NOT JUST BLACK OR WHITE

Turning greywater into a resource

By Tracy Quinn

California, no stranger to extended dry periods, is struggling with the most extreme drought the state has endured in more than 500 years. As climate change—projected to worsen our water woes with more frequent and severe droughts—becomes the "new normal," many are finally waking up to the water scarcity realities facing the nation's arid western and southern states. Given the severity and far-reaching impacts of our dwindling water supplies on cities, farms, native fisheries and the environment, one has to wonder: Why on Earth are we still watering our lawns and flushing our toilets with increasingly scarce and expensive potable water?

Reduce, reuse, recycle—a phrase many of us are familiar with from elementary school and usually associate with trash—is a concept applicable to water as well. For our communities to be resilient and prepare for the worst effects of climate change, we need to rethink how we use, and reuse, water and wastewater so that we can sustainably manage the full water cycle and make the most of our limited resources. While recycling—which in this case refers to municipally recycled water—depends on several factors outside the typical consumer's control, the first two represent excellent opportunities for people to make a positive impact on their community's sustainability. First, we can reduce our water consumption by making small changes to our daily activities, such as not watering our lawns as often and taking shorter showers, and we can replace inefficient products in our homes like clothes washers, toilets, faucets and showerheads. Second, we can reuse water in our homes and businesses to the greatest extent possible. The easiest and safest application of this concept is the onsite use of lightly used water, or greywater, that otherwise would be discarded as waste.

What is Greywater?

Greywater typically is defined as untreated wastewater that has not come in contact with toilet waste and includes wastewater from bathtubs, showers, washbasins, washing machines and laundry tubs. It does not include wastewater from kitchen sinks or dishwashers. Generally, greywater can only be used for outdoor landscape irrigation, toilet flushing and clothes washers.

Depending on the type of greywater system employed, greywater sources can account for nearly 50% of indoor household water use, while end uses that can utilize greywater consume nearly 75% of total indoor and outdoor household water demand. Greywater technologies vary in complexity; the three general categories of systems include:

- Manual bucketing, the act of collecting water from your shower in a bucket while you wait for the water to heat up sufficiently. It can be used to water house plants and supplement outdoor irrigation;
- Diversion and filtration systems such as laundry-to-landscape that, as the name implies, divert discharge water from a clothes washer to the outdoors to irrigate the landscape; and
- Treatment and reuse systems that treat water to a standard fit for household use and can be used for flushing toilets, washing clothes and aboveground irrigation.

In addition to saving water, the use of greywater reduces the volume of water discharged to the sewer. Potential benefits of such reduced flows for wastewater collection and treatment systems include increased capacity that can avoid, downsize or defer the need for new capital projects; improved efficiencies in primary treatment due to increased concentration of biological oxygen demand; and reduced energy demand and costs for treatment. Additional research would be valuable to further characterize and quantify these and other impacts of reduced wastewater flows.

Despite the well-documented widespread adoption of greywater use in other developed countries with similar climates and water scarcity issues, such as Australia and New Zealand, the urban areas in water-stressed states in the U.S. have been slow to encourage it as a standard measure for conserving water. But at least one state, Arizona, has already started to follow the lead of Australia, implementing water-smart strategies to overcome the barriers standing in the way of more widespread and efficient use of this untapped resource.

The Natural Resources Defense Council greywater system in Santa Monica, Calif.

Educating the Public

Generally, people in the U.S. are not as well informed about water resource limitations and the use of alternative water sources as Australians, who spent the better part of this century coping with severe drought. Education of both the public and the regulatory community is an essential first step to expanding the use of greywater in this country. If people do not know what greywater is, they will not request incentives and guidance from their water suppliers, encourage local market demand or advocate for sensible regulations. If the public health concerns of regulators are not addressed and the mitigation of risk with proper management strategies is not fully understood, there will be reluctance to allow the use of greywater—even though there have been no documented cases of illness from greywater in the U.S. reported to the U.S. Centers for Disease Control and Prevention.

Inadequate understanding of the risks of greywater use is one factor that has led to regulatory structures and permit requirements that can be confusing, cost-prohibitive and time consuming, even for simple laundry-to-landscape applications. In California, this has resulted in many homeowners skipping the permitting process all together. It is estimated that for every permitted greywater system, there are 8,000 unpermitted ones.

A better model to encourage safe use of greywater is used by the Arizona Department of Environmental Quality and allows residents to adhere to the requirements of a General Permit for reclaimed water use for the onsite private residential use of up to 400 gal per day of greywater for drip or flood irrigation. There are no formal notifications to the department, no review or design approval, and no public notice, reporting or renewal required. Although Arizona residents do not have to apply to receive a formal permit for permission to use greywater, they must abide by 13 best management practices (BMPs) that were developed to protect public health and water quality. The BMPs include recommendations such as avoiding human contact, labeling greywater pipes, covering and securing storage tanks, and minimizing surface accumulation. This policy makes it easier and more cost-effective for people to safely use greywater and reduce household water demand.

Another barrier can be the expense of modifying the plumbing in an existing house. For most existing buildings, collecting water from lavatory faucets, showers and bathtubs is a difficult and expensive task. In these cases, diversion or simple self-contained treatment systems (like faucet to toilet) are the only affordable options. To better prepare for an uncertain future and more fully utilize greywater in our homes, we can look to the example of Tucson, Ariz.. There, new single-family homes are required to have building drains for lavatories, showers and bathtubs that are segregated from drains for all other plumbing fixtures to allow for future installation of a distributed greywater system, and either a separate multiple-pipe outlet or a diverter valve, and outside "stub-out" installation on washing machine hookups to allow for separate discharge of greywater for direct irrigation. When and if a homeowner decides to supplement potable water use with greywater, the process will be much more cost-effective.

Climate change means more water uncertainty for everyone. But greywater can address some of our water scarcity challenges today. We need public education that provides water-smart guidance and introduces both new and time-tested ways to save every last drop in our homes. That public awareness will create a thriving greywater market. Equally important, local authorities, including city planners and public health officials, should and can do more to facilitate greywater permitting and safe use by developing sensible regulations that encourage use of alternative water sources like greywater while remaining protective of public health, and adequate rebates and incentives to jump start the market. Now is the time to take action. SWS

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