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?

✗ It is \textit{not} carrying out repairs when a pump finally breaks down.
✔ It is \textit{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.

<table>
<thead>
<tr>
<th>Daily:</th>
<th>Weekly:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump operation</td>
<td>Lubricate moving parts</td>
</tr>
<tr>
<td>Pump and base cleanliness</td>
<td>Check tightness of nuts and bolts</td>
</tr>
<tr>
<td>Wastewater drainage</td>
<td>Check security of pump on base</td>
</tr>
<tr>
<td>Comments of users</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monthly:</th>
<th>Yearly:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check output rate</td>
<td>Remove downhole assembly</td>
</tr>
<tr>
<td>Check for condition of concrete base</td>
<td>Inspect and replace parts where necessary</td>
</tr>
</tbody>
</table>

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

\textit{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 their 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 done by people using the pump, but a look after many handpumps, inspections, overhauls, and repairs.

Advantages
✓ Community retains responsibility
✓ Back up for major problems
✓ Pride in maintaining pump

Disadvantages
✗ Community dependent in p
✗ Delays awaiting actions of authority
✗ Skilled team needs to be p
✗ 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

Totally self-sufficient communities (A) are not widespread, but with the increasing availability of Village Level Operation and

Increasingly, private enterprise is being seen as the channel for the purchase of spares and expertise.

Typical maintenance points

- Leather or rubber seals will wear
- Leather will deteriorate rapidly if allowed to dry

- Ball valves can wear and leak from the ‘water hammer’
- Rubber/leather valves will deteriorate from fatigue

- Paint pump annually

- Bolts and nuts - Check weekly

- Concrete base and seal - Clean daily - Repair

- Pump rod and coupling - Check

- Downhole assembly - Remove and check annually, replace worn or broken parts, and reassemble

- Rising main - Corrosion or wear of threads

- Piston valve - Wear or corrosion

- Piston seal/washer - Worn or corrosion

- Foot valve/check valve - Worn or corrosion

- Strainer/screen - Block

- Check pump output meter

- ‘T’ bar on handle reduces wear on bearings

- Pivot and rubbing plate

- Stuffing box - Check

- Stuffing box - Replace
Maintaining handpumps

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

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

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.
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**
UNICEF, India Mark-II handpump installation and maintenance manual.

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