

Graywater Systems

Benefits

- Reduced fresh water use
- Diminished sewer flows
- Less energy and chemical use
- Groundwater recharge
- More verdant landscape
- Reclamation of otherwise wasted nutrients

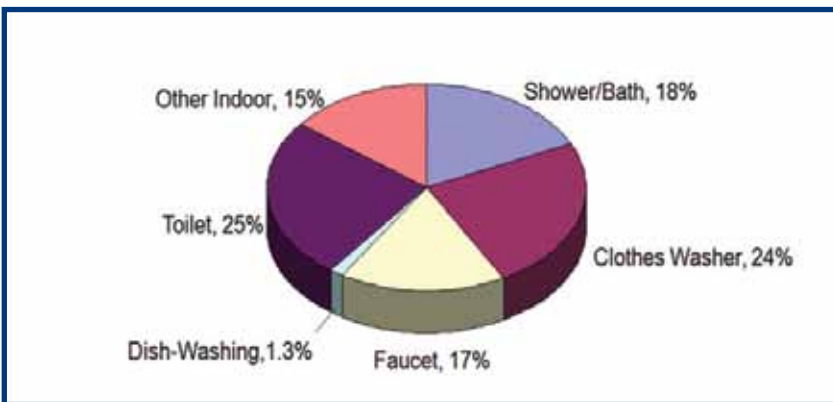


Graywater systems irrigate landscapes such as this native plant garden in Santa Monica. These systems conserve potable water for human consumption.

Graywater Systems Conserve Water

Why not reuse your household water by installing a graywater system? Graywater is the wastewater that drains out of washing machines, sinks, bathtubs and showers. It can be reused in your yard to water plants and trees. In the soil, graywater is purified naturally by microorganisms that break down organic contaminants. It can percolate deep in the ground and help recharge groundwater.

In August 2009, California graywater system regulations were revised, giving homeowners the opportunity to divert washing machine graywater directly into their yards without a permit, providing a few rules are followed (see box on page 3). A family of four can potentially divert 22,000 gallons of water per year by using graywater from the laundry system alone. The average three bedroom home generates 160 gallons of graywater per day, or 58,400 gallons per year. In Southern California, where 38% of single family household water demand is used outdoors (landscape irrigation and car washing), graywater systems can save 25 to 40 percent of potable water.



25% of indoor water usage (from the clothes washer) can be diverted from the sewer to a graywater system without a permit. *Illustration from UCLA IOE.*

Background

The concept of water reuse is not new or unique to California. Historically, in the hot and dry regions of the United States, graywater was used to water home orchards and landscapes. Pioneer women hauled many a dishwater basin out into

What is Graywater?

Graywater is untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. Graywater includes wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers.



Graywater is excellent for fruit tree irrigation.



Close up of valve that switches graywater discharge from sewer line to graywater irrigation system.

Photo courtesy of Greywateraction.org.

other large perennials. Branched drain systems are time consuming to install, but once finished, require very little maintenance and work well for the long term.

Simple System. A shower is a great source of graywater. Usually, it produces a lot of relatively clean water. Gravity-based shower systems are simple and effective. If your yard is located uphill from the house, a pumped system will be necessary. These systems require a permit in California.

the yard to revive a wilting prized plant. Europeans have had laws for graywater irrigation for over a hundred years, and many rural and arid countries use graywater practices in one form or another for survival.

Although graywater use has been common in rural areas for decades, recycling graywater is controversial due to public health concerns. California, Arizona, New Mexico, Texas, Colorado and Montana have addressed these concerns and currently allow graywater systems. Although California was one of the first states to legalize graywater systems, the old permitting system stipulated by the California Plumbing Code was so prohibitive and costly that most people opted to install simple, unpermitted systems.

Graywater System Types

Laundry-to-Landscape. This is the only type of system that can be installed in California without a permit. Washing machines are typically the easiest source of graywater to reuse because graywater can be diverted without cutting into existing plumbing. Washing machines typically have an internal pump that drains used water out of the tub and into a hose that directs the water outside. The hose can be redirected from the sewer line to tubing that leads into 1" irrigation line. Although graywater is expelled above ground, it should be covered with two inches of mulch or gravel. When installing this system, the hose leaving the washing machine is attached to a valve that allows for easy switching between the graywater system and the sewer. The laundry-to-landscape system is low cost, easy to install, and requires very little maintenance.

A **Branched Drain** system is similar to the laundry-to-landscape system with branching pipes. In this system, graywater flows through standard drainage pipe by gravity, always sloping downward at 2%, or 1/4" drop for every foot traveled horizontally. The water is divided up into smaller and smaller quantities using a plumbing fitting that splits the flow. The final outlet of each branch flows into a mulched basin, usually to irrigate the root zone of trees or

California's Revised Graywater Regulations

Chapter 16a of the California Plumbing Code, approved by the California Building Standards Commission on July 30, 2009, states: *a construction permit shall not be required for a clothes washer system which does not require cutting of the existing plumbing piping provided it is in compliance with Section 1603A.1.1.* This means California residents can now install simple graywater systems without a permit. For the first time, building professionals and landscapers can install practical, code compliant graywater systems in California. The new state standards also provide guidance for avoiding potentially unhealthful conditions and emphasize the benefits of residential graywater use in relieving stress on private sewage disposal systems.

Complex System. These are pumped systems. If you can't use gravity to transport graywater (your yard is sloped uphill, or it's flat and the plants are far away) you will need a "drum with effluent pump" system. The water flows into a large (usually 50 gallon) plastic drum that is either buried or located at ground level. A pump is used to push the water out through irrigation lines (no emitters) to the landscape. Pumps add cost, use electricity, and will break, so use a simpler system if possible.

Plant and soil recommendations

Graywater is excellent for shrubs and trees because it is nutrient-rich and high in potassium and phosphorus. However, homeowners should realize that graywater quality is highly variable and source-dependent.

- Watch plants closely for signs of damage. Certain plants may be sensitive to changes in water quality and may not be suitable for graywater irrigation. Use of wash water is questionable for very salt-sensitive plants such as azaleas and strawberries.
- When designing the layout of your graywater system in your landscape, note that California code stipulates graywater should not be used to irrigate food crops with edible parts that contact the soil, such as root crops.
- Don't use graywater for potted plants or new transplants since they are sensitive to variable water quality.
- Don't pour graywater directly at the base of tree trunks or shrubs. This may cause crown rot and is not ideal, since the feeder roots that take up water are located farther out.
- Do apply enough water so the plants get a good drink. If you just wet the surface of the ground around deep-rooted plants, they will get little benefit.
- Do apply graywater at or slightly below the soil surface. Never spray on foliage, twigs or stems. Use subsurface drip or irrigate below mulch in basins.

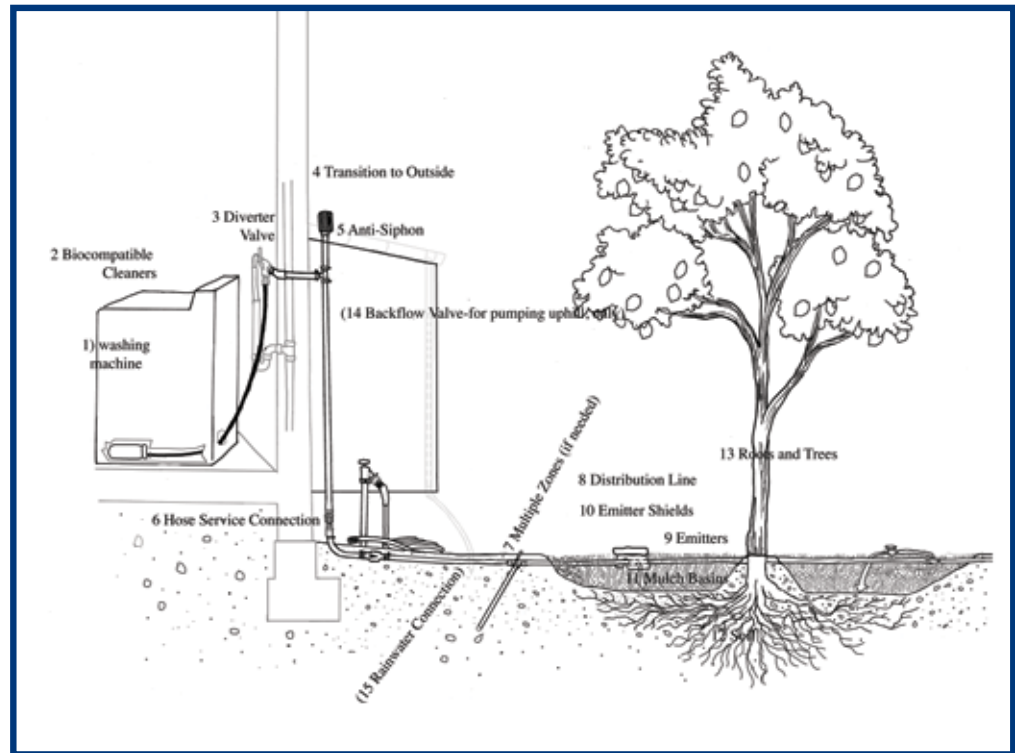


Avoid using graywater on salt-sensitive plants such as strawberries. Photo by Jack Clark Kelly, Univ. of Calif.



This subsurface outlet provides ornamental shrubs with graywater. Photo by Greywateraction.org.

- Do apply over or under mulch. Be careful of applications that apply graywater directly to leaf surfaces of ground covers and turfgrasses.
- Do control graywater application and infiltration to prevent standing puddles and surface runoff.
- Do test soil periodically to reveal any salt or boron toxicity problems. Acid-loving plants can have problems if detergents make water too alkaline.
- Do use biocompatible (taken up by plants and re-used) and biodegradable soaps.



This illustration demonstrates a laundry-to-landscape system. Illustration courtesy of Art Ludwig of Oasis Design, <http://oasisdesign.net/greywater/laundry>.

References and Resources

- Oasis Design Grey Water Information Central: <http://www.oasisdesign.net/greywater/index.htm>
- Greywater Action for a Sustainable Water Culture: <http://greywateraction.org/>
- Greywater Irrigation: <http://greywater.sustainablesources.com/>
- Greywater - a Potential Source of Water: <http://www.ioe.ucla.edu/reportcard/article.asp?parentid=4870>
- CA Dept. HCD Chptr. 16a-Nonpotable Water Reuse Systems: http://www.hcd.ca.gov/codes/shl/2007CPC_Graywater_Complete_2-2-10.pdf
- City of Santa Barbara Graywater Irrigation Information: http://www.santabarbaraca.gov/Resident/Water/Water_Conservation/WCSustainableOptions.htm
- Landscape Plant selection guide for Recycled water irrigation: http://groups.ucanr.org/slosson/Landscape_Plant_Selection_Guide_for_Recycled_Water_Irrigation/
- Ventura County Guidelines for the Installation and Use of Residential Laundry Graywater Disposal Systems: http://www.ventura.org/RMA/build_safe/special/Graywater%20Handouts/GW1_graywater_11x17.pdf
- Graywater Systems for Residential Buildings in Los Angeles County: <http://www.ladbs.org/faq/info%20bulletins/plumbing%20code/2008/IB-P-PC%202008-012%20Graywater.pdf>
- Santa Monica Water: Graywater & Cisterns: http://www.smgov.net/Departments/OSE/Categories/Water/Graywater_Cisterns.aspx

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