

# Real and Ideal Markets for California

## Potential Limits and Infrastructure's Roles

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inter-tied California water system, and incorporates economic water demands, environmental constraints, and surface and groundwater availabilities and infrastructure limits.

California's diverse mix of water uses, highly variable hydrology, and vast network of water conveyance and storage infrastructure supports an unusual variety of water markets. In 1991, at the beginning of the fifth year of drought, the state of California formed an Emergency Drought Water Bank to ease and formalize water market transfers for that year. Since then, water market transfers and exchanges have become prominent in water planning and operations for many urban, agricultural, and even environmental purposes, despite lingering concerns for third party and long-term impacts. Previously, water market activity was largely among farmers within agricultural regions.

### Three Related Commodities: Water, Storage, and Conveyance

In California, three simultaneous markets involve water. These are markets for short- or long-term use of water rights, storage of water, and conveyance of water. Aspects of these markets differ and interact. California's extensive water infrastructure network allows relatively widespread participation in water markets, yet the movement of large quantities of water from buyers to sellers is limited by the physical capacities of that network. Several agricultural districts with large cones of groundwater depression specialize in marketing water storage rights, allowing urban and agricultural districts to store water purchased during wet years for use in dry years. Other agricultural districts with surplus surface water specialize in the sale or lease of water rights, which fetch higher prices when purchasing agencies have a place to store such water. Conveyance is perhaps the most monopolized water

California's water management infrastructure and CALVIN model schematic.



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resource in California, with only a few large aqueducts available for east-west or north-south transfers. Water transfer prices, costs, and risks are all highly affected by the price and institutional and physical availability of the water conveyance infrastructure. These factors contribute to the complexity and multilateral nature of water markets and related water capacity markets. Nevertheless, such markets do provide economic and environmental benefits, flexibility for management, and facilitate integration of the diverse water management options available to the many parties involved in California's water system.

### Quantifying Market Potential and Interactions

In order to evaluate the costs and benefits of water marketing in California, the CALVIN model was used to compare the costs of current water allocations and operations under 1997 water management policies against those under both regional and statewide water markets. Regional water markets were assumed to allow unlimited water market activity within each region, with interregional flows of water limited to those allowed under current water policies. A statewide water market was also examined where all agricultural and urban water rights and contracts were assumed to be flexibly transferable in a market, even between regions of California. Both average total cost and average water scarcity cost (the cost that would be incurred if the water were not available) were evaluated. The

Estimated 2020 water management costs under current operations, ideal regional water markets, and statewide water markets in California.						
Region	Average Water Scarcity Cost (\$M/yr)			Average Total Cost (\$M/yr)		
	BC	RWM	SWM	BC	RWM	SWM
Upper Sacramento Valley	7	5	0	35	34	29
Lower Sacramento & Delta	36	1	1	212	166	166
San Joaquin and Bay Area	15	0	0	394	358	333
Tulare Lake Basin	37	19	2	461	34	415
Southern California	1501	255	197	3074	1855	1838
<b>TOTAL</b>	<b>1596</b>	<b>279</b>	<b>200</b>	<b>4176</b>	<b>2847</b>	<b>2780</b>
<i>BC = base case: current water allocations and operations projected for 2020 conditions</i>		<i>RWM = regional water markets</i>		<i>SWM = statewide water market.</i>		
<i>Water scarcity costs are based on estimates of the economic values of water to agricultural and urban water users</i>						

model was run using projected 2020 water demands with the present storage and conveyance infrastructure.

As shown in the table above, the results of this model indicate that all five major regions of the state could potentially benefit, in terms of reduced costs, from unfettered water market transfers, both intraregional transfers and overall statewide transfers. Indeed, though not shown in this table, agricultural production also would benefit from water markets in every region except Southern California. There, agriculture based on Colorado River flows is the main potential exporter of water to urban users, and California's Colorado River Aqueduct is filled to capacity. When California's Colorado River water is available on the market, relatively few additional interregional water transfers are sought elsewhere.

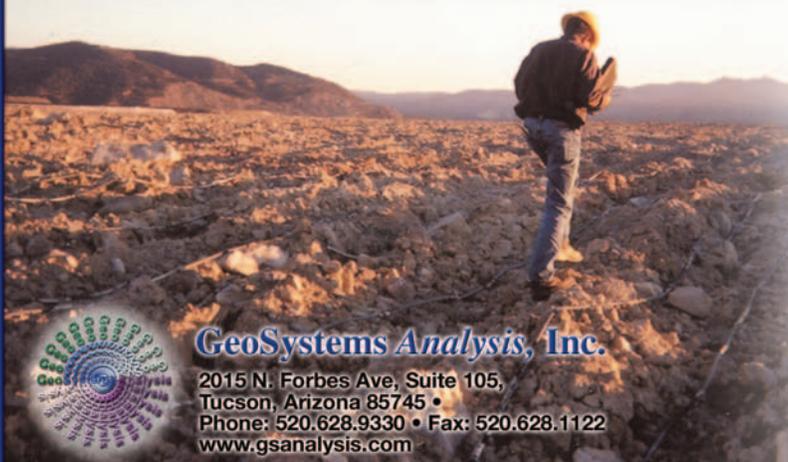
As evidenced by the model results and California's current water marketing activities, water market transfers seem to provide flexibility and incentives to local agencies, offering water management options that are more effective and better coordinated. This is especially true in terms of the conjunctive use of ground and surface waters, water conservation, and the coordinated operation of water management infrastructure to lower costs and water losses. This increased regional flexibility reduces the demand for additional water imports.

### Some Issues Remain

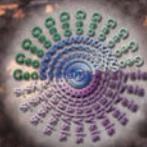
Despite currently increasing market activity and data supporting lower costs under market scenarios, water market transfers remain controversial in California. Most of this controversy

*See California markets, page 30*

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involves potential third-party effects on environmental interests and on the economies of rural towns and counties in water-selling regions. While third-party economic costs have been shown to be small compared with state and even county economies, they can be significant for individuals and individual rural towns. There are also concerns that water market transfers could have a wide variety of third-party environmental impacts. As water markets continue to be developed for pragmatic purposes by pragmatic people, such concerns appear to be more satisfactorily addressed over time. For example, to minimize negative third-party effects, it is becoming common to limit concentration of water purchases from selling regions and to coordinate water purchases with some environmental objectives, but it will take time to work through these issues.

### ***Markets Offer Multiple Benefits***

California's experience and the results from the CALVIN model in California indicate that water markets provide considerable flexibility for managing large, complex, and diverse water resource systems. Where control of the system is decentralized, markets also provide incentives and mechanisms for different buyers and sellers, including environmental interests, to cooperate and seek opportunities for mutual benefits. Water marketing's ability to help coordinate local agency actions is a major benefit, given the current financial and political difficulties of federal and state agencies in providing leadership in solving water problems.

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### ***Additional Resource.....***

*Jenkins, M.W., A.J. Draper, J.R. Lund, R.E. Howitt, S. Tanaka, R. Ritzema, G. Marques, S.M. Msangi, B.D. Newlin, B.J. Van Lienden, M.D. Davis, and K.B. Ward, 2001. Improving California water management: Optimizing value and flexibility, Center for Environmental and Water Resources Engineering Report No. 01-1, Dept. of Civil and Environmental Engineering, University of California, Davis, CA. [cee.engr.ucdavis.edu/faculty/lund/CALVIN](http://cee.engr.ucdavis.edu/faculty/lund/CALVIN)*