



Marketing Water

The Obstacles and the Impetus

by *Kenneth D. Frederick*

As water grows more precious, so do the incentives—and the innovations—to try to apply market principles to its use and management.

Water is becoming increasingly scarce in the United States. Demand is rising along with population, income, and an appreciation for the services and amenities that streams, lakes, and other aquatic ecosystems have to offer. In contrast, the options for increasing supplies are expensive relative to current water prices and often environmentally damaging. Furthermore, contamination and unsustainable rates of groundwater use threaten current supplies in some regions.

Ordinarily, Americans count on prices and markets to balance supply and demand and allocate scarce resources. When demand increases faster than supply, higher prices provide incentives to use less and produce more. And, as conditions change, markets enable resources to move from lower- to higher-value uses. Market forces, however, have been slow to develop as a means of adapting to water scarcity. Both the nature of the resource and the institutions established to control its use help explain why.

Market Obstacles

Efficient markets require that buyers and sellers bear the full costs and benefits of transfers. But interdependencies among the many users of a stream or aquifer make that difficult to do. Selling water rights, for example, is likely to alter the quantity of water in a stream or the location of a diversion or returnflow (water withdrawn from a stream or aquifer that is returned to a location where it can be used again). Third parties—people benefiting from the water other than the buyer and seller—will be affected by the change. Third-party impacts might include a change in the recreational amenities provided by a free-flowing stream or the erosion of a rural community's tax base when a farmer sells water to a city.

Efficient markets also require well-defined, transferable property rights. But riparian rights, which are still the principal basis of water law in the Eastern United States, are poorly defined because water use is subject to regulatory or judicial interpretations as to what is reasonable or might unduly inconvenience others. Moreover, these rights are not directly marketable because they are attached—and their use is restricted—to the lands adjacent to a stream.

In the West, where streams are less common and flows are smaller and less reliable, "prior appropriation" quickly displaced riparian rights as the primary basis of water law. Appropriative rights are established by withdrawing water from its natural source and putting it to beneficial use. During drought, supplies are allocated according to the principle of "first in time, first in right." This principle provided a powerful incentive for the quick diversion of streamflows and allowed irrigators to acquire the highest priority rights to much of the water. While appropriative rights can be transferable, they are commonly attenuated in ways that limit how and where water can be used.

Water has traditionally been treated as a free resource to be harnessed to serve cities, factories, and farms. Anything less was seen as wasteful. Thus, subsidized water storage and distribution systems and irrigation projects contributed to a nine-fold rise in water withdrawals from 1900 to 1970. They also contributed to the loss of tens of thousands of miles of once free-flowing streams and, eventually, to a shift in national policy. To protect streamflows and recover forgone environmental and recreational values, Congress passed legislation such as the Wild and Scenic Rivers Act of 1968, the National Environmental Policy Act of 1969, and the Endangered Species Act of 1973.

In recent decades, these environmental laws have been used to block construction of many dams and in some cases to challenge previously established rights to divert water from streams and lakes. Domestic, industrial, and agricultural users continue to vie for water that is withdrawn from reservoirs and streams, and now all three groups must also vie with environmentalists and recreationists over how much water can be diverted. Conflicts also arise over the priority that dam managers should give to flood control, water supplies, hydropower production, fish habitat, and recreational opportunities. These conflicts are now generally played out in the courts or administrative proceedings rather than in the marketplace.

Overcoming the Obstacles

If water has been slow to be bought and sold like other commodities, the incentives to do so are strong. Most of the senior water rights in the arid and semi-arid West are held by farmers and irrigation districts. They pay nothing for the water itself and generally only a modest amount to have it delivered to their farms. As a result, enormous amounts of water are applied liberally to relatively low-value crops and the marginal value of the water is likely to be well under \$50 an acre-foot (af)—the quantity of water that will cover one acre to a depth of one foot. In some cases the value of the water could be increased simply by leaving more in the river to provide hydropower, fish and wildlife habitat, and recreation rather than diverting it for irrigation. In many other instances, the value of water would rise by selling some of it to urban areas that are spending more than ten times as much to augment supplies through recycling or other costly water projects.

Despite the obstacles, the impetus to move from lower to higher value use is driving some water transfers. Temporary transfers are becoming increasingly common to respond to short-term fluctuations in supply and demand. Precisely because they are temporary, short-term leases, options to purchase during dry periods, and one-time purchases through water banks blunt a principal third-party concern that a transfer will permanently undermine the economic and social viability of the water-exporting area.

Transfers among farmers within the same irrigation district are common and relatively easy to arrange because the third-party impacts are likely to be small

and positive when the water stays within the community. But when farmers want to sell water to cities, irrigation districts resist, fearing the loss of agricultural jobs and income that accompanies rural water use.

A water bank provides a clearinghouse to facilitate the pooling of surplus water rights for temporary rental. If well-defined, its rules and procedures can reduce the costs and uncertainties associated with a transaction and increase the opportunities for both buyers and sellers.

California established emergency Drought Water Banks in 1991, 1992, and 1994 to reallocate water among willing buyers and sellers. Water purchased largely from farmers willing to idle land or pump groundwater rather than divert surface water for irrigation was sold to cities and farms or used to protect water quality in the state's delta region and meet instream fish needs. Any adverse third-party impacts on the water-exporting communities were probably insignificant compared with the overall benefits of moving water to higher-value uses. Sales exceeded \$68 million in 1991; they averaged less than \$11 million in the latter years when drought conditions subsided. Idaho and Texas have established permanent water banks and other states are now considering establishing them as well.

Transferring Permanent Water Rights

Temporary water transfers are particularly useful for adapting to short-run changes attributable to such things as climate variability. They are less effective in dealing with long-term imbalances between supply and demand resulting from changing demographic and economic factors, social preferences, or climate. At some point, the historical allocation of water becomes sufficiently out of line with current conditions to warrant a permanent transfer of rights.

The process of resolving the third-party issues associated with the transfer of a long-term shift in water use is often slow, costly, and contentious. Proposed transfers face the hurdle of proving the negative, that a change will not harm others. This requirement stifles the development of markets in water rights. The Colorado–Big Thompson project (described in the sidebar), which has been able to avoid third-party issues, is the exception. The ongoing efforts (described below) of the coastal region of Southern California and the city of Las Vegas are more

indicative of the obstacles to acquiring additional water.

Both of these geographic areas face the challenge of meeting growing demands for water at a time when their traditional sources are declining and environmental considerations restrict the development of new ones. Los Angeles has already been forced to reduce the amount of water it takes from the Mono Lake region and, to comply with a mandate to improve environmental conditions in Owens Valley, will have to further reduce the city's supplies. In addition, the Southern California Metropolitan Water District (MWD), a large water supplier servicing more than fifteen million consumers including the residents of Los Angeles, is losing access to surplus water (that is, unused entitlements of other states) from the Colorado River. Las Vegas, meanwhile, has been depleting its groundwater stocks, causing subsidence within the city.

Under a 1989 agreement, Southern California's MWD has invested more than \$100 million in lining irrigation canals and other water conservation projects in the Imperial Irrigation District. In return, MWD received the right to use the conserved water, approximately 106,000af per year, for at least thirty-five years. Provisions were introduced to assure that neighboring irrigation districts in the United States did not lose their water rights as a consequence. But the impacts on irrigators across the border where groundwater recharge declined were ignored because the Mexicans lack a legal claim to the water.

San Diego receives about 90 percent of its water from the MWD and, as a junior claimant, is the first to be cut back in time of drought. To increase the quantity and reliability of its supplies, the San Diego Water Authority has agreed to fund additional conservation efforts in the Imperial Irrigation District in return for the conserved water. As originally proposed, 20,000af would be transferred in 1999, with the annual quantity increasing to 200,000af after ten years. Disputes with MWD over use of the Colorado River Aqueduct to transport the water, however, have delayed completion of the transaction.

Las Vegas, which is already using most of Nevada's legal entitlement to the Colorado River, is seeking to buy more shares of the river from states with unused entitlements. Legal issues have undermined earlier proposals for interstate and interbasin sales of Colorado River water and enabled Southern

Trading Water

The Bureau of Reclamation's Colorado-Big Thompson project brings an average of 230,000 acre-feet of water annually from the Colorado River Basin across the continental divide to northeastern Colorado. Rights to proportional shares of this water are traded actively within the Northern Colorado Water Conservancy District unencumbered by third-party concerns.

Under western water law, downstream users generally own the rights to the returnflows. But in this case the district is able to retain ownership of the returnflows because the water originates in another basin. As a result, rights to the water are traded within the district much like stocks in companies. This arrangement does not eliminate the third-party impacts associated with returnflows, only the need to consider them in transfer decisions. The benefits of being able to transfer water readily among agricultural, municipal, and industrial users exceed any likely third-party costs.

However, limiting sales to within the conservancy district precludes opportunities for even more profitable transactions. For example, an acre-foot of water in perpetuity has sold for \$3,500 more in the neighboring Denver suburbs than in the conservancy district.

California's MWD to take unused entitlements for free. Rising water values, however, are creating new interest in such sales in Nevada, which lacks rights to surplus flows, and in states wanting to benefit from their unused shares.

In 1996, Arizona established a Water Banking Authority to purchase their own unused Colorado River water for storage in groundwater basins and possible sale to California and Nevada. Interstate sales, however, are tightly restricted; they are limited to 100,000 af/year and only when there is no use for the water in Arizona and there are no shortages on the Colorado River.

Las Vegas is also interested in buying water from Utah, which has not been using its full entitlement. However, a transfer between an upper basin state (Utah) and a lower basin state (Nevada) could require renegotiation of the 1922 Colorado River Compact dividing the river between the two basins.

The Federal Role

State institutions are primarily responsible for allocating waters within their borders. But the federal government—manager of much of the West's surface waters, supplier of water to about 25 percent of their irrigated lands, the source and enforcer of environmental legislation affecting water use, and trustee for Indian water rights—also has a critical role in breaking down the institutional obstacles to permanent water transfers. Some steps in this direction have been taken.

- In 1988, the Department of Interior adopted a policy of facilitating voluntary water transfers involving federal facilities as long as the transfers comply with federal and state law, have no adverse third-party impacts, and do not adversely affect facility operations.
- The Central Valley Project Improvement Act of 1992 authorized the transfer of federally-supplied water outside the project service area. Although no off-project transfers have been approved yet, the act is potentially significant because the project is the largest water storage and delivery system in California and most of the project water is allocated to agriculture under highly subsidized terms.
- A proposed federal rule from the Department of Interior (*Federal Register*, December 31, 1997) is designed to encourage and facilitate voluntary transactions among the three Lower Colorado River Basin states by establishing a framework for approving and administering interstate agreements.
- In addition, the federal government as well as some states have been acquiring water for environmental purposes, such as the preservation of endangered species. These purchases help establish markets as viable mechanisms for allocating water.

More steps are of course needed. Uncertainties surrounding large but unquantified Indian water claims, for example, hinder the assignment of clearly defined, transferable property rights in water. Providing the tribes with rights that could be sold for uses off the reservations would foster water marketing as well as tribal welfare.

Finally, water scarcity and the potential benefits of water marketing are not limited to the West. In the East, riparian rights are gradually being replaced by or supplemented with permits. The advantages of using markets to allocate these permits will grow as the resource becomes increasingly scarce. Indeed, auctioning and trading permits are innovative approaches that might facilitate a more efficient allocation of water. It is unlikely, however, that markets resembling the ones we use to allocate most goods and services will ever become commonplace to transfer water. Finding expeditious ways to deal with the third-party effects that plague nearly all water rights transfers is critical if traditional market forces are ever to thrive. In the meantime, the enormous potential benefits of water marketing still wait to be tapped.

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