

ONE WELL IS NO USE

In an African rural water context, a single isolated well is no use. It will be over-used, and no one will take responsibility for, or pay for, pump repair and maintenance. Also, in landscapes with strongly seasonal rainfall patterns, yield from a well is limited¹.

A good hand pump like the Consallen will reliably serve 250 people daily with 20 litres (5¼ US gallons each). This adds up to 5000 litres, 5 tons or 1312 US gallons of water per day. As you go down the scale of pump prices, the number of people that can be reliably served with this basic water quantity is fewer, leading to the need for more pumps and wells to serve the same number of people. Since the wells are the most costly element of a water supply, it is clearly cheaper to employ the best possible pump, to minimise the number of wells that must be built.

Then you need to do the same for all the surrounding villages in an ever-widening circle.

Unless you do so, the one pump you install will either be used to death, with people coming from miles around, and/or it will be stolen by a raiding party from another village close by, out of frustration and jealousy. Everyone in rural Africa knows that the water from a hand pump is clean and hygienic. This may or may not be true, depending on the well's construction and design, and on the pump – but the people mainly believe this to be the case. Those with the means, will travel a long way to get the better water, and the single pump may be subjected to 24 hours-a-day working; the people who wait in line often quarrel violently when they are tired and frustrated.

Pumping all day and all night seven days a week is not sustainable. The pump will wear out and the well may run out of water. When the pump is broken from over use, who will mend it. Certainly the people in the village where it is installed will not. They will reasonably point to the outsiders who have flocked to get water and say that they are the ones who wore out the pump – let them pay.

Similarly with professional water carriers; they make a business from selling the free water from the pump. They make more money if they do not have to wait in line, and can get re-filled quicker. They are mainly men and have no difficulty intimidating women and girls away from the pump.

¹ One well is no use because in a typical African landscape the geology and rainfall pattern will often not provide sources with a bigger yield than is sufficient for about 250 people year round. See our essay 'Where shall we dig and how deep will we need to go'

One village in Uganda found a solution to the problem of professional water carriers. They put a lock & chain on the pump, which was removed only by the caretaker and the committee – and then only to a supervised limited timetable and number of people. It meant that the water vendors had no access to the pump during the day. They then came to an agreement with the committee that, in exchange for free access to the pump water, they would undertake the entire cost of pump maintenance.



The picture above was taken before the afternoon unlocking session – in the time before water carriers took over the maintenance at the CMS pump. Pump installed in March '92. A second picture taken 17 years later is shown at the end of this essay.

This pump is situated on the outskirts of a 'trading centre' on the main Trans-African highway in Uganda. Essentially it is a village on the main road with shops and food stalls catering for the passing trade. The water carriers seem to number at least 6 or 8 and use bicycles to transport about 80 litres at a time in 20-ltr plastic jerry cans. Straight from a hand pump, this is quality stuff and sells at a premium. The pump probably serves between 500 and 1000 people.

This illustrates some problems associated with having too few pumps in a landscape. The well was constructed and the pump installed at the CMS (Church Missionary Society) site near Iganga. There should be several more in the area, but while the one is maintained by the water carriers, there is no incentive for more pumps to be purchased or wells dug. Actually, the people and businesses who pay for water to be delivered are subsidising all the others, who benefit greatly. This is a curious and accidental effect of 'privatisation' on rural water supply. Perhaps it should be called by its proper name of, Private Enterprise. At the time of writing the pump has been working like this for about 12 years, having been donated originally as a single well. Normally one would have said that this would have had a useful life of a year or so. The well was hand dug not far from an existing seep, which had an overflow at certain times of

the year. It is quite shallow because the water table is high. However, it has performed well over the years and is totally reliable at a yield probably 4 times more than could reasonably have been expected. After 17 years of continual use, the Project estimates that this pump has delivered about 30 million litres of clean water!

Water carriers are only one example of what can happen when too few pumps are placed. The picture below shows a well sunk on the outskirts of a village in an area also used by cattle herders. The well was exposed, because the huge rig imported to drill it could not get into the village proper. The well was taken over by the drovers, who were too strong for a small village to retain any control. *See Further Note*



The practicalities of hand pump design, manufacture and maintenance are such, that the best that can be done is a pump suited to the needs of 250 people, each drawing 20 litres of water per day. The best that the people can do is to pump at about 1000 litres per hour. Individuals cannot work at this rate for an hour, and the reality is that the pump output will never be much more than about 850 litres per hour on average. So the well needs to produce not some idea of the maximum, but a factor of safety above 1000 litres per hour. A reasonable test result would be about 2000 L/hr.

If the well cannot yield more than half the proposed test, consideration should be given to building another well to share the load. It is better to have more shallow wells than to drill deeper, and expect a single well to serve more people than the pump can reasonably sustain.

Even if a bed of gravel is discovered, with a yield so high that it cannot be measured, the pump will only be capable of providing the requirements of a fixed and limited number of people in a sustainable manner. A high yielding well is actually no more useful in hand pumped water supply than one producing only 1000 litres per hour.

Anyone thinking of paying for a well in Africa, or starting an NGO to undertake water projects, or even projects that have a water component, should consider whether their contribution would be more effective as part of an existing project. While being aware that *successful* water projects are thin on the ground and difficult to find, a single isolated well is a waste of money. One of the major elements missing from all failed water projects in Africa is continuity. They are all treated as *projects*, which, by definition, have a short life and an end point. Water supply must be unending – it is required to be perpetual and continuous – otherwise it is useless. Having access to clean water for a few months and then returning to a polluted open pit, when the pump fails through lack of maintenance, will cause more deaths than not having clean water in the first place.

See the second element of Further Note below.

The aim should be to produce many shallow wells of adequate, but fairly modest, yield to a good standard of hygiene. At least one well is required for every 250 people in the population. More will be needed if the quality of the pump to be used is such that fewer people can be served in a sustainable manner.

Long term continuous management of the water supply is a component that must be built into any system. There is no such thing as a self-sustaining water system – they need active management. Bear in mind that there has been at least 40 years of attempts to undertake African rural water development. Most of the experience gained has been lost as short term projects fail and the people move on to better career prospects or easier problems to solve closer to home. But it is not new, just because politicians in some rich countries have decided in 2005 to raise the issue for their own reasons. African poverty and bad conditions in the rural places where the majority of people live, has been around as an issue at least since the second world war. During the Colonial era there were good attempts to solve many problems, and some considerable success. Things went down hill after independence. Money was no longer put into Agricultural Extension, and programmes of long term incremental improvements for the mass of populations as it was diverted to satisfy the then current political imperatives in newly independent countries.

New projects and their supporters should consider what they want to achieve by their efforts, to research what has been done before, and not try to reinvent the water equivalent of the wheel.

The best results are derived from long term commitments. Exit strategies should be based on gradual withdrawal of support, and development of local management expertise and career prospects. Nothing useful can be achieved in a normal project time scale of 18 months. The time span that gives best results is measured in decades. Any

commitment of less than 10 years is of no practical use. Local management is best if there is some reason to expect progress – expansion and prospects of managerial advancement is a better spur than salary increases when the job prospects are only a year or so. Suppression of local talent by the imposition of inexperienced overseas ‘management’ should be minimised. A volunteer, qualified only by professed adherence to a particular religious persuasion is not a great help in African rural development.

Within this requirement for long-termism are several inherent problems. The life of Government policy is either 4 or 5 years depending on the country. All politicians have the same problem, and this affects development in Africa. Even the best and longest term programmes must redevelop their fundraising strategies every year or so to suit the changes introduced by new Governments or even new ministers as they struggle to find sound bites & photo opportunities, and change policies to suit their hunger for publicity. NGOs need to consider whether following a mirage of Government funding is sound policy. They may be better to only rely on funds they can raise and sustain themselves, independently of Governments and their effects on policies. They also need to ensure that these funds are spent wisely, getting best value, rather than the cheapest available. Money donated by children doing sponsored cycle rides is not less valuable than ‘real’ money, just because it was donated for free – it is not Monopoly Money, and should be spent carefully.

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See also:
http://en.wikipedia.org/wiki/Subsistence_farming

FURTHER NOTE:

The scheme depicted by the ‘Bad Cows’ photo above was a large politically motivated project in Nigeria, where the politicians had decided that a single well in any substantial village of up to 5000 people would deliver more votes per dollar than any other act. The drillers were asked to construct wells capable of at least 100,000 litres per day. The result was about 20 metres deep in an area where 12 to 15 metre hand dug wells were the normal method of obtaining water. The picture shows the result of the one well policy, where the villagers were unable to protect ‘their’ pump from drovers.

In another village, which had previously been served by 10 hand dug wells, the extra 5 metres of draw-down allowed by the new well, resulted in all 10 of the hand dug wells drying out. This meant that the

single hand pump became the only source of water for the entire village. This unforeseen result of the political policy, as implemented in practice on site, was close to a disaster. The pump could not sustain what became 24-hour pumping, particularly as no maintenance system was either produced or contemplated. What happened was that the pump broke down and was not repaired. The hand dug wells recovered after a week or so, and the status quo anti was re-established.

The political elite had taken out a 40-year loan from World Bank to fund this short-term wheeze.

The Consultants argued at the time that one new well and a hand pump was an improvement on what had existed. Clearly this was not the case, because, to adequately serve the 5,000 population, a total of 20 pumps would have been required as a minimum. Each existing well should have been replaced by two new 20 metre wells with pumps. This number of pumps would have provided a good cash income for at least one handy person working part time doing pump preventive maintenance and servicing. And the population would have been provided with a permanent and sustainable water supply. It would not have required a drilling company from the Far East, at great expense, but could have been done with simple equipment locally made for a project of this scale (1000 villages).

Second element: Development philosophy

There is a marked difference between development projects, which have an engineering basis and those, like ‘Health’ which do not. Different thought processes are involved in providing health services. There is no end to the requirement – Doctors do not see their work as having an end, or being completed, since tomorrow brings new people with a lifetime of needs. Project orientated activities see an end, and an exit. They are characterised by a completion date and a timetable within which the project must be completed. Health is not like that, because it is never ending and continues as long as new lives are created. Rural water is best if the same mind-set is generated as exists in ‘health’. A health service is not as easy to manage as ‘management by target’, but the benefits can be huge. One method is to combine rural water with ‘health’ by making it part of Primary Healthcare. This is after all, the purpose of clean water in a rural African setting. It has been tried, and it works, with a life many years longer than the funding.

NOTE ON CMS PUMP near IGANGA, Uganda

The picture below was taken in August 2009 at the CMS pump site shown on page 1 of this Essay. After 17 years, mainly under the control of the water carriers of the Trading Centre, the pump has been totally reliable. It has been fully maintained by the water carriers in their own interests, because it is their means of

livelihood. It is understood that delivered water is Ugs 10/- per litre, and obviously, the more that can be delivered, the greater the income for the carrier. The 20 litre jerrycans seen here cost Ugs 200/- each delivered to the end user. Children have to wait until the professionals have finished, but the water is free.

The Project feels that the pump may have delivered 30,000,000 litres over the 17 years and is said to be working almost 24 hours per day.

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