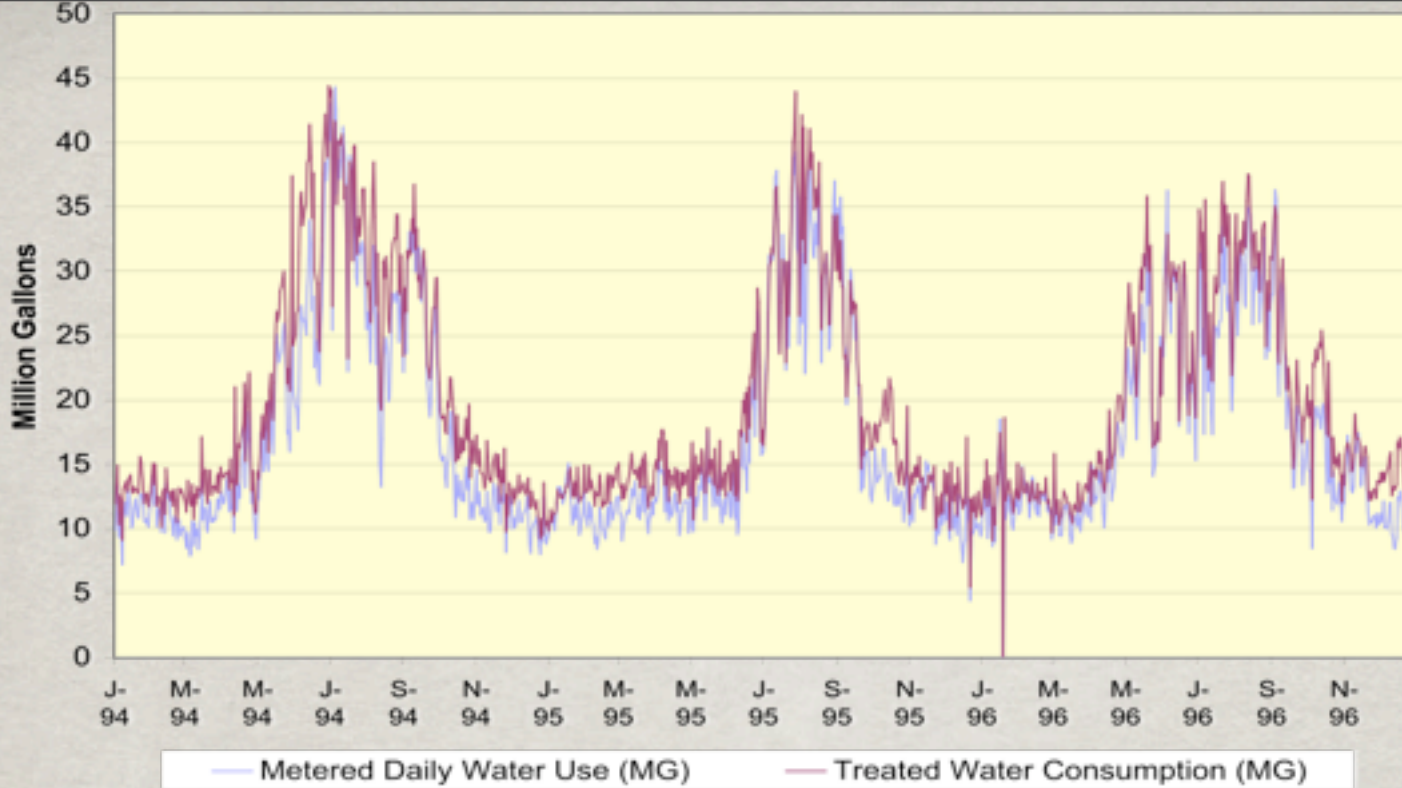


# Water Budgets for Colorado Landscapes Poudre River Forum

January 2015

Paul W. Lander, PhD, ASLA, LEED A.P.  
AWE

City of Boulder,  
1994-1996



Cities Usage Patterns:

~95% Treated Drinking Water  
Peak Demand from Outdoor Use  
Residential ~ 65% of Total Demand



City of Boulder,  
1994-1996

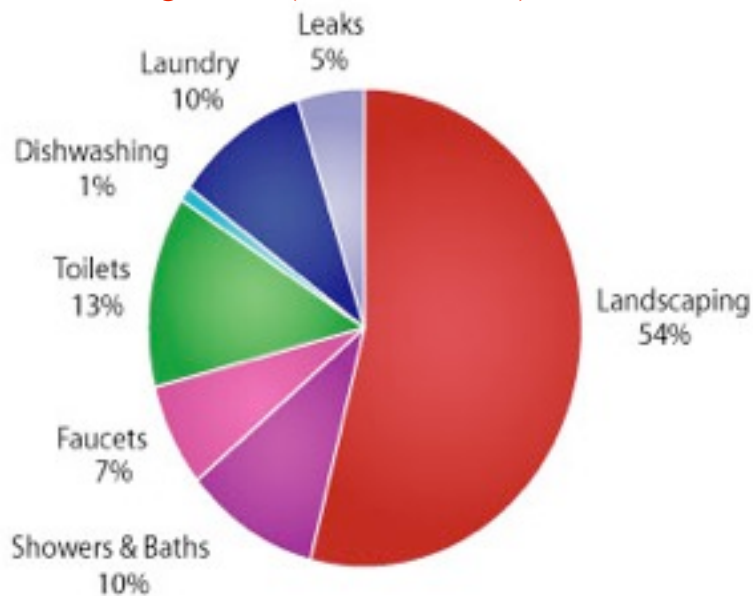


S- 95 N- 95 J- 96 M- 96 M- 96 J- 96 S- 96 N- 96

- Treated Water Consumption (MG)

### Single Family Residential Water Use

100% Drinking Water (EPA Standards) <5% consumed



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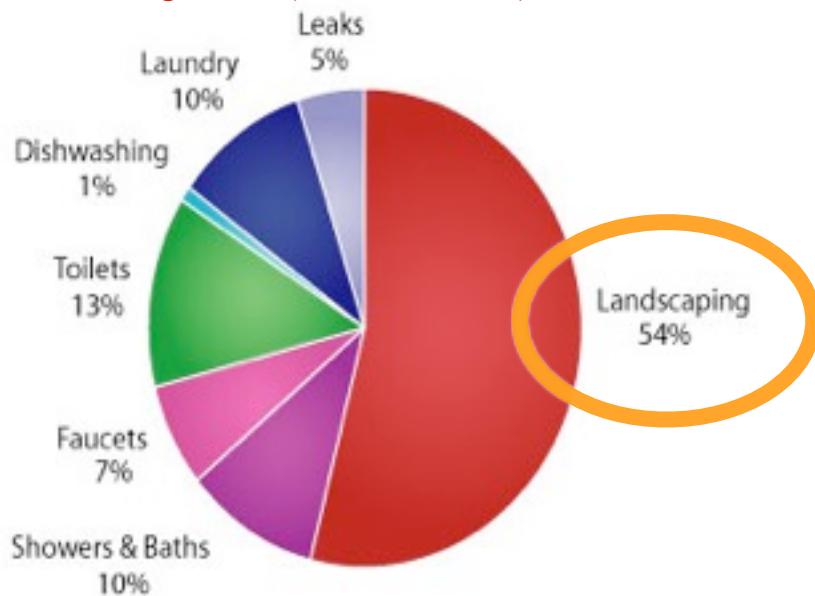


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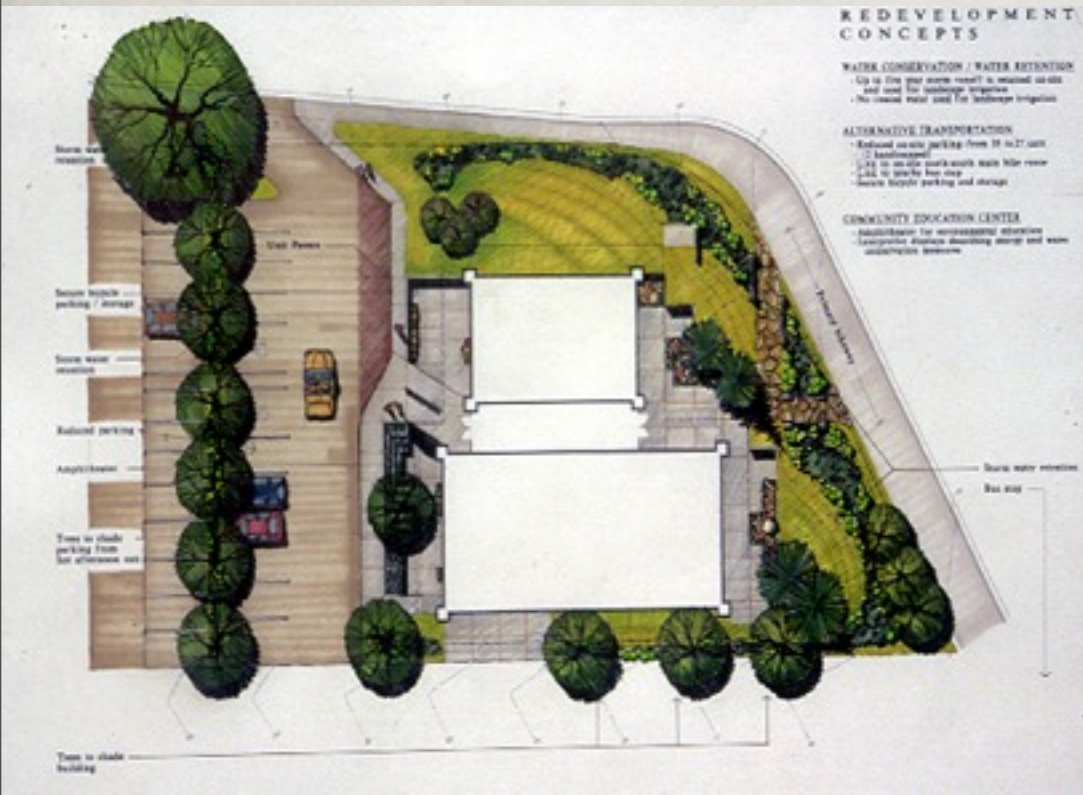


Green  
Infrastructure  
Important, and  
We Can Do Better





# Water Budgets Explained



1. Calculate ^

2. Allocate >

## WATER BUDGET

Indoor (5000 gal/month)  
*plus*



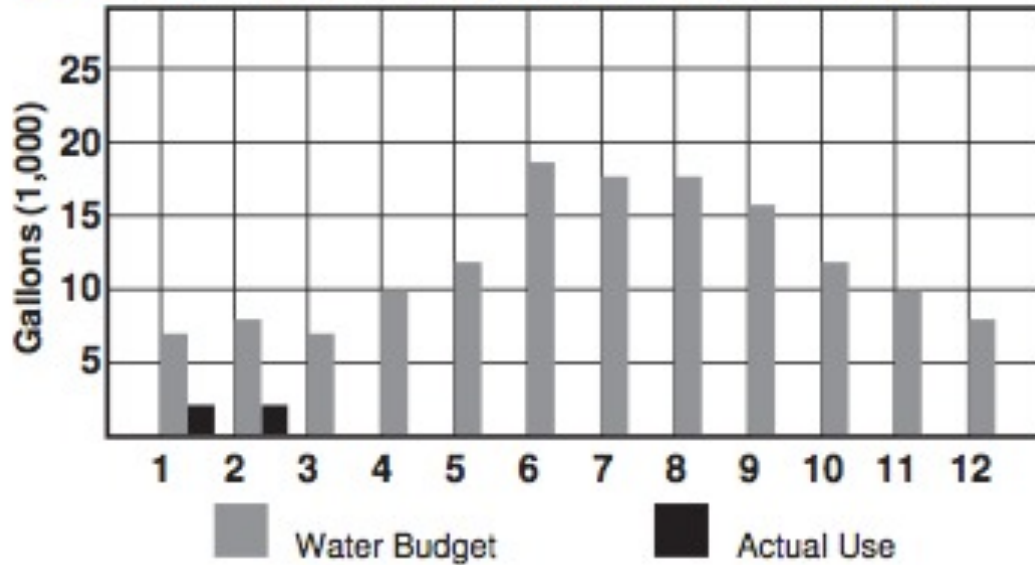
Outdoor Allocation  
15 gal/sq.ft x LS sq.ft.  
(ET curve Mar-Oct)

# Water Budgets Explained

13

## Water Budget VS. Actual Use

Water Budget does not carry over from billing cycle to billing cycle.



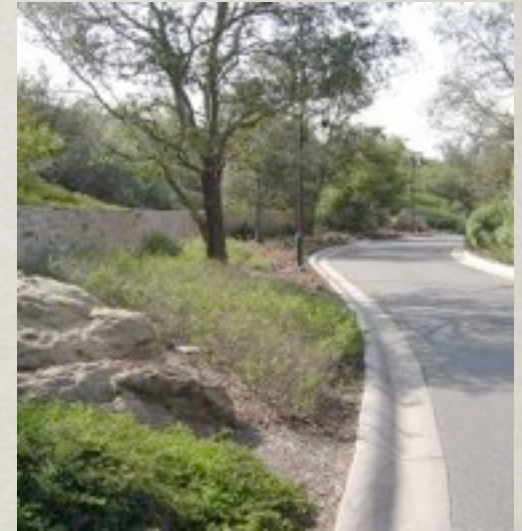
3. Measure & Report

4. Educate and Charge

Boulder, CO	\$/1000 gallons	(% of budget)
Block 1	2.25 (3/4 base)	0% - 60%
Block 2	<b>\$3.00 ("base rate")</b>	61% - 100%
Block 3	\$6.00 (2 x base)	101% - 150%
Block 4	\$9.00 (3 x base)	151% - 200%
Block 5	\$15.00 (5 X base)	> 200%



# Rate Structure ('91) & Plant Material Selection Reduces Water Use Irvine Ranch, CA



circa 1970s

circa 1990s

circa 2000s

## Public LS ~1990-2010

Doubled Area while Total Use Increased <4%

Avg Use Declined :3.5 AF/ac to 1.9 AF/ac

Improved Water Quality with reduced dry weather runoff

High Community Satisfaction

Relatively Quick Implementation



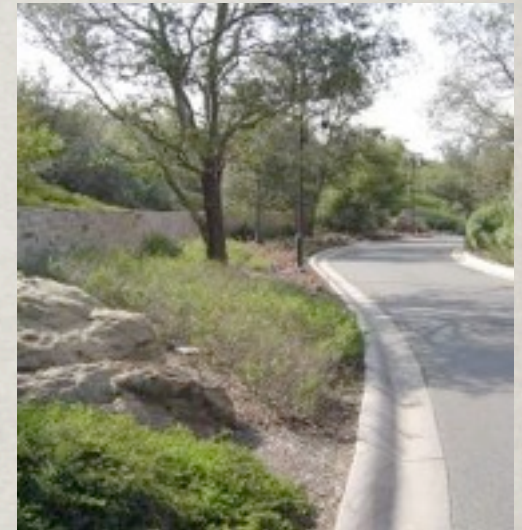
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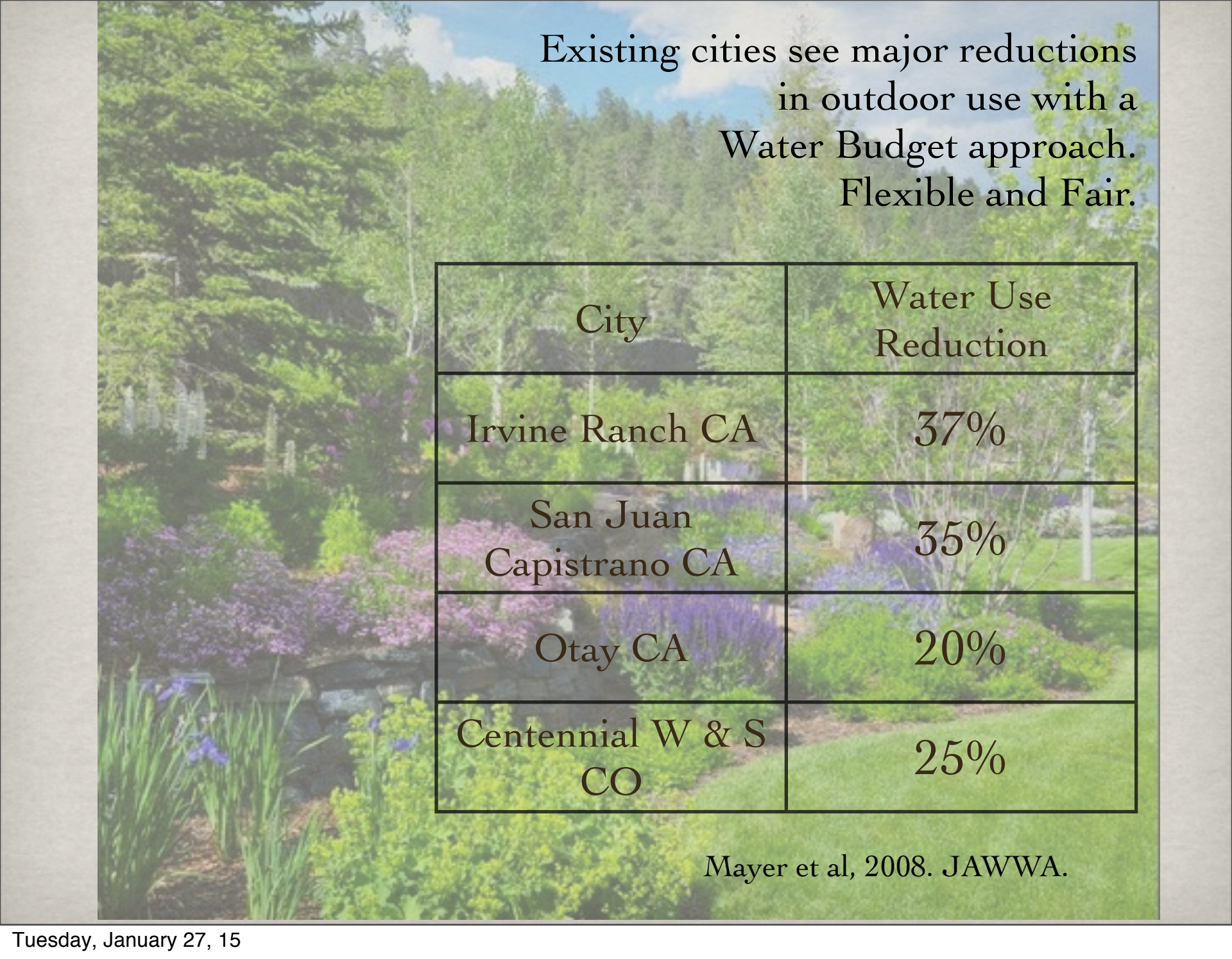
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Existing cities see major reductions  
in outdoor use with a  
Water Budget approach.  
Flexible and Fair.

City	Water Use Reduction
Irvine Ranch CA	37%
San Juan Capistrano CA	35%
Otay CA	20%
Centennial W & S CO	25%

Mayer et al, 2008. JAWWA.



# Rethink Storage....

## Green Water Matters



### Water in Biosphere (km<sup>3</sup>)

Groundwater 4000.0

Freshwater Lakes 125.0

Soil Moisture 67.0

Rivers 1.2

after Wetzel, SUNYEsf.edu

1 km<sup>3</sup> ~ 264 Bg



^ Marcia Tatroe,  
Aurora, CO

Brad Lancaster:  
Tucson, AZ >



Harvesting Rainwater.com © Brad Lancaster



# Optimizing Outdoor Water Use

Action	Avg Savings	Time Frame
Restrictions/Drought	10-15%	Reactive
Water Budgets	25-30%	Existing: Educate & Manage
Zero Water/Offsets	50%+	Future: Planning & Management

AWE, Jan 2015:

170 Studies Reviewed

Industry Reviewers

- > Thin on Robust Documentation
- > Ripe for Further Research

