California Water Issues: The Drought Edition

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Floods, droughts and lawsuits: it’s the way we get things done

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Part 1: Understanding California Water

- Surprisingly abundant
- Extreme variation in space and time
- Adaptation to climate extremes
- Adapting to change
Abundant Water, Diverse Climate and Geography
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COEFFICIENTS OF VARIATION OF TOTAL PRECIPITATION, WY 1951-2008

Courtesy Mike Dettinger, USGS
Adaptation: Surface Storage
Adaptation: Surface Storage
Adaptation: Groundwater Storage

San Joaquin Valley Hydrology

Area of land subsidence

Faunt et al., 2009
Adaptation: Groundwater Storage

More than 70 MAF Overdraft in San Joaquin Valley

Groundwater Loss

CHANGE IN GROUNDWATER STORAGE, IN MILLIONS OF ACRE FEET

1977

By region
- Entire Central Valley
- Sacramento Valley
- Delta and Eastside Streams
- San Joaquin Basin
- Tulare Basin
Adaptation: Distribution Systems
Adaptation: Distribution Systems
The Weak Link: Sacramento-San Joaquin Delta
Adaptation: Ecosystems
California’s native freshwater fishes in decline
Adaptation: Change

- Changing Climate and Sea Level
- Changing Demand
- Changing Ecosystems
Part II: From Drought to Myths

• Why Myths?
  • Simplify issues
  • Create “common knowledge based on common sense”
  • Powerful communication tool
  • Usually some basis in fact
Myth 1: California is running out of water
But Human Uses are Declining

Gross water use, million acre feet

- Total
- Agricultural
- Urban

Years: 1960 to 2010
Economic efficiency of water use continues to rise while use goes down.

Source: Data from DWR, DOF, and US Bureau of Economic Analysis (as cited in Hanak et al, Water and California’s Economy, 2012)
We are not running out of water, just cheap water

- We are adapting to increasing scarcity
- We are increasing reliability in large urban areas
- But difficult adjustments ahead in agricultural sector as water prices rise
Myth 2: We Can Conserve Our Way Out of CA’s Water Problems
Reality: Conservation is important, but its effectiveness can be overstated

- New technology and changing water use habits will help, particularly in urban settings
- Farmers are becoming more economically efficient with water
- But conservation does not always yield “new” water, because “excess” water is often already reused
Myth 3: Environmental regulation is causing California's water scarcity
Depends on how you define “environmental water”

Statewide Annual Gross Water Use by Sector

- **Urban**: 9 maf (10%)
- **Agriculture**: 33 maf (40%)
- **Environment (Including North Coast)**: 41 maf (50%)

**Basis in Fact**

- Half of water use is allocated to the environment
- Meeting habitat and water quality standards is a significant constraint
- The amount allocated to the environment has been increasing over the last 20+ years
- But....
Most environmental water doesn’t compete with other uses.

Gross Water Use in the Interconnected Portions of California (excludes North Coast)

- **Environment**: 32 maf (53%)
- **Urban**: 8.5 maf (14%)
- **Agriculture**: 20 maf (33%)
Myth 4: The California Craft Brewing Industry is Hosed (it’s time to move)
No You’re Not (i.e. don’t move)

- Urban breweries tend to have the most resilient supplies (albeit growing in cost)
- North Coast region traditionally wet (but occasionally unreliable)
- Greatest risk is for rural breweries lacking diversified water portfolio
- Wastewater an issue for everyone

Ritchie, 2012
Craft Brewer’s California Water Footprint
(NOTE: Preliminary estimates only)

- **Not Very Much***:
  - 3M bbl = 93M gal
  - 6 gal/gal processing = 558M gal
  - Total 651M gal/year = 2003 acre-ft

- **Compare Water Use**:
  - Per capita 150 gal/day = 1/6 acre-ft/year
  - Typical acre crop uses 3(+-) acre-ft/year

- **Equivalent Usage**:
  - 12,000 people
  - 640 acre almond orchard
  - 4.4 hours of LA water use

*data sources: Ritchie, 2012, T. McCormick pers comm.*
But... Craft Brewers Total Water Footprint
(NOTE: Preliminary estimates only)

- It’s a Pretty Big Number
  - 55 lbs of barley and 1.3 lbs hops/barrel = 169M lbs*
  - Annual yield/acre = 1 ton**
  - Water use = 2 acre-ft**

169,000 acre-ft = 590 gal/gal beer

- California craft brewers use enough water to supply a million people

* T. McCormick pers. comm., ** UC Extension values
From myth to nuanced reality

1. California is not running out water, just cheap water.
2. We cannot conserve our way out of this problem, but it helps.
3. The environment is not taking all the water, but it is taking an increasing share.
4. You are not hosed. California is a great place for sustainable craft brewing and unlike most other industries, you import 99% of your water from out of state.
Conclusion