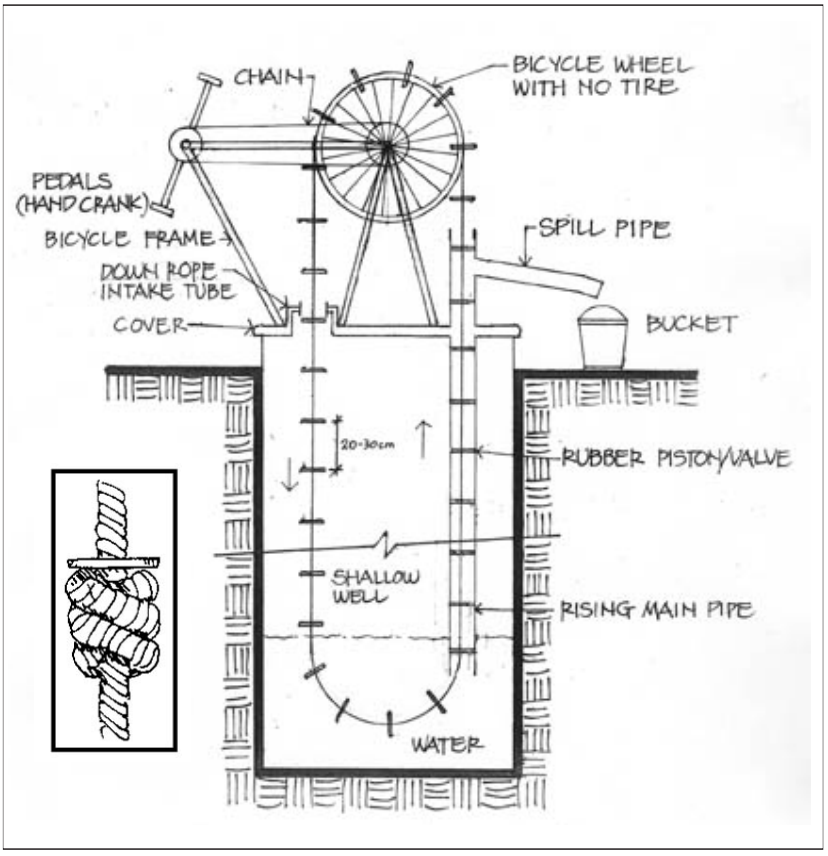
Useful water pumps

What is this Action Sheet about?
Water flows downhill. A pump is needed to move water uphill. Many kinds of pumps are available including pumps that use electricity, gas, solar energy, or human energy to move water. If a pump is difficult to use or if it is out of service often, people may return to collecting water from unsafe sources. This Action Sheet gives details of two useful water pump designs.

How to choose a pump
Because a pump may be the most costly part of a water system, it is important to choose the right kind of pump for your household or community. When choosing a pump you may want to consider these things:
- Both men and women should be involved in selecting the community pump.
- A pump should reduce the effort needed to lift water.
- A pump should be manageable by one woman alone.
- A pump should be reliable. If a pump needs costly fuel or electricity which may be unavailable, it is not useful.
- A pump should be easy to repair with available spare parts. A pump that breaks easily but is very easy to repair locally may be better than a pump that will only break after 5 years, but that cannot be easily repaired by local people.

The rope and washer pump: A low cost, easy way to lift water.
All pumps have one thing in common — if they break there is no water. For most people, the best pump is one that they can build, operate, and repair by themselves. The rope and washer pump is based on an ancient design from China. It is used to raise water from drilled or hand-dug wells up to 50 metres deep. It uses a metal pulley wheel, a rope with small rubber discs attached, a plastic pipe that encases the rope, and a rope guide in the bottom of the well. As a person turns the pulley wheel, water is lifted and pours out a spout at the top of the well. Because only a small amount of water is lifted with each turn of the wheel, it takes very little strength and is easy to operate.

The best thing about this pump is the low cost and the ease of fixing it. The rope is the part most likely to break, and even if it is patched rather than replaced, the pump still works. The rope and washer pump is used in many places around the world. In each place people have changed the design to fit their needs and the materials they have to build and repair it.



Rope and Washer Pump, with rubber discs inset. Image: Greg Bartle

Farmer Jenny Nkhudu using her treadle pump to send water to the fields,
Image: Malawi Enterprise Zone Association, Harvest Help partner organisation

Another useful pump design is the treadle pump. The treadle irrigation pump is able to lift up to 7,000 litres of water per hour using the power of the human body, and can be made locally at low cost in small-scale metalworking shops.

Water pumps like those shown above can be used for small scale irrigation of crops, helping families to grow crops in the dry season where before they had to wait for the rains.

Note for people living in semi-arid and dry lands: See Action Sheets 43 Drip Irrigation and 44 Buried Clay Pot Irrigation on ways to make sure that your crops are getting only as much water as they need. Too much water can damage the soil.

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CAP-NET www.cap-net.org/
IRC - International Water and Sanitation Centre www.irc.nl
Network for Water and Sanitation International (NETWAS) www.netwas.org/
UNDP Community Water Initiative www.undp.org/water/

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How to Make a Rope and Washer Pump -- www.developmentbookshop.com/book

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"Water Pumping Devices: A handbook for users and choosers", by Peter Fraenkel, 2nd edition, ITDG Publishing, 1997 www.developmentbookshop.com/book

Rural Water Supply in Africa – Building blocks for Handpump Sustainability by Peter Harvey and Bob Reed, WELL, wedc.Lboro.ac.uk/publications

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