

Los Angeles's "theft" offers positive lessons for water markets.

The Myth of Owens Valley

BY GARY D. LIBECAP

University of Arizona

THERE IS AN EMERGING WATER CRISIS IN the American West that has only been delayed by this winter's unusually high levels of precipitation. Persistent drought and rapid urban population growth in the region have led cities such as Los Angeles, Las Vegas, San Diego, Phoenix, Denver, and Tucson to scramble for more water. At the same time, growing recreation and environmental demands for rebuilding riparian areas and maintaining in-stream flows, along with federal mandates under the Endangered Species Act to protect fish stocks, have spurred additional searches for water.

Where can this water come from? There are no new sources of supply—no big, new Army Corps of Engineers dams or Bureau of Reclamation projects. Desalinization is extremely costly, yielding only minor amounts of water and posing its own environmental problems. And only so much water can be squeezed from existing urban consumers through conservation, despite mandates for low-flush toilets and greater use of effluent.

The water has to come from agriculture, where up to 90 percent of it is used—often on low-value crops or ones that depend on federal price supports to remain competitive. This allocation is based on historical water rights made under the "prior appropriation" doctrine used throughout the West. Prior appropriation emerged in the 19th and early 20th centuries as farmers and miners claimed water and moved it to their farms and mines through ditches, canals, and aqueducts. Agriculture and mining are no longer economically dominant, being eclipsed by manufacturing and service industries. Rural populations have declined, just as

urban ones have exploded. Yet, the old water allocation remains generally intact.

There are remarkable and persistent price disparities for water in the West. Through their irrigation districts, farmers typically pay the pumping and conveyance costs for water plus, if applicable, minimal charges on past Bureau of Reclamation investments for dams and canals. The charges generally range from \$15 to \$25 an acre-foot (the amount of water necessary to cover one acre of land one foot deep, or 325,000 gallons). At the same time, urban water districts pay \$200–\$500 or more per acre-foot for water when they are able to buy it from agriculture.

Efforts to secure long-term leases or permanent transfers of more than trivial amounts of water to urban uses are almost always controversial and protracted. Concerns are raised about the impact of the export of agricultural water on return flows (much irrigation water seeps back into canals or streams for subsequent use by others), the impact on aquifers if exported surface water is replaced by greater groundwater withdrawal, and the economic impact on rural communities if significant amounts of farmland are fallowed, depressing demands for agricultural labor and equipment. Across the western states, there are provisions in statutes, court laws, and regulatory structures for third parties to contest any proposed sale or lease of water from farmers to cities, environmental agencies, or private groups. There also are various regulations and restrictions on water transfers. As a result, the transaction costs for water trades are often very high, despite the fact that the amounts of water to be transferred are often quite small. The consensus among most economists is that a comparatively small shift of water out of agriculture would go a long way in addressing increased urban and environmental demands.

In current discussions of western water policy, the early-20th century water deal between Los Angeles and landholders in Owens Valley, Calif., plays a prominent and

Gary D. Libecap is the Anheuser Busch Professor of Entrepreneurial Studies, Economics, and Law and director of the Karl Eller Center at the University of Arizona. He also is the Robert Wesson Fellow on Scientific Philosophy and Public Policy at the Hoover Institution. Libecap may be contacted by e-mail at glibecap@eller.arizona.edu.

decidedly negative role. It is used as a metaphor by opponents of water reallocations to demonstrate all that can go wrong with water markets. Even proponents of contemporary water exchanges emphasize that their proposals will *not* be another Owens Valley. The allegations are that Owens Valley water was stolen from farmers by a rapacious Los Angeles and, once it was shipped out of the valley through the Los Angeles Aqueduct, the agricultural economy was ruined and the valley was left a wasteland.

Unfortunately for the development of water markets and the smooth reallocation of water, the story is wrong. The water was neither stolen nor was the farm economy left in ruins. There is another and more useful lesson to be drawn from Owens Valley for promoting the development of water markets: Because water is a complex resource with many interconnected uses (some rivalrous and some not), any water trade is likely to have at least a few third-party effects. Fears of those effects bottle up contemporary water discussions. But the Owens Valley experience reveals that the allocative benefits of moving water from low-valued uses to high-valued ones are so large that they most likely will swamp the distributional concerns. Accordingly, provisions to address the concerns systematically and up-front should be considered to speed water transfers and make them more routine and predictable.

THE OWENS VALLEY MYTH

The Owens Valley tale as told in countless academic papers and popular press articles can be summarized as follows: Owens Valley was an agricultural paradise in the early 20th

the water was diverted to the aqueduct. The farm economy was crushed, leaving the region dependent on the whims of the Los Angeles Department of Water and Power (LADWP) as its colonial master.

To add further insult to the valley, more than half of the early water drained from it went not to urban residents of Los Angeles, but instead to farmland in the San Fernando Valley, fueling land speculation there. As William Kahrl wrote in a 2000 journal article on Owens Valley:

And so, with money, guns, and a unity of purpose with what they identified as the public interest, the bankers and businessmen of Los Angeles determined to seize the water resources of the Owens Valley 240 miles to the northeast. And, by correcting God's design for their community with the construction of the Los Angeles Aqueduct, they laid the foundations for the modern metropolis.

Various aspects of this dark story are incorporated by legal scholars in articles regarding water transfers, by economists in monographs on western water, and in the popular press. The 1974 movie *Chinatown*, starring Jack Nicholson and Faye Dunaway, added to the notoriety of Owens Valley by dramatizing alleged conspiracies involving the valley's water and land speculation in Los Angeles.

WHAT REALLY HAPPENED

Owens Valley was the first large-scale, rural-to-urban water trade, completed between 1905 and 1935. Using archival

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century, comparable to the Imperial Valley. But the paradise was despoiled after former Los Angeles mayor Fred Eaton, chief water engineer William Mulholland, and J.B. Lippincott, chief of southwest operations for the Federal Reclamation Service, conspired to block a proposed reclamation project in 1904 that would have provided needed drainage for the valley. Instead, they secured a right-of-way for the Los Angeles Aqueduct across federal land. At the same time, a water supply crisis was manufactured in Los Angeles, prompting city voters to approve the issuing of bonds to finance construction of the aqueduct.

Once the aqueduct was in place, the fate of the valley was sealed. City representatives secretly purchased land and water rights from unsuspecting farmers. Local residents were ill-prepared to meet the hardball negotiating tactics of city officials. Eventually, virtually all of the valley's agricultural land was handed over to Los Angeles, and irrigated agriculture ended as

material at the LADWP and the Water Resources Center Archives at the University of California, Berkeley (which includes the purchase negotiations between the Los Angeles Water Board, its land agents, and land owners in the Owens Valley) as well as details about the farms that were purchased (including prices paid), it is possible to reconstruct and analyze the bargaining over land and water rights that took place. Doing so gives a more accurate understanding of the historical record and the real lesson of Owens Valley for water trades today.

At the turn of the century, Los Angeles desperately needed more water in order to grow and become a major West Coast port. The city was in a semi-arid region where annual precipitation not only was extremely variable, but averaged just over 14 inches. It relied upon the meager and inadequate Los Angeles river watershed. To the northeast in Owens Valley on the eastern slopes of the Sierras, however, there was a great deal of

water—some 37 million acre-feet, about the same as that held in Lake Mead today.

To get water, Los Angeles had to purchase Owens Valley farms and their water rights. There were about 900 small farms in the valley, each of which provided only a small fraction of the water that would be needed. Between 1905 and 1922, the Los Angeles Water Board purchased desert lands in the southern part of Owens Valley to acquire the right of way for an aqueduct as well as riparian claims to excess water that had not been diverted for irrigation in the northern, more agricultural, part of the valley. Only a few farms were involved in the southern valley transactions.

Construction of the Los Angeles Aqueduct began in 1907 and was completed in 1913. It was one of the nation's largest public works projects at the time, second only to the Panama Canal. By 1920, Owens Valley provided Los Angeles with a flow of 283 cubic feet of water per second, whereas the entire Los Angeles basin supplied a flow of just 68 cubic feet per second.

The new water supported the city's growth from 250,000 people in 1900 to 2,208,492 by 1930. The reallocation of water also brought spectacular property value gains in Los Angeles. Initially, much of the water went to irrigate lands in the San Fernando Valley, but it was gradually diverted to urban domestic and industrial use as the city's population grew. The Board provided Owens Valley water only to areas that agreed to be annexed by the city, and this provision led

to the dramatic increase in the size of Los Angeles by over 325 square miles.

AGRICULTURAL PARADISE? Even though Owens Valley has been portrayed as a land of great agricultural potential, it was in fact a marginal farming area. The valley is approximately 120 miles by six miles and is bisected by the Owens River that, until diverted to the aqueduct, dumped into the alkaline Owens Lake. In 1920, prior to major land purchases by Los Angeles, there were just over 7,000 people in the valley, living on farms or in five small towns. There were some 140,000 acres of farmland, of which perhaps 50,000 acres could be cultivated. Livestock was a principal agricultural product. The elevation of the valley (ranging from 3,600 to 4,300 feet), short growing season (150 days), alkaline soil, and limited access to markets constrained its agricultural potential.

Its production was more characteristic of Great Basin agriculture than of elsewhere in California, and even then Owens Valley farming was less than typical. Using Census data to compare Inyo County (Owens Valley) farms with a baseline of farms in similar Great Basin counties (Lassen, Calif., and Churchill, Douglas, and Lyon, Nev.) for 1920 reveals that Inyo farms tended to be smaller on average (269 acres versus an average of 713 acres for the other four counties) and the annual value of production per farm was lower (\$4,759 versus \$10,069). Those data suggest that Owens Valley farmers may have been quite anxious to sell their land to an interested buyer.



NORTH VALLEY Beginning in 1923, in the face of drought and rising population growth, the Los Angeles Water Board began to purchase lands in the more agricultural and densely populated northern part of Owens Valley. The negotiations involved most of the region's farmers, and they are the source of the bargaining conflicts that characterize the Owens Valley water transfer. From 1923 to 1934, the Board moved aggressively in its purchases, securing an additional 863 agricultural properties covering 145,867 acres. Some 1,300 town parcels also were purchased beginning in February 1931. By 1934, the agency had acquired 95 percent of the agricultural acreage and 88 percent of the town properties in the valley.

The farms of primary interest to the Water Board were those that carried the most water rights and were either properties riparian to the Owens River and some feeder streams or, more importantly, part of formal irrigation ditch companies. The ditch companies provided most of the water for farming in the region and the shares in a ditch company that each farmer held determined how much water could be diverted to the farm. By purchasing the farms, the Board could secure their ditch allocations for the aqueduct. At the same time, however, membership in mutual ditch companies provided a convenient organizing device for farmers to collude in their negotiations with Los Angeles.

Once the Water Board bought a farm, its ditch water allocation, riparian claim, or groundwater could be released to flow down the river to the aqueduct. Depending on aqueduct needs,

some water was retained for more limited irrigation, and livestock raising replaced other kinds of agriculture. The farms were consolidated into larger units and leased by the Water Board, a practice that continues today. If Water Board land agents could not reach agreement with one land owner, they would turn to another.

TOUGH BARGAINING Negotiations with some farmers took from three to five years to complete, whereas other agreements came quickly and smoothly. For those farmers who had contentious negotiations with the Board, disputes centered on three issues: valuation of property, bilateral monopoly, and third-party effects.

Valuation Disputes There were two conflicts in determining prices for Owens Valley land. One was the basis for general valuation of farm properties—whether the estimated water supply on a farm should be valued as an input to agricultural production in Owens Valley (as desired by the Water Board) or as an input to land value increases in Los Angeles (as desired by farmers). The second was the determination of the value of any particular property when farms were heterogeneous.

The valuation of particular properties was a continuing and important source of contention because the properties were so heterogeneous with respect to productivity and water. Some farms were spread across the valley and were

MORGAN BALLARD



TABLE 1

Owens Valley Farm Property Characteristics

Mean Values

Property Type	Year of Purchase	Size (Acres)	Total Water Acre-Feet /Farm	Water Acre-Feet/Acre of Land	Purchase Price	Price/Acre of Land	Price/Water Acre-Feet	Number of Farms
All Properties	1926	154	448	4	\$23,425	\$198	\$178	595
Farms Not on Ditch	1927	207	261	1	19,890	82	473	228
Keough Pool	1928	79	366	6	27,647	443	77	23
Cashbaugh Pool	1927	126	544	4	32,156	242	69	43
Watterson Pool	1926	147	584	4	33,983	237	75	20
Non-Pool Farms on Ditches	1926	122	581	5	23,861	263	112	281

SOURCE: "Chinatown: Transaction Costs in Water Rights Exchanges," by Gary D. Libecap. Karl Eller Center Working Paper, 2005.

not on irrigation ditches or along any flowing stream. Those were the least productive farms and were purchased by Los Angeles for their ground water. Other farms were clustered in riparian areas or along mutual irrigation ditches and, even there, good land was scarce and not uniformly distributed. With limited arable land throughout the valley, not all of the water in well-endowed areas could be used to enhance cultivation and agricultural production.

Because the value of agricultural productivity in Owens Valley was the basis for water valuation in the offers made by Los Angeles, farmers with large amounts of water could be penalized. Their extra water did not increase agricultural output correspondingly and, as a result, they were implicitly offered less for it when Los Angeles tried to buy their farms. Accordingly, the farmers typically held out for higher prices, and were the center of the negotiating disputes with the Board.

Differences between the bid and ask prices could sometimes be very large. Owners of the 160-acre Parker ranch asked for \$30,000 for the property and improvements. Land agents for the Water Board offered \$11,496. At least part of the gap was based on the absence of comparison purchases in the area. Although the owners lowered their ask price to approximately \$23,000, negotiations languished for at least four years. In another case, another farmer rejected a bid of \$11,200 for his 50-acre farm, claiming the Board's assessment undervalued the water and improvements on his property. Using prices paid by the Board for neighboring properties with and without water, he estimated the added value of water, incorporated it into his calculation, and countered with an ask price of \$18,338.56. He

then held out for two years before selling his farm to the city for \$19,000.

Bilateral Monopoly Disputes Disputes over valuation of critical water-bearing properties took place within a bilateral monopoly context. The Los Angeles Water Board generally was the only purchaser of Owens Valley lands and water rights. Once the Los Angeles Aqueduct was constructed, the city had a large, immobile investment that depended upon Owens Valley water. Landowners, in turn, formed sellers' pools to collude in their negotiations with the Board. Although the pools never included all of the valley's farmers, they did involve those with the most water. By the latter part of the 1920s, in the face of drought and continued population growth, Los Angeles was dependent upon securing those lands for filling the aqueduct.

There was an effort in 1923 to join all of the farmers with significant amounts of water in Owens Valley into a single negotiating unit, the Owens Valley Irrigation District. The organization could have helped farmers secure more of the gains from trade, but it collapsed by the middle of 1924 when the Board purchased almost all of the farms on two key irrigation ditches before they joined the district. The farms were preemptively purchased at comparatively high prices, as shown in Table 1, limiting the ability of the Water Board to perfectly price discriminate.

Three sellers' pools were formed: the 23-member Keough pool on the Owens River Canal, the 20-member Watterson pool on Bishop Creek Ditch, and the 43-member Cashbaugh pool on Bishop Creek Ditch. The Keough pool was the most

concentrated and tightly organized group, and this condition helped its members achieve the highest per-acre prices for their farms. Negotiations between the Water Board and pool members were the most contentious and drawn-out in Owens Valley.

Pool leaders resorted to violence to pressure the Board to meet their price demands when negotiations broke down, threatening the security of the city's water supply. Between 1924 and 1931, the aqueduct and city wells were repeatedly dynamited, although the aqueduct was never seriously damaged. The violence attracted state and national attention, and compelled the Board to reach agreement with remaining property owners on price. The Board correctly viewed the dynamiting as a negotiating tactic, but was extremely worried about disruption of the aqueduct flow.

By contrast, sales agreements with non-ditch, non-pool farm owners (just under half of all of the farms) went smoothly. Although they received the lowest per-acre prices for their lands, the farmers received the highest prices per acre-foot for their small amounts of water. The Board had to at least pay farmers their reservation price to sell their farms, and in doing so the comparatively "dry" farmers did well.

Third-Party Effects As Los Angeles purchased properties in Owens Valley and took them out of irrigated agriculture, there were complaints that this action was hurting the local economy and damaging property values within the five towns. The magnitudes of the effects were disputed by the Board and landowners. The general deterioration in the national agricultural economy in the early 1920s also hurt the community, and this effect was difficult to separate from the Water Board's purchase of lands and accompanying export of water. In 1925, the Owens Valley Reparations Committee demanded either that the Board pay \$5.5 million in reparations for the loss in town lot value or that the city purchase the properties for \$12 million. Not only were the prices for town properties well above what Los Angeles had been paying for other lands, but they carried few or no water rights.

Legislation was enacted by the California Legislature in 1925, at the behest of Inyo County representatives and other rural legislators, requiring cities to compensate for damages to businesses and property owners when water was taken from the drainage area. The statute added pressure on the Board to buy the town properties or be faced with reparations demands. The constitutionality of the legislation was subsequently challenged in court by the City of Los Angeles, but the California State Supreme Court ruled in 1929 that Los Angeles was obligated to purchase the town lots.

Disputes over property valuation drug on, delaying purchase agreements. Ultimately, a compromise was reached and

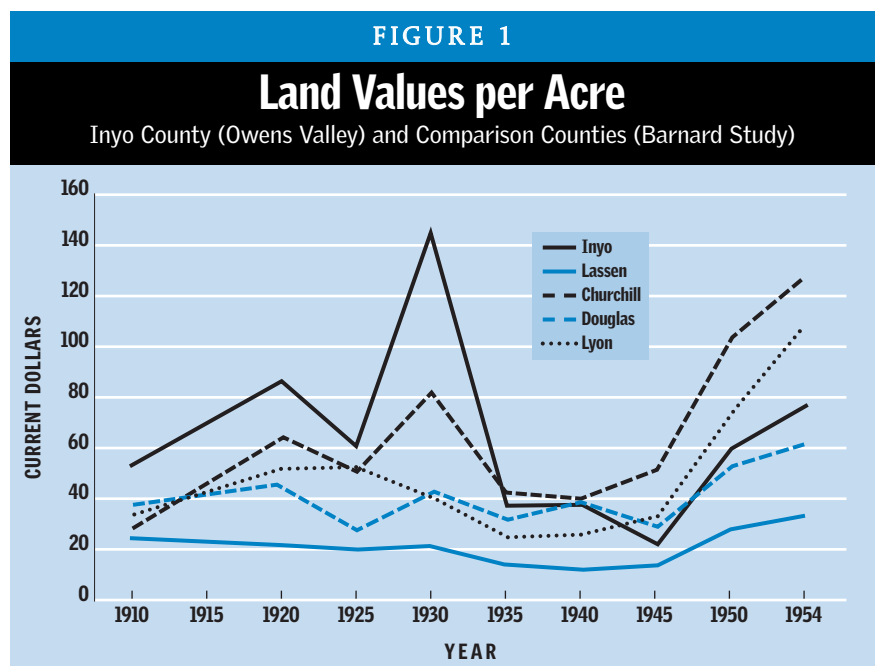
Los Angeles paid \$5,798,780 to 824 owners for their town parcels. The prices paid were based on 1923 values that existed prior to major purchases by the city in the valley, and they did not reflect the effects of the Depression on land values.

STATISTICAL ANALYSIS

The LADWP archives include a data set of farm properties purchased between 1916 and 1934 by the Board. The data set includes 869 observations, close to the total number of farms in the area at that time according to the U.S. Census. Dropping any properties of less than 10 acres as not being farms but most likely town lots, as well as dropping incomplete entries, leaves 595 observations for analysis. Of those, 367 farms were on ditches and 228 were not on ditches but scattered throughout Owens Valley.

Table 1 provides mean values for farm property owners in Owens Valley by various classifications. As indicated by the mean values in the table, farms on ditches sold for higher prices per acre and greater total prices than did those that were not on a ditch. The former parcels had more water per acre of land and their owners were likely to be in a sellers' pool. Those farmers who were in the Keough pool commanded the highest price per acre of land, they sold the latest (held out the longest), and they had the most water per acre of land to offer Los Angeles. Members of the other two pools, Cashbaugh and Watterson, also did better on average in terms of price per acre of land and total purchase price than did non-ditch properties. Even non-pool members who were on ditches earned more in total price and per-acre price than did the non-ditch farmers.

Non-ditch properties sold for less in total and per-acre payments. They typically had less water and their owners were unorganized. Although they received less for their land, the non-ditch farmers earned more per acre-foot of water than did farmers more favorably located on ditches. This outcome reflects the purchase of a bundled asset in the land market. At



minimum, the Board had to pay a price that equaled the agricultural value of a farm in order to secure it and its water from the owner. If some of the water on a farm was not used directly to increase agricultural production, then farmers with less water were likely to receive more per unit of water than did their counterparts who had larger water endowments, unless the latter could effectively organize.

Controlling for other factors, econometric analysis of the land market reveals that the per-acre price received by a farmer increased by \$32 for every year that sale was delayed. The Water Board on average paid more for properties the longer the owner held out for higher prices. This return was

The negotiations over these properties helped to give the Owens Valley water transfer its contentious history.

THE IMPACT

The Water Board spent close to \$19 million through 1934 for agricultural properties, and nearly \$6 million for town parcels. The evidence suggests that landowners in Owens Valley did better in selling their farms than if they had stayed in agriculture. Census and State Board of Equalization data are the basis for that conclusion.

First, consider the plot, shown in Figure 1, of Census values for farmland per acre in Inyo County relative to five other Great

Basin counties (Lassen, Calif., and Churchill, Douglas, and Lyon, Nev.) between 1910 and 1954. The run-up in land prices in Inyo County during the 1920s as the Water Board bought properties is very apparent. It is also evident that land values in Inyo County after 1930 (when most properties had been purchased) were not much different from those in the other counties. Clearly, Inyo County farmers did well in selling during the 1920s and the county was not turned “into a desert” as is alleged in the literature.

In terms of the third-party effects, consider the “Grand Total Value of Properties” as shown by the State Board of Equalization for the towns of Bishop (county seat of Inyo) and Susanville (county seat of Lassen), respectively, as shown in Figure 2. There is no evidence of a dramatic

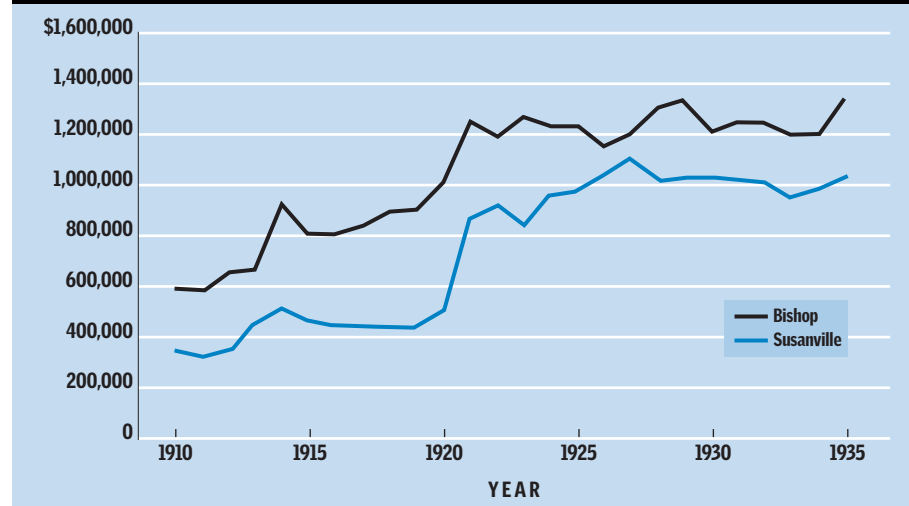
decline in property value in Bishop. According to Census data, between 1900 and 1930, land values in Owens Valley rose by around a factor of 11, increasing from an average of \$13 per acre to \$143. By contrast, land values in Lassen County barely doubled over the same 30-year period, from \$10 per acre to \$21. The data suggest that most of the rise in land values in Inyo County was due to land purchases by Los Angeles and not to changes in agricultural commodity and livestock prices. During the same period, the overall value of agricultural land and buildings in Inyo County rose by nearly \$12 million and in Los Angeles County by \$406 million. The Los Angeles increase was due mostly to migration and development opportunities made possible by the arrival of Owens Valley water.

Regardless of how the gains are measured, on average Owens Valley landowners did better by selling to Los Angeles than remaining in irrigated agriculture, using Lassen and other Great Basin counties as baselines. Owens Valley landowners captured part of the aggregate gains of trade, as did property owners in Los Angeles. The data are indicative of the dramatic size of the aggregate benefits of this early water exchange, even when none of the increase in urban land values in Los Angeles is included.

FIGURE 2

Total Assessments of Municipalities

(Current dollars)



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In total, the Census and state Board of Equalization data suggest a more positive bargaining outcome than is commonly suggested for Owens Valley. The export of water reduced crop production as a share of overall agricultural output and encouraged a shift toward livestock. But this pattern also took place elsewhere in the Great Basin. The comparative advantage of the region ultimately was in livestock, so there likely would have been a gradual shift from crops in Owens Valley, even had the aqueduct not been built. Owens Valley was not left a wasteland as is sometimes alleged.

THE ORIGIN OF THE OWENS VALLEY MYTH

The positive assessment of the outcome of the Owens Valley water transfer outlined above is in sharp contrast to the received view that Los Angeles “stole” the water and left the valley a wasteland. Where does the “water theft” notion come from?

In part, the sense of theft comes from the inability of the pool farmers to capture more of the value of their water holdings as they negotiated in an agricultural land market. They wanted prices that more closely reflected water values in Los Angeles, not in Owens Valley agriculture. But they were not able to do so. Their “cartel” was not strong enough. Pool farmers were able to secure higher per-acre land prices, but the prices did not fully compensate them for their greater water endowments.

Calculated from the econometric analysis, the “implicit” prices for an annual flow of water paid by the Water Board ranged from \$20.47 per acre-foot for non-ditch farms to \$3.33 per acre-foot and \$2.99 per acre-foot for Keough and Cashbaugh pool farms, respectively. At the same time, based on its investments in the Colorado River Canal beginning in 1924, Los Angeles was willing to pay at least about \$9.50 per acre-foot for water from the Colorado River. If the figures are representative of the distribution of benefits of trade, they demonstrate that non-ditch farmers came closer to capturing more of the gains of trade than did the pool farmers who were at the heart of the conflict. In general, however, whether or not a farmer was part of a sellers’ pool, he generally received well below the maximum amount the Board might have been willing to pay for water.

The second and related source of the notion of property theft comes from the huge imbalance in the distribution of the total gains from trade. Census values for farm properties alone indicate that the overall gains to Los Angeles were 40 times more than those of Owens Valley from the redistribution of water. The effort of farmers to receive more of the gains of trade in negotiation explains the formation and relative greater success of the sellers’ pools. Even so, a disproportionate share of the returns went to Los Angeles.

CONCLUSION

The evidence presented here demonstrates that the Owens Valley transfer was not the disaster that is commonly asserted in the contemporary literature. Indeed, it does not deserve to be cited as the leading example of the dangers of water exchanges from agriculture to urban and environmental

uses. Its outcome was favorable for the parties involved and should be presented as such. The conflict or “theft” was over the distribution of the gains from trade in which both parties participated.

Fairness in compensation issues is important in contemporary water transfer efforts. Valuation disputes, bilateral monopoly factors, and alleged third-party effects complicate measurement and negotiation between representatives of urban areas and irrigation districts in water negotiations. The long and tortuous record of negotiations in Owens Valley, despite large *ex post* aggregate gains from trade, provides evidence of the importance of resolving distributional conflicts in determining the timing and ultimate success of water transfers. **R**

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