



Rainwater harvesting in Sri Lanka provides kindergartners with drinking water in the dry season.

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More Water, Less Waste: Improving Global Sanitation and Freshwater Access with Waterless Toilets and Rainwater Harvesting

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Around the world, temperatures are rising and sources of freshwater are becoming increasingly unpredictable. Two and a half billion people already lack access to basic sanitation, and nearly one billion people lack access to safe drinking water.¹ Adding to the problem, global warming is expected to lead to more floods and more droughts, both of which reduce the availability of safe, clean freshwater for drinking, sanitation, irrigation, and other basic needs. Fortunately, there are technologies such as waterless toilets and rainwater harvesting that can be deployed immediately—and cost-effectively—to improve sanitation, protect existing supplies of freshwater, and create new sources of safe water.

Delivering Water and Sanitation Services Where They Are Needed Most

A lack of access to safe water and sanitation results in more than 1.6 million people dying each year of entirely preventable diarrheal diseases—and 90 percent of these deaths are children under age five.² The International Panel on Climate Change (IPCC) predicts with high confidence that global warming will further reduce access to freshwater.³ With more water shortages on the horizon, now is the time to invest in successful and cost-effective technologies such as waterless toilets and rainwater

harvesting to conserve freshwater. These cost-effective, simple, and sustainable technologies are particularly useful in rural villages, arid regions, hurricane and disaster relief areas, and urban slums.

Waterless Toilet 101

A waterless urine-diverting toilet may look like a western-style seated toilet or take the form of a cost-effective squatting toilet, but rather than using water to flush human waste down a pipe to a treatment plant, the waste is diverted into separate liquid and solid storage tanks for reuse.



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An example of a urine-diverting toilet that can be used with or without water.

Credit: Wostman Ecology

Users add a scoop of sawdust or cold ash to deodorize and dehydrate the solid waste. Liquid waste can be stored in tanks long enough to decompose into plant-friendly nutrients such as potassium, phosphorus, and nitrogen. Solid waste can be stored for 6 to 18 months (depending on the climate) to dehydrate and decompose into compost and fertilizer. During this time, harmful bacteria and parasites die, leaving behind safe, nutrient-rich compost.

Waterless toilets can be significantly cleaner and safer than existing options if properly designed, used, and cleaned. Carefully designed air shafts and solar or wind-powered fans can improve ventilation, reduce odors, and inhibit insects from breeding and spreading disease. The lack of odor also means that waterless toilets—unlike pit latrines—can be built indoors, increasing comfort and convenience.

Turning Waste Into Water, Fuel, and Fertilizer

By converting waste products into usable resources, waterless toilets can bring a number of benefits to local communities:

- Storage tanks for waterless toilets can be above-ground and therefore avoid contaminating groundwater wells and other freshwater sources.
- Solid waste gives off methane and other gases while decomposing. This bio-gas can be captured and reused to provide energy for cooking or lighting a home. The bio-gas generated by one adult's solid waste provides enough energy to provide for the daily energy needs of one person in the developing world.⁴
- Both liquid and solid waste can be reused as safe and environmentally friendly fertilizers, helping to avoid harmful chemical alternatives that can contaminate water and food.

Harvesting the Rain

Rainwater harvesting is a time-tested practice of collecting rainwater during wet seasons to store for use during dry seasons. From highly sophisticated, large-scale reservoirs and treatment plants to village-level collection with natural rock catchments, there is a wide range of technologies available. Some of the most cost-effective methods for collecting clean drinking water involve installation of a corrugated, milled steel, or tiled roof with a gutter that is in

turn connected to a swiveled collection pipe. The swivel allows users to divert the initial rainwater flow, which may contain unwanted debris rinsed from the roof, away from the collection box for “clean” water. Additional filter materials in the collection box can further purify the water as it flows into a storage tank.

Increasing Affordable Access to Freshwater

Rainwater harvesting can provide communities with cost-effective access to water for drinking, irrigation, and other basic needs.

- Rainwater can be an important source of freshwater for communities and can help them adapt to increasingly unpredictable water supplies stemming from global warming.
- Rainwater provides some of the cleanest naturally-occurring water available, particularly in rural areas where levels of exhaust or pesticide pollution in rainwater is low.
- Rainwater can also be harvested as lower-quality water in natural or manmade catchments for animals, irrigation, or laundry and household cleaning.
- Rainwater can be treated through inexpensive techniques, including use of disinfection tablets and solar disinfection (placing water in clear bottles for exposure to sunlight).
- Rainwater can be used where surface water does not exist or is contaminated, or where groundwater is inaccessible or of poor quality.

Reaching Global Development Goals by Meeting Critical Water Needs

Improved sanitation and drinking water access are preconditions for reaching many of the UN Millennium Development Goals, including reducing poverty, hunger, and child mortality and improving gender equality, environmental sustainability, and maternal health.⁵ Deploying water conservation technologies such as waterless toilets and rainwater harvesting can be a cost-effective means for avoiding pollution of existing water resources; achieving stability and security in impoverished regions by avoiding massive migration motivated by lack of water; preventing violence sparked by conflicts over water resources; and adapting to climate change, starting today.

¹ World Health Organization, Water Sanitation and Health Project, http://www.who.int/water_sanitation_health/mdg1/en/index.html.

² Ibid.

³ Intergovernmental Panel on Climate Change, Fourth Assessment, *Climate Change 2007: Synthesis Report*, p. 49.

⁴ Environmental Change and Security Program (Navigating Peace Initiative), Woodrow Wilson Center for Scholars, *Water Stories: Expanding Opportunities in Small-Scale Water and Sanitation Projects*, p. 63.

⁵ Ibid; Water Aid, *Climate Change and Water Resources*, p. 14 (2007), http://www.wateraid.org/documents/climate_change_and_water_resources_1.pdf.