

Project Summary:
The Evolution of Water Institutions and Policies in the California Economy

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Objectives

1. Develop a conceptual framework to analyze the economic and environmental impacts of changes in water policies and institutional and organizational structure of water systems. Using this approach, we will develop methods to:
 - a. Consider the impacts of alternative water systems designs, from central control of all water systems to complete deregulation and privatization.
 - b. Assess the impact of alternative mechanisms of allocation, from queuing rules to different water marketing frameworks.
2. Apply this approach to California water systems and investigate:
 - a. Efficiency and effectiveness of the current system of water conveyance and distribution, including water projects, aqueducts and water districts.
 - b. Potential for economic and environmental gains from reforming the system, including consolidation of districts, enhanced trading and increased inter-connectedness of water distribution.
 - c. How to enhance reliability and reduce vulnerability to crisis within alternative institutional frameworks.

Background

The California economy, like many others, would not have been able to survive without large water conveyance systems. These systems include three elements: extraction or diversion at the source, conveyance from region of origin to destination, and distribution. The financing, construction, management, and maintenance of these systems require a set of policies and institutions. For example, in California, the prior appropriation system and the Colorado State and Central Valley projects, are the major building blocks of the California water system. Both institutions and policies tend to reflect the economic and political reality at the time of their inception. The prior appropriation system, for example, with its emphasis on use-it-or-lose-it and first-come-first-served prioritization rules, is a queuing system that was motivated by a desire to attract settlers and expand diversion in a period when water was abundant. The system of water districts that we now have in the state reflects the political and economic reality of a bygone era. However, water policies and institutions tend to evolve over time. Yet their evolution may be slow and painful, with major changes frequently triggered by crisis. As California entered the 21st Century, one wonders to what extent its water institutions and policies are equipped to handle economic growth (that may be uneven across sectors), increased water scarcity, and climatic and other changes.

Methods

We expand economic modeling systems of natural resources that allow for differences in performance over space and time¹. These models will consider different structures of the

industries controlling extraction, distribution and use to obtain basic analytical results. The more applied results will rely on computer simulations that rely on parameters characterizing the California water system. We will first develop a deterministic model, and then introduce elements of randomness and uncertainty.

ⁱ For example, we will expand the frameworks in Chakravorty, Ujjayant, Eithan Hochman, and David Zilberman. "A Spatial Model of Optimal Water Conveyance," *Journal of Environmental Economics and Management*, Vol. 29 (March, 1995), pp. 25-41, and Xabadia, Angels & Goetz, Renan U. & Zilberman, David. "Control of accumulating stock pollution by heterogeneous producers," *Journal of Economic Dynamics and Control*, Elsevier, vol. 30(7), (July 2006), pp. 1105-1130.