Development and the environment

by Ron Bannerman

The choice of technolgy on a water project will ultimately determine the sustainability of an installation.

If the goals of environmental protection and appropriate development policy are to improve welfare, then the term 'sustainable development' and its definition, 'meeting the needs of the present generation without compromising the needs of future generations', can be applied to both. It is interesting to look at the problems of rural water supplies as illustrating these general principles.

It is of course not possible to have development without any cost to the environment, so development may never be said to be completely sustainable. If, however, we preserve natural capital by ensuring that losses in one area are replenished in another, there can be recognition that attention is being paid to sustainability. Clearly then, there is a need to monitor the cost of development. When it becomes inevitable that irreplaceable natural resources will be used to improve welfare, development policymakers should ensure that this exchange of natural resources for human capital, (through education or technological advance), is as equitable as possible. But it is our ability to make this exchange efficiently that will determine the level of sustainability we have achieved in development.

Rural water delivery

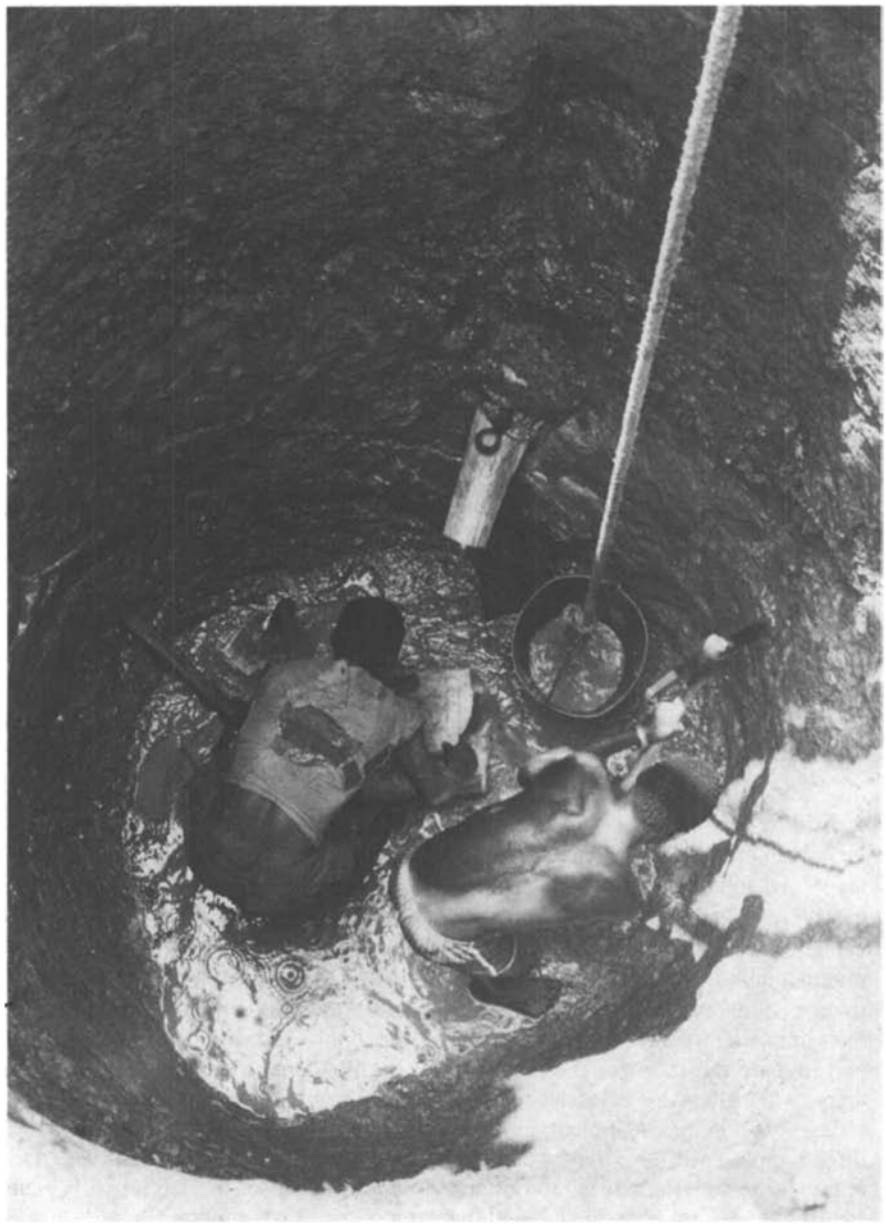
The idea of conserving natural resources has also galvanized thinking at field level about ways in which the supply of water to rural communities is 'at the least cost, while conserving water, land, plant, animal, and genetic resources; [and] is environmentally non-degradable, technologically appropriate, economically viable, and socially acceptable.'

Such criteria for rural water provision are humbling and, although I think the processes used by WaterAid in Ghana are sustainable, we have not yet achieved that Utopian state.

The Ghana programme has all the correct ingredients for sustainable and replicable rural water provision, because we:

- fund indigenous organizations to construct hand-dug wells which are low cost, technologically appropriate, and environmentally friendly;
- require high levels of community participation to guarantee movement towards community management;
- do not install handpumps unless the ability and willingness to pay has been expressed by the community;
- involve the community at all stages of the decision-making;
- have health education as an integral part of waterpoint delivery;
- provide village-level maintenance training;
- mobilize locally available resources; and, last but by no means least,
- emphasize institutional capacity-building at all levels but particularly at project level.

We use two technologies for the well itself: one is concrete-lined, while the other is block-lined. Both of these are low cost compared to a well drilled by a large multi-purpose rotary rig, but they are both high cost compared to community income levels (estimated in 1990 to be approximately $150/year/average farming family of six adults, which, interestingly, should



WaterAid/Jeremy Hartley

Members of the community must be involved in their water-supply project, and although this often means providing labour, it also means making decisions.


WaterAid/Nick King

A concrete-lined well needs external resources and technology, but is much cheaper than a borehole.

permit some discretionary spending on water). The well with the handpump costs £2000 including all capital expenditure and health education programmes. Thus technological advances and social organization do impose limits on sustainability, even though both can be managed and improved.

Well construction technologies

The well is constructed by the community and by local artisans who are trained by the project and who provide technical guidance at the community level. All members of the community can be involved, and indeed are.

Men do the digging, provide the manual labour, and very often make the decisions, while the women collect the sand and gravel for the construction and prepare the food for the technical teams when they have to sleep in the village. While the technical team of three people is in the village, the well is lined, the superstructure, apron, and runoff channel are constructed, and the pump is fitted. Included with each pump is training in simple operation and maintenance procedures. Each well is fitted with a standard lid which has an entry hatch through which water may be fetched if the pump breaks down. The construction process of hand-dug wells not only has the advantage of community involvement and minimum equipment needs, but it also ensures that the community can still have access to their water supply by use of a bucket and rope if the handpump breaks down. Hand-dug wells can also be used in low-yielding aquifers, because they are able to store water. (For a detailed account of how to construct a well please refer to *Hand-dug wells and their construction.*[1])

Our two well-construction methods have one important difference: one is lined with concrete and requires metal shuttering, while the other uses blocks, and requires locally manufactured low-cost block moulds. The former requires more technical supervision and external equipment than the latter, which incorporates more community participation because the community can, with a little training, mould blocks while digging. It is significant to note that, contrary to expectations, there is no appreciable cost-reduction advantage to the block-lining method.

Sustainability of technologies

Thus although it can be argued that a concrete-lined hand-dug well is sustainable relative to a borehole, and probably not as sustainable as a block-lined well, it could also be argued that relative to income at the community level none of these technologies are sustainable, because the community could not install the well themselves, that is they could not replicate the technology. What is clear is that as we descend the technological scale, we seem to approach sustainability. But if you have to go so far down the technological ladder to achieve 'true sustainability' that the objective of improving the quality of life may not be achieved, then there is no point. Once again we have the compromise or the trade-off.

If the borehole is the least sustainable option, then why do we have boreholes at all? Choice of technology seriously affects how far we can move

towards sustainability, so perhaps a rule of thumb to move closer to sustainability would be to provide the most effective, technologically feasible water installation that is acceptable to the recipient community, from whom active participation must be encouraged. Do not put a borehole where a hand-dug well will do, do not put a concrete-lined well where a blocked-lined one will do, and do not put anything in without the community's involvement.

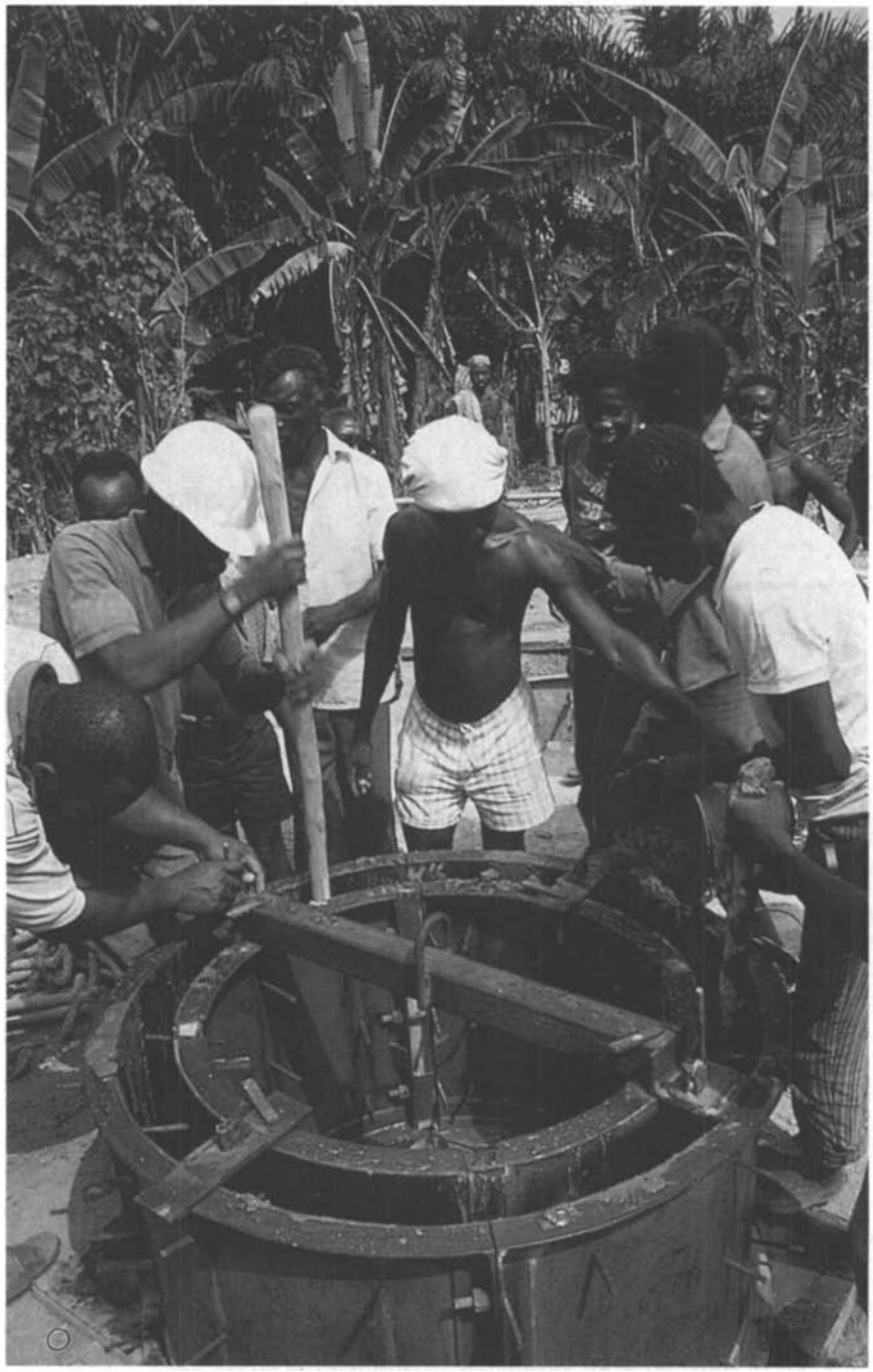
Maintenance cost

Many of the advantages of a hand-dug well are less obvious when you embark on the adventure of handpump technology and the myriad of little-tried but much-discussed and promoted processes to ensure the adequate maintenance of handpumps. All the water installations described so far can receive pumps. The wells we construct are fitted with a standard lid to which, should conditions allow, a pump may be fitted. The basic conditions which we consider necessary are the ability and the willingness of the community to pay for the maintenance of the pump. There is an initial charge of the equivalent of $60 before a pump is fitted. Uptake varies from area to area, and is clearly related not only to community income-levels but also to previous experience and the perceived advantages of a pump installation. There is no doubt that the uptake of handpumps can be improved by an education programme about their potential health benefits. Maintenance is paid for by the community itself, but includes a subsidy of about 40 per cent of actual costs. This system is probably not sustainable, but there are some basic principles which will move us towards sustainability.

The principles of village-level operation and maintenance (VLOM) should be adhered to by choosing a pump that has at least the potential to be locally manufactured and which can for the most part be repaired by the community itself without heavy equipment. The full costs of maintenance should be met by the community. In principle the frequency of breakdown is less significant if the community can make the repair, but in our experience there comes a point when the age of the pump makes repair prohibitively expensive, and we have no indication that the communities in which we work could meet the full costs of pump replacement, which is ultimately inevitable.

It is vital that the principles of VLOM are not abused, in that they should not be used as a method of divesting either the executing or implementing agencies of the responsibility of guaranteeing at least the minimum level of service. Thus the most successful technology is likely to be that chosen to give the community the highest level of service that it is willing to pay for, will benefit from, and has the institutional capacity to sustain.

The concept of sustainability has caused us to examine more closely the technology options and maintenance systems. None of these are as of yet perfect, but it would be unfair to say that gains have not been made. These gains are in the acceptance of partnerships of responsibility. Members of the local community take a lead role and are encouraged to be actively involved in the decisions that will irrevocably affect their lives. By becoming involved the ability and willingness of the community to pay will more easily be achieved, thereby guaranteeing some mobilization of funds from the user. Such funds are clearly a more effective and sustainable source of funds than those provided from fickle central governments. ●



WAid/Photographer

Choosing a technology like block-moulding will allow the community to do more of the work.

Reference

1. Watts, S.B., and Wood, W.E., *Hand-Dug Wells and their Construction*, IT Publications, London, 1977.

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