

Groundwater in California History, Economics, and Politics

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Background

- Last worked on institutional change in water at Caltech almost 30 years ago
 - The place: France,
 - The problems: Irrigation and drainage
 - The time 1700-1850
 - The solution local improvement districts
- Perfect preparation for thinking about California Groundwater today
- Claim: understanding the situation requires a combination of history, economics and politics.
- Confession, as division chair I have had limited time to work on this so I have more questions than I have answers.

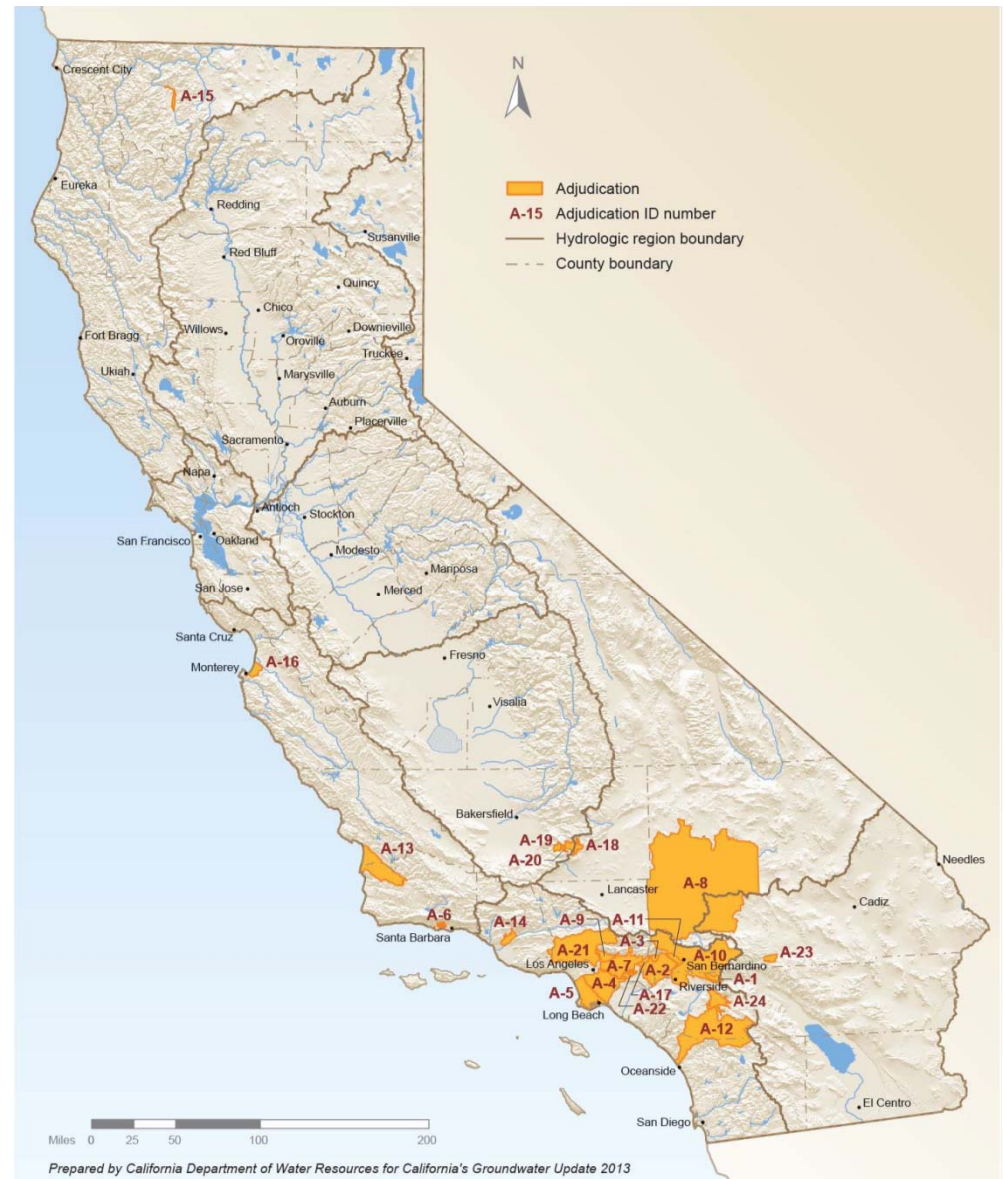
- Groundwater is a classic common pool.
- Most states and countries have regulations about groundwater, essentially before 2014 California does not but it has claims.
- California's water rights on groundwater recognize two types of claims: appropriation and overlying. These claims are rights as long as they are exercised continuously. Implicitly these rights are rival so at some point if water levels fall, the older claims have priority (in this sense groundwater is like surface water). At issue (for holders) is how to enforce these rights, at issue for the state is how to regulate them.
- 1937 Pasadena sues the other pumpers in the Raymond basin, with a goal to limit the number of new wells sunk and the amount of water collectively extracted.
- 1945 the adjudication becomes final and binding on the last hold out.

Raymond Basin and the property rights school

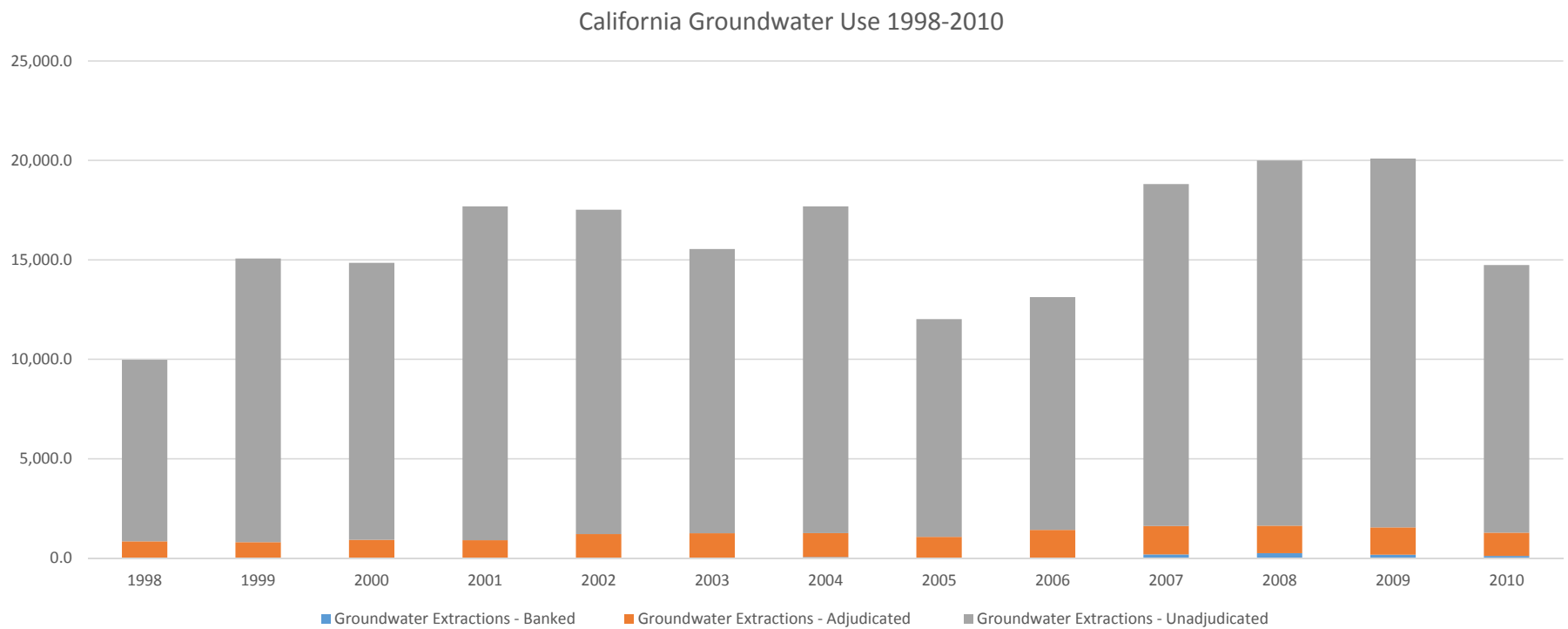
- The Raymond judgement provides
 - (1) a recognition of current rights as proportional claims to a set maximum pumping level (initially 21900 acre feet),
 - (2) mechanisms to monitor wells and pumping, to trade these claims on a flow or permanent basis, and later to store water over time and to incentivize recharge
- Highly successful: groundwater levels recover by mid 1950s and are stable since then.
- Viewed as classic example of local solution to tragedy of the commons (Ostrom, Bloomquist)

No so fast!

- 70 odd years later, there are 26 adjudicated district, none in the central valley and two north of Bakersfield. So institutional learning has been limited to the Southern California, and even there, it is very incomplete.



In fact these districts are largely trivial



More problems for Property rights view

- The Raymond Adjudication occurs at a time when bargaining is easy because of the proximate arrival of an alternative source of water (Colorado). For urban water district there is not going to be much interruption in the quantity of water, the issue is going to be price.
- Note:
 - The Adjudicated groundwater Basins data is pretty good
 - The unadjudicated one seems doubtful.
 - It is interesting that the Department of water resource data stops in 2010, before the drought.

Political economy

- Pure politics
 - Failure to enact any meaningful legislation before 2014
 - Real limits on the speed of action in the absence of quantity monitoring
 - Given the 2014 law it is pretty clear that we are going to have a lot of adjudication.
- Political economy of litigation
 - Absence of adjudicated districts in the areas where groundwater matters the most (Central Valley)
 - Absence of any record of failed attempts to adjudicate districts (litigation that started but did not complete).

North vs South

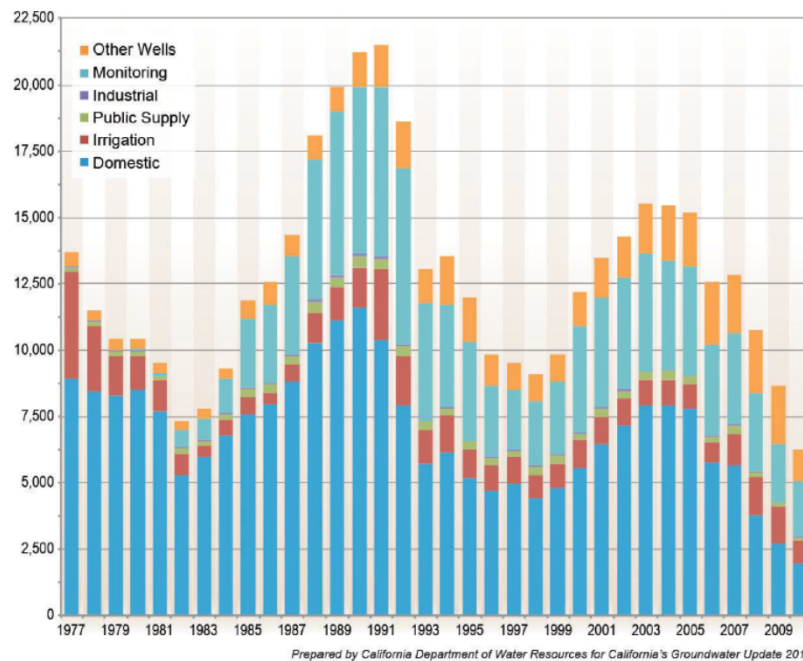
- The 1980s
 - Emphasis optimistic view
 - Depletion combined with institutional learning would make it progressively easier for local basins to adjudicate
 - This despite the fact that cost rose with number of users. So larger basins would be more difficult.
 - Made sense since Pasadena/Raymond went first with less than 30 claimants, and the West coast basin with hundred was slow and tortured....but we now can do Los Osos with a few dozen or the Antelope Valley with 75K.

The problem of the 21st century

- 1930-1960 adjudications
 - Mostly urban
 - Have alternative source of surface water (Colorado river, LA aqueduct)
 - Groundwater is cheap
- 2015-2040
 - Mostly agriculture
 - Surface water is cheap but rationed by complex priority system
 - Groundwater is expensive but in very elastic supply
 - Neither surface nor ground 'prices' are really market prices.
- Complicates matters

Knowledge is power, but is also expensive

Figure 2-6 Statewide Number of Well Logs Filed per Year, by Well Type (1977-2010)



One issue that matters is how many wells.

Graph is wells with logs, not wells
What is the difference by how much?

If we do not know wells how can we know consumption

The road ahead

- Pure Social Science
 - How to make adjudication easier?
 - What kind of markets
 - Within basins or across
 - Groundwater or surface water or both?
- Between Science and Social Science
 - What is the relevant definition of basin?
 - Those in Bulletin 118 have an implicit definition of externality (interconnectedness) that is not well articulated but is going to become more important overtime
 - How much does climate change push us to intertemporal rather than interregional water management ?