Sinking or Swimming in Water Policy?

Rodney Smith

The current struggle for control of California's water supplies has become legendary. Municipalities are searching for supplemental water supplies to meet growing residential and other urban demands. At the same time, new claimants are making political and legal demands on existing water supplies to serve environmental purposes. The rise of environmental claims operates on both sides of "the Marshallian scissors" of supply and demand. In some instances, such as the massive state and federal water projects and the City of Los Angeles's projects in the Owens Valley and Mono Lake, environmental objectives require restrictions in project operations that reduce the amount of water available to traditional users. In other instances, such as the enhancement of streamflows for fisheries, environmental objectives are a new use for existing supplies.

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Agricultural water users have the lead role in this unfolding drama. They own the legal rights to the bulk of California's water. Based on concepts of water law developed in the 19th century, water rights are generally based on the principle of "first-in-use, first-in-right." Since irrigated agriculture developed before municipalities and environmental demands emerged, agricultural water users own the most "senior" water rights in the state. Therefore, during times of drought, when the yield from water supply sources is especially low, holders of the most senior water rights must receive the amount of water specified in their right before holders of more junior water rights receive any water.

Or, taking an analogy from corporate finance, agricultural water users hold the most senior, secured claims. Meanwhile, municipal water users hold the junior, unsecured claims. Given the fact that current and anticipated future water demands under existing institutional arrangements exceed available supplies, holders of junior water rights, in effect, hold the junior debt and common stock in a firm on the verge of filing under Chapter 11. Continuing the analogy, environmental interests are struggling to develop and acquire a new security in the reorganized firm that meets their objectives.

In the end, water will be reallocated in California from agricultural to municipal and environmental purposes. The critical question

Table 1
California Water Supplies
with Existing Facilities and Programs

Source of Supply	(Millions Acre Feet Per Year) AverageYear	Drought Year
Local Surface	10.1	8.2
Local Imports	1.0	0.7
Colorado River	5.2	5.1
Central Valley Project	7.5	5.0
Other Federal	1.2	0.8
State Water Project	2.8	2.2
Reclaimed	0.2	0.2
Groundwater	7.5	12.2
Overdraft	1.0	1.0
Dedicated Flow	27.2	15.1
Total	63.7	50.5

Source: Draft California Water Plan Update, Department of Water Resources, November 1993, p. 358.

is, how? Admittedly, one's preferred answer depends on philosophical beliefs and training as well as stakes in the outcome. For many economists, the natural answer lies in reallocation through voluntary exchange. The more politically oriented may favor reallocation through the legislative and administrative process. For some lawyers, unstated "ethical canons" compel them to champion litigation, the second most favorite historic means, after gunfighting, for resolving conflicts over western water. As might be

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expected, the participants, to date, have used all three tools. Those interested in timely and efficient reallocation of water find their interests best served by reallocation through voluntary exchange.

Like the transition to a market economy in the former Soviet Union and Eastern Europe, the use of voluntary transactions to reallocate California water will require institutional change. The good news is that the process has started. The bad news is that the necessary changes will challenge underlying principles of water pricing and allocation by agricultural and municipal water providers, and will require the public to devote fiscal resources to fund activities that address environmental concerns.

Where's the Water?

California's water comes from a variety of sources (see Table 1). The yield of supply sources depends on hydrologic conditions. "Average year"-conditions generally correspond to the average amount of water available over a long-term period. "Drought year"-conditions refer to the average amount of water available during the recent drought years 1990 and 1991. An acre foot of water equals 325,850 gallons, the amount of water that covers an acre of land to the depth of one foot.

For agricultural and municipal users, supply sources are about evenly divided between locally developed supplies, e.g., local surface, local import, and groundwater, and federal and state projects such as the federal government's Colorado River and Central Valley Projects and the State Water Project. Judging by the relative yields during average and drought years, Colorado River water and groundwater are the most reliable water supplies in California. The yield and reliability of the federal Central Valley Project and the State Water Project are probably overstated in Table 1. In estimating the water available from these projects, the California Department of Water Resources (DWR) expressly neglected the effect of more stringent water quality standards and other actions to be undertaken under the federal Endangered Species Act which likely will lower water yields (see below).

Growing Pressures on the Status Quo

Under existing institutional arrangements, California's water future will be one of escalating demands overwhelming dwindling supplies. In a market economy, of course, demand and supply would remain matched through rising prices for water. But the tradition in California has not been to rely on market mechanisms. Instead, water resources have been developed and allocated through a system of rights, decrees, entitlements, and contracts in which agricultural and municipal districts, mostly projects owned by local governments, have deliv-

Table 2
Projected California Net Water Demands

Sector	(Million Acre Feet Per Year) 1990		2020		Change	
	Average	Drought	Average	Drought	Average	Drought
Urban	6.7	7.0	10.5	11.0	3.8	4.0
Agriculture	27.0	28.4	25.1	26.3	-1.9	-2.1
Environmental	28.2	16.1	29.0	16.9	0.8	0.8
Other	1.8	1.7	1.8	1.5	0.0	-0.2
Total	63.7	53.2	66.4	55.7	2.7	2.5

Source: Draft California Water Plan Update, Department of Water Resources, November 1993, p. 364

ered water at "cost-based" prices. That is, the prices paid by water users generally reflect only the costs of developing, storing, and conveying water to customers. Institutional arrangements have historically placed the "scarcity value" of water at zero.

When economic reality increasingly deviates from administrative fiat, reform must eventually follow. To illustrate the increasing pressure for reform, consider the results from DWR's most recent exercise in extrapolating water demands independently of available water supplies.

Between 1990 and the year 2020, net water demand in California is projected to increase by 2.7 million acre feet per year in average years, and by 2.5 million acre feet per year in drought years. (see, Table 2). "Net water demand" for a user equals the amount of water delivered less any amount that subsequently flows for use by other legal users.

These projections take into account the water savings anticipated from mandated conservation programs. Reflecting the rapid municipal growth anticipated for California, DWR projects that net water demands for urban uses will grow by more than 50 percent in both average and drought years. Reflecting the changing economic conditions of irrigated agriculture, DWR projects that net water demands for agriculture will decline slightly. For reasons discussed below, DWR's projections probably understate, perhaps substantially, the increase in water allocated for environmental purposes such as water for fresh water wetlands, instream fisheries, management of flows in the Bay-Delta, and designated wild and scenic rivers.

California's water supplies are not projected to keep pace with projected demands. Total supplies are projected to increase by 2.0 million acre feet per year for average water years and 1.8 million acre feet per year for drought years (see Table 3). This additional water is only about three-quarters of the growth in projected net water demands.

Given the difficulties of obtaining environmental approvals for any projects in California, projects that seem capable of implementation today become impossible to implement tomorrow.

Three Reasons for Overestimating Supply

Three assumptions of these projections are noteworthy, all of which suggest that supplies may be less than projected.

First, the projections include supplies from new projects that have been extensively investigated and that DWR believes have a "high" likelihood of implementation. But given the difficulties of obtaining environmental approvals for

Table 3
Projected California Water Supplies

	(Million Acre Feet Per Year) 1990		2020		Change	
Source	Average	Drought	Average	Drought	Average	Drought
Local Surface	10.1	8.2	10.3	8.4	0.2	0.2
Local Imports	1.0	0.7	1.0	1.0	0.0	0.3
Colorado River	5.2	5.1	4.4	4.4	-0.8	-0.7
Central Valley Project	7.5	5.0	7.9	5.1	0.4	0.1
Other Federal	1.2	0.8	1.2	0.8	0.0	0.0
State Project	2.8	2.2	4.1	3.0	1.3	0.8
Reclaimed	0.2	0.2	0.7	0.7	0.5	0.5
Groundwater	7.5	12.2	7.8	12.8	0.3	0.6
Overdraft	1.0	1.0	0.5	0.5	-0.5	-0.5
Dedicated Flow	27.2	15.1	27.8	15.6	0.6	0.5
Total	63.7	50.5	65.7	52.3	2.0	1.8

Source: Draft California Water Plan Update, Department of Water Resources, November 1993, p. 359

any projects in California, projects that seem capable of implementation today become impossible to implement tomorrow. In this regard, one cannot find solace in the experience of Inyo County (Owens Valley), and the City of Los Angeles. In 1989, these two long-time protagonists reached a settlement of their decades-long dispute over the environmental effects of pumping by Los Angeles in the Owens Valley. The terms of settlement proved acceptable to politically-accountable local officials in the Owens Valley. And three of the five Inyo County Board of Supervisors approving the agreement, in fact, survived recall elections, while the other two supervisors were defeated by challengers who did not run against the settlement.

A second reason that future water supplies might be overestimated is that the projections assume that state water quality standards adopted in the late 1970s for the San Francisco Bay/Sacramento-San Joaquin Delta will remain in place.

However, the Environmental Impact Report for the settlement proved unacceptable to environmental groups and the California Department of Fish and Game, who sought greater environmental protections than demanded by the officials of Inyo County. Today, five years later, the dispute remains in litigation. Unless a last attempt at settlement proves successful, local officials anticipate that it may take another five years of litigation before the historic 1989 settlement can be legally implemented. Meanwhile, the environment deteriorates.

A second reason that future water supplies might be overestimated is that the projections assume that state water quality standards adopted in the late 1970s for the San Francisco Bay/Sacramento-San Joaquin Delta will remain in place. The Bay-Delta provides two-thirds of all water used in California and 40 percent of the state's drinking water. The operation of the federal Central Valley Project and the State Water Project depend on these standards. The more stringent the water quality standards, the lower the projects' yields, especially in drought years.

For many reasons, the Bay-Delta standards in the future will be far more stringent than those imposed in the 1970s. For one reason, a state appellate court rejected the older standards in a 1986 decision. For another, the federal Environmental Protection Agency in September 1991 held that new proposed standards, while more stringent, did not satisfy the requirements of the federal Clean Water Act. Since that time, the federal government has been working with state interests to devise standards acceptable to the federal government that protect the habitat and other designated fish and wildlife uses of the Bay-Delta estuary.

A third reason why projections of future water yields are probably optimistic is that they do not consider any reductions in available water supplies due to the listing of the Bay-Delta fisheries under the federal Endangered Species Act. Again, challenges from environmental

groups likely will cause delays, changes or abandonment of plans to increase water yields that are said to threaten certain species.

In sum, the projected *increased* yields from the Central Valley Project and the State Water Project may prove illusory. If so, 1.7 million acre feet per year of increased supplies in average years, 85 percent of the projected increase, and 0.9 million acre feet per year of increased supplies in drought years, 50 percent of the projected increase, may be phantom water. Reflecting this possibility, DWR considers alternative "hypothetical cases" in which an additional 1 million, 2 million, or 3 million acre feet per year of water may be used to meet the environmental demands of the Bay-Delta, and to protect listed fish species.

The "statewide" picture neglects the water situation of specific regions. Consider the projected situation for the South Coast Region, the approximate service area of the Metropolitan Water District of Southern California, stretching from Ventura County in the north to the Mexican border, including the counties of Ventura, Los Angeles, Orange, San Diego, and parts of Riverside and San Bernardino. During average water years, projected "shortages," the difference between projected water demand and projected water supply, will reach 500,000 acre feet per year by the year 2010 and 986,000 acre feet per year by the year 2020 with supplies only from existing facilities (see Figure 1a). During drought years, the projected shortages will reach, respectively, 1,700,000 and 2,296,000 acre feet per year (see Figure 1b). If the "Level I" Programs, that is, those that the DWR believes have a high likelihood of being implemented, do not prove illusionary, the projected shortages are substantially smaller, but still significant. By the year 2020, projected shortages would reach 373,000 acre feet per year during average water years and 1,000,000 acre feet per year during drought years. If one believes that the yields from the State Water Project and the Central Valley Project will *not* increase, as many do, the South Coast basin must engage in draconian rationing or acquire substantial amounts of supplemental supplies from new sources.

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Reflecting this view, the Metropolitan Water District of Southern California (MWD) recently released its own plan indicating that, unless new supplies are found, Southern Californians will face water rationing every other year. Because it lacks long-term reliable supplies, MWD estimates, the disruptions during drought suffered by Southern Californians result in annual economic losses measured in the billions.

An Early Experiment in Reallocation

With the economic stakes in water reallocation high and growing, it is not surprising that there have been significant attempts at water reallocation. The search for supply reliability and yield from reallocations has been underway since the early 1980s. A brief review of milestone events illustrates how participants have used the three

Figure 1a -- Water Shortages in S. Coast During Average Years

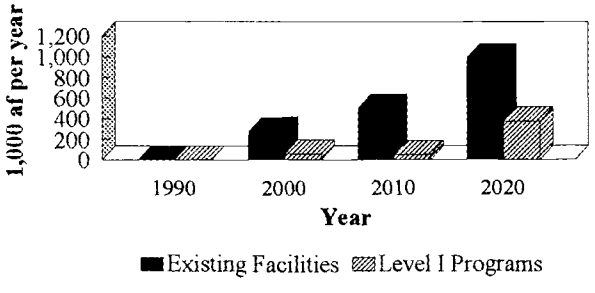
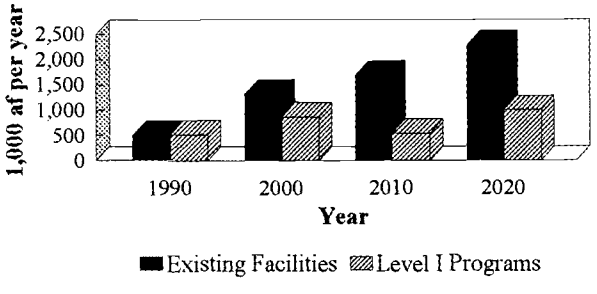
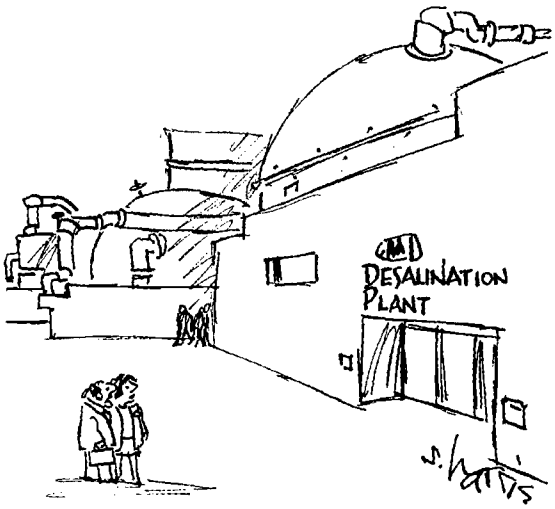


Figure 1b -- Water Shortages in S. Coast During Drought Years





"Just in case it doesn't work, we'd like you to come up with some uses for ten million gallons of salt water every day."

basic means of reallocation: 1) voluntary exchange; 2) legislative and administrative mandates; and 3) litigation.

One landmark in reallocation of California water, the 1989 long-term conservation agreement between the Imperial Irrigation District (IID) and MWD, had mixed origins. On its surface, the agreement seems to be a proto-type of an economist's vision of voluntary reallocation. Under the 40-year agreement, MWD will receive up to 109,000 acre feet per year of reliable Colorado River water conserved by a variety of projects, including non-leak gates, canal lining, and systems automation. In return, MWD will spend an estimated $92 million to plan and construct the facilities, cover IID's indirect costs of up to $23 million, $14 million over the first 5 years of the agreement for operating costs, and pay $3.1 million a year for 35 years thereafter. At a capitalized cost of $1,500 per acre foot per year of conserved water, some heralded the transaction as the start of a new era in California water supply.

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Actually, the transaction was driven by threatened regulatory action by the State Water Resources Control Board (SWRCB). The process started in the mid-1980s, when a local farmer claimed to suffer flood damages as a result of IID's water management practices. Believing that it had an easement that allowed the flooding, the district denied responsibility for damages. As part of its litigation strategy, the landowner filed a complaint with the state alleging that IID's water practices conflicted with the California Constitution, Article X, Sec 2, which prohibits the "waste or unreasonable use or unreasonable method of use" of California's water resources.

While the lawsuit eventually was settled, a state investigation of the Constitutional allegation continued. In its "Decision 1600" issued in 1984, the SWRCB held that IID's practices violated the California Constitution. As part of its reasoning, the SWRCB noted that the value of IID's water to MWD was greater than the cost of conservation. Therefore, IID was obligated to conserve water!

After the decision MWD and IID began negotiating a water conservation agreement. In 1985, the district board rejected a proposed Memorandum of Understanding with MWD because, among many reasons, the agreement provided no economic benefits for the district or landowners. After IID had exhausted all avenues of legal appeal of D-1600, the SWRCB issued another order giving the district 90 days to submit a written conservation plan, including a detailed description of how a $100 million conservation program would be funded. Otherwise, IID risked further regulatory action that could have resulted in a reduction in its water rights under state law. The agreement beat the SWRCB deadline by nine days.

After the district board rejected the 1985 Memorandum of Understanding, the U.S. Congress also became involved in district affairs. In 1988, Congress passed legislation that was sought by MWD, Public Law 100-675, which authorized the Secretary of Interior to line the All American Canal to recover water seeping from the unlined canal. The All American canal is IID's delivery system for its entire entitlement of Colorado River water. The act specified a statutory procedure for the allocation of the 67,700 acre feet per year of water

conserved by the lining. While open to different statutory interpretations, the act is generally believed to prohibit IID from marketing the conserved water outside the priorities set by Congress or from selling conserved water at prices above the actual cost of lining the canal. By a vote of 3-2, the IID board decided in August, 1993 to sign a funding agreement with MWD that follows the restrictive interpretation of the statutory scheme.

For local opponents of the funding agreement, two factors were particularly troubling. First, Congress placed restrictions on the marketing of a water right granted under state law, recognized under the 1922 Colorado River Compact, and expressly quantified in the U.S. Supreme Court decree in *Arizona v. California*. Second, a conservative economic valuation released by the district concluded that IID could fund the project itself and earn profits of at least $150 million over the life of a long-term program of leasing the conserved water. And, if the 1988 act had not created legal ambiguity, the district's gains from leasing would have been even greater.

Recent Reallocation

Water reallocation proceeds differently in the 1990s than it did in the 1980s. The 1991 drought in California aroused nascent market forces. In that year, the State Water Project initially announced cuts of 90 percent in the contractual entitlements of water that purchasers otherwise would receive from suppliers. The federal Central Valley Project initially announced cuts of 50 to 75 percent. With panic about California "running out of water," Governor Pete Wilson did not declare an emergency and suspend water rights, as many expected. Instead, he announced a four-point plan that included the creation of the *1991 Drought Emergency Water Bank*. Funded by the purchasers of water, this Bank's mandate was to acquire water from willing sellers. The Bank purchased a total of 827,726 acre feet of water in 1991 from farmers in the Delta who fallowed their land, from farmers in the Sacramento Valley who switched from surface water to groundwater, and from northern water agencies who had previously stored water. The bank paid a single price of $125 per acre foot and charged buyers $175 per acre foot for delivery at the Delta. The buyers paid the costs of conveying water to their service areas. The difference between the price charged and the price paid covered administrative costs and the 25 percent loss as water is conveyed through the Bay-Delta (through which about 25 percent of the water was conveyed). Buyers included MWD, San Francisco, other municipal water users in northern and southern California, and agricultural water users in the San Joaquin Valley. Not all the water acquired by the bank was used in 1991. Over 250,000 acre feet were stored.

The scope of bank activities since 1991 has been considerably smaller. In 1992, the bank lowered its acquisition price to between $50 and $60 per acre foot and acquired about 150,000 acre feet of water from growers who switched from surface water to groundwater. While the bank, which must be reconstituted annually, did not operate in 1993, a 1994 bank was formed this summer. The bank has acquired about 200,000 acre feet of water at a price of $67.50 per acre foot delivered at the Delta pumps of the State Water Project or the Central Valley Project. Like the 1992 bank, the water is acquired from growers who switched from surface water to groundwater.

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Numerous other water transactions have occurred. Agricultural water districts have leased and exchanged water from holders of surface water rights. The Kern County Water Agency, near Bakersfield, has created an internal market for the lease of groundwater within its boundaries. Once again, the activities of MWD warrant discussion.

In 1992, in another example of reallocation-thru-trade, MWD entered into a two-year agreement to acquire 93,000 acre feet per year of Colorado River water from the Palo Verde Irrigation District. MWD paid farmers to fallow 21.7 percent of their lands on a rotational basis. The program is estimated to yield MWD 4.6 acre feet per each acre of land fallowed per year.

MWD paid growers $620 per acre, or about $135 per acre foot. MWD stored the conserved water in Lake Mead for use by the year 2000. Given the evaporation losses and risk of loss from flood control releases, the implied value MWD places on the water, when taken, is about $350 per acre foot.

New Federal Action: Reducing Yields But Freeing Trade

Congress has also intervened in water reallocation when it passed in 1992 the *Central Valley Project Improvement Act*. Like a successful hostile takeover in the corporate arena, the act effectively restructured this entire federal project of water projects. The act has two important provisions concerning water reallocation. First, the act's many environmental provisions will mean a reduced yield from the Central Valley Project and a reallocation of at least 800,000 acre feet per year of water to environmental purposes. And second, the act contained significant transfer provisions that enable all individuals or districts who receive Central Valley Project water to transfer all or a portion of the water to any other California water user. The act included many specific provisions governing the amount of water eligible for transfer and it limited the role of districts in approving transfers initiated by water users. For may proponents of water transactions in California, the act removed many of the institutional barriers that had previously locked up the Central Valley Project's water from voluntary transactions.

The federal Bureau of Reclamation is on the verge of broadening the potential scope for market transactions involving Colorado River water.

MWD has stepped in to attempt to take advantage of the 1992 act by agreeing to acquire Central Valley Project water from a landowner. The seller, Rusty Areias, (who was also a State Assemblyman) receives water from the Central California Irrigation District (CCID). According to the terms of the 15-year contract, MWD will purchase Areias's entire water use allotment from CCID for at least 7 of the 15 years under a take-or-pay obligation. Payments are based on an initial price of $175 per acre foot. After the initial transfer agreement was signed, MWD paid Areias earnest money of $563,500. Upon completion of all approvals and execution of the final agreement, MWD will pay an amount equal to half the estimated cumulative payments over the term of the agreement, less the payment of earnest money. Therefore, for example, if the Secretary of Interior determines that the annual amount of transfer water is 4,600 acre feet, the additional payment would be $2,454,000. For water actually taken, MWD will pay $87.50 per acre foot escalated by the growth in the Consumer Price Index (CPI). The agreement assigns MWD all legal, engineering, and other costs of approval as well as conveyance costs.

Finally, the federal Bureau of Reclamation is on the verge of broadening the potential scope for market transactions involving Colorado River water. Last spring, Reclamation released its third draft of proposed regulations governing its administration of water entitlements in the Lower Colorado River basin, which includes Arizona, California, and Nevada. The draft regulations specify a framework for Reclamation approval of transactions involving conserved water, including interstate leasing of water and off-the-reservation leasing of Indian water rights, both potential political land mines. If this politically contentious decision is eventually published and adopted in its current form, the federal government may become an active contributor to the development of water markets in southern California.

Future Pressures

With economics, law, and politics in alignment, can significant voluntary reallocations of California's water be far behind? Perhaps not, but there are two remaining issues concerning institutional reform.

The first issue involves the role of the landowner in water transactions. In California public policy speak, the term of art is "user initiated transfers." The critical issue is, who should control as well as benefit from water transactions? In many instances, districts hold legal title to water rights. In other cases, districts are the parties to water service contracts in their role as trustees for owners of the rights, for

example, farmers. At the same time, they act as trustees on behalf of the equitable and beneficial interests of landowners. Should districts refuse trades supported by landowners? How should any proceeds from district transactions be shared with landowners? Such questions have been at the center of many unsuccessful state legislative attempts to clarify the relationship between districts and landowners. While the U.S. Congress has resolved this issue for districts served by the Central Valley Project, the issue is unresolved for districts in the rest of the state. From a practical viewpoint, of course, if district boards decide to pass through the economic gains to landowners, as occurred in the Palo Verde/MWD transaction and in district transactions with the 1991 drought bank, then legislative solutions are not needed.

The second issue involves pricing and allocation policies of municipalities. As already mentioned, municipalities use "cost-based" pricing of water services. The cost of supplemental water supplies will greatly exceed the historical costs of existing supplies. MWD estimates that the average cost of supplemental supplies from water acquisitions, conservation programs, and other projects will be two or three times the rates currently charged customers. If public ownership or regulation of privately-owned water companies are not abandoned, conflict could emerge among water users over the allocation of the potential economic rents from not charging the marginal cost of water service. While economists view every customer as a marginal demander for water service, political considerations are likely to make distinctions between existing customers and new customers.

This debate has already erupted in the California Legislature over AB 2673, a bill that would have required new developments to have an identified source of water before a local agency could approve development plans. Although the bill died in a Senate committee, its supporters will be back next session. Since other western states, such as Arizona, Colorado, Nevada, require developers to locate water supplies for their development, it is perhaps inevitable that such legislation will eventually pass in California. When it does, the law should initiate as active a market in water rights as comparable laws have done in other western states.

A Barometer of Change

As necessity is the "mother of invention," drought, economic pressures, and political demands to require significant reallocation of California water. Will the reallocation occur in the marketplace, in the courtroom, or in the halls of the Legislature? The early returns indicate that there are, indeed, emerging markets in California water.

Will the remaining institutional issues stymie the development of water markets? Given the potential economic rewards from completing water transactions, resolving these and other issues seems worth a try. When will we know? When private sector groups emerge "to do deals."

Selected Readings

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