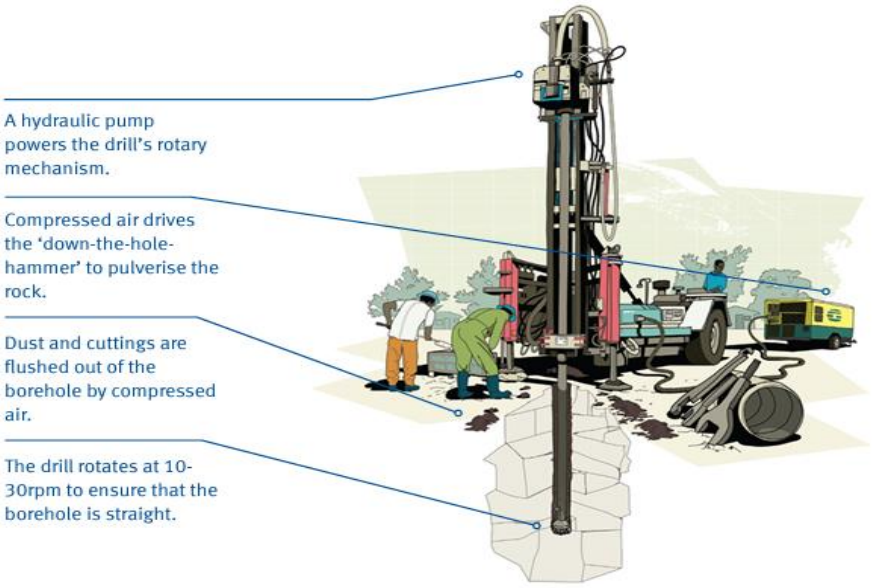
Water Technologies Information Pack

Boreholes:

When water sources are unreliable, groundwater is the most reliable source of water. In areas with very hard rock or very deep groundwater digging boreholes can be a good solution. Hydraulic pumps and rock drills dig to depths of 100m or more to access deep underground water sources. Once installed water is pumped to the surface either by hand or, where there is a high demand, using electric engines. The water is usually stored in tanks before being piped to taps in the village.

Environment needed:	Can be located in hard rock areas and dry and wet areas. They can survive flooding without contamination.
Supply/Population:	Can supply larger populations
Climate needed:	Can be installed in dry areas
Technical Abilities:	Needs extensive surveys by experts on geology and groundwater and experts needed for installation and maintenance.
Cost:	High
Materials:	Complex technology is needed to be installed and maintained
Water requirements:	needs a groundwater supply

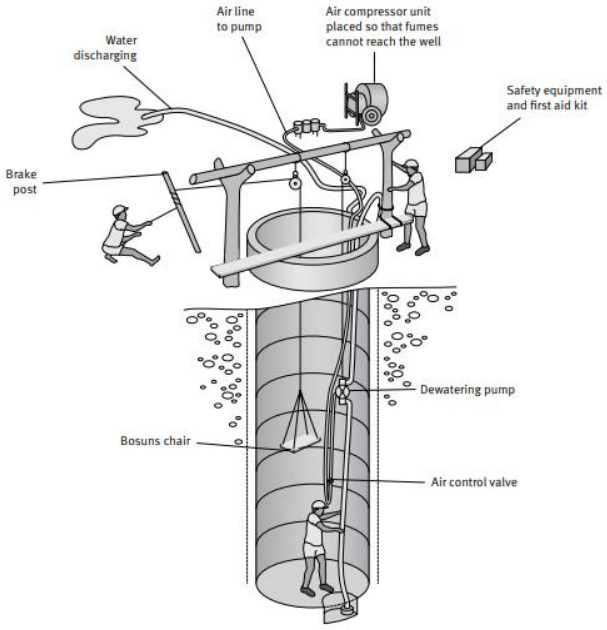


Advantages of borehole	Disadvantages of boreholes
✓ Can supply a larger number of people	✗ Can be costly to install
✓ Can reach deep depths of groundwater	✗ Requires lots of technical knowledge
✓ Generally good yields	✗ Requires skilled maintenance work
✓ Can help in hard rock areas	✗ Installation is complex

Hand-dug wells:

A traditional method used for getting to ground water where by a well is dug by hand to access ground water. As they are dug by hand this kind of well is restricted to areas with suitable types of ground (soft grounds: soils, clay and sand). This can be done with to reach groundwater up to 30m deep and can be dug under supervision by the villagers themselves. Wells are roughly 1.5m in diameter.

Environment needed:	Needs soft ground for it to be dug by hand. Useful in both dry and wet areas as long as there is groundwater available less than 20m from surface. At risk of contamination from flooding when there is no lid on well.
Supply/Population:	Can serve 300 people
Climate needed:	Can be installed in dry areas
Technical Abilities:	Can be created by any person with some technical supervision
Cost:	Low
Materials:	Simple technology is needed to install the well with locally available materials and can be fitted with either a hand pump or an access hole.
Water requirements:	needs a groundwater supply

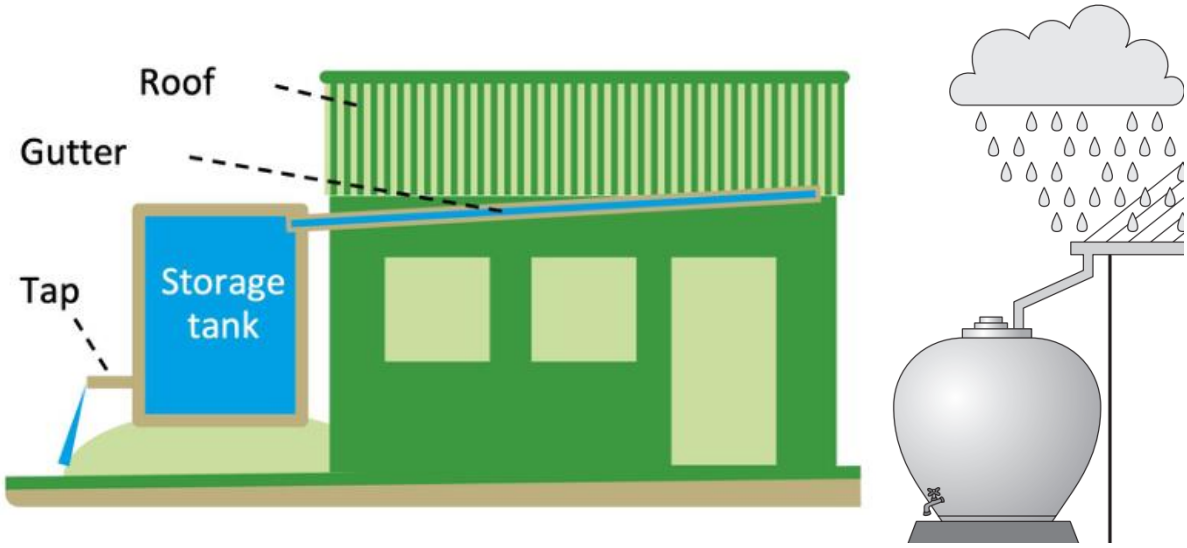


Advantages of hand-dug wells	Disadvantages of hand-dug wells
✓ Cheap materials can be used	✗ Can be time-consuming to construct
✓ Can be built by communities themselves	✗ Risk of collapse if not supported properly
✓ Generally good yields	✗ Depth of well is limited
✓ Uses simple materials so is easy to maintain	✗ Unless capped or protected, hand-dug wells can be open to contamination

Rainwater harvesting:

Where there is no surface water, groundwater is too deep or inaccessible due to hard ground conditions, or where it is too salty, acidic or otherwise unfit to drink, rainwater harvesting is a good alternative. In addition, areas with regular rainfall have this is the most appropriate alternative.

Environment needed:	Useful regardless of geology. Needs soft ground for it to be dug by hand. Useful in both dry and wet areas as long as there is groundwater available less than 20m from surface. At risk of contamination from flooding when there is no lid on well.
Supply/Population:	Depends on storage facilities could supply a school, hospital or singular home
Climate needed:	Requires two wet seasons a year
Technical Abilities:	Low skills required; A supervision check recommended to ensure a suitable standard.
Cost:	Low
Materials:	Simple technology is needed to build a storage tank, good roofing and guttering for catchment.
Water requirements:	needs rainfall

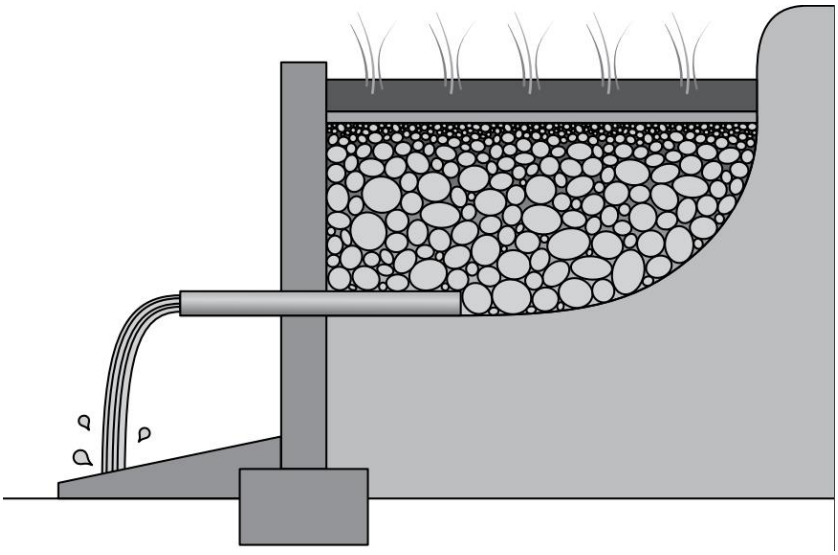


Advantages of rainwater harvesting	Disadvantages of rainwater harvesting
✓ Cheap materials can be used for building and storage	✗ Supplies can be contaminated if catchment surfaces aren't cleaned
✓ Construction is relatively straightforward	✗ Poorly constructed water storage can suffer from algal growth and pests
✓ Provides safe water close to buildings	✗ Not effective all year in arid areas
✓ Low maintenance costs and requirements	✗ Can act as a breeding ground for disease if not properly maintained

Spring protection schemes:

Surface springs occur where groundwater emerges at the surface. A spring source can be used pipe water to a community or to provide a single outlet, running continuously, which is set at a sufficient height to allow a bucket or container to be placed below it. With the latter, to prevent waste, any flow which is not needed for domestic use can be used for irrigation.

Environment needed:	Requires a spring water source close to the surface with soft rock.
Supply/Population:	depending on the flow rate this can supply up to 150 people.
Climate needed:	Supply will vary with the seasons but does requires rainy seasons
Technical Abilities:	Low skills required; supervision check recommended to ensure a suitable standard.
Cost:	Low (medium if water is piped to community)
Materials:	simple technologies needed to build and maintain
Water requirements:	needs a spring to use as a source

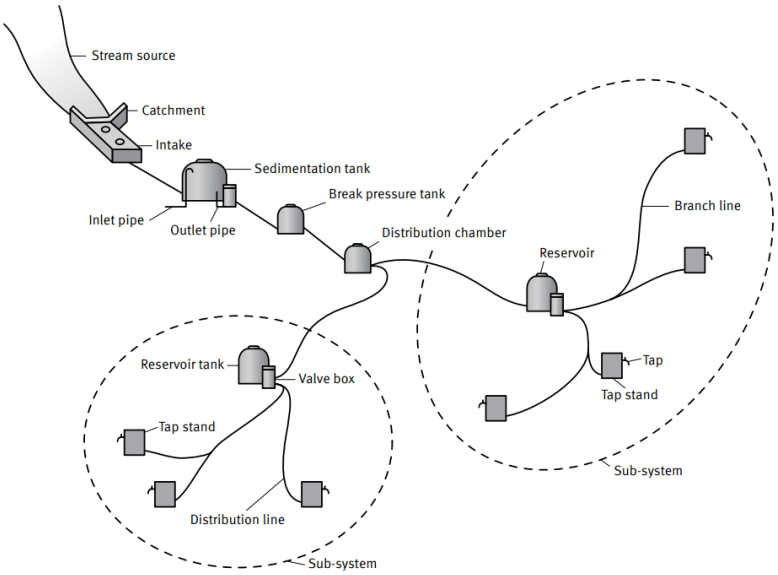


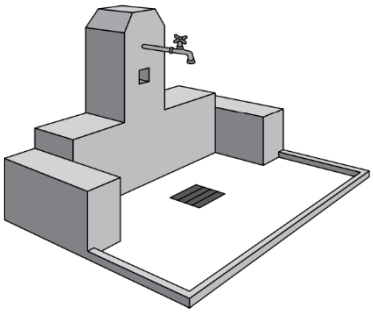
Advantages of rainwater harvesting	Disadvantages of rainwater harvesting
✓ Water coming naturally to the surface limits need for pumping	✗ Yield can diminish or dry up during extreme drought periods
✓ Low maintenance and running costs	
✓ Can be high yielding source of good quality – no need for treatment	✗ Regular maintenance needed around the spring head to prevent pollution
✓ fast flowing springs can irrigate crops as well as supply for domestic use	

Gravity fed-water systems:

Water is found from a spring, stream or river in an upland area that is collected and then, using the force of gravity water is piped downhill through to local communities who access the water by using tap stands within the community. These systems tend to be highly reliable and easily maintained but are expensive to install.

Environment needed:	Requires a spring water source in an upland area not too far from communities. It is desirable for the ground to be easy to dig up, but this isn't essential.
Supply/Population:	150 people per tap stand installed
Climate needed:	Can be installed in any climate with more reliable supplies found in areas with regular rainfall.
Technical Abilities:	High skills required for building although local communities can help in building the network but maintenance can be done with low skills.
Cost:	High (installation) but Low after development (maintenance)
Materials:	building requires simple technologies to build and develop
Water requirements:	needs a spring to use as a source





Advantages of gravity fed schemes	Disadvantages of gravity fed schemes
✓ Use of gravity stops the need for expensive pumps	✗ More expensive construction costs than underground water sources
✓ Low maintenance and running costs	✗ Difficult terrain can restrict pipe-laying
✓ Consistent level of service due to low maintenance needs	✗ Yield can diminish or dry up during extreme drought periods
✓ Tap stands can be within reasonable distance (250 metres) of all households	✗ Build-up of limescale in pipes in hard water areas