shows very clearly that new concepts can gain a strong foothold and become completely absorbed into traditional practice. Such a process establishes the strength of the technology and makes it sustainable.

Family ownership

The ownership of the unit is particularly important — and this is very clear in the case of a family-owned unit — as opposed to one supposedly owned by a community. Families invariably use their own well, even when improved communal protected sources fitted with a handpump are installed nearby. The advantages of the family-owned water-point are certainly numerous.

The most obvious advantage of the upgraded well, apart from the improved water quality, is the sustainable maintenance capability. Many family wells using a windlass and bucket system have been in use for generations, and operate effectively without external support. Current evidence shows that upgraded wells can also be maintained effectively by the families themselves, without any other support.

The family well is close at hand and very convenient, so naturally more water is used for personal hygiene, gardening, and other activities, an important consideration where improvements in health are concerned. The technology is simple, logical, cheap, fast, and easy to build. In addition, improvements like this are considered improved family assets and are often prestigious. They are preferred to communal systems, and thus evoke a stronger sense of ownership and a willingness to sustain maintenance. They are known to be reliable, and the protection endowed by the cover leads to improved confidence in the supply itself. They are also safer for children.

Experimental programme

In the current national experiment the family subsidy offered consists of a strong windlass, a well-lid made of tin, and three bags of cement. Current evidence suggests that this subsidy is sufficient to encourage the family to improve their well, and this means cleaning out the existing well thoroughly, lining the well with bricks (if this has not

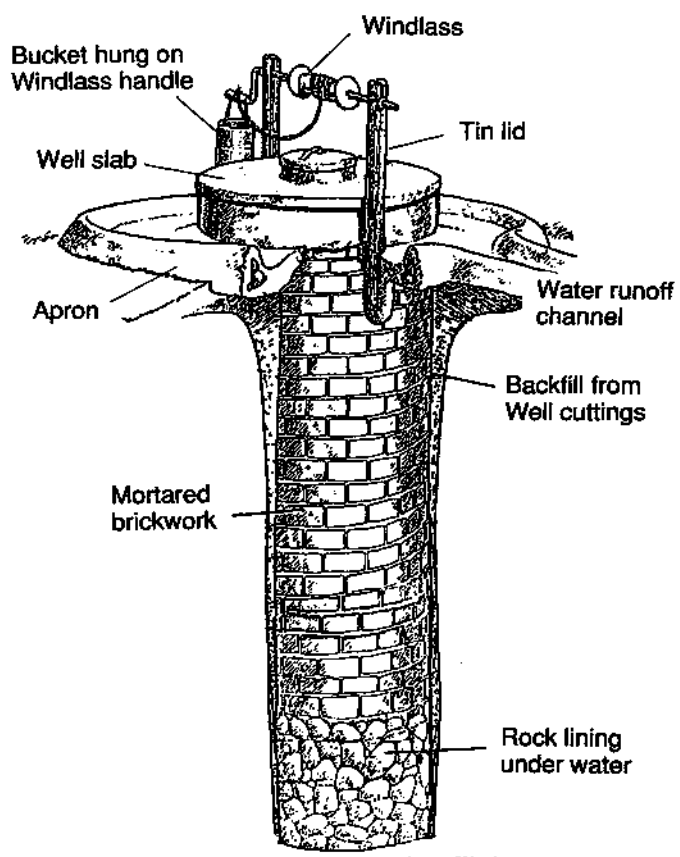

Figure 1. 'Cross-section of an upgraded well' from Blair's Upgraded well manual for fieldworkers.

already been done), providing additional bricks, stone, sand, poles, bucket, and rope, and the labour to finish the task. In many cases, the offer of a subsidy encourages families to dig entirely new wells for their own use. In some areas a reduced subsidy, consisting of the windlass and tin lid alone, is sufficient to encourage the family to provide cement and all the other requirements to complete an upgraded family well.

Although the experiment is still in its infancy, about 1000 family-owned wells have been built in Zimbabwe, with examples in all of the eight provinces. The programme is being promoted by the Ministry of Health, through the Department of Environmental Health. Teams from the Blair Research Laboratory in Harare respond to requests from the provinces or districts to undertake demonstration and training exercises. Expertise is thus built up at the village level. In almost every case the technique quickly catches on, especially amongst potential users. Environmental Health Officers, who have for many years accepted that a well could only be protected with a handpump, are also rapidly accepting the merit of the system.

The windlasses used in the programme are currently mass produced and are made of strong materials which will last for decades. Their cost is about Z$32 (US$13) each. Together with the cement that is provided, the value of the subsidy is about Z$60-80 (US$24-32), and it usually serves from five to 10 people. The costs of construction and the recurrent costs of maintenance are borne entirely by the users.

Evaluations

Preliminary evaluations demonstrate that this system has already become very popular with the users, who are prepared to put physical effort and their own funding into the upgraded well unit. The water quality is improved, and very often the water is preferred to handpumped water, because of its taste. Health education materials which describe how to care for and maintain the upgraded well are provided to the users, together with material on hygiene and the proper use of water.

With so many upgraded wells now in place more detailed evaluation studies are now being planned to monitor a number of factors which include evidence of local maintenance and repair; improvements in water quality; and user attitudes and alterations in water usage patterns, including behaviour related to the hygienic use of water. The economic implications of the exercise are also being examined, especially those relating to sustained maintenance.

One well for every family

While the technique described here applies only to families or small communities living in areas which have high groundwater levels, this covers a substantial part of the country and includes those areas with the highest population densities. Obviously upgraded wells can be upgraded further with a hand-operated or motorized pump, which may find greater favour in the future, especially where the maintenance problem can be resolved in practice.

Because maintenance is such a key issue, any system where this has been successfully resolved must be considered seriously. The fact that so many wells fitted with a bucket and windlass system have operated successfully in the past suggests that they are likely to continue working in the future. This makes the system desirable, and makes the effort of digging wells deeper or digging more of them certainly worthwhile. The ultimate aim would be to provide one upgraded well for every family where it was technically feasible, a possibility which the present system may allow.

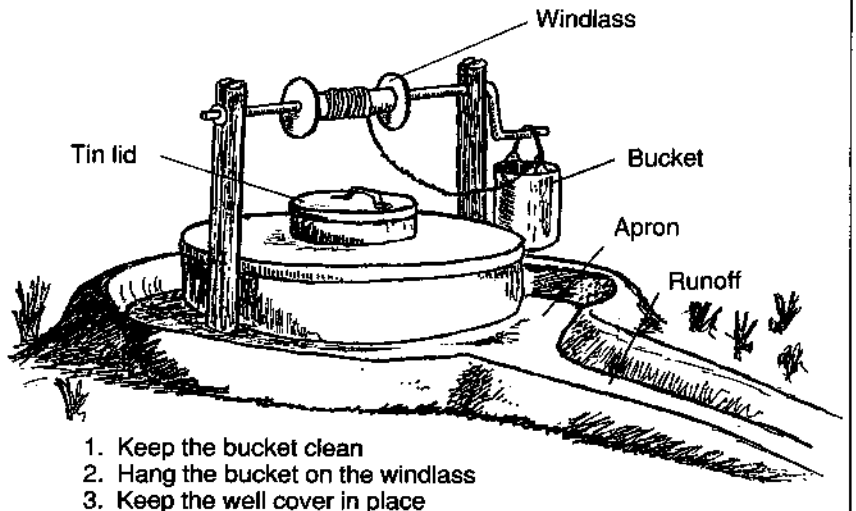

Figure 2. 'How to look after your well' from Blair's Upgraded well manual for fieldworkers.

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