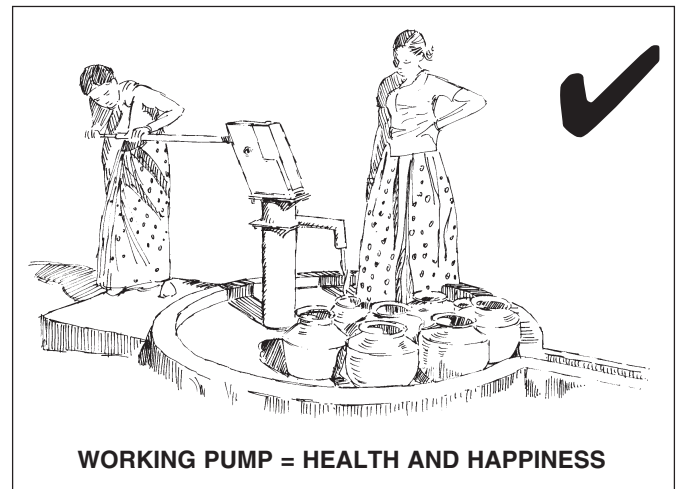
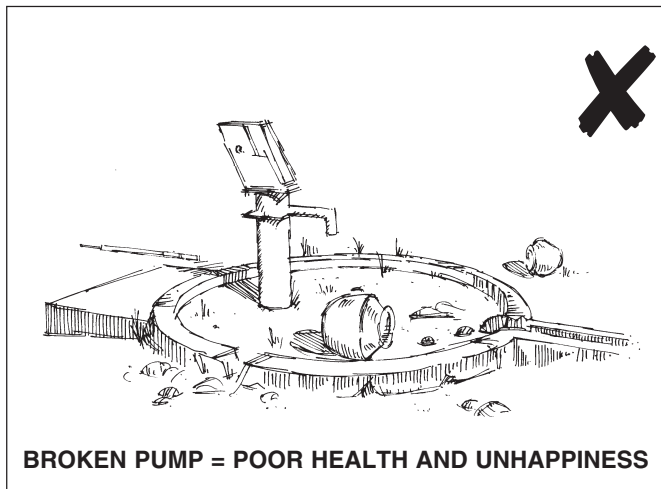


33. Maintaining handpumps

Handpumps can provide a permanent source of unpolluted water which is vital for a healthy developing community. A significant proportion of installations are not in optimum working order, however, and some are broken and inoperable for long periods. One of the major factors contributing to this waste of resources is inadequate or non-existent maintenance.



What is maintenance?

X It is *not* carrying out repairs when a pump finally breaks down.

✓ It *is* periodically inspecting an installation and replacing parts that are worn or show other signs of deterioration. Its aim is to prolong the life of the pump and avoid unexpected breakdowns.

Planned preventative maintenance is an organized system of inspections on a daily, weekly, monthly, and yearly basis, which should maximize the time for which a pump can deliver good drinking-water.

A typical schedule is given below but will vary for different pump types.

- Daily:**
- Pump operation
 - Pump and base cleanliness
 - Wastewater drainage
 - Comments of users

- Monthly:**
- Check output rate
 - Check for condition of concrete base

- Weekly:**
- Lubricate moving parts
 - Check tightness of nuts and bolts
 - Check security of pump on base

- Yearly:**
- Remove downhole assembly
 - Inspect and replace parts where necessary

Whenever remedial actions are required these are to be carried out and records kept at all stages.

This system of work requires proper scheduling, and experience has shown that the organization is just as important as the physical work.

Maintaining handpumps

The handpump is installed for the benefit of the community and it is reasonable to expect some contribution to its maintenance as they will want to look after their investment. In the past, maintenance has been organized in one of three ways:

A. Community management

All inspections, repairs, renovations and replacements are carried out by members of the community or under the community's direction.

Support to the community can be provided by private enterprise (spares and services) or purchased from a government agency.

Advantages

- ✓ Fast response to problems
- ✓ In control of own affairs
- ✓ Develop pride in own abilities and achievements

Disadvantages

- ✗ Needs motivated people with appropriate level of skill
- ✗ May require engineering facilities
- ✗ Need to hold expensive stock of spares

B. Centrally managed with community involvement (tiered system)

Simple routine inspections are carried out by the community people using the pump, but a centrally managed team is responsible for looking after many handpumps. This team carries out inspections, overhauls, and repairs.

Advantages

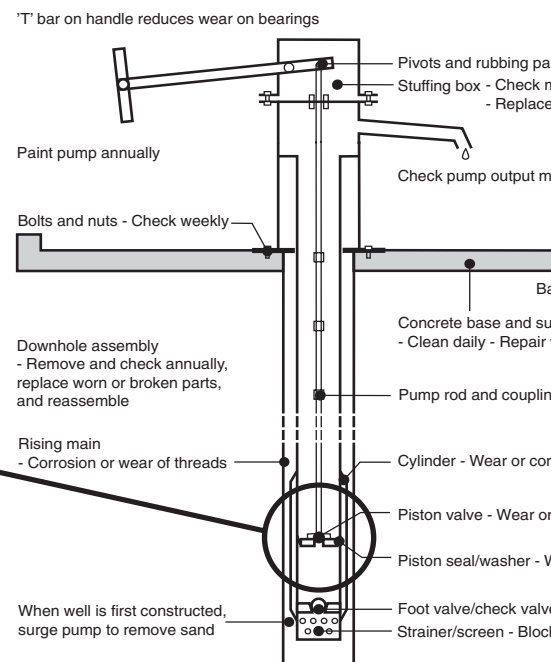
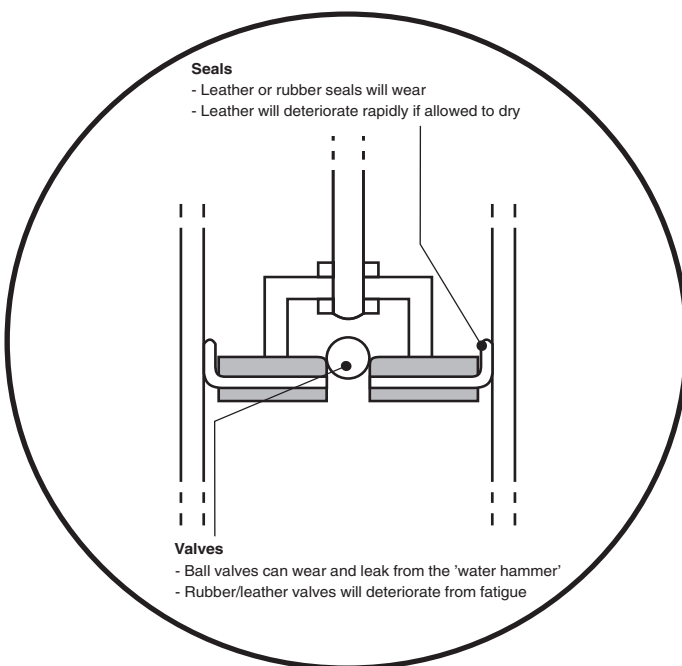
- ✓ Community retains reasonable responsibility
- ✓ Back up for major problems
- ✓ Pride in maintaining pumps

Disadvantages

- ✗ Community dependent in major problems
- ✗ Delays awaiting actions of central team
- ✗ Skilled team needs to be paid
- ✗ Expensive vehicles required

- While the centrally managed system (C) would seem the easiest to set up, it is the least effective in the long term.
- The compromise option (B) with both central and community involvement is perhaps the most common choice, but it has many disadvantages.
- Totally self-sufficient communities (A) are not widespread, but with the increasing availability of Village Level Operation and Maintenance (VLOM) systems, they are becoming more common.
- Increasingly, private enterprise is being seen as the channel for the purchase of spares and expertise.

Typical maintenance points



Maintaining handpumps

its continued use by the community. This is especially so if the community has initiated the pump installation, see ways:

community (em)

nd repairs are carried out by the a centralized specialist group ps will visit periodically for major repairs.

able measure of control and

ns beyond local resources is developed

art on another organization central group properly resourced to be effective ed

C. Centrally managed

All work is carried out by a central agency.

Advantages

- ✓ Smaller stock of spares required per pump
- ✓ Concentration of skills and resources

Disadvantages

- ✗ Slow response to remedy breakdowns
- ✗ High cost and possibly poor service
- ✗ Routine inspections may not be carried out
- ✗ No involvement or commitment by the community

s not always been sustainable.

and Maintenance (VLOM) - designed pumps, this option is becoming more feasible.

parts - Lubricate weekly
monthly
annually

monthly

ase drainage - Check daily

rplus water drain
when needed

g - Tightness and wear

rosion

deterioration

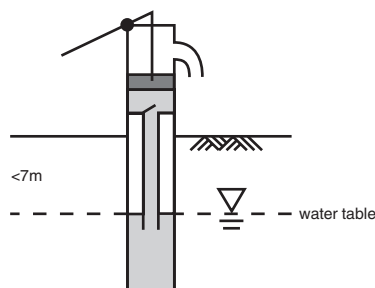
Wear or deterioration

e - Wear or deterioration
kages

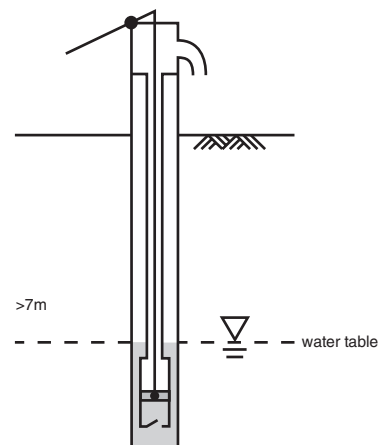
The significance of maintenance

When handpumps are to be installed a lot of time is spent considering the type of pump and the installation details, but ease of maintenance is of vital importance as it will influence the effectiveness and life of the pump.

Ease of maintenance should influence choice as much as hydrogeology.



Shallow water table - Suction pump
Easy maintenance as all parts are above ground



Deep water table - Lift pump
Complex maintenance as some operative parts are below ground

Maintaining handpumps

Community involvement

No matter what system of management is adopted, user involvement is vital for the long-term effectiveness of the handpump. The best way to achieve this is by the appointment of a *pump caretaker* who, after proper training and the supply of a tool kit, will carry out the following duties:

The pump caretaker's duties:

- To carry out inspections daily, weekly, monthly
- To keep records of all checks and work
- To monitor pump output rate
- To keep pump and base clean and clear of refuse
- To train people how to use the pump properly
- To make simple repairs or replacements
- To request help for major problems
- To keep a supply of spare parts
- To ensure surplus water is drained away
- To give guidance in health care

The pump caretaker should:

- Be female (if culturally or socially acceptable)
- Be aged 18-35
- Live close to the pump
- Be physically fit and active
- Be acceptable to the community
- Be a pump user
- Have own means of support as the pump caretaker's job is only part-time
- Be self-motivated

In order to emphasize their responsibility, pump caretakers should receive payment.

Physical maintenance

There are so many types of handpump that it is not within the scope of this Technical Brief to detail specific maintenance points, but it should be noted that whenever parts rub or rotate, wear will take place. Lubrication will minimize the wear, but routine inspections will confirm the rate of deterioration and decide when a replacement is required.

All nuts and bolts should be kept tight, as excessive play encourages wear.

Each type of pump will require a different level of maintenance, and one reason for keeping records is to review procedures to check if they are appropriate.

Every handpump should be available for work 100 per cent of the time, but this cannot be achieved by only responding to breakdowns. A strategy of Planned Preventative Maintenance will keep the non-working time to a minimum.

Further reading

- Colin, J., *VLOM for Rural Water Supply: Lessons from experience*, WELL, London, 1999. (<http://www.lboro.ac.uk/well>)
- Kennedy, W.K. and Rogers, T.A., *Human and animal-powered water-lifting devices*, IT Publications, London, 1985.
- Pacey, A., *Handpump maintenance in the context of community well projects*, IT Publications, London, 1977.
- UNICEF, *India Mark-II handpump installation and maintenance manual*.
- World Bank / Rural Water Supply Handpumps Project, *Community water supply — the handpump option*, World Bank, 1986.

Prepared by Bob Elson, Richard Franceys and Rod Shaw

WEDC Loughborough University Leicestershire LE11 3TU UK
www.lboro.ac.uk/departments/cv/wedc/ wedc@lboro.ac.uk

