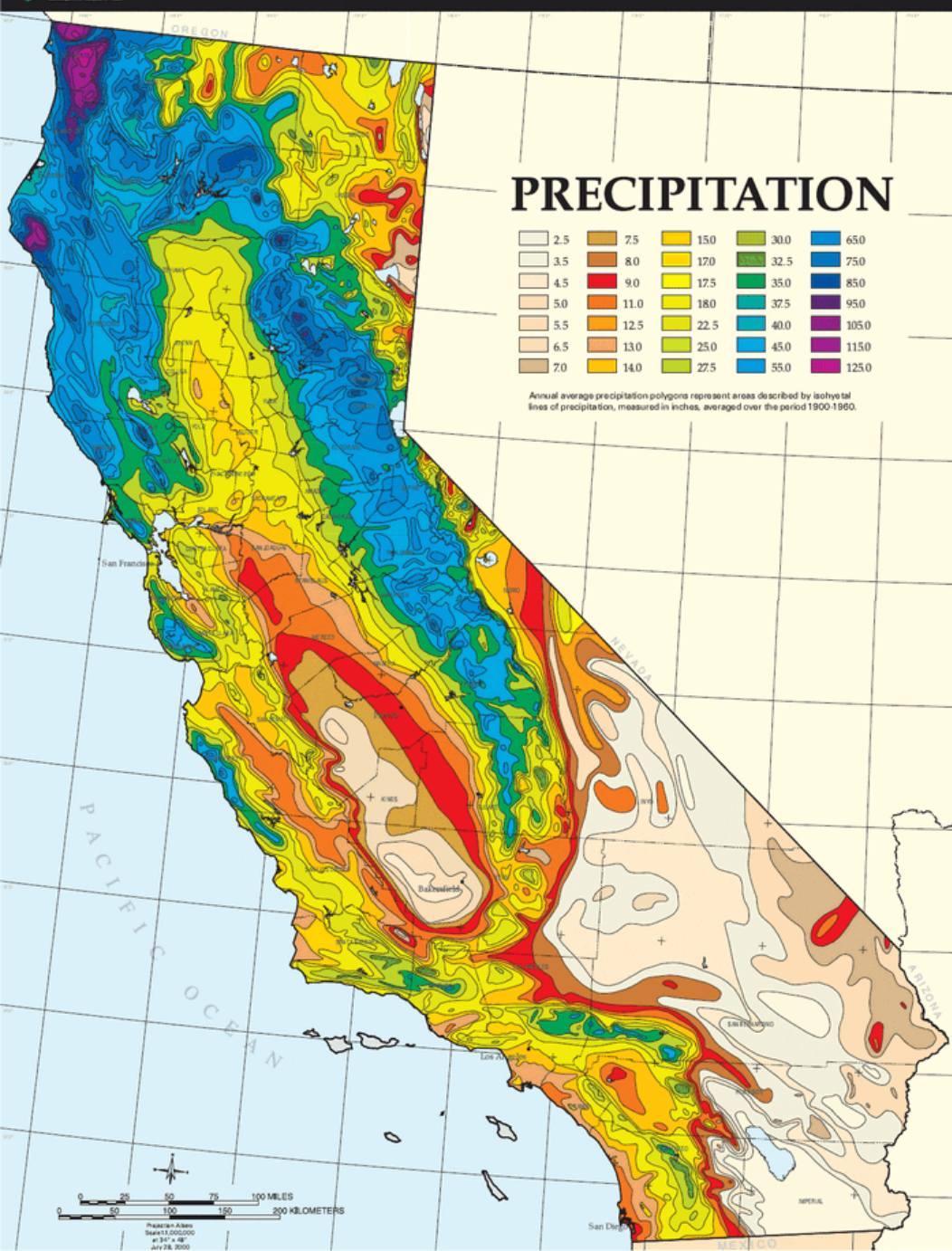


# Water Markets and Drought Resilience post-SGMA

Anita M. Chaudhry  
Professor of Economics  
CSU Chico

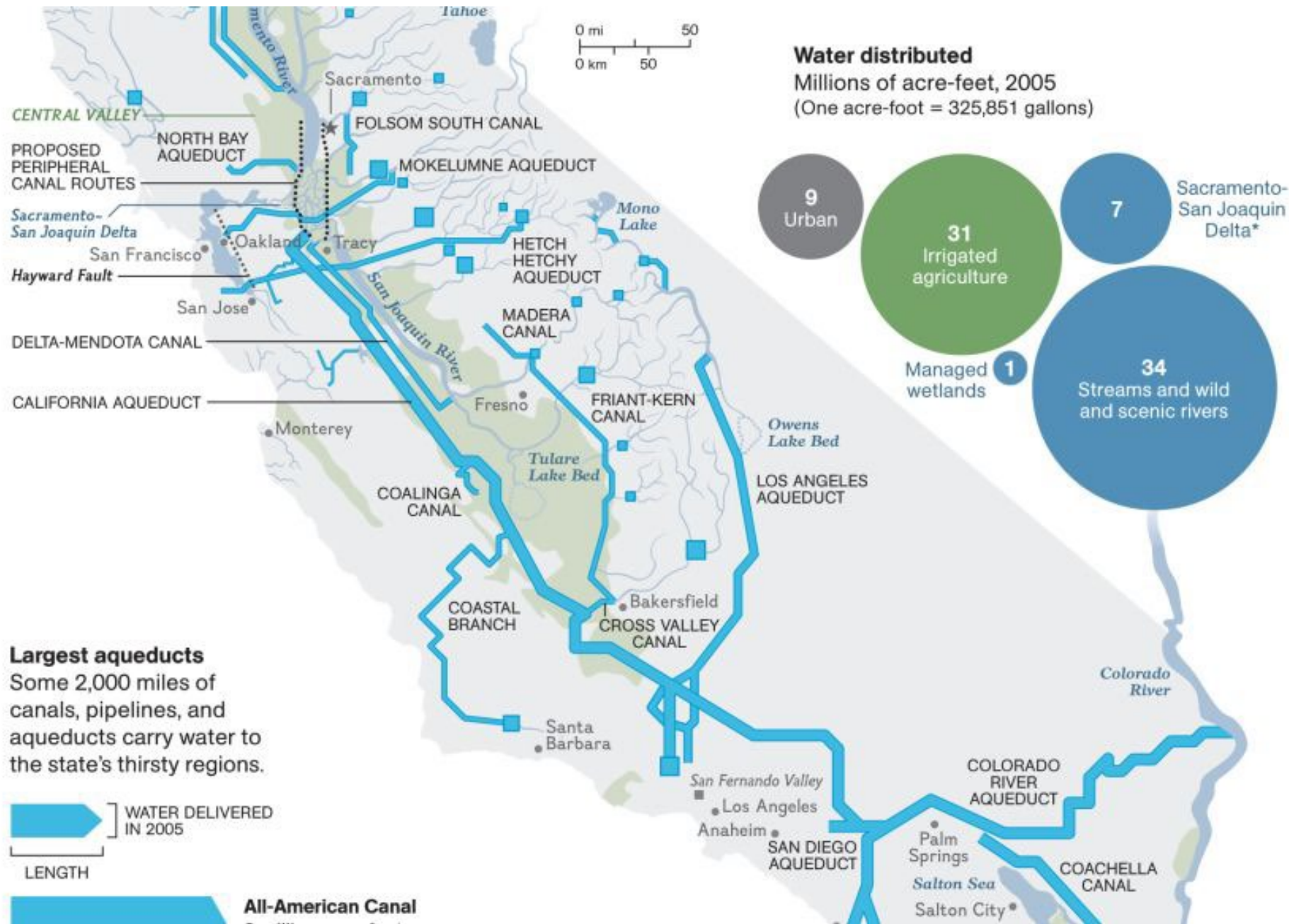
2023 CSU-WATER Conference: Our WATER's Future: Challenges and Next Steps  
April 13<sup>th</sup>  
CSU Monterey Bay



# California Average Annual Precipitation Map (1961-1990)

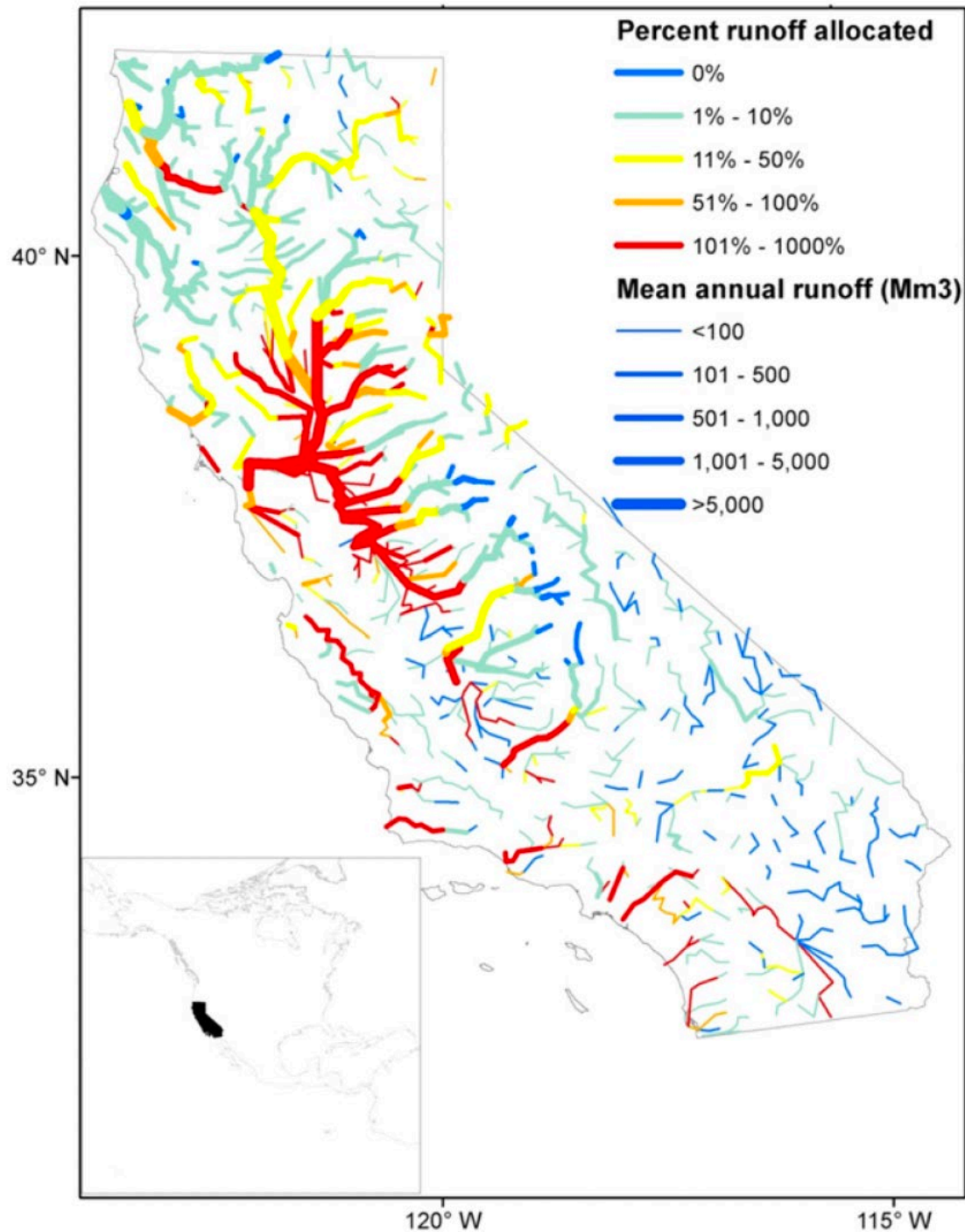
An engineering problem to be solved?

# Replumbing California



We solved it!?

Source: National Geographic



Cumulative water right allocations relative to mean annual runoff

Water law perspective, who has the first right to use water?

- What is your mental map of California's water?
- "To break a mental model is harder than splitting an atom" --Albert Einstein



# Water and irrigation districts

A **polycentric** model of California's water

# Polycentric water system of California

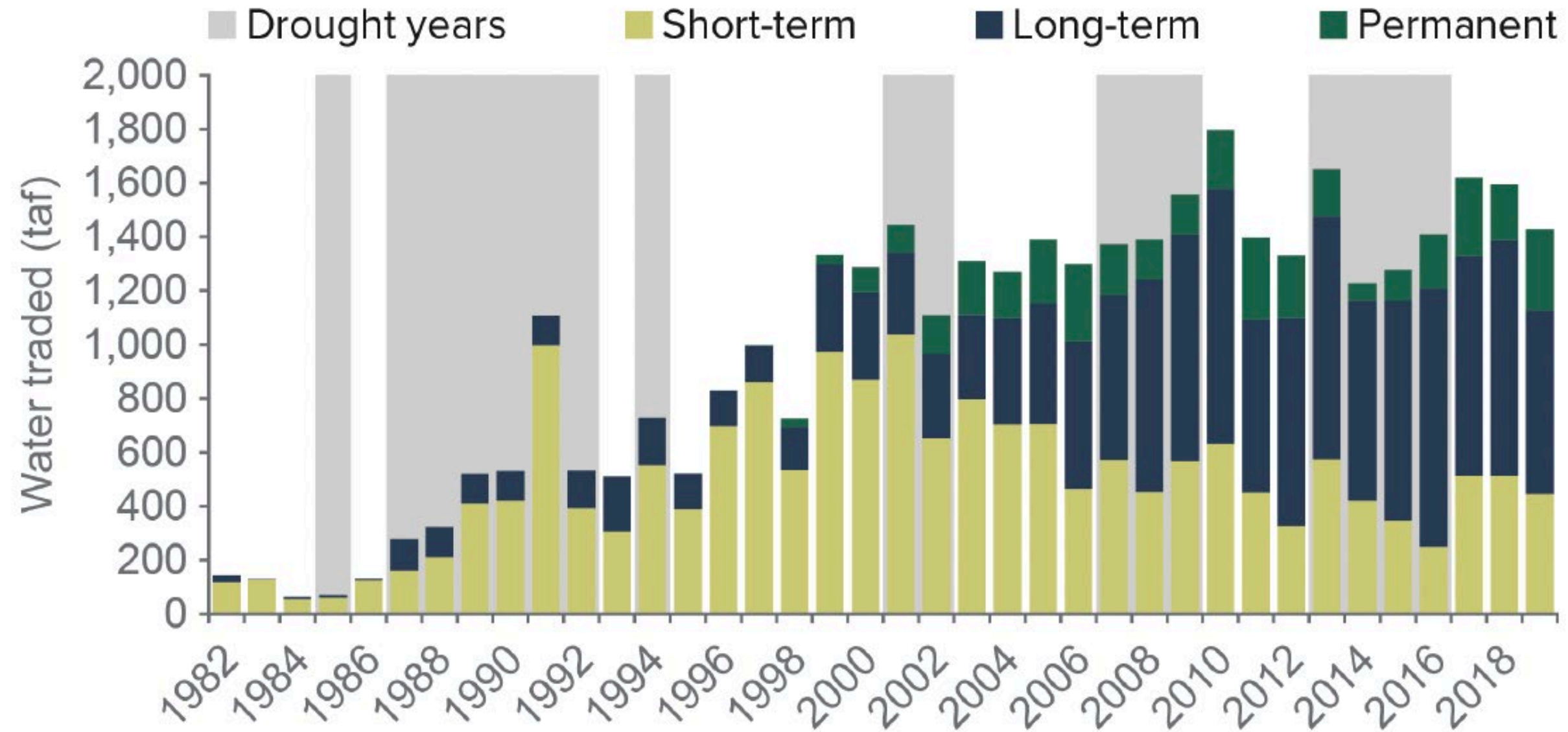
- Many centers of decision making that are formally independent of each other but which, nonetheless, are forced to interact in both competitive and cooperative fashions, and may be embedded into larger systems...

V. Ostrom

# Water Markets and Farm Wealth

- Districts trade water in water markets, water markets can impact farm wealth
- Farm real estate accounts for 80% of asset value in agricultural sector in the U.S.
- Water markets are likely to expand as groundwater users in other basins implement the Sustainable Groundwater Management Act (SGMA).





Source: Hanak et al. (2021) California's Water Market, PPIC

# Some considerations for good water market design

1. Transferrable water rights are well defined, secure, and reflect actual uses (**measurement**)

**Hydrologists, hydrogeologists, water lawyers...**

2. Buyers and sellers comply with the trade rules (**monitoring**)

**Remote sensing experts, crop scientists...**

# Some considerations for good water market design

3. Market failure: Third party effects (**measurement, valuation, monitoring, and dispute resolution processes**)

**Public health experts, social scientists, hydrologists, ecologists, environmental engineers...**

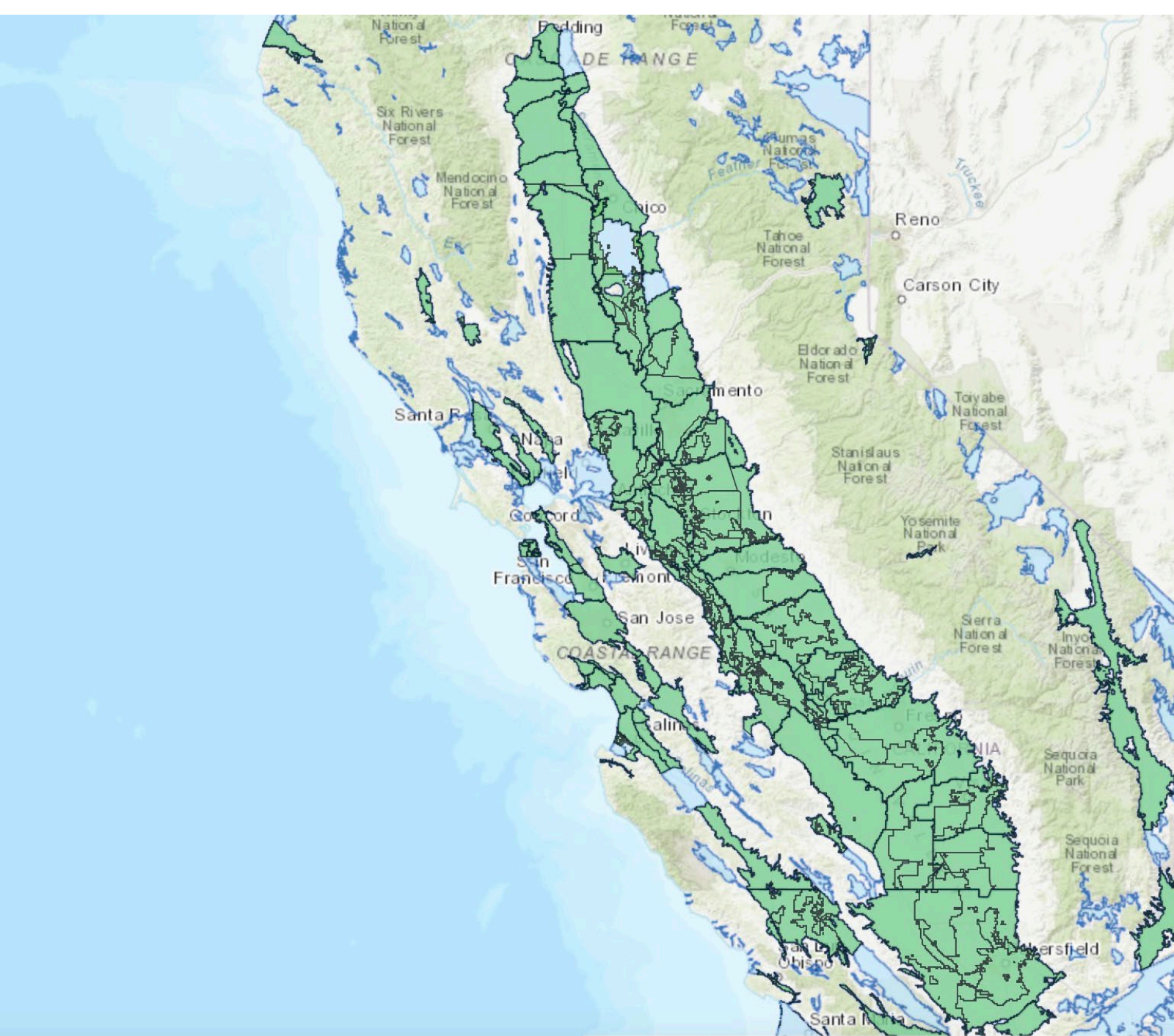
4. How should the efficiency gains be distributed? Get past the “Ideology of efficiency” (**tax policy**)

**Public policy, social scientists...**

# GSA Boundaries

GSA: Another **center**  
of decision making

Source: GSA viewer @ [sgma.water.ca.gov](http://sgma.water.ca.gov)



# SGMA and water market design

- Water markets could play a key role in helping communities adapt to SGMA and stave off the worst effects of reduced groundwater pumping.
- Good market design is critical to creating effective and responsible water markets that support low-cost trading and banking while protecting third parties from harm

# Beyond state and markets---an interdisciplinary research agenda post-SGMA

- Designing institutions to force (or nudge) entirely self-interested individuals to achieve better outcomes has been the major goal posited by policy analysts for governments to accomplish for much of the past half century.

# Instead...

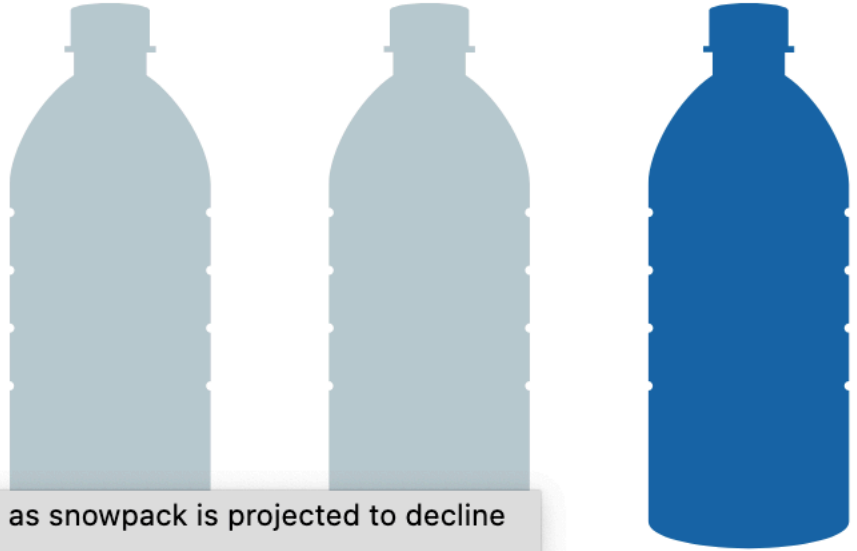
- Development of institutions that bring out the best in humans. We need to ask how diverse institutions help or hinder the innovativeness, learning, adapting, trustworthiness, levels of cooperation of participants, and the achievement of more effective, equitable, and sustainable outcomes at multiple scales.

**Thank you for your attention**



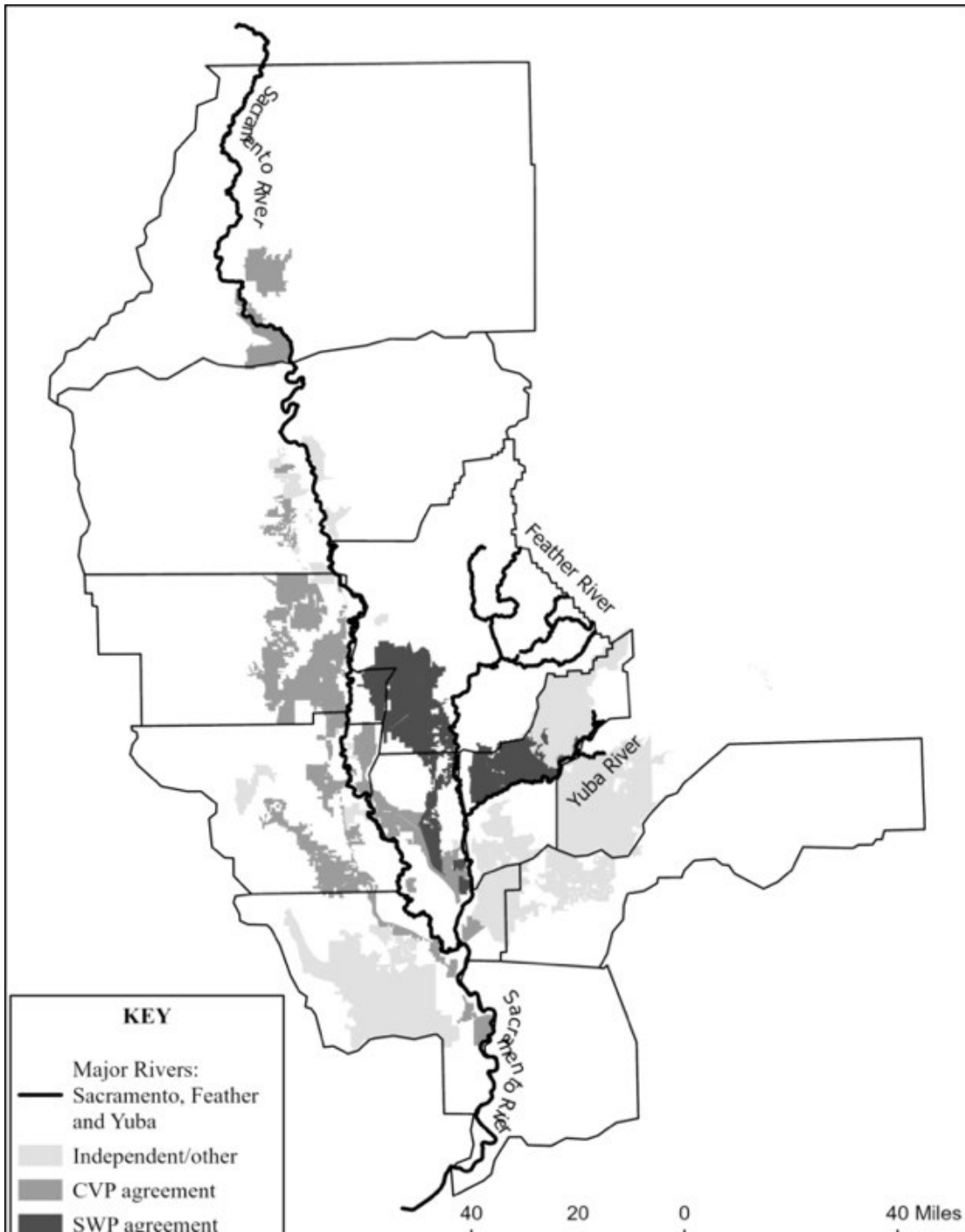
BY 2100  
WATER SUPPLY FROM SNOWPACK  
IS PROJECTED TO

**DECLINE BY  
TWO-THIRDS**



By 2100, the average amount of water stored as snowpack is projected to decline by 2/3 of its historical average.

# Agricultural districts in Sacramento Valley



# What is a water market?

- Water markets are institutional and infrastructure arrangements that facilitate transfer of water rights between water users in exchange of monetary compensation.
- Market rules are result of socio-political processes and should be embedded in societal needs, instead of being an imposition from bureaucrats, agribusiness sector, investors, corporations, or politicians.
- Water markets need effective regulatory institutions to work well.

# Why a market in water?

- It is no longer possible to solve scarcity problems solely through an engineering approach, with supply-side measures. Demand management strategies should also be entertained.
- In arid regions such as CA, over-allocation of surface water coupled with trends of decreasing supply suggest that new water demands will be met by re-allocation from existing uses.
- Economic instruments have gradually made their way into the mix of water policies
  - Some jurisdictions have already established water markets, Spain, Chile, Australia, Western U.S including CA (1991 onwards).