



Every 20 seconds, a person in the developing world – usually a child – dies from diseases caused by polluted drinking water. But this heart-breaking issue extends even to rich countries like Canada, where water contaminated by animal waste has been a problem.

Through basic information and challenging activities, these junior high (grade 7-9) science resources are intended to teach students principles around water stewardship and water treatment, while adhering to government education guidelines. Learn about Samaritan's Purse's work helping families get safe water and involve your students in thinking about world water issues and how to solve them.

TREATMENT OPTIONS:

6. RAINWATER HARVESTING

Domestic rainwater harvesting is an innovative solution to meeting water needs, and can be implemented quickly and modularly. Renewed interest in the technology is reflected in the water policies of many developing countries, where it is often cited as a source of household water.

The basic system consists of a tank to capture rainwater falling on the roof of a house, and gutters to bring it to the tank. More sophisticated systems also have some filtering.

Rainwater systems are decentralized and independent of topography and geology.

There are three main components:

1. Roofs and other surfaces to collect water. These are best made from plastic sheets, tiles, thatched palm leaves, or galvanized, corrugated steel.
2. Gutters and drainpipe, usually made from bamboo or untreated timber, to transport water to a storage reservoir.
3. A reservoir – usually a wood, plastic, fiberglass, concrete, or cement-block tank – to store the water until it is used, plus a tap, pump, or rope and bucket.

The efficiency of rainwater collection depends on materials used, construction, maintenance and total rainfall. If cement tiles are used as roofing, about 75 per cent of rainwater is collected. Clay tiles collect usually less than 50 per cent. Plastic and metal sheets have an efficiency of 80-90 per cent.

Rainwater sources and types of use

Rainwater systems can be further classified by their reliability, with four types of user regimes:

- Occasional – water is stored for only a few days in a small container. Suitable when there is a uniform rainfall pattern with very few days without rain and there is a reliable alternative water source nearby.
- Intermittent – in situations with one long rainy season, when all water demands are met by rainwater; however, during the dry season, water is collected from non-rainwater sources.
- Partial – rainwater is used throughout the year but the 'harvest' is not sufficient for all demands. For instance, rainwater is used for drinking and cooking, while water from other sources is used for bathing and laundry.
- Full – for the whole year, all water for all domestic purposes is rainwater. In such cases, there is usually no alternative source and water must be well managed, with enough storage to bridge dry periods.



Is it ready to use?

Rainwater is clean and safe to drink. However, as the rain falls on roofs and runs through gutters into the reservoir, it has many opportunities to become contaminated. Leaves, debris, dust and even mice or monkey feces can end up in the water reservoir as the water runs over the roof and through the gutters.

To combat this, many catchment systems have some sort of filter or “first flush” system to try to eliminate this contamination. However, because of the possibility of this contamination, it is recommended water in the reservoir be treated with chlorine before using.

Benefits, drawbacks, and appropriateness

The benefits of rainwater harvesting are:

- The water source is close to people, so it is convenient and requires a minimum of energy to collect.
- Less back problems and growth reduction, particularly among children and women, since the water doesn't have to be humanly transported over long distances.
- More time for education and personal development, particularly for young girls as time saved from carrying water is now used for school attendance or homework.
- Users own, maintain and control their system.

The drawbacks of rainwater harvesting are:

- Very limited use in dry climates.
- Initial installation is costly and laborious.
- It is not a good stand-alone water supply solution in any but the most water-stressed situations, since the increase in tank capacity necessary to bridge a long dry season can be very expensive.
- The collected water may still require chlorination.

Suggested activities:

- Research where rainwater harvesting has been extensively used. Was the driving impetus in each case the same? What conditions, environmental and/or economic, made it possible?
- Have students research what kind of rainwater harvesting system they would install on their family dwelling. Is it worth the cost?
- Have students research what kind of rainwater harvesting system is becoming popular in Canada (rain barrels attached to evestrough downspouts, for watering gardens and lawns). Have students find out where these barrels can be bought and how to install them.

Sources: Samaritan's Purse Canada, www.turnonthetap.ca
<http://www.ircsa.org/factsheets/lowincome.htm>
<http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/drh.htm>