Drought-Proof Your Landscape with Greywater

Presentation by Laura Allen
from Greywater Action

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Inside the house a diverter valve provides an easy way to control the flow of greywater— one side of the valve is connected back to the sewer or septic system, and the other side of the valve is piped to the landscape— either through the floor and crawlspace, or directly out through the wall.

The image on the left shows the pipe going through the floor. The image on the right shows the pipe going through the wall directly to the landscape.
Outline of Presentation

• Introduction
• Overview of water system
• General greywater considerations
• Common types of greywater systems
• Design considerations
• Resources
HOW MUCH WATER DO YOU USE EACH DAY?
THE GLOBAL WATER GAP

Mozambique: 1 gal/person
UK: 40 gal/person
France: 76 gal/person
US: 150 gal/person

Source: UNDP Human Dev. Report 2006
77% of American's don't know the source of their drinking water (excluding those with private wells)
Do you know where your water comes from?
The California Aqueduct
California Drying
Cumulative water storage changes from NASA GRACE (2002-2014)

June 2002
June 2008
June 2014
Declining storage in major global aquifers (2002-2013)

The diagram illustrates the total water storage anomaly (in mm equivalent water height) for several major global aquifers from 2002 to 2013. The aquifers are color-coded as follows:

- **Guarani** (black)
- **Southern Plains** (blue)
- **NW India** (cyan)
- **Middle East** (red)
- **Canning** (pink)
- **N China Plain** (green)
- **Central Valley** (yellow)

The data shows a generally declining trend in water storage across all aquifers, indicating a decrease in groundwater levels over the 12-year period.
Where does the water go after the drain?
The Hyperion Wastewater Treatment Plant in Los Angeles. Photo credit to dsearls
About 50% of residential water is used for irrigation.

I don't need clean drinking water!
Greywater Reuse
16-40% reduction in water use

House using greywater for irrigation with simple laundry-to-landscape and gravity-fed systems

© Steve Sanford from The Water-Wise Home
Californian's produce around 1 billion gallons of greywater every day.
Greywater vs. Desalination Plants

Image credit Logicom
10% of homes in Southern CA using washing machine greywater

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~ 40 million gallons/day
Greywater is water from:

#1 Washing machines

- Top loading machine: 30-50 gallons/load
- Front loading machine: 12-25 gallons/load
- Top efficient: 15-25 gallons/load
Greywater is water from:

#2 Showers and baths
Greywater is water from:

#3 Sinks

(Kitchen sink water is not currently considered greywater in California and is difficult to legally reuse)
Greywater is *never* from toilets!
A brief history of the **legality** of greywater:

**Before 2009:**
- It was not possible to install a legal system, there were 1.6 million illegal systems in California.

**After 2009:**
- It is possible to install several types of systems legally, some don't require a permit.
Is greywater legal? Yes!

Greywater is regulated by Chapter 16 of the California Plumbing Code.
Benefits of Greywater

• Save water
• Save time
• Save energy
• Fosters a connection to our landscapes
• What else?

www.greywateraction.org
How can you use greywater?

#1 For outdoor irrigation

#2 To flush toilets

These systems require filtration, disinfection, and frequent maintenance. They are difficult to obtain permits for.
Use Plant Friendly Products

These products don't contain SALT, BORON, or CHLORINE.

For example: ECOS, Biopac, Trader Joes, Oasis, Vaska, Aubrey Organics, hydrogen peroxide bleach.

Don't use sodium based water softened water.

www.greywateraction.org
Greywater is NOT Potable

It's important that:

• Greywater doesn't pool up.
• People don't have direct contact with the water.
• Greywater doesn't run off or enter a storm drain, creek, river, etc..
• Greywater is not used to irrigate root crops.
"Mulch"

Wood chips filter and absorb greywater before it soaks into the soil.
“Mulch Basin”

A shallow basin filled with mulch (wood chips).

The basin spreads greywater out, provides surge capacity, and prevents pooling or runoff.

This man is filling the basin with wood chips.
“Diverter Valve”

The valves allow us to control the flow of greywater (either to the landscape, or to the sewer/septic)
A Bucket

- Collect cold water as shower heats up
- Dishpan in sink to collect wash water
- Use for irrigation
- Use to “bucket” flush toilet (pour into toilet bowl)
Greywater Systems can be Simple or High-Tech

from “The Good House Book” by Clarke Snell

Image Water Sprout
www.greywateraction.org
Simple Systems  Irrigate Larger Plants

- Trees
- Bushes
- Vines
- Larger annuals and perennials
...but not lawns or small plants

Irrigating these types of plants requires a more complex type of system.
Simple System:
Laundry-to-Landscape (L2L)

A washing machine system that doesn't alter the plumbing and doesn’t require a permit (if basic guidelines are followed).
Simple System: Laundry-to-Landscape (L2L)

Costs: $150-$250 parts, $700-$2,500 professional installation
Laundry-to-Landscape System

Sewer connection

Diverter valve

Greywater goes to landscape
Branched Drain: A Gravity System

- To install this system you must be able to access the drainage plumbing.
- It requires a permit.
- The landscape must be lower than the greywater pipes.
Branched Drain: A Gravity System

Costs: $250-$500 parts, $800-$4,000 professional installation (permit fees cost more)
A Diverter Valve Controls GW Flow

A motor (called an actuator) can be added, enabling the valve to be controlled by a switch inside the house.
Branched Drain System

Setbacks from buildings and property lines

Greywater outlet is under a solid shield and flows into a mulch basin. Size of basin depends on soil type and amount of water.

www.greywateraction.org
Completed System and 1 Year Later

Images: Josh Lowe

www.greywateraction.org
Pumped System

- A diverter valve directs GW to a tank
- Unfiltered GW is pumped out to the landscape with 1” tubing and ½” outlets
- System requires an outlet and uses electricity
- Requires a rigorous permitting process
Pump and Filter System for Drip Irrigation

(Filter must be cleaned manually and require frequent maintenance)

Drip irrigation

Note: Filtered GW requires special drip tubing and is not compatible with most standard drip systems.
High-End Residential

Images: Watersprout.org
High-tech Greywater System
NRDC Headquarters- ReWater System

www.greywateraction.org
Pre- Legal Kitchen Sinks
Common Errors

“"I'm going to pump my greywater to the top of my property and store it a large tank, then gravity flow it down the hill to irrigate through drip irrigation system”.

#1 Storage tank

#2 Overuse of pumps

#3 Misuse of filters
What system would you recommend here?

“My yard slopes downhill. All the plumbing is accessible in my 3 foot high crawl space. I want to irrigate 10 fruit trees.”
House using greywater for irrigation with simple laundry-to-landscape and gravity-fed systems

© Steve Sanford from The Water-Wise Home
Design Considerations

• **WHAT** sources of greywater can you access?

• **HOW** much greywater does your home produce?

• **WHAT** plants will you irrigate?
  
  • Match the amount of GW with their weekly irrigation needs. Remember to “hydro-zone”! (Keep plants with similar water needs together.)

• **CHOOSE** a system to meet your needs.
For more information visit greywateraction.org

Resources:

• San Francisco Graywater Design Guidelines for Outdoor Irrigation (downloadable manual- sfwater.org/graywater)

• The Water-Wise Home by Laura Allen. How-to book with instructions for greywater irrigation systems.

• Ask This Old House episode “Graywater, Small Engines”

• Kit for L2L www.cleanwatercomponents.com

• L2L DVD from Oasisdesign.net (originators of L2L and Branched drain systems)

• Greywater Action's Q&A forum
Free downloadable manual from sfwater.org
Ask This Old House Video
On-line vendors and kits
Oasis Design

Grey Water Central

The web's information central on all aspects of grey water systems from the leading innovators and producers of greywater information

By Art Ludwig

On this page:
- Why you can trust this information
- What is grey water?
- What is grey water reuse?
Spanish information
(manual, ppts, download from greywateraction.org)
For more information visit greywateraction.org

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