California's Drought: Lessons for Adaptation & Policy Reform

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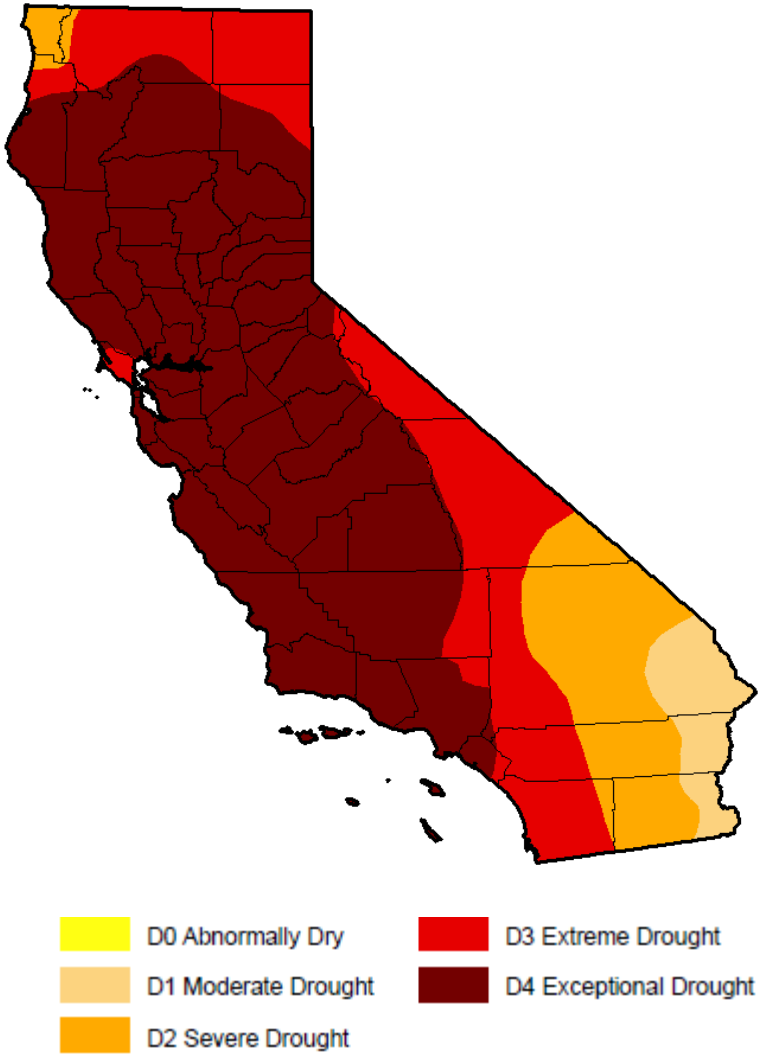
PPIC

California is in the midst of a major drought



- Droughts are a recurring feature of our climate
- Reservoirs, snow pack are extremely low
- Next year could also be dry

Source: U.S. Drought Monitor, NOAA/NWS/NCEP/CPC (July 2014)

Droughts reveal strengths and deficiencies in water management

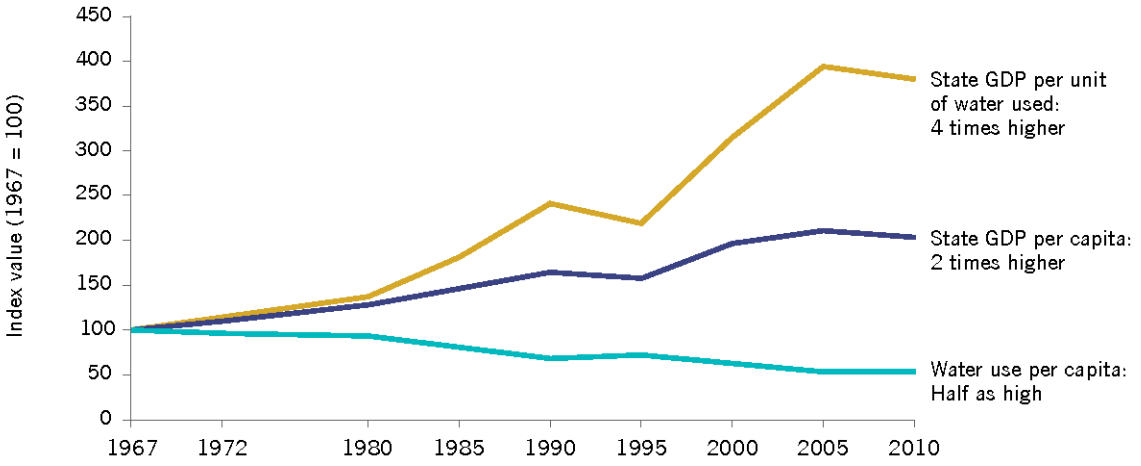
- **Good News:**
  - Limited urban shortages
  - Better performance thanks to planning, investments

- **Bad News:**
  - Painful agricultural reductions
  - Supply emergencies in small communities
  - Environmental water crisis (fish, birds)

Supplies are becoming more limited, but potential to adapt is strong

- Not running out of water, just cheap water
- Population growth, changing climate require ongoing adaptation

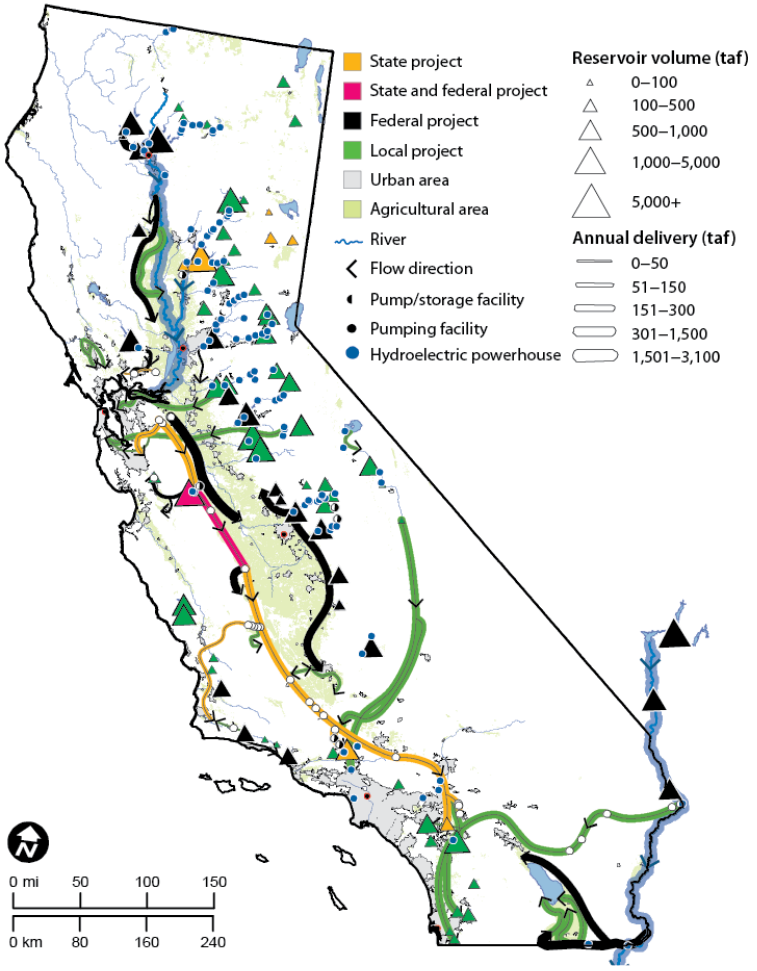
Economic productivity of applied water is rising



Source: Hanak et al. Water and the California Economy (PPIC 2012)

California as a test-case for adapting to scarcity

- Complex and highly engineered system
- Large role of irrigation (80% of human use)
- Lots of stakeholder involvement
- Some surprisingly "unmodern" management systems



What can we do better?

- Plan, prepare and prioritize
- Manage demand
- Manage groundwater as drought storage

You can't manage what you don't measure

- Imprecise surface water use reporting
- Limited information on groundwater use
- Very hard for state to regulate curtailments
- What's needed
  - Institutional reform
  - Updated data systems, monitoring technology (remote sensing role?)

We don’t prepare for droughts, even though we know they are coming

- We do “dry runs” for other natural disasters (earthquakes, floods)
- We also need dry runs for droughts
- Identify information and coordination gaps that need to be filled before the next major drought

Regulators are making costly, ad hoc environmental water tradeoffs

VS.

Environmental priority-setting needed before a drought

- Develop emergency measures in advance
- Designate "strongholds" for maintaining populations
- Create a funding mechanism to assist recovery (from water sales?)

Blue Creek is an important refuge for migrating salmon and steelhead

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Conservation is important, but its effectiveness can be overstated

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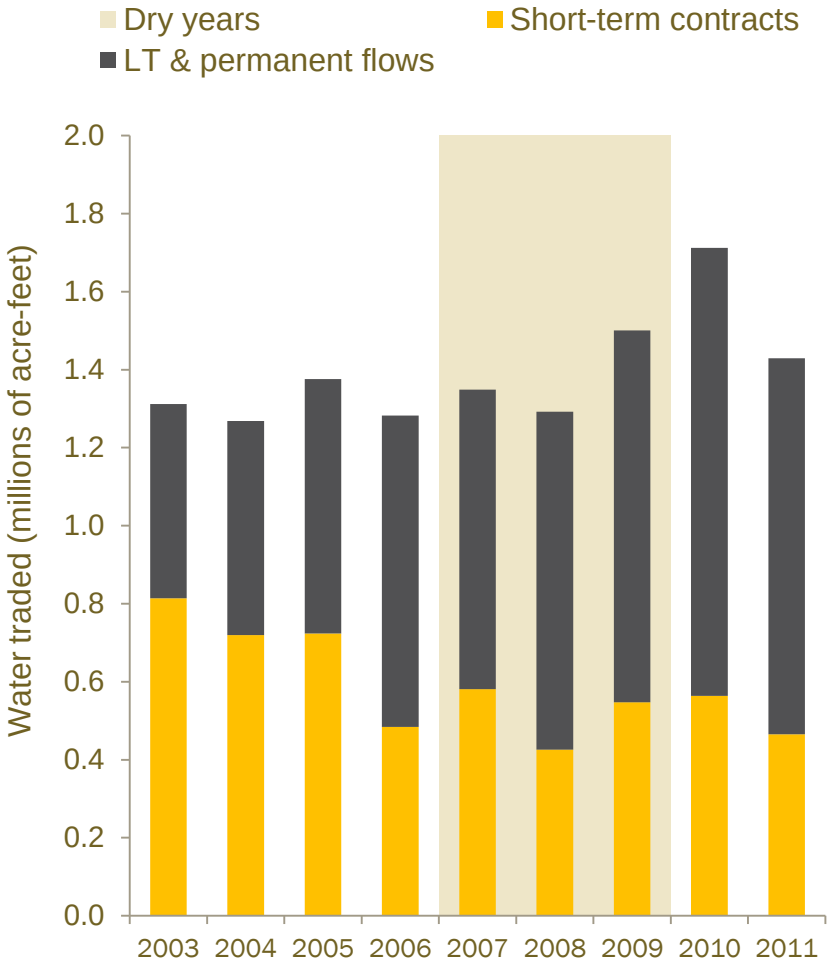
- In cities, new technology and changing habits
- Farmers are becoming more economically efficient with water
- But irrigation efficiency does not always yield "new" water at the basin scale
- Beware of unintended consequences of technology subsidies

Drought presents a fiscal conundrum for urban water utilities

- Many utilities are coping by increasing fixed service charges, but this dims customer incentives to reduce water use
- Drought pricing can maintain solvency while providing price incentives

Water markets can provide relief, if the right rules are in place



Source: Hanak & Stryjewski, California's Water Market, By the Numbers: Update 2012 (PPIC 2012)

- Institutional constraints limited trading in California's last drought: complex, frequently changing approval process
- This year, very high prices within a segmented, low-information market

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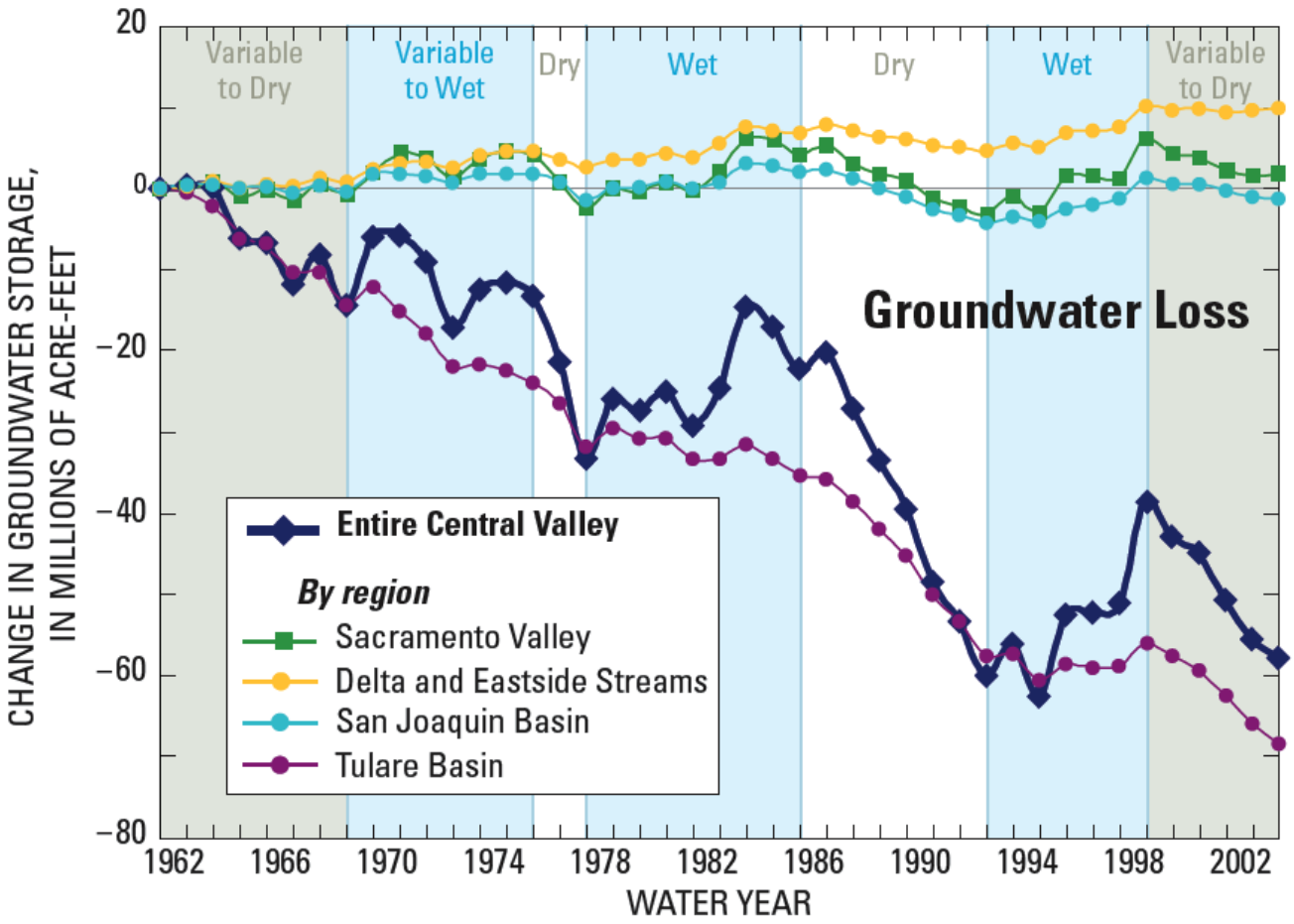
Groundwater is ideal drought storage, but reserves are shrinking



Faunt et al., USGS, 2009

Better groundwater management can build a "not-so-rainy day fund"

- Drought's silver lining: New groundwater legislation passed
- Subsidiarity principle: Local and regional control with state as administrator of last resort
- Implementation challenge: Will likely require reducing farm acreage

Anaheim Lake, one of Orange County's recharge basins.

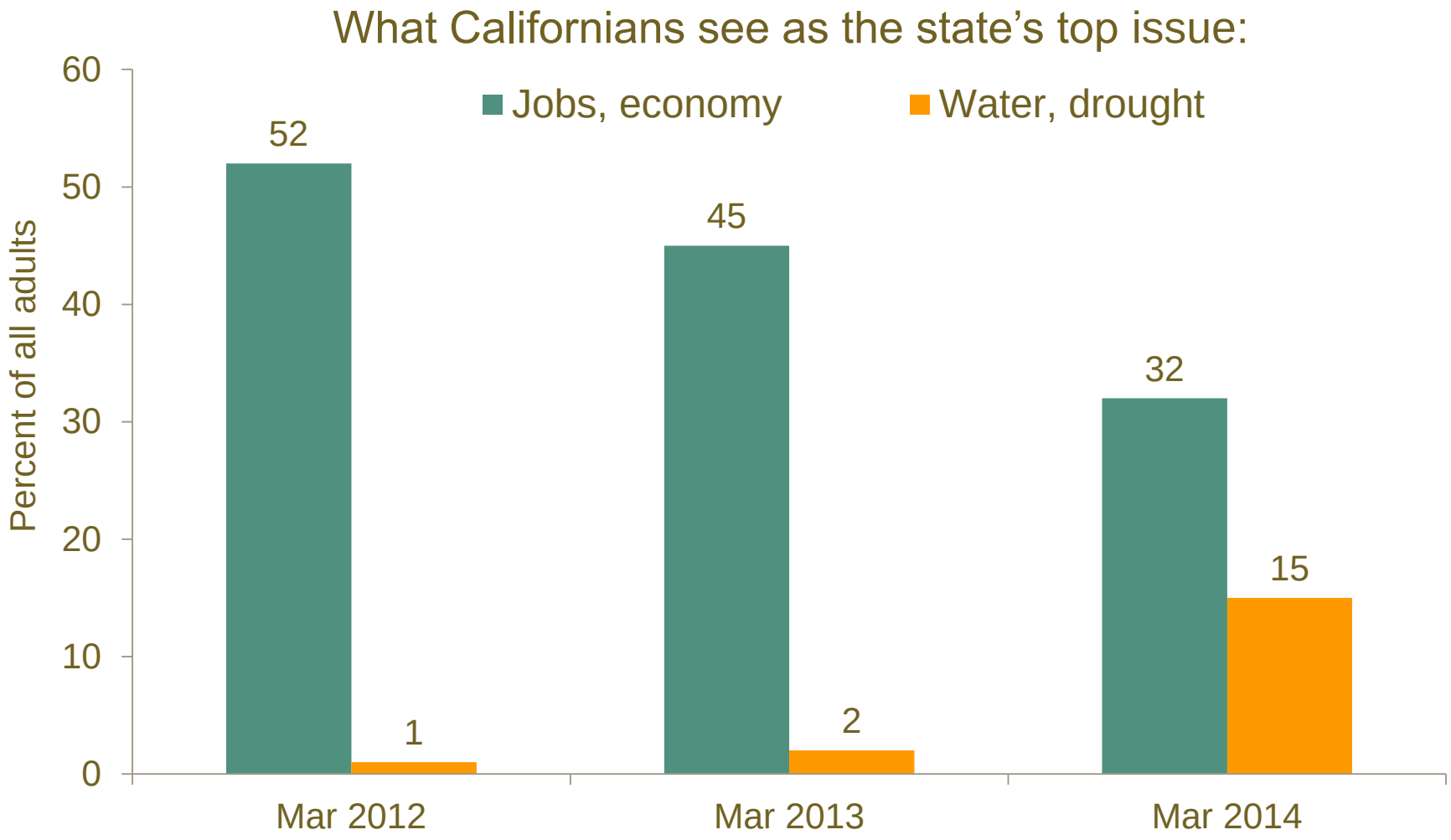
Lessons for adaptation and reform come from around the state

- Significant progress in the large urban regions:
  - Strong planning systems
  - Diversified and integrated supplies
  - Sustainable source of local funding
- Much work still to do in:
  - Rural areas (groundwater management)
  - Statewide integration (conjunctive use of groundwater-surface water)
  - State/federal oversight (water rights, markets, environmental flows)

Some takeaways for developing regions?

- Water portfolios can build urban resilience
- Irrigation efficiency is not a panacea to deal with scarcity
- Groundwater management can imply costly tradeoffs; will need institutional, financial support
- Conjunctive, integrated approaches can leverage, repurpose existing infrastructure for new conditions

In the world of public policy, a drought is a terrible thing to waste



PPIC Statewide Survey: Californians and their Government (March 2014)

Thank you!

More information at www.ppic.org and californiawaterblog.com (UC Davis Ctr. for Watershed Sciences blog)

Notes on the use of these slides

- These slides were created to accompany a presentation. They do not include full documentation of sources, data samples, methods, and interpretations. To avoid misinterpretations, please contact:

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- Thank you for your interest in this work.