LESSONS FROM A GRAYWATER-FRIENDLY STATE

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- Lessons from a Pioneer Greywater State: Arizona was the first state to allow residential greywater systems to be installed without a permit.
- How did this radical shift in regulatory approach occur?
- What have been the implications for water savings and public health?
- How have municipalities and water districts responded?
- What can California learn from Arizona's experience?

EARLY HISTORY

Zanjeros originally delivered water to early citizens.

Until 1990, TUCSON the largest city in the US 100% on ground-water.

EARLY HISTORY

1940 - Last year that Tucson's water table was balanced.

1940's - End of any perennial surface flow in the Santa Cruz River near Tucson.

COLORADO RIVER COMPACT

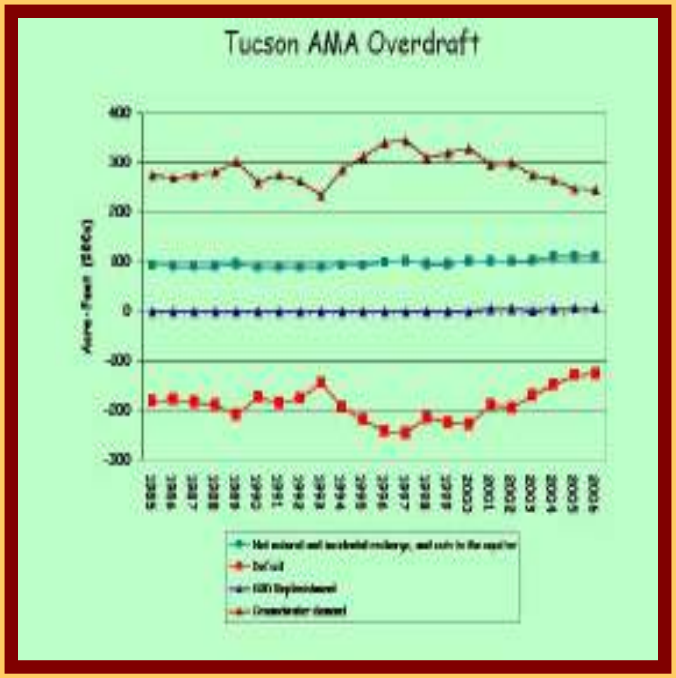
6 of the 7 basin states agree in the 1920's

AZ didn't agree until 1968

Allocations based on inaccurate data.

1980 GROUNDWATER CODE

SAFE-YIELD by 2025



The amount pumped annually must not exceed all recharge, both natural and artificial.

Each water provider has a GPCD goal.

CENTRAL ARIZONA PROJECT

Elev. change: 735’ to 2389’

336 miles long

15 pump/lift stations

10 siphons

RECENT HISTORY

Regional drought

Effects of climate change

GRAYWATER: WHERE ARIZONA WAS 10 YEARS AGO

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Regulators acknowledge the schism.

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Significant number of 'wildcat' systems in the region.

INITIAL RESEARCH CHALLENGES

Convince the regulatory agencies:

To fund the research.

That it is OK to study lawbreakers.

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Convince the regulatory agencies:

- **To fund the research.**
- **That it is OK to study lawbreakers.**

Agree on research components.

- **Amount of unpermitted use occurring**
- **Water and soil quality testing of sites.**

HOW MUCH USE OCCURRING . . .

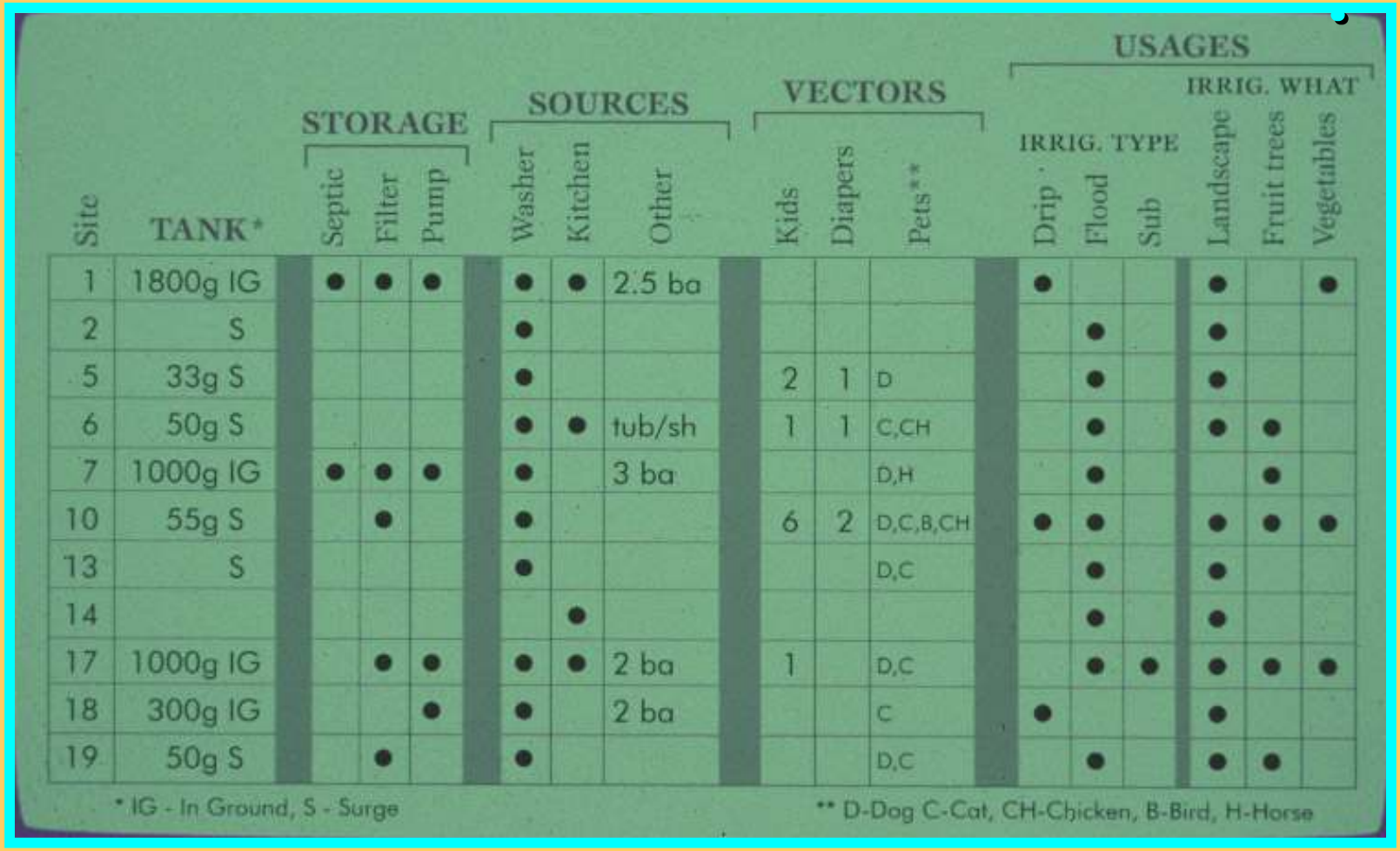
RESIDENTIAL GRAYWATER SYSTEMS: the Good, the Bad, the Healthy

GRAYWATER REUSE BY PROVIDER

PROVIDER	% Reuse	Weight	Wt. % Reuse
Avra Co-op	25.0	0.02	0.50
Flowing Wells	13.2	0.03	0.40
Green Valley	1.5	0.03	0.04
Marana	14.8	0.01	0.15
Metro	1.8	0.07	0.13
Oro Valley	3.4	0.05	0.17
Ray	15.8	0.02	0.32
Tucson Water	14.6	0.77	11.24
TOTAL	8.4	1.0	13.00

13%

SAMPLING WATER AND SOIL . .



Site	TANK*	STORAGE			SOURCES			VECTORS			USAGES						
											IRRIG. TYPE			IRRIG. WHAT			
		Septic	Filter	Pump	Washer	Kitchen	Other	Kids	Diapers	Pets**	Drip	Flood	Sub	Landscape	Fruit trees	Vegetables
1	1800g IG	●	●	●	●	●	2.5 ba				●			●		●
2	S				●							●		●		
5	33g S				●			2	1	D		●		●		
6	50g S				●	●	tub/sh	1	1	C,CH		●		●	●	
7	1000g IG	●	●	●	●		3 ba			D,H		●			●	
10	55g S		●		●			6	2	D,C,B,CH	●	●		●	●	●
13	S				●					D,C		●		●		
14						●						●		●		
17	1000g IG		●	●	●	●	2 ba	1		D,C		●	●	●	●	●
18	300g IG			●	●		2 ba			C	●			●		
19	50g S		●		●					D,C		●		●	●	

* IG - In Ground, S - Surge

** D-Dog C-Cat, CH-Chicken, B-Bird, H-Horse

FROM THE MOST RUDIMENTARY . . .

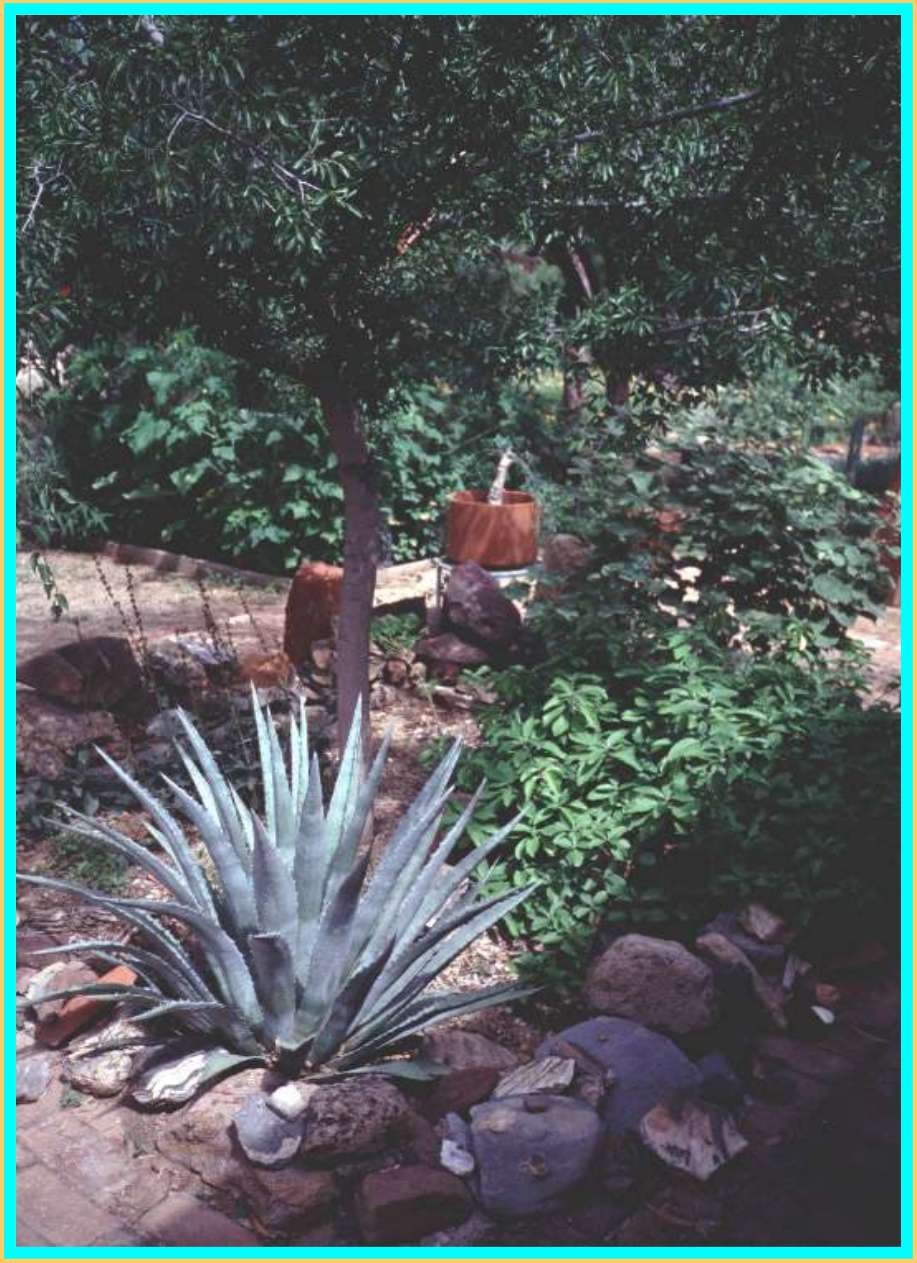
. . . TO

THE TYPICAL

FROM THE WHAT THE? . . .

. . . TO THE ELEGANT & CLEVER

RESULTING GRAYWATER GARDENS . . .



POST - STUDY DEVELOPMENTS

Data and risk assessment presented to ADEQ.

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New Az Graywater Rules

USE YOUR GRAYWATER

IF YES TO ALL . . .

My graywater originates from my residence, used within my property, for watering and composting.

My household generates < 400 gallons of graywater per day (20-35 gpd x number of residents).

I only flood or drip irrigate with my graywater.

I subsurface irrigate food crops, except for citrus and nut trees.

USE YOUR GRAYWATER

IF YES TO ALL . . .

My graywater does not contain hazardous chemicals.

I apply my graywater to minimize standing water.

My graywater can be diverted to the sewer or septic system.

My graywater storage is covered.

I allow no direct contact with my graywater.

USE YOUR GRAYWATER

IF YES TO ALL . . .

My system is sited outside any floodway.

My graywater never comes within 5’ of the groundwater table.

I have clearly marked any pressure piping in my system.

My graywater contains no water used to wash diapers or similarly soiled items.

SINCE THE RULE CHANGE .

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Graywater Guidelines published by Water CASA - Summer 2002.

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Spanish version - Fall 2003.

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Spanish version - Fall 2003.

New Mexico version - 2005.

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25% of costs up to $1,000 for Graywater & RWH Systems.

SINCE THE RULE CHANGE . . .

Tucson requires graywater plumbing in new construction - June 2010.

FUTURE SCENARIOS

All outdoor water use exclusively from 3 sources: reclaimed water, harvested rain water and graywater reuse.

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All toilet flushing exclusively from 3 sources: reclaimed water, harvested rain water and graywater reuse.

FUTURE SCENARIOS

When sold, existing homes will be required to be retrofitted to new home standards.

Benefit of hindsight . . .

What have been the implications for water savings and public health?

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What can California learn from Arizona's experience?

www.watercasa.org

thank you!

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