

Water in California

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Water Availability

Water availability in California is concentrated in the north and mountainous areas (Figure 1). This water is naturally most available in the wet winters and from spring snowmelt. Much of this water would flow into the Central Valley and out the Sacramento-San Joaquin Delta. With a Mediterranean climate, California's water availability is also tremendously variable between seasons and years (Figures 2 and 3).

Most agricultural and urban water uses are in the central and southern parts of California, and are predominantly in the spring and summer. Variability in water supplies means that there will be shortages of water in California in many, even most years. Management of naturally-varying water supplies for both economic and environmental purposes presents policy challenges.

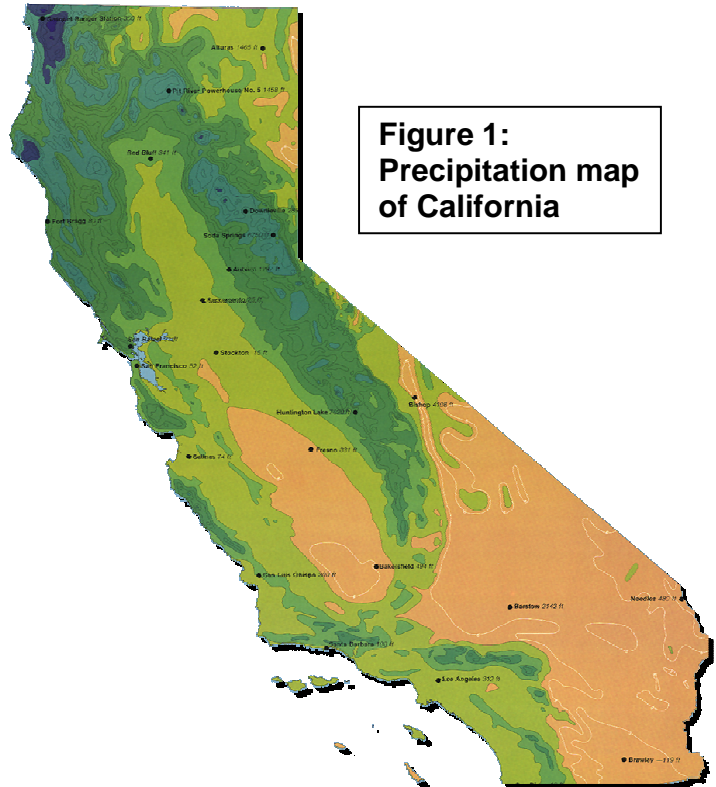


Figure 1:
Precipitation map
of California

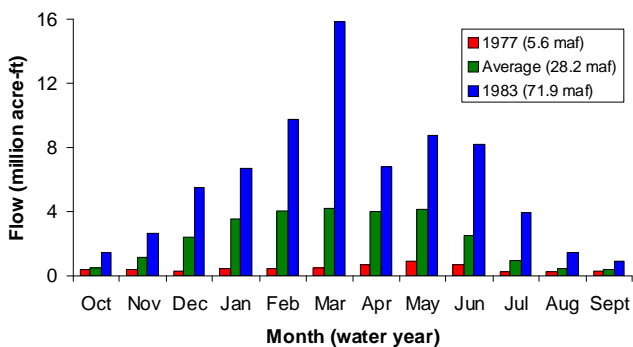


Figure 2: Natural Delta Outflows

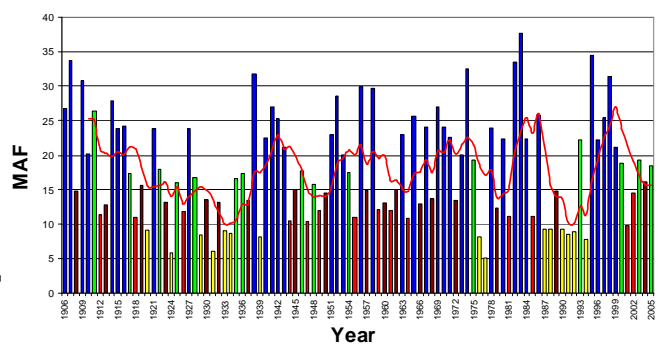


Figure 3: Sacramento River Flows

Water Management

California has developed extensive infrastructure to store and move water for these economic purposes (Figure 4). This system is changing over time to adapt to environmental purposes and evolving water demands.

Most water in California is intensively managed, outside of some North Coast rivers. All levels of government participate in this extensive and interconnected water system.

State (SWP) and federal (CVP) projects are most geographically extensive, but most supplies, storage, and conveyance are controlled by California's 3,000+ water districts. State water rights, regulations, and contract law, combined with the SWP and CVP backbone storage and conveyance facilities, allow the many local water districts and users to cooperate and compete in an orderly way.

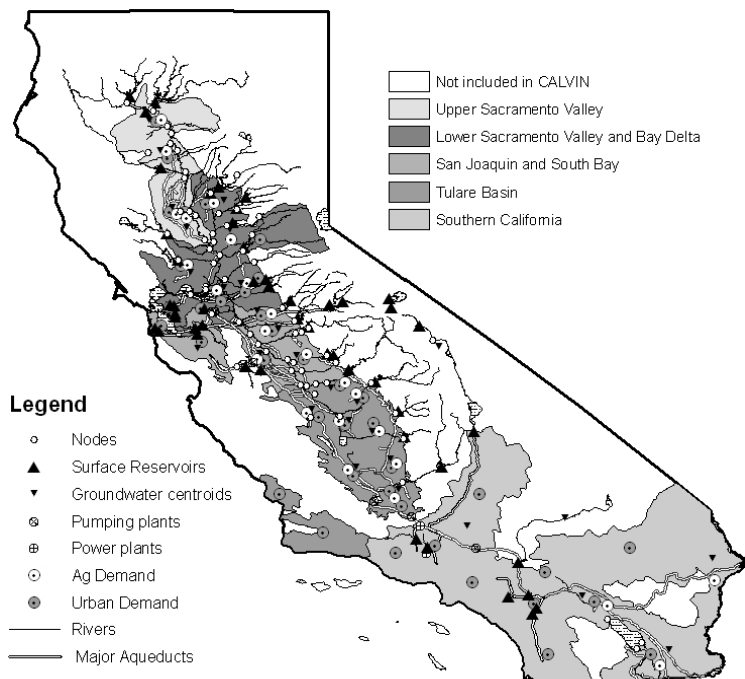


Figure 4: California's extensive water management infrastructure

Changing State Roles in Water Management

The end of major expansions of state and federal water projects has returned local activities, finance, and initiative to the forefront of infrastructure expansion and operational innovation in recent decades. This marks a return to the traditional prominence of local governments in American water management, which was interrupted in California during the period when large inter-regional projects were established. Most water management decisions and expenditures are local, by local agencies (water retailers and regional wholesalers) and water users (households, farms, and businesses). Local management activities include traditional water supplies from reservoirs and aquifers, as well as more recent and innovative water conservation, groundwater banking, wastewater reuse, and water marketing activities. These newer technologies are better suited to local implementation. In some ways the maturing of California's water system requires a shifting of initiative to local agencies, and this is happening.

While state and federal roles in infrastructure development and innovation have diminished, state and federal governments have major regulatory and operational roles. New regulatory roles come principally from new environmental, endangered species, water quality, and public health legislation. State and federal ownership of the largest storage and conveyance systems also gives them substantial operational control of water for much of California.

The advent of water markets, largely a local initiative with important state support, also increases the importance of the state's traditional water rights regulation role. A beneficial state role here is not necessarily to limit water rights (which are priority-based in any event), but to improve the quantitative definition, predictable enforcement, and reasonable and beneficial use of these rights and regulate how the exercise of water rights might interfere with environmental, recreational, and other uses of water.

The state also has useful new roles in aiding water conservation and wastewater reuse by supporting plumbing, health, and regulatory codes for these purposes. State and federal funding also has often subsidized these local actions through water bonds, an example of a poorer unit of government (the state) subsidizing wealthier units of government (water districts).

Many of California's water problems are regional, with statewide implications. Some major water problems include:

- 1) Klamath River system – salmon, hydropower, water exports
- 2) Sacramento Valley – flood management, conjunctive use, salmon
- 3) Mountain communities – local urban water supplies, FERC re-licensing
- 4) The Delta – unsustainable ecosystem, levees, and land use; main water supply hub
- 5) Bay Area – water supply, drinking water treatment, earthquakes, Delta, sea level rise
- 6) San Joaquin River – water supplies, salinity, floods, salmon
- 7) Tulare Basin – water supply, salt, groundwater overdraft – 2nd Hub
- 8) Southern California – water supply, drinking water treatment
- 9) Salton Sea – Pacific flyway, urbanization, salt
- 10) Colorado River – salt, ecosystems, Pacific flyway, Mexico treaties
- 11) Salinas Valley – sea water intrusion, groundwater overdraft
- 12) Groundwater – overdraft, salinization, land subsidence, quality, water rights

Overall, many of these problems stem from challenges to the established water management system from short-term uses prevailing over long-term uses, growing water demands, increasing water quality concerns, climate change, and deteriorating native ecosystems. Expanding traditional water infrastructure usually has a diminishing capacity to contribute to solving these problems. For example, the most cost-effective locations for dams already have dams, and new larger dams tend to provide small amounts of new water deliveries in proportion to their size. State and federal agencies had a comparative advantage from the 1930s until the 1980s in developing large-scale infrastructure. This large-scale infrastructure is largely completed. State and federal roles also are tremendously hampered by a lack of financial resources as well as the political consensus that characterized the dam-building era.

Local agencies are the most directly accountable for solving the water problems of their water users, and have shown much initiative since the 1980s. Most new infrastructure during this period have been conceived, designed, built, and financed by local agencies. Local agencies also have led in integrating new infrastructure, water conservation, groundwater banking, wastewater reuse, and water market activities at local and even regional and statewide scales. Recent voluntary water transfers from Sacramento Valley irrigation districts to southern California urban districts, with groundwater banking in San Joaquin Valley irrigation districts and

conveyance using State Water Project facilities, illustrate the new world of California water. Local authorities' initiative, arrangements, and finance within state regulation and using state and federal facilitates is how things are being done. How can things work better?

The State's Roles for the Future

Major state agencies involved in water include:

The Resources Agency:

Department of Water Resources (DWR) and its State Water Project (SWP)

Department of Fish and Game (DFG)

Department of Boating and Waterways (DBW)

California Bay Delta Authority (CBDA), including CALFED

Delta Protection Commission (DPC)

California Environmental Protection Agency

State Water Resources Control Board (SWRCB)

Regional Water Quality Control Boards (RWQCBs)

Department of Public Health (DPH)

Central Valley Flood Protection Board (CVFPB)

Various smaller agencies and conservancies, mostly of local or regional importance.

State agencies are involved in most water problems in California, but often not at the forefront of forging solutions. State agencies have often found their greatest value in supporting local initiatives, and in trying to bring a more comprehensive statewide strategy to particular problems (as with flood management).

Despite the capabilities and initiative of local agencies, some challenges are beyond local capabilities. These include the Delta, groundwater rights, water market and rights regulation, water quality regulation, endangered species protection, regional flood management, and sometimes enforcement of regional agreements. Strategic thinking and action is needed for these problems, and perhaps others. Given the decentralized governance of water in California, strong state agency actions must be supported by strong political leadership or insulation from short-term political pressures.

Can California state government configure its agencies and the individual talents of their staffs to support and provide leadership for these major problems? The recent record here is not promising. Too often, state agencies are empowered only to certify a consensus solution among stakeholders. They have often been unable to help forge such consensus or provide solutions in the larger state interest.

A central challenge for many of California's most serious water problems is to integrate pragmatic strategic thinking and actions occurring at local levels with new more decision-capable strategic thinking at the state level. Without state direction and support for problems such as the Delta, groundwater, water rights, flood management, and water quality, we will see a plethora of locally-instigated actions which are not always going to be as productive as they could be or in the long-term interests of the state of California. Local initiatives and decentralized governance are highly effective for many incremental changes, but many strategic

changes with local and statewide benefits require greater state capability and exercise of authority.

Some Questions for State Leadership

As a long-term academic observer (with all the benefits and drawbacks this implies), I'll offer some observations on some common questions. These and other questions regarding water management in California are quite complex and deserve to be looked at in more depth and breadth than is possible here. Hopefully these observations, which are neither unique nor new, will have some use along the way.

Water Infrastructure

The operation and management of California's statewide water infrastructure (CVP and SWP) is tremendously important for almost the entire state. Some common questions include:

- 1) Should we separate the State Water Project (SWP) from DWR? This would separate the water supply utility function of DWR (and most of its budget) from DWR's water planning and flood control functions. This by itself would weaken state authority and capability, but would create a more focused water supply utility. The governance of the new utility would be important. How to strengthen the remaining weakened functions of DWR would be a problem. There is some value in the state having an integrated water management capability, even if the integration is imperfect.
- 2) Should California or local users acquire the federal Central Valley Project (CVP)? The separation of the CVP and SWP causes many inefficiencies and limits strategic thinking and actions for California water management and policy. An effective forward-looking statewide water utility (within or outside of DWR) should include much of the CVP. Other parts of the CVP could be usefully disentangled from the federal government and locally owned and controlled. (Many parts of the CVP are already locally operated.) The federal government might pay to shed itself of these financial liabilities. However, state and local agencies should be careful in how to acquire these assets usefully. The reconciliation of water contracts, regulation, and finance for the CVP and SWP is likely to be difficult and controversial.
- 3) The Delta? Fundamental change in the Delta is inevitable due to sea level rise, land subsidence, earthquakes, floods, and invasive species. The new Delta will inevitably have higher sea levels, more permanently flooded islands, and substantial changes in water exports. Strong state leadership will be needed to avoid very expensive and potentially catastrophic failures of the Delta and prepare for a more environmentally and economically desirable transition.

Regulation

Water regulation problems in California have shifted from simple allocation of fixed water and fishing rights, to regulating the operation and management of an environmentally complex water system. State actions and capabilities have not evolved into this new and unavoidably more controversial role.

- 4) Should the State Water Resources Control Board (SWRCB) be more aggressive in water rights and water quality regulation and in facilitating water markets? Aggressiveness seems needed in the sense of tighter water rights enforcement and not offering expectations of unlimited water availability in an arid region with highly variable supplies. Aggressiveness also seems needed in establishing efficient procedures that allow existing water rights to be more flexibly and beneficially employed without unreasonable environmental impacts. A more assertive SWRCB will become the focus of more controversies and political pressures.
- 5) To better employ its broad water rights and water quality powers, the SWRCB needs greater cohesion and consistency of leadership. SWRCB leadership is too vulnerable to short-term political pressure to maintain a strategic direction which involves political controversy. Strategic action and policy from the most powerful state regulatory agency is easily thwarted. The current SWRCB seems destined to be weak-willed.
- 6) The Department of Fish and Game (DFG) has its origins in the regulation of hunting and fishing rights, yet it has considerable authority to regulate water use to protect the environment, especially in relation to the Public Trust Doctrine. However, DFG has not shown itself to be effective in using its authority to deal with environmental problems.
- 7) California's flooding problems require some significant state involvement in local floodplain land use decisions, mandatory insurance or taxation in floodplains to cover state liabilities, or devolution of state flood damage liability to local agencies.
- 8) Overall, state agencies, despite their often talented and valiant staffs, have lacked political support for strategic thinking from a technical perspective. The state unavoidably has too great a responsibility in operating, managing, and regulating California's complex water system to be so decapitated. Among governmental agencies, only state agencies can support both the depth of expertise and the broad perspective required for strategic thinking tied directly to policy-making. This is the principal weakness of the state in addressing many water problems in California.

The complexity of California's water system has allowed very extensive economic exploitation of California's limited and variable water resources, and provides a rich set of options for adapting water management to evolving problems. California's decentralized governance system has been very effective in water management and introducing local innovations, far more than one would normally expect of a centralized water management system. However strategic changes which must involve many diverse stakeholders are sometimes necessary and problematic in our water management system. The state of California must muster greater capacity for these occasions. In many cases, as with the Delta and climate change, and Katrina in New Orleans, underlying physical and biological realities will force change upon a system paralyzed by indecision or stalemate.