

## **WELL Study**

# **VL0M for Rural Water Supply: Lessons from Experience**

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## Summary

The purpose of this study is to review the literature on the experience with an approach to rural water supply known as Village Level Operation and Maintenance Management (VLOM). The following issues are addressed:

- How useful has the concept of VLOM proved to be?
- What evidence is there of success in achieving the objectives of the VLOM approach?
- Has VLOM been incorporated into later concepts such as “community management” of rural water supply?

The concept of Village Level Operation and Maintenance Management (VLOM) in relation to communal handpumps has gained wide acceptance in the rural water sector since it was first proposed in the early 1980s. Project designs based on VLOM principles are commonplace. However, implementation of handpump programmes in accordance with VLOM criteria have been only partially successful and the VLOM approach to maintenance has been very difficult to realise in the field, especially in Africa. As a result, enthusiasm for the concept is now more guarded and VLOM technology is increasingly seen as only one amongst many components needed for the sustainable provision of village water supplies.

Difficulties with the introduction of VLOM have called into question a number of inherent assumptions in the concept relating to the user community, the supporting environment and technology choice. Of particular importance is the assumption that introducing and supporting VLOM is an easier task for government than running a centralised maintenance service.

VLOM has undoubtedly brought the answer to sustainability a little closer; however, the goal of easy maintenance remains elusive. Perhaps the greatest lesson is that there are no ‘off-the-shelf’ solutions which can bypass the need for effective government institutions for community support. Wherever this problem is unresolved, and where there are no NGOs or other agencies to fill the gap, sustainability will always be in doubt. Unfortunately there are no simple solutions on the horizon for sub-Saharan Africa, which experiences these problems most acutely.

## **1. Purpose**

This study summarises the findings of a literature review of sector experience with the Village Level Operation and Maintenance Management (VLOM) approach to rural water supply. The following issues are addressed:

- How useful has the concept of VLOM proved to be?
- What evidence is there of success in achieving the objectives of the VLOM approach?
- Has VLOM been incorporated into later concepts such as “community management” of rural water supply?

The readership for the study comprises DFID staff, their local project partners in government and NGOs, and consultants; note that there are general lessons which may be applicable to rural development programmes other than water supply.

## 2. Background

### 2.1 VLOM

The term VLOM, originally meaning *Village Level Operation and Maintenance*, was developed in the 1980s as a technological concept relating specifically to handpumps for rural water supply. At the time it was believed that communal handpumps could meet most rural water supply needs of the developing world if problems with the existing designs could be overcome. These designs fell into three broad categories.

Firstly, so-called 'first generation' pumps, which included old colonial types, developed earlier in the century. These were of heavy durable construction to withstand constant use and abuse and would work for years, but were expensive and difficult to repair when they broke down, making users heavily dependent on centralised maintenance services. Most governments could not provide these services on a reliable basis (Wood, 1993).

Secondly, single-family type pumps which had been used in North America and Europe for more than 100 years, and were not suitable for heavy communal use.

Finally, second generation pumps, which had emerged in the 1960s and 1970s. These were more durable than single-family types but easier to repair than first generation models. The most notable example was the India Mark II which appeared in 1979 and for which an innovative three-tier maintenance system was developed, leading (initially) to a substantial reduction in downtime. The community (first tier) was expected to do preventive maintenance but not repairs, while local mechanics (the second tier) carried out more difficult repairs. The government provided a third tier of mobile teams, each responsible for 500 handpumps, for complex below-ground tasks. Unfortunately, as the number of handpumps grew the system became overloaded and downtime increased to an average of 45 days due to the lack of third-tier support.

Such experience indicated that centralised systems were both complex and expensive, and prompted UNDP/World Bank to embark on a major project to develop a third generation pump of simple design which could be maintained at village level in Africa. The term VLOM was coined, and to satisfy this definition a pump would need to be:

- easily maintained by a village caretaker, requiring minimal skills and a few tools;
- manufactured in-country, primarily to ensure the availability of spare parts;
- robust and reliable under field conditions; and
- cost effective. (Arlosoroff, 1987).

At first, then, VLOM was a design concept and related to communal, not household handpumps.

**Box1: The India Mark II Handpump**

Though not a VLOM design, the India Mark II has become the world's most widely used handpump with more than two million installed in India and over five million world wide. It is still, arguably, the most cost-effective handpump for depths up to 45m, even in Africa where high freight costs make imported pumps more expensive than in India. It has not, however, proved a sustainable solution to rural water supply problems in Africa, mainly because the Indian-style tiered maintenance system has frequently failed or not been set up in the first place.

(Wood, 1994)

## 2.2 Pump Development

One outcome of the project was the Afridev which was first produced in limited numbers in Kenya in late 1985 (Arlosoroff, 1987). This is regarded as the classic VLOM handpump, although others of the genre were developed such as the India Mark III which appeared in 1991.

As new designs were developed, donors established links with manufacturers and stimulated in-country production of pumps and spares. In the absence of a patent, many manufacturers produced their version of the Afridev and local manufacture has been carried out in several African countries as well as Pakistan, India, Canada and UK.

## 2.3 VLOM Systems

The term VLOM rapidly gained currency in the sector and after some time the terminology was extended to village-level operation and maintenance *management*. This broader concept was concerned with the maintenance system needed to keep a VLOM-type pump in working order, rather than just the technological requirements of handpumps. As communal handpumps began to feature in an increasing number of rural water supply schemes so common project designs emerged for the promotion of VLOM. A typical approach would include the following components (Noppen, 1996; White, 1996).

- Project staff formed user committees in each village prior to surveying and construction, and subsequently trained them.
- The committees organised community labour and contributions to capital costs. After construction they would co-ordinate operation and maintenance including fund-raising.
- Local leaders and committee members might sign a contract with the project agency specifying the responsibilities of each; there might also be a handover ceremony.
- Project staff trained designated users in repair and maintenance and provided basic tools, possibly including an initial supply of spares.
- The project organised the supply of spares either via a government department or, ideally, through local shops.

Great expectations were placed on the communal VLOM handpump. As the concept took off, many projects were built on the premise that this approach would succeed, without necessarily investigating the risks and constraints, determining community preferences or appraising the alternatives.

### **3. Outcome of VLOM Approaches**

The introduction of VLOM should have heralded a new era of sustainability in rural water supply schemes. Sadly, this did not happen and by the early 1990s pumps had fallen into disrepair throughout the developing world. It was clear that handpumps, including some VLOM designs, despite their many advantages were not living up to earlier expectations. What appeared to be lacking was the ability of both governments and user communities to maintain them (Morgan, 1993); this was especially true in Africa. Affordability of both capital and repair costs was also cited as a problem (Wood, 1994).

Even where communities did attempt to take care of their pumps, this largely involved carrying out repairs after a breakdown; preventive maintenance was hardly ever undertaken (Skinner, 1996; Baumann, 1998).

## **4. Problems with Handpumps**

### **4.1 Design Problems**

The development of VLOM pumps was a long process and some pumps supposedly satisfying VLOM criteria were released into the market without prior testing under VLOM conditions. Other pumps, which were not really of a VLOM type, were marketed under this banner which had become the catchword of the sector.

There were a series of problems with both the function and durability of the Afridev design; Wood (1994) identified the following from experience in Ethiopia:

- *PVC riser pipes*, which were sometimes glued together, needed to be removed so that sections where the rod connector had worn holes could be replaced. The caretaker alone could not do this. Also, risers in wide-diameter wells flexed during pumping and eventually cracked because the pipes were not secured.
- *Pump rod jointing*. The clip-on device, where used, came off after a few months. A special fishing tool was then needed to extricate fallen rods - the ordinary tool was not suitable.
- *Plunger seal and O-ring* absorbed water, expanded and were difficult to remove.

By the time such problems came to light, funds for research and development had virtually dried up, hampering further improvements.

### **4.2 Ease of Maintenance**

Thus many pumps proved far harder to repair at village level than had been envisaged; many people were forced back into using traditional, unprotected sources. A very common problem was with the rising main, meaning that even the Afridev could not be fully repaired by a village caretaker. Despite design improvements, this problem remains today.

Another pump promoted under VLOM was the 'WAVIN'. This was used in Guinea-Bissau, but suffered frequent breakdowns, especially from pipe failure due to jointing problems. This became so bad in one area that the population stopped repairing them even when parts were given free (van der Werff and Vischer, 1995).

A further issue is that deeper boreholes may be harder to maintain than shallow ones.

### **4.3 Local Manufacture**

Adoption of the VLOM approach led to in-country manufacture of handpumps in several locations. This succeeded in many places but there have been attendant problems of quality control. In Asia some of these have been resolved through the introduction of third party inspection (for example by the UK Crown Agents). UNICEF have supported standardisation and quality control for handpumps and spare parts in India. However, in Africa this is still in its infancy.

Attracting private sector interest has also been a problem in some countries. Local production tends to be expensive in Africa, much of which lacks an established small-scale industrial base. In 1994, the Afridev was being made in large numbers at competitive prices in India and Pakistan and sold for installation in African countries more cheaply than African-made models.

#### **4.4 Installation Costs**

Installation costs in some regions also cast doubt on the classification of handpumps as an affordable technology. Whereas drilling costs in India are typically in the region of \$1,000 per well, in many African countries the figure is over \$10,000 (Wishart, 1997).

#### **4.5 Maintenance Costs**

Both the provision and maintenance of many new generation handpumps have proved expensive, especially where spare parts have to be imported. The most important factor affecting maintenance costs is the number of pumps covered by the maintenance system (Skinner, 1996). In sparsely populated areas where the density of handpumps is low, the unit costs for setting up a maintenance scheme are high. Thus, many villagers in such areas cannot afford to contribute significantly to the upkeep of their pump. This also raises the question of who will replace the pumps at the end of their working life. These problems are exacerbated by a lack of standardisation in some cases, and a more general failure to develop the practice of preventive maintenance which saves costs in the long run.

#### **4.6 Commercial Viability**

Spare parts distribution has also been a problem, especially in areas of low population (and hence pump) density. Unless there is a critical mass of pumps in a district, the market for spares is so small that no commercial operator is likely to have an incentive to import and stock them. This again leads to dependency on government or, more commonly, on donors.

#### **4.7 Installation Quality**

The installation of good pumps on bad wells or boreholes has been a problem in many places, resulting in early failure of the pump due to problems such as sand intrusion and silting. Quality control of both community construction and private contractors is essential but often logistically problematic, and is not always achieved.

## **5. Problems with Maintenance Systems**

Problems with the organisation and execution of maintenance are perhaps greater than those with technology and can be traced back to three key assumptions in the VLOM approach; all of which are open to question. These are considered below.

### **5.1 Assumption 1: The user community will be able and willing to maintain communal handpumps**

In many projects little or no investigation is done during project appraisal to assess whether a community can actually be “VLOMed”. Experience suggests that in many cases they cannot, for a number of reasons.

#### **5.1.1 Pump Ownership**

Handpumps are often ‘handed over’ to communities in the belief that true ownership is also transferred. This has proved to be a gross under-estimate of what it takes to instil a communal sense of responsibility; in reality, communities rarely accept the ownership of communal facilities (Morgan, 1993). The test of ownership comes when the community are expected to pay for maintenance or repairs; often they do not, especially when they have previously been led to believe that government would be responsible for such services. This problem is made worse through inadequate extension work whereby ownership is not clearly defined; when a handpump breaks down, people feel no obligation to mend it.

Even where a sense of ownership is established, people may refuse to participate in maintenance when the costs are too high, for example when replacement of the rods and/or rising mains is necessary. This may result in users returning to traditional, usually unprotected sources.

A community’s confidence in its ability to maintain pumps also needs careful nurturing. Frequent breakdowns, especially those requiring major works, do not help and may give the community no confidence in the pump itself (Baumann, 1998). Land ownership can also be a problem; if the pump is sited on privately owned land, access may be restricted and users will feel no sense of responsibility towards it.

#### **5.1.2 Human Resource Base**

VLOM systems sometimes fail due to the lack of basic technical skills in sparsely populated rural areas; again this is a major problem in Africa. In much of Asia, with its higher population density and large cities, different levels of skill are available at different prices, even in many rural areas. In much of sub-Saharan Africa, the few skilled people who exist are often in great demand and are therefore peripatetic.

#### **5.1.3 Project Design and Management**

Mobilisation and training for operation and maintenance usually receive low priority in project design. Many projects ignore or grossly underestimate the time needed for development of VLOM; project durations and targets are based around the time taken for hardware implementation, with relatively little time devoted to training caretakers during handpump installation. The few documented projects, which were relatively successful with VLOM, placed a distinct emphasis on preparing the community and the supportive environment. The Karonga

project in Malawi, for example, included a four year maintenance phase after Afridevs had been installed, during which the project team maintained a high profile in the community (Noppen, 1996).

Even where designs are sound, some projects fail because of poor management and execution, particularly in extension work. An analysis of logistical management, the frequency and quality of interactions between villagers and extension workers and the extent to which a project keeps its promises to communities can be very revealing. NGO's are not immune to many of the criticisms made of government agencies and a careful distinction should be made between those projects where VLOM failed, and those where VLOM was never really tried.

### **Box 2: Introducing VLOM in Malawi: The Karonga Experience**

The Karonga project provided Afridev pumps to a population of 60,000; subsequently, four years were devoted to motivating and preparing the community for VLOM. It thereby served to test whether, given the right support, a community can manage their own water supplies using the VLOM approach.

In each village a water and health committee was established in addition to one committee per pump with at least two trained attendants for repair and maintenance. High-demand spares were supplied by a local wholesaler to village shops, while the government's role was restricted to monitoring and policy-making. The intention was that even if the government did not fulfil its role, the pumps could still be maintained.

When the project began the Afridev had not been fully tested and some parts had to be changed on all pumps after installation. Appropriate tools had also not been designed. These problems were eventually resolved and in 1997, two years after all project support had ended, a study found that:

- *95% of the handpumps and boreholes were working, with 75% working "well";*
- *communities repaired their handpumps, even replacing pump rods and rising main sections. However, they did no preventive maintenance or repairs to aprons and headworks;*
- *half of the pumps had either no or only one attendant. In most cases, at least one of the four essential tools had been lost or was never issued;*
- *most village water and health committees were defunct but pump committees remained active;*
- *communities had small amounts of cash on hand for maintenance but did not buy spares in advance of a breakdown. No regular contributions were made to maintenance funds; and*
- *village shops no longer sold spares, as there was too little business. Town-based wholesalers, however, still sold them.*

**Box 3: Lessons from the Project**

- VLOM is not a technical but a community concept; technology is only one part of what is needed to make VLOM a reality.
- Training for operation and maintenance should be part of project design, not an afterthought. It will be a long, slow process but will lead to improved sustainability.
- There is also a need to build confidence in the community concerning their ability to manage their handpumps.
- Operation and maintenance structures should be designed in accordance with the strengths and weaknesses of the community and supporting institutions.
- Where local skills are minimal only one type of handpump should be offered, to simplify maintenance tasks. This also increases the chances of a commercial market for spares.
- The improvement of traditional sources such as springs and wells should also be investigated as an alternative to handpumps.
- Extension staff are the key link between project agency and community and can create or destroy trust and confidence. It is very important to ensure that they are properly trained for their role.
- A distinction should be made between high and low demand spares (fast- and slow-moving spares). The former should be available through village shops, the latter via bigger, town-based dealers.

(Noppen,1996; Kleemeier,1998)

**5.1.4 Village-level Structures**

Village water committees set up at the instigation of project agents are often perceived as having no real purpose unless considerable time and effort is put in to developing them. As a result, many do not last much longer than the project itself although they may have been effective in organising construction of the water point. If the operation and maintenance system is designed around the water committee, the breakdown of the committee can jeopardise the maintenance of the pump.

Some other features of maintenance systems have also proved to be problematic. For example, many projects train area mechanics for the more complicated pump repairs which are beyond the remit of pump caretakers. Typically this is proposed as an income-generating activity for the mechanics who will charge for their services. In practice, many mechanics have been unable even to cover their costs, let alone generate a surplus. In Guinea-Bissau, area mechanics were unable to replace their bicycles after four years. (van der Werff and Vischer, 1995).

**Box 4: Improving maintenance in Guinea-Bissau**

A project focusing on the maintenance of existing handpumps in one region of Guinea-Bissau resulted in 90% of the pumps functioning, three quarters of them being of a non-VLOM type. The project was supported externally but implemented through existing government structures; it began with eight regional maintenance teams which gradually reduced in size and number to the point where they provided only a backstopping role.

A repair system for non-VLOM pumps was established using private sector area mechanics who were selected by village committees and trained by government teams. Once trained, the mechanics were given a tool kit, some spares and a bicycle and began charging the community for their services. Though successful to some extent, this arrangement provided the mechanics with only a very small income, thereby calling its sustainability into question.

For VLOM-type pumps, one village mechanic was trained per pump and received no payment. He/she was a member of the village water point committee, which comprised two male, and two female members. Women were found to be good for the job because, unlike men, they tended to remain in the village. The system worked reasonably well.

Water point committees were established from 1988 onwards and a review in 1994 found nearly all of them still functioning and managing pump maintenance, although aprons were not repaired. This was not the case, however, where the village had a WAVIN pump; this supposedly VLOM design broke down so often that many people stopped using it.

The fact that so many non-VLOM pumps were brought up to a good level of maintenance suggests that the maintenance system and supporting environment may be at least as important as the technology in determining sustainability.

(van der Werff and Vischer, 1995)

## **5.2 Assumption 2: Government will be able to provide an enabling environment to support VLOM**

### **5.2.1 Government Capacity**

Where VLOM has been adopted it is usually the result of a heavy donor input of expertise and resources. CARE International, for example, reported that in December 1997, after a three-year period of mobilisation and training, 97% of the 135 Afridev pumps in their project area were working and had an average down time of less than 10 days. (Obiols and Baumann, 1998). This suggests that with intensive support, communities can, to some extent, take on VLOM responsibilities.

It is no surprise, however, that with imported management and generous funding, maintenance can be improved; indeed in Guinea-Bissau both VLOM and non-VLOM pumps were brought up to an excellent level of maintenance this way. VLOM was introduced in response to inadequate government services, and the real test of its value is whether it can succeed in an ordinary government environment.

Unfortunately, the assumption that supporting VLOM is a less onerous task than running a centralised maintenance system has not been borne out in the field. There is little evidence of governments facilitating VLOM effectively on their own, although the Indian experience with maintenance gives some grounds for optimism (Talbot, 1997). Not only is it onerous - in the Karonga project it took four years of concerted effort to introduce VLOM - but it incorporates concepts which are often new to government departments and are not always understood by the staff who are supposed to promote them. An innovative, community-based system is unlikely to thrive if it depends for its support on government departments characterised by chronic under-funding, poor management and low motivation.

At the very least, a programme of awareness-raising and capacity-building is needed if government agencies are to accept the new proactive role of training users and ensuring a supply of spares, rather than seeing VLOM as a signal to shrug off all responsibility once the pumps are installed. Some institutions may need major reform before they can take on such a role.

Supporting VLOM may also be no cheaper to government than a centralised maintenance system. Recent experience indicates that any savings from ending the repair service will be offset (initially at least) by the cost of training and mobilisation activities, which on the basis of NGO experience may take several years. (Baumann, 1998)

Too often, the external support agency hands over the support of VLOM to government (formally or implicitly) just as it hands over pumps to communities, without any preparation for the task. Unfortunately, most government departments do not at present have the vision, the resources or the management and extension skills to promote and support VLOM effectively.

**Box 5: CARE Inhambane Project, Mozambique**

CARE's Afridev project in Inhambane has monitored pump performance since 1993. Many of the pumps have been installed to depths which are over 45m and serve more than 100 user families. In-country manufacture of pumps by a Dutch company has been established, with third party inspection, and the sale of spares has been commercialised since 1996.

Originally, communities only had to pay for routine preventive maintenance with the government or NGO providing major repairs for free. These were needed frequently given the large number of users and installation depths. In 1996 CARE began transferring full maintenance responsibility to communities by training 'maintenance and repair groups' (MRGs) at village level. These were to deal with all repairs including the removal and repair of rising mains, which sometimes cracked.

By December 1997, 97% of the 135 handpumps in the project were functioning and had an average downtime of less than 10 days. 77% of breakdowns were repaired wholly or partly by communities, 19% needed some external assistance and 4% were done by local government workshops or CARE.

**Lessons from the Project**

- Communities had the capacity to pay for routine maintenance and repair, but it was uncertain whether they could pay for major repairs such as replacement of the entire rising main. The involvement of the private sector helped in making unsubsidised spares available at acceptable prices.
- A backstopping system (a 'second tier') of local mechanics was recommended in addition to MRGs to support communities in those activities requiring more confidence and skill such as replacing the rising main, or fishing for dropped pipes and rods.
- A suitable technical solution for deep installations was needed due to a big increase in breakdowns at pump depths over 45m, of which pipe joint failure was a common cause.

(Obiols and Baumann, 1998)

**5.2.2 Policy Environment**

The adoption of VLOM usually marks a clear departure from existing custom and practice in both community and government and therefore has implications for the management and orientation of government services as a whole. It is difficult to introduce VLOM or community management while the broad policy environment is still based on traditional notions of government provision.

A conducive policy is therefore needed for public acknowledgement and promotion of the shift to community management and to create an obligation on government departments to re-orient their services. If, as often happens, real government commitment is lacking then the adoption of VLOM becomes confined to specific projects and to those issues over which the implementing agencies have direct influence. This is, inevitably, unsustainable.

### **5.3 Assumption 3: Communal handpumps will be able to meet most rural water supply needs**

As the VLOM concept gained currency many projects opted for communal handpumps on the assumption that this was the best option for the community. In practice, many communities have proved unable or unwilling to support communal handpumps and their suitability for every circumstance must now be questioned. In some cases, other options preferred by the community could be more sustainable. Examples include the following:

- Upgrading traditional sources which the community values and which are easier to maintain than handpumps (Waterkeyn, 1997). This could be especially applicable to sparsely populated areas where skills and spare parts are difficult to access, and low pump density raises maintenance costs.
- The provision or upgrading of a household facility such as a well or simple handpump if the aquifer is shallow. Some communities who would be unwilling to maintain a communal pump may be quite happy to invest in this option, which has been dubbed 'FLOM' or 'family-level operation and maintenance' (Waterkeyn, 1993). Family handpumps are commonplace in the Indian sub-continent and are installed without external support. They are not robust, but are cheap and simple to fix and their popularity makes the commercial supply of spares viable. However, the affordability of family water supplies depends upon the availability and accessibility of groundwater.
- The provision of a higher and more expensive level service where the community expresses a strong demand and willingness to pay. In Guinea-Bissau some communities did not regard a handpump as a sufficient enough improvement to their existing water supply to warrant payment; however, they were willing to pay for a household facility such as a yard tap (van der Werff and Vischer, 1995)

## 6. Implications

While the handpump has its merits, there is now considerable doubt that VLOM in its true sense is possible. In the African context there is little evidence that communities are able or willing, on their own, to support handpump programmes in the long-term. If handpumps are to be used, therefore, reliance on VLOM alone should be avoided. It may be more appropriate to develop the concept of shared responsibility for maintenance under a two or three-tier system with local caretakers responsible for simple tasks and more skilled district-based teams, supported by government institutions, dealing with the more complex problems. (Morgan, 1993). It is significant to note that the world's most popular handpump, the India Mark II, relies on such a system. This, in turn, means that handpumps will only be sustainable where government institutions have the capacity and motivation to provide support; this might be mediated via the private sector in some situations.

There is little doubt that VLOM handpumps are more useful than non-VLOM handpumps and as such constitute a valuable advance in technology design. However, there are other technology options to consider. Criteria are therefore needed for assessing whether, in any given situation, communal handpumps represent the most appropriate option with regard to the community, the supporting environment and other technology options. Their use should probably be restricted to a narrower range of circumstances, for example: institutions; areas where the water table is too deep for simpler technology options such as open wells or simple lift pumps; and areas with higher population density so that walking distances are not too large.

Handpumps are likely to remain an important technology for rural water supply; however, many communities cannot afford the full range of pump repairs and it has been very difficult to establish financially self-sustaining maintenance systems. It has also proved virtually impossible to foster the practice of preventive maintenance. External financial support will therefore be needed for the foreseeable future for the purchase, maintenance and replacement of pumps.

VLOM is one of a number of concepts developed to try to find a solution to rural water supply needs in the face of inadequate service providing institutions. It is the institutional issue above all, which needs to be addressed; this problem cannot be bypassed.

## 7. Has VLOM been Useful?

Despite the problems with VLOM there have been many positive outcomes.

- Although initially concerned with hardware, the focus of attention shifted to the ability and preferences of the communities who were required to carry out maintenance. It also linked hardware and software considerations and responded positively to the evident failure of centralised systems. As such, it helped develop the concept of community management. VLOM has become a concept based around the dynamics of the community, rather than technology.
- It showed that government alone cannot meet the needs of the community and that a more flexible approach to service delivery is needed. There are important roles for large private sector enterprises to manufacture pumps and spares, and for smaller enterprises for local sale and distribution of spares and to supply skilled labour for pump repairs.
- The rural water sector learnt more about the conditions needed to make a project succeed even where the technology is relatively simple. The problems proved far more complex and time-consuming than had been previously believed.
- It highlighted the benefits of technology standardisation. Using a limited range of pumps makes it easier for people to learn how to mend them, simplifies the supply of spares and avoids waste resulting from the installation of pumps which cannot be repaired. An increasing number of countries are now opting for a limited range of 'standard' pumps which are gradually replacing the many and varied designs hitherto installed under successive, unrelated initiatives.

## 8. Other Lessons

The experience with VLOM has been informative about the way such concepts evolve and develop in the water sector. In retrospect, it is clear that the hopes raised by VLOM were unrealistic; these were no doubt fuelled by the huge ambitions of the Water and Sanitation Decade. Everyone is looking for an answer to the sustainability question and when a new concept or buzzword emerges there is a rush to adopt it even before it has been fully scrutinised and tested. As a result, when problems arise they do so on a large scale. Instead of painstakingly revising and improving the concept, the tendency is to move on to another new concept that in turn may fail or work only partially.

Having said this, it is understandable that the term VLOM has become less prominent in sector jargon whilst 'community management' and more recently 'demand-responsive approaches' have come to the fore. VLOM is closely linked to community management; indeed, it prepared the ground for it. Nevertheless, even accounting for all its software elements, VLOM is a concept built around a particular technology. Community management is concerned more generally with the design of programmes according to community preference, capacity and willingness to pay; it is thereby less prescriptive, with VLOM forming just one optional component.

VLOM has undoubtedly brought the answer to sustainability a little closer; however, the goal of easy maintenance remains elusive. Perhaps the greatest lesson is that there are no 'off-the-shelf' solutions which can bypass the need for effective government institutions for community support. Wherever this problem is unresolved, and where there are no NGOs or other agencies to fill the gap, sustainability will always be in doubt. Unfortunately there are no simple solutions on the horizon for sub-Saharan Africa, which experiences these problems most acutely.

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*(Note: there are many references on VLOM handpumps and projects that used them. The references below relate more specifically to the VLOM concept.)*

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