

Sustainable Supply Chains for Rural Water Services

Linking local procurement of handpumps and spare parts supply



Summary

There is a critical need to increase the sustainability of rural water supply services, especially in sub-Saharan Africa. One of the primary reasons for low levels of sustainability is that supply chains do not deliver spare parts close to customers at an affordable cost. Most of the users of handpumps live in rural areas, where they require access to spare parts through some form of distribution network. Typically, spares are not readily available.

This field note outlines why current approaches to supply chain development for spare parts have not worked. It presents a set of solutions to ensure the availability of spare parts for operation and maintenance of rural water systems through integrated supply chains.

Although the same companies manufacture handpumps and spare parts, the route through which these items reach the rural community are completely different. Most handpumps which are installed in African countries are manufactured in India and imported through government- or donor-funded projects or by NGOs and installed by the project. In contrast, the spare parts are purchased from an overseas manufacturer by an agent, and then sold to users or area mechanics through spares outlets.

While reasonable profits can be made from trading in pumps, the margins on spare parts are considerably lower. As a result, there are very few incentives for national or more local private businesses to stock and sell spare parts. In order to address this problem, it is recommended that the supply of pumps and spares should follow the same distribution path, from manufacturer to agent to local pump supplier. Ideally, the communities should be able to buy the pump and spares directly from the same local supplier. This needs to be undertaken in conjunction with the establishment of quality assurance mechanisms for local supplies of pumps and spare parts.

Linking the supply of products, such as pumps and spare parts, with technical services, such as pump installation, repair and rehabilitation, also increases supply chain effectiveness as it creates a chain of incentives for the private sector.

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Abbreviations

NGO	Non-Government Organisation
PST	Pumps, spares and technical service providers
QA	Quality Assurance
SDB	System Density Breakpoint

Glossary

System Density Breakpoint (SDB) is defined as the minimum density of systems required to produce enough demand to generate sufficient turnover of spares and sufficient profit for the retailer. It is dependent on the local context and can be used to test the commercial viability of the supply of spare parts at the user level. For more details refer to Harvey & Reed (2006).

Introduction

Sustainability of rural water services

There is a critical need to increase the sustainability of rural water services, especially in sub-Saharan Africa, which has the lowest water supply coverage of any region in the world (WHO/ UNICEF 2010), and where it is estimated that 36% of hand-pumps are out of service at any one time (RWSN 2008). If current failure rates continue, attempts to increase water supply coverage will be hindered, and many millions of rural dwellers will remain without access to safe water.

There are several reasons for low levels of sustainability, including:

- Inappropriate technology choice, resulting in lack of affordability or acceptability among communities;
- Inappropriate or poorly designed management structures;
- Insufficient government or external support to communities;
- Poor quality design and construction of technical systems;
- Lack of access to spare parts for maintenance and repair.

One of the primary reasons for low sustainability of rural water supplies is the limitation of available supply chains to deliver spare parts close to customers at affordable cost.

The majority of handpumps installed in sub-Saharan Africa outside South Africa are manufactured in India, meaning that, in general, pumps and components must be imported. This is primarily because most customers opt for the cheapest price internationally and most African manufacturers are unable to make products as cheaply as their foreign counterparts.

Meanwhile, the vast majority of customers requiring spare parts are community water committees or private mechanics based in rural areas. This means that there must be a supply and distribution network for the recurrent delivery of spares from the point of manufacture to the points of use, at an acceptable price and quality. Ideally, water committees should be able to obtain spares the same day as a fault arises in order to facilitate rapid and effective repair of their water system.

While handpumps remain the predominant technology choice for improved rural water supplies in Africa, there are very few examples, if any, of sustainable private sector supply chains for handpump spare parts (Baumann 2000). This field note outlines why current approaches to supply chain development have not worked, and presents a set of supply chain solutions to ensure the availability of spare parts for operation and maintenance of rural water systems.

Why supply chains break down

There are a number of fundamental reasons why spare part supply chains break down, namely:

- limited profit for private sector involvement resulting in lack of commercial viability;
- different procurement procedures used for pumps and spare parts;
- government and donor policies or strategies that subsidise equipment and services;
- dependence on community-based maintenance systems which require supply chains to reach remote, sparsely populated areas.

All these factors are interrelated. In particular, the relationship between procurement practices for pumps and spares and commercial viability is critical.

Procurement practices

A recent study indicated that approximately 80% of handpumps used in sub-Saharan Africa are imported, primarily from India (Sansom & Koestler 2009). Current trends indicate that the numbers imported are increasing annually (Figure 1). It is estimated that UNICEF alone is responsible for importing approximately 20% of these.

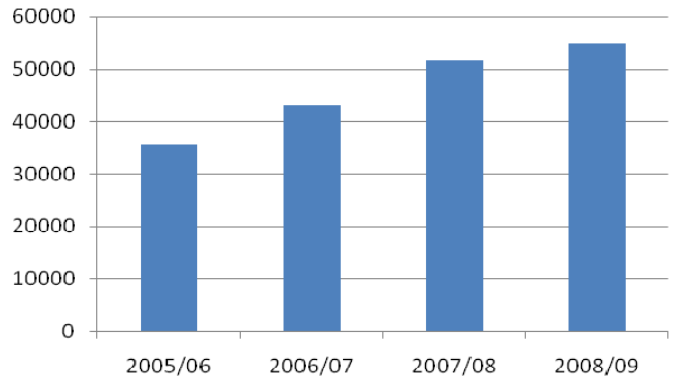


Figure 1: Estimated total numbers of handpumps imported to Africa each year

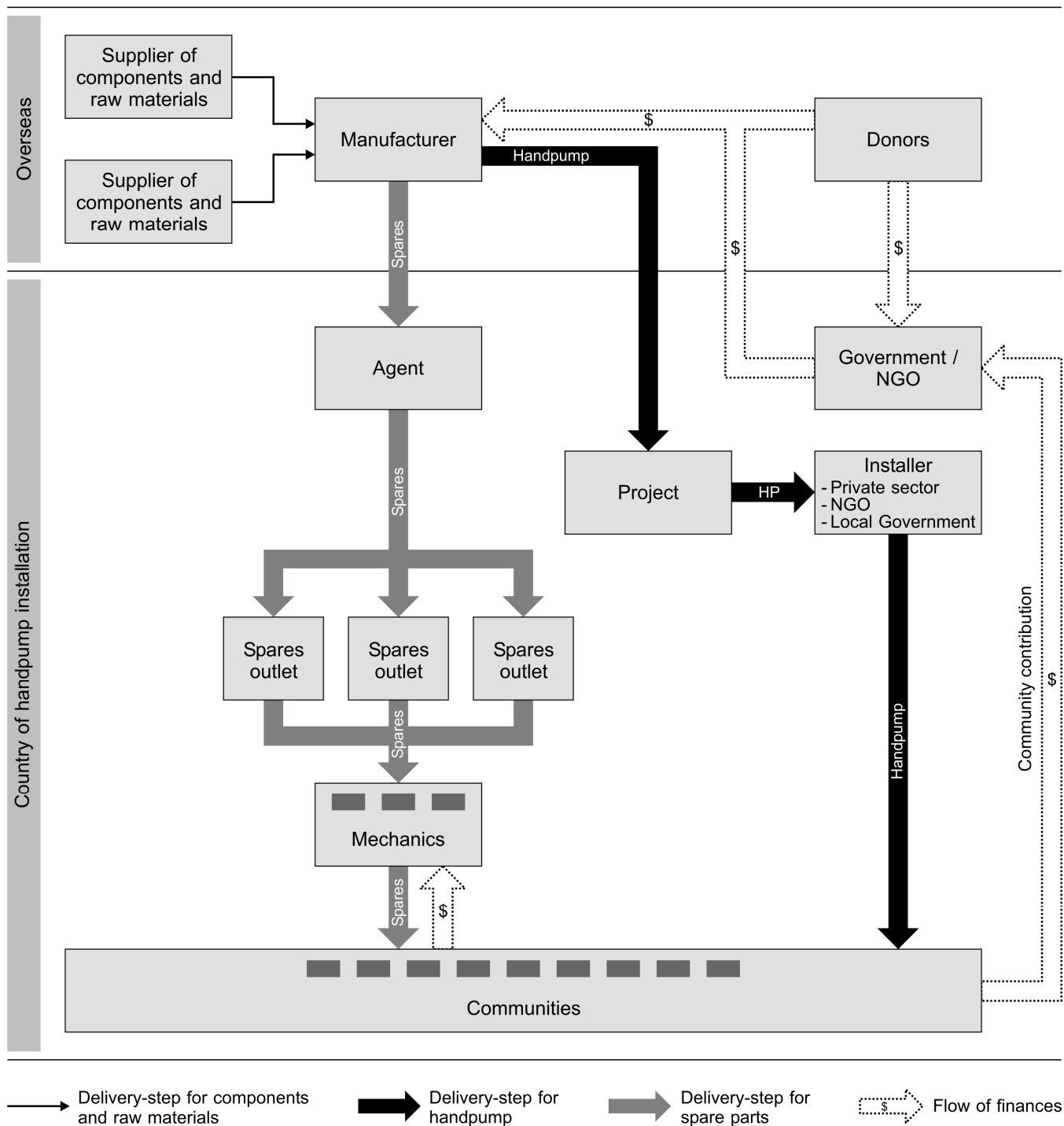
(Source: Sansom & Koestler 2009)

The procurement of spare parts is often separated from the procurement of pumps and major system components. Most implementing agencies buy pumps in bulk, especially where a project approach of installing several hundred pumps in a given area is used. Manufacturers and suppliers are selected primarily on the basis of cost, and consequently, many agencies order pumps directly from manufacturers overseas. The overseas private sector is keen to compete for such contracts since the profit margins on pumps are attractive. However, they have no incentive to supply spare parts since these provide negligible profits, and as long as they continue to receive large orders for pumps, business remains viable. This practice means that an isolated supply chain must be set up for the ongoing supply of spare parts.

Figure 2 illustrates the contrast between the typical route for the provision of spares and that for the provision of pumps. The diagram represents the typical scenario where handpumps are manufactured outside the country of use, as indicated by the dotted black line. The step from the suppliers of key components and raw materials to the manufacturer is the same for pumps and spares, but after that the routes diverge completely. The handpump is usually purchased directly from

the manufacturer by the donor or government, although a few donors may purchase from an in-country agent. It is then delivered to the project and finally installed by the private sector, NGO or local government. In contrast, the spare parts are purchased from the manufacturer by an agent, and these then pass down the supply chain to spares outlets distributed around the country, from where they are purchased by area mechanics and finally by the users.

Figure 2: Segregated supply chains

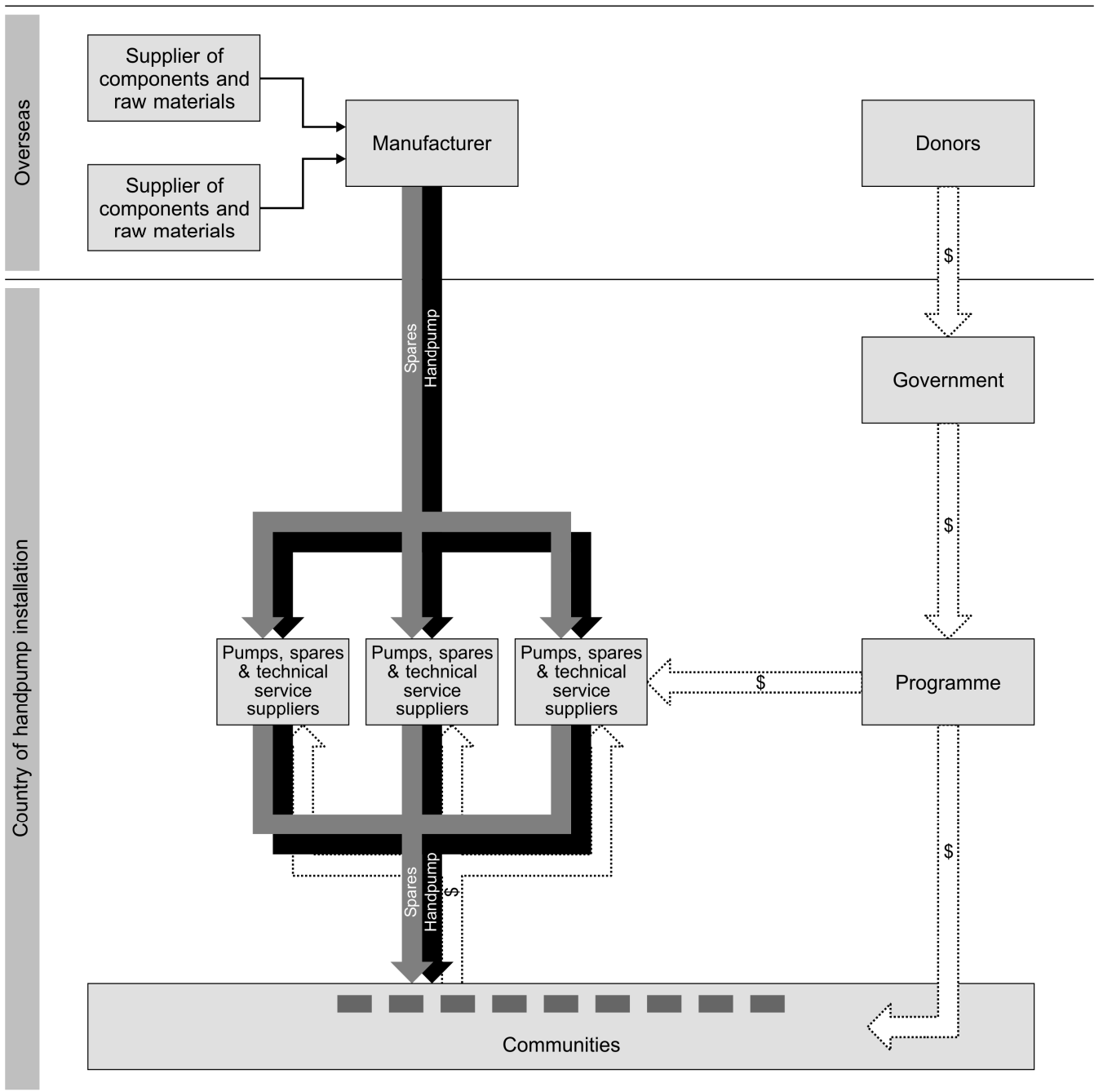


The large number of necessary delivery steps that exist between the user and the manufacturer for spare parts is indicated in the diagram. At each step, the respective spare company needs to make some profit. This inevitably leads to higher prices for the user while minimising profits for each step in the supply chain.

Commercial viability

The procurement practices described lead to the need to set up a stand alone supply chain for spare parts. A System Density Breakpoint (SDB) methodology (see Glossary) was applied in a rural area of Ghana to determine the density of handpumps required to make a stand alone private sector spare parts supply chain viable (Harvey & Reed, 2006). The minimum density of handpumps required to produce enough demand to generate

Figure 3: Integrated supply chain



sufficient turnover of spares and sufficient profit for the retailer was estimated to be 0.159 pumps/km² (approximately 200 pumps within a 20km radius). However, the average handpump density in the same area was only 0.052 pumps/km², less than a third of the minimum required density. This was the case even in a populous area where there had been intensive handpump installation programmes for several decades. The system density has been found to be significantly lower in many other rural areas of sub-Saharan Africa indicating that stand alone private sector supply chains for spare parts are unviable.

Stand alone spare parts supply chains are not commercially viable in the vast majority of sub-Saharan Africa.

Supply chain solutions

Local procurement

Successful supply chain management requires a change from managing individual functions to integrating activities into key supply chain processes (Lambert, 2001). Strengthening links between pumps, services (such as borehole drilling and pump installation) and spare parts can therefore increase the viability of supply chains. Procurement practices of donors and governments can have a considerable influence on this.

A major shift is required from selecting pump suppliers by lowest price internationally to selecting in-country suppliers who can also provide spares and related services. Normally, this does not mean procuring from in-country manufacturers (although this is fine if they are available) but from in-country importers

and retailers. This may result in slightly higher cost to the purchaser in the short term but is a more sustainable long-term option. Government decentralisation policies can also contribute by encouraging the procurement of pumps and services at district or local level. Where successful, this approach can stimulate spare part supply chains down to district or ward level, which is likely to provide sufficient access for most rural water-users.

Figure 3 presents an alternative model for spare parts supply whereby spares outlets are replaced by pumps, spares and technical service suppliers (PSTs). Ideally, communities themselves should be enabled to purchase pumps as close to the community as possible rather than have agencies procure pumps for them. This ensures that spare parts are also available at this level. However, even if pumps are procured on behalf of communities by government or a support agency, it is important that this is also done as local to the served communities as possible.

The advantage of such an approach to procurement is that pumps are purchased routinely from the local suppliers on a continual basis, rather than by occasional bulk order. This means they generate continuous revenue. If in-country suppliers can anticipate a steady demand for pumps, they will be likely to ensure that they keep both pumps and spare parts in stock. The cost of such a mechanism to the funding agency may be slightly higher, but this is a price worth paying to promote sustainability.

Local procurement requires effective Quality Assurance mechanisms to ensure that locally supplied handpumps and spares meet specifications and are not poor-quality imitations. Where possible, Quality Assurance mechanisms should utilise the national bureau of standards or equivalent government institution.





Integrated services

The private enterprise supplying pumps and spares can also provide technical services, such as pump installation and repair, to diversify profit-making activities. A recent study in Uganda indicated a strong desire among local spare parts dealers to diversify activities in this way to increase profits (Baumann et al. 2002).

The linking of products, such as pumps and spare parts, with technical services, such as pump installation, repair and rehabilitation, can go a long way to increase supply chain effectiveness, because a chain of incentives is created for the private sector. The same company that sells pumps and spares can also provide repair services, or even manage water services for rural communities; this means they need to make less profit from the spares alone and yet it is in their interest to ensure that spares are available. Because such enterprises have greater mobility than community members, spare parts retailers can be further way from rural communities whilst still ensuring an effective and sustainable supply chain that keeps water systems operating. A survey of rural communities in Uganda (Harvey et al., 2006) revealed that an overwhelming majority (88%) had no fundamental objection to private sector service delivery, although there were some concerns about cost, indicating that regulation is important (Figure 4).

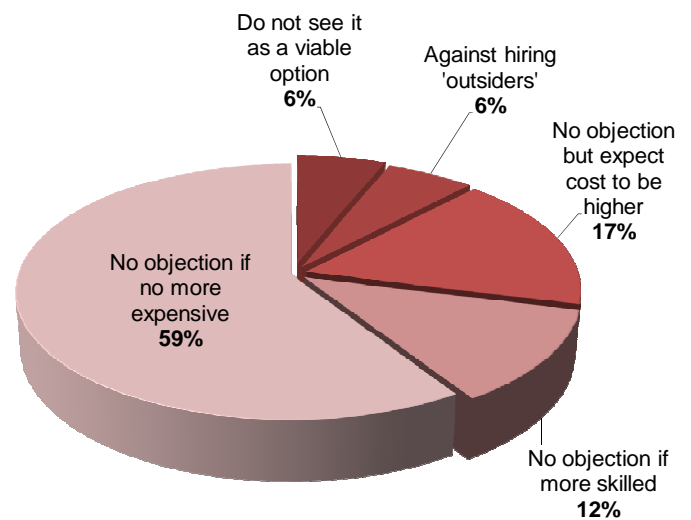


Figure 4: Community perceptions towards private sector service delivery in Uganda

(Source: Harvey et al., 2006)

Integrating products and services in this way can increase the commercial viability of supply chains, and thereby help to provide sustainable access to safe water for rural communities.

Key Messages

In order for supply chains to be sustainable, so that spare parts are readily available for the maintenance and repair of rural water systems, the following actions should be taken:

- **Procure handpumps locally:** Handpumps should be procured in country and as close to the end user communities as possible. Ideally, communities should purchase handpumps from local dealers themselves, but where this is not possible, support agencies should procure from local suppliers who are willing to maintain a constant stock of pumps and corresponding spare parts.
- **Develop quality assurance mechanisms:** Effective Quality Assurance (QA) mechanisms for locally supplied handpumps and spares should be developed by governments and other key stakeholders, preferably involving the national bureau of standards or equivalent government institution.
- **Support integrated supply chains:** Governments and support agencies should provide incentives for private sector primary supply chains for handpumps and spares, from capital cities to district towns. One way to do this is to instigate procurement at district level by communities or decentralised government institutions.
- **Award contracts for provision and maintenance:** 'Bundled contracts' for both the provision of handpumps and their maintenance and repair should be awarded to interested private sector enterprises. Such contracts may include requirements for after sales service, such as warranty schemes or bidding for least subsidy approaches. Where such models do not exist already it may be appropriate to pilot new approaches.
- **Explore private sector service delivery models:** Rural water service delivery models involving local private sector enterprises should be explored and promoted as alternatives to community management of operation and maintenance. These models have the advantage that the onus is on the private sector rather than the community to obtain spare parts, and hence spares outlets can be situated further away from rural communities.

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About the author

Dr. Peter Harvey is co-ordinator of the RWSN Sustainable Rural Water Supplies flagship and is currently Senior Adviser for Water Supply at UNICEF. His main areas of expertise are sustainability of rural water services; groundwater resource development; and water quality and safety.

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Contact




The Rural Water supply Network (RWSN) is a global knowledge network for promoting sound practices in rural water supply.

RWSN Secretariat
SKAT Foundation
Vadianstrasse 42
CH-9000 St.Gallen
Switzerland

Phone: +41 71 228 54 54
Fax: +41 71 228 54 55
Email: rwsn@skat.ch
Web: www.rwsn.ch



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