

## **Reasons to Allow Simple Graywater Systems that Meet Standards, Without Requiring a Permit**

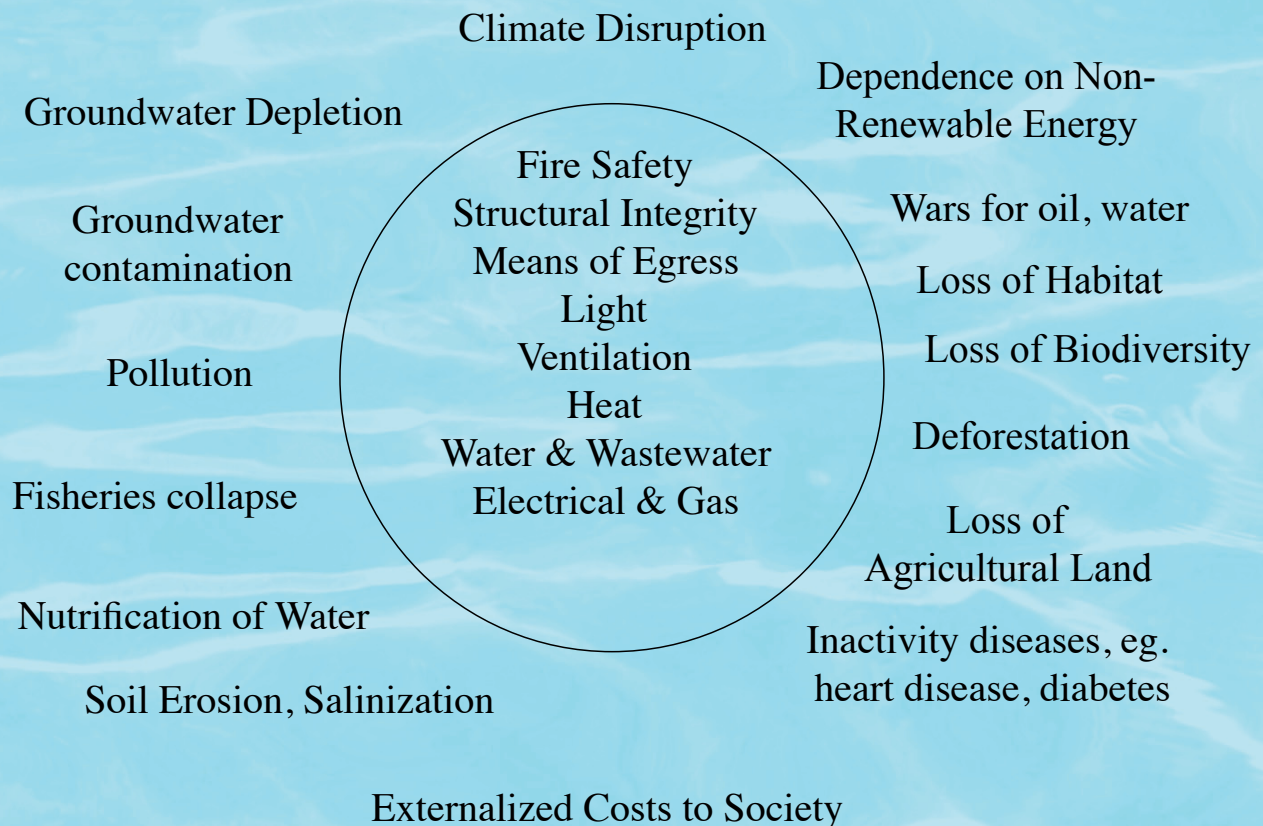
Prepared for the California Building Standards Commission by Art Ludwig, July 29<sup>th</sup>, 2009

- 1. It makes sense to apply regulatory, citizen, and professional resources to risks that matter** — It is common to exempt actions that have impact below a certain threshold from permits. Graywater's health impact is so low it has not reached the detectability threshold, in the US, ever. There have been over a billion graywater system user-years of exposure in the US, and not a single documented case of graywater-transmitted illness (see graywater calculations). *This reason alone is sufficient.*
- 2. A set of simple, attainable standards, would open the door for professionals to work legally and affordably on improving our stock of simple graywater systems** — The permit requirement, though universally ignored by homeowners, deters licensed professionals from installing graywater systems. Compliance can easily double or triple the cost of a simple system installed by a landscaper, plumber or contractor as compared to the same system built identically to meet standards but without an inspection or permit.
- 3. Realistic standards will enable graywater players to openly share experience and develop improved best management practices and publicize them widely.**
- 4. As well-built simple systems become more common, the quality of DIY systems will be improved** — as they emulate their neighbors' professionally installed ones.
- 5. Realistic standards will shift the relationship between government agencies and graywater users** — A portion of the resources that have been going into hiding graywater systems would go into upgrading them instead.
- 6. The strategy of requiring permits for simple graywater systems has failed to a degree almost unique among any standard, code or law** — The compliance rate is about one in 10,000. Simply stated, the permit approach has no traction. To the extent that there ever was willingness to get a \$100 permit and inspection for putting a hose on one's washing machine, decades of extremely unrealistic standards have trained Californians to give the graywater permitting process a wide berth. It will take years to regain the respect the regulatory system has lost in this area, even with the best approach.
- 7. The integrity of the permitting process is undermined by non-sensical requirements** — With no health basis for requiring permits, the focus has turned to the desirability of permits *per se*. While this argument may hold for building inspectors, it is likely to backfire with the citizenry. If regulations are unreasonable, citizens will become accustomed to ignoring regulator direction, achieving the opposite of the intended effect.
- 8. The direct effect of standards that require a permit on the stock of graywater systems is essentially nil** — It is irrelevant how perfect the few hundred permitted systems are. To the extent that the quality of graywater systems matters, the question is how to reach the 1,700,000 systems built without permits. The only way to do this, in my opinion, is by rebuilding trust and respect, via common sense standards.
- 9. Regulator, academic, and industry access to systems will be improved** —realistic standards lower barriers between graywater players.
- 10. Diversion of graywater from overloaded septics and sewers will be facilitated** — diverting graywater from overloaded septics is commonly recognized as the most effective, affordable way to tip a marginal septic system or sewer from a state of failure to one of satisfactory performance (graywater is typically 2/3 of the hydraulic load). Allowing this to be recommended by officials, and done inexpensively by professionals would be a substantial improvement to public health. *This reason alone is also sufficient justification for allowing graywater systems that meet standards, without requiring a permit.*

# *Risk — Through the Microscope of Codes...*



## *Risk — The whole picture*



Re SB 1258: Discard the UPC model, use the state-of-the-art AZ/ NM/ TX tiered approach to greywater regulation

Dear Mr. Rowland,

February 24th, 2009

I am an ecological systems designer, and the author of three books on greywater.

It seems that the main stated argument against California greywater standards following the lead of Arizona, New Mexico and Texas into the 21st century is public health concern. But...

1) **Greywater has hundreds of times fewer pathogens than combined sewage. Logically, greywater systems could be hundreds of times less effective at sequestering pathogens from people and still be no more dangerous than septic or sewer systems.** (average of values from calculations, U of AZ study--see <http://oasisdesign.net/greywater/law/california/index.htm#references> for complete list of citations and calculations)

2) **The past several decades of greywater prohibition have inadvertently resulted in the construction of a rather large number of unpermitted systems. The quantity of those systems is vast (eight million in the US, 1.7 million in California)** and the experience long term, going back to the founding of the country. (Soap and Detergent Manufacturer's Association Graywater Awareness and Usage Study, a nationally representative sample of 61,377 households; 13.9% of which were using greywater in CA, the highest proportion of any state).

This has in effect served as a large-scale, long term, and fairly conclusive experiment on the epidemiological danger from unregulated greywater reuse.

There have been approximately a **billion greywater system-user-years of exposure in the US** since 1950, plus exposure to guests and neighbors. If one greywater user in 100,000 got sick and mentioned why, there would be 10,000 incidents on record.

In fact, **there is no record of a single documented instance of greywater-transmitted illness in the US**, according to the CDC. (By comparison, approximately 20,000 people were struck by lightning over the same time period).

It is certain that greywater risk is non-zero. It is possible that the risk from the average greywater system could be low enough to be unnoticeable in the background risk, yet still be of concern in the aggregate.

However, with such a vast quantity of systems, **there must be outlier systems that are several standard deviations riskier than the average that still number in the thousands. If even these have escaped notice, the implication is that the inherent risk must be very low indeed.** (One unfortunate Californian has been struck by lightning on seven occasions. That there is no analog for greywater incidents is quite instructive).

Of the 12 illnesses identified by WERF as potentially greywater-transmittable, 9 are reported to the CDC by legal mandate. Reportable illnesses have been tracked by all levels of our public health system since 1925. This serves as a more tightly run subset of the general greywater experiment. **There are over 100,000 instances of these 9 reportable sicknesses, per year, or several million total. If greywater were a significant transmission path, tens of thousands of alarms in the reportable illness system would have put public health officials on the track decades ago.**

The absence of reports of greywater-transmitted illness fits with the simple logic of point 1, and lends support to the Arizona/ New Mexico/ Texas regulatory approach. This holds that permits and inspections are not necessary for simple greywater systems (the people of California seem to agree: only one system in eight thousand is permitted).

**Unless HCD can:**

A) Prove that greywater systems are dangerous, in light of a billion system-user-years of real-world experience to the contrary


B) Prove that tight regulation (which deters licensed professionals but not homeowners) is better for public health than realistic guidelines that professionals would follow to improve the state's stock of systems

C) Produce a risk assessment that shows that in a world which may be out of usable water within our lifetimes, rigorous permitting of greywater systems is a priority use of regulatory and citizen resources

**please shift from the failed UPC-style approach to the state-of-the-art Arizona/ New Mexico/ Texas tiered approach to greywater regulation.**

A slightly improved version of the Arizona code that is a suitable starting point for new California tier 1 standards can be found at: <http://www.oasisdesign.net/greywater/law/#model>.

Sincerely,

A handwritten signature in black ink, appearing to read 'Art Ludwig', with a stylized flourish extending to the right.

Art Ludwig  
Ecological Designer

## California Greywater Policy Data and Calculations

Feb 24, 2009. Check <http://oasisdesign.net/greywater/law/california/index.htm#references> for updates to this spreadsheet.

Datum	What	Date	Source	URL, comment
<b>Greywater system exposure in California</b>				
36,553,215	Population of California	2007	US census bureau	<a href="http://quickfacts.census.gov/qfd/states/06000.html">http://quickfacts.census.gov/qfd/states/06000.html</a>
13.9%	Households with greywater systems	1999	Soap and Detergent Manufacturer's Association Graywater	<a href="http://www.sdascience.org/docs/Graywater_Habits_&amp;_Pract">http://www.sdascience.org/docs/Graywater_Habits_&amp;_Pract</a>
5,080,897	Greywater users	2009	Calculation; population * percent greywater users	extrapolation from 1999
2.87	People per household	2000	US census bureau	<a href="http://quickfacts.census.gov/qfd/states/06000.html">http://quickfacts.census.gov/qfd/states/06000.html</a>
1,770,347	Greywater systems	2009	Calculation; greywater users / people per household	(this assumes the proportion of greywater use has not changed since 1999)

System user years-CA		<i>Note: This is a back of the envelope-type calculation; the point is still valid if it is off by a factor of two or four</i>		
5,080,897	Greywater users	2009	from above	
10.0%	Households with greywater systems	1950	Estimate; in general, older infrastructure has more greywater use, approaching 100% with rural 70+ year old buildings	
10,586,223	Population of California	1950	US Census Bureau	<a href="http://www.census.gov/dmd/www/resapport/states/california.pdf">www.census.gov/dmd/www/resapport/states/california.pdf</a>
1,058,622	Greywater users	1950	Calculation; population * percent greywater users	
3,069,760	Average number of greywater users	1949-2009	average of 2009 and 1950 greywater users	
60	Years from 1949-2009		calculation	
184,185,576	System-user-years of greywater exposure, not counting neighbors		calculation; average greywater users * years	

Greywater system exposure in United States				
303,824,640	Population of US	2008	CIA estimate	<a href="https://www.cia.gov/library/publications/the-world-factbook/p">https://www.cia.gov/library/publications/the-world-factbook/p</a>
7.0%	Households with greywater systems	1999	Soap and Detergent Manufacturer's Association Graywater	<a href="http://www.sdascience.org/index.php?option=com_content&amp;">http://www.sdascience.org/index.php?option=com_content&amp;</a>
21,267,725	Greywater users	2009	Calculation; population * percent greywater users	extrapolation from 1999
2.59	People per household	2000	US census bureau	<a href="http://quickfacts.census.gov/qfd/states/06000.html">http://quickfacts.census.gov/qfd/states/06000.html</a>
8,211,477	Greywater systems	2009	Calculation; greywater users / people per household	extrapolation from 1999

System user years-US		<i>Note: This is a back of the envelope-type calculation; the point is still valid if it is off by a factor of two or four</i>		
21,267,725	Greywater users	2009	from above	
10.0%	Households with greywater systems	1950	Estimate; in general, older infrastructure has more greywater use, approaching 100% with rural 70+ year old buildings	
152,271,417	Population of US	1950	NPG historical data	<a href="http://www.npg.org/facts/us_historical_pops.htm">http://www.npg.org/facts/us_historical_pops.htm</a>
15,227,142	Historic greywater users	1950	Calculation; population * percent greywater users	
18,247,433	Average number of greywater users	1949-2009	average of 2009 and 1950 greywater users	
60	Years from 1949-2009		calculation	
1,094,845,995	System-user-years of greywater exposure, not counting neighbors		calculation; average greywater users * years	

Reports of graywater-transmitted illness in US				
0	Reports of greywater-transmitted illness		18 years of greywater policy discussion, Letter from CDC	
400	People struck by lightning in the US, per year	2008	NOAA lightning safety	<a href="http://www.lightningsafety.noaa.gov/medical.htm">http://www.lightningsafety.noaa.gov/medical.htm</a>
344	People drowned in bathtubs	2005	National safety council	<a href="http://www.nsc.org/research/odds.aspx">http://www.nsc.org/research/odds.aspx</a>

Greywater system permit compliance rate in California				
1,770,347	Greywater systems	2009	from above, extrapolation from 1999	(this assumes the proportion of greywater use has not changed since 1999)
200	Permitted greywater systems	1992-2009	ReWater Systems, 70±, Bill Wilson + Kevin 20±, Ted Adams, 5± Art Ludwig, 2±...rest are a guess. I'd say lower bound is	
8,852	Ratio of unpermitted to permitted systems		calculation	
0.011%	Percent of permitted systems		calculation	

Reportable GW Diseases, Potential & Reported Disease	Total Cases in 2007	Est. 60 Years Cumulative Cases	Cases Linked to Graywater
Cholera	7	288	0
Cryptosporidiosis	11,170	502,650	0
E. coli, Shiga toxin-producing (STEC)	4,847	218,115	0
Giardiasis	19,417	873,765	0
Hepatitis A	2,979	134,055	0
Legionellosis	2,716	122,220	0
Salmonellosis	47,995	2,159,775	0
Shigellosis	19,758	889,110	0
Vibriosis (non-cholera Vibrio species infections) §	447	20,115	0
<b>Totals</b>	<b>123,713</b>	<b>4,920,093</b>	<b>0</b>