Towards Sustainable Gardening: Rainwater Harvesting and Greywater Use

Mar. 22, 2014 Alice Cantelow

Water Conservation is important for all Californians, all the time- not just during droughts. We in the foothills are connected by water to the Delta wetlands, Central Valley farms, and water for 23 million other Californians. Also, droughts can come again unannounced, and every drop used now is a drop not stored.

Average daily water use per person in the EID area (most of the Western Slope of the county) is 240 gallons. About 60% of this is used outside (70% in El Dorado Hills, 50% in Camino). (source: EID, February 2014) That's 144 gallons a day per person- our gardens take a lot of water!

Alternate water sources- rain and greywater- can make a big difference.

But don't forget to utilize other low water use measures in the garden first:

- Selection of low water use plants – many need watering once a month or less
- Incorporate native vegetation already in place into your garden
- Efficient irrigation (drip usually best)
- Regular (even monthly) adjustment of automatic watering timers
- Check soil for dryness several inches down before watering. Don't water mid-day.
- Mulch, mulch, mulch – significantly reduces water needed
- Use automatic shutoff valve on hoses
- Seek out and quickly fix any leaks

Rainwater Harvesting Calculation

square footage of bldg. below roof	x	ave. rainfall/ inches per foot	x	7.48 convert cu. ft to gallons	x	.9 To account for gutter leaks etc.	=	yearly gallons of rain that can be collected

So, for a 1500 square foot house in Placerville:

1500 x 39/12 x 7.48 x .9 = 33,000 gallons per year!

Annual Rainfall	Average	Lowest
El Dorado Hills	25	
Placerville	39	15
Camino	45	

It may actually be better to use lowest rain water amts. rather than ave., since that is when stored water is needed most.

Another great way to store rain- in the soil, using earthworks.

*Divert water from hardscape, slopes, or downspouts onto nearby plants
*Can divert to first one, then another and another plant as it cascades down through your lot.
*Plant in rain basins, rain gardens (but again, provide a high water escape)
*Slow, spread, and infiltrate the water

Some Principles to Follow when using earthworks (source: Brad Lancaster's Rainwater Harvesting):

- Long thoughtful observation first
- Start small and simple, and start at top and work down
- Always plan an overflow route and manage that overflow as a resource
- Keep water at least 10 feet from foundations
- Check for underground utilities before digging
- Construct earthworks in disturbed areas, not healthy intact ecosystems
- Make basins deeper and berms bigger than you might first think necessary
- Don't let water stand for more than 12 hours- mulch, plant, use overflow spillways
- Three important elevations: spillway, surrounding land, bottom of basin. *Minimum* elevation difference between each of these is 4 inches.
- Do not cut off an existing healthy, natural watercourse
- Consider using overland flow (vs. piped) for water that has flowed over ground or paving.
- Live within your site's water budget

Water Quality-

- Rainwater is very soft, which most plants love.
- Contamination can occur from roofing material itself
- Contamination can also occur from things like bird poop, dead animals in the gutters.
- Rain going across ground can also pick up contaminants.

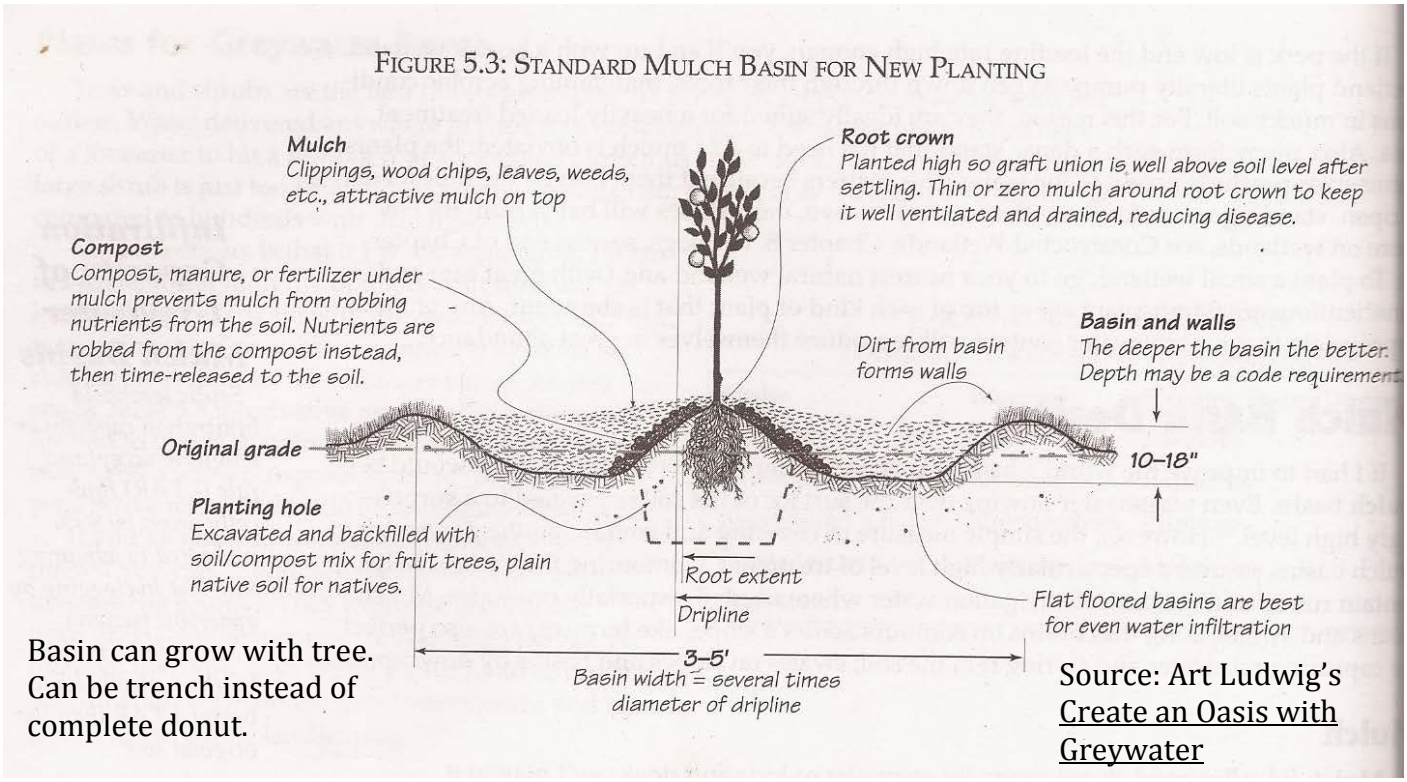
To avoid contamination:

- Clean metal, slate, or tile roofs are best, especially if using water for vegetables.
- Consider using rain from other roof types only for ornamental plants (or use in toilets).
- Keep gutters screened against critters, and/or clean regularly.
- Do not divert rain water that could be contaminated with animal waste to edible plants

Comparison: Some Rainwater Storage Options			
	Pros	Cons	Ideas
Barrel	cheap, easy	small-doesn't hold much	Use the water regularly during spring and fall so it can fill up again and again. Add several together for more storage. Use water indoors (toilets, laundry) to match use to supply better (i.e. winter)
Poly tank	Large- significant storage	Expensive, takes large space	Put in shade so less algae chance + to avoid solar deterioration
Rain garden	Relatively cheap and large-	Storage localized to one area. Plants will probably need supplemental water during dry summer.	Use those native plants that can handle both seasonal inundation and seasonal drying. See plant list for Elk Grove's Plaza rain garden.
In soil using earthwork, diversions, infiltration.	Cheap, good exercise.	Must prevent drowning your plants. Some may find earthworks unsightly.	Divert water to first one then other plants to avoid flooding one too long. Watch and monitor/change if needed.

Greywater- Another Alternate Water Source for Gardens

- Eliminates the rainwater timing problem of mismatched supply and demand.
- Yes, legal. But laws have been changing rapidly. Current CA law in effect as of Jan. 1st 2014
- Wastewater types- blackwater (toilets, kitchen sink) versus greywater
- Sources of greywater allowed to be reused legally in landscape in California
  - Shower, clothes washing machine, bathroom sink- only these in California
- Permits are not required for washing machine system, but bldg. permit is required for others.
- Specific requirements must be met for all systems! See references
- Chemicals in greywater
  - Pathogens possible- E. coli, salmonella, giardia, etc.- prevent all direct human contact!
  - Soap chemicals- avoid boron, sodium. Look for greywater-safe label. Examples of acceptable liquid laundry detergents: ECOS, Trader Joe's , Vaska, Dr. Bonner's, etc.
- What can be irrigated with greywater: trees and shrubs best. Not lawns or veggies.
- Apply in mulch basin, with at least 2 inches of cover. Large wood chips are best cover.



Basin can grow with tree. Can be trench instead of complete donut.

Source: Art Ludwig's Create an Oasis with Greywater

Laundry to landscape system, showing diverter valve and vacuum break vent. Vent would have been best placed outside to prevent flooding though. Pipe shown goes through floor and out to mulch basin. Uses machine pump but be careful not to go too high.

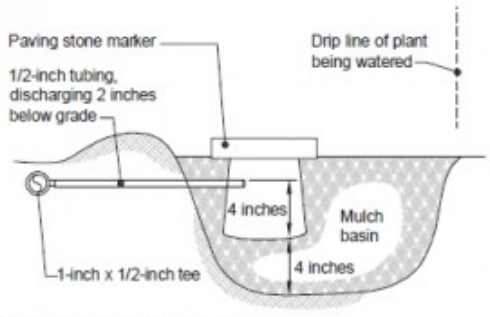
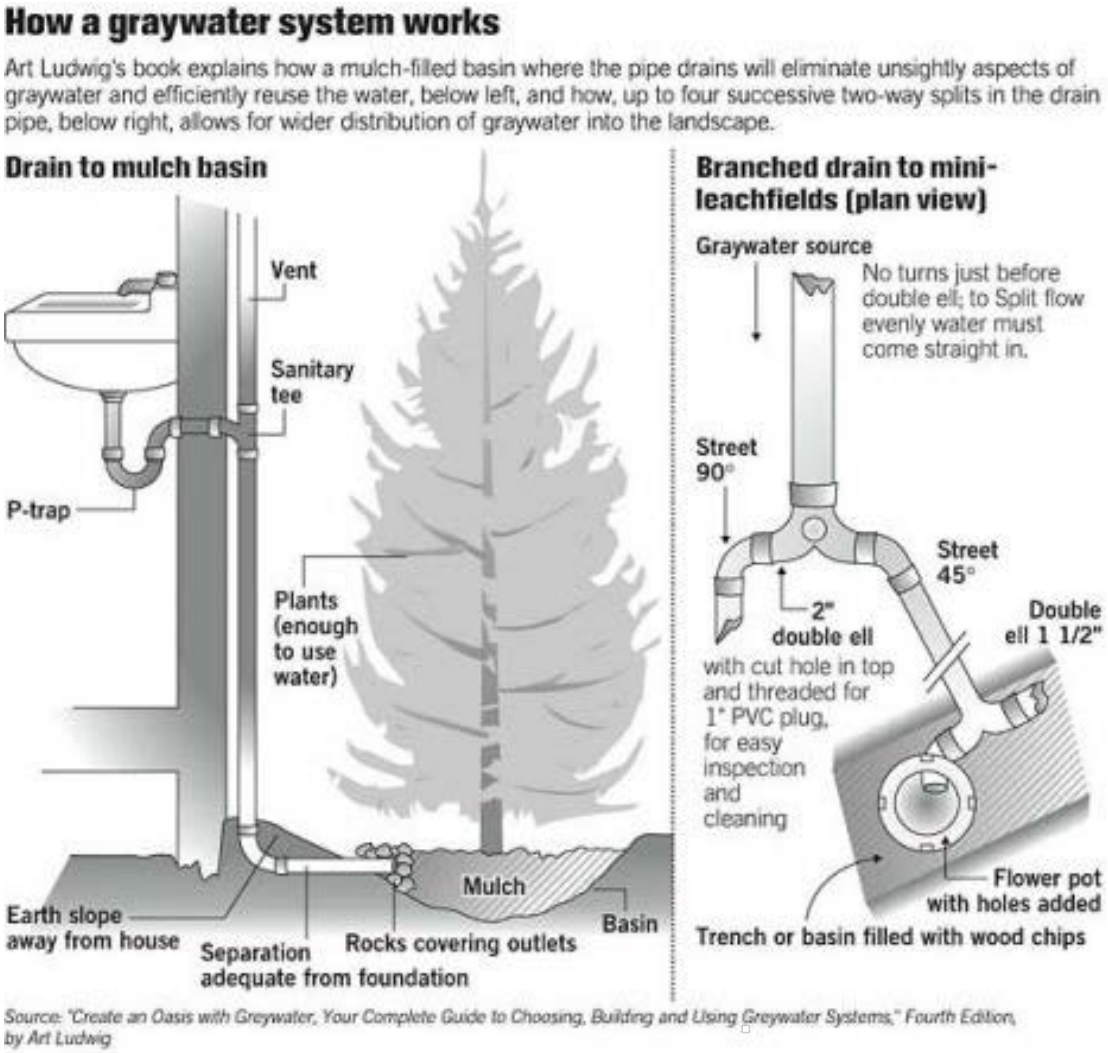


Figure 4. Mulch shield placement.

Mulch basin outlet detail

Source: S.F. greywater manual

A simple branched drain system, for non-laundry systems: note: slopes of drainage pipes important!



Useful Resources:

Brad Lancaster, 2009, Rainwater Harvesting, for Drylands and Beyond- Vol 1, 2

Art Ludwig, 2009, Create an Oasis with Greywater and Water Storage- tanks, cisterns, aquifers, etc.

UCCE greywater fact sheet:
https://ucanr.edu/mg/users/documents/5758Dealing%5Fwith%5FDrought50709.pdf

Full text of new Calif. Plumbing Code (see ch. 16 and 17 especially)
https://law.resource.org/pub/us/code/bsc.ca.gov/gov.ca.bsc.2013.05.pdf

Good summary of CA plumbing code requirements for laundry to landscape system, from Santa Clara Valley Water District (that gives their customers rebates for such systems):
http://www.valleywater.org/GraywaterRebate.aspx

San Francisco Greywater Design Manual for Outdoor Irrigation
http://sfwater.org/modules/showdocument.aspx?documentid=55

Greywater friendly products http://greywateraction.org/content/greywater-friendly-products