



Federal Reserve
Bank of Dallas
**San Antonio
Branch**

May 1998

Market Solutions to Water Allocation in Texas

In the future, water will become more scarce in Texas, and the laws and allocation systems that are in place will determine the amount and efficiency of water use in the state.



As fast-growing populations across Texas face shrinking water supplies and environmentalists and budget-conscious governments limit the number of new reservoirs, businesspeople and policymakers are searching for new solutions. One potential solution to this impending crisis is to allow free markets for water. Water marketing would permit water-wealthy areas to sell water and water rights to water-thirsty areas and allow low-valued users to sell to high-valued users. Interior Secretary Bruce Babbitt highlighted the importance of water marketing when he said, "Without water markets, we can't solve the problem of meeting the future water needs of the West."¹

Most of the goods and services we consume are delivered to us via a free-market exchange, in which willing participants enter into trade because each participant gains. Water, however, is often delivered to us by a local institution that typically draws from a local source such as a river, reservoir or aquifer. While we often hear about certain areas of the state facing a water shortage, products delivered through the free market rarely experience a prolonged shortage. In a market system, an increase in demand invokes an increase in price, which then stimulates a greater supply and a reduction in demand until

the factors are equated and the shortage no longer exists. In a nonmarket system, an increase in demand might not be followed by an increase in price. Without the price rise, producers are not motivated to produce more and consumers are not motivated to consume less; thus, shortages arise.

For water marketing to exist, it is necessary to have water property rights that are well defined, enforceable and transferable. Water marketing has been limited in Texas, although in some areas—particularly the Lower Rio Grande Valley—this mode of water allocation has a long history.² Texas law recognizes that surface water

VISTA is a new publication launched by the San Antonio Branch of the Federal Reserve Bank of Dallas to study economic issues and trends in South Texas. *Vista* joins a family of economic publications produced by the Dallas Fed that includes *Southwest Economy*, *Houston Business* and *Business Frontier*.

Our first issue is devoted to a subject of growing importance to the state and the South Texas region—water. Specifically, the authors address how free markets for water can ensure future availability of this precious resource. Water marketing was the subject of the San Antonio Branch's first annual economic conference, "Headwaters to Economic Growth" (see box). This article summarizes the main topics covered at the conference.

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rights are private property, freely transferable to other public and private parties so long as certain conditions are met. On the other hand, ground water, which represents 60 percent of the water used in the state, is governed by the rule of capture (more formally known as the rule of absolute ownership), which is more restrictive to water marketing because ground water has no clear property rights. Texas Senate bill 1, passed in November 1997, takes some steps to further encourage water marketing in the state.

Water Scarcity in Texas

Texas must plan ahead if it is to avoid a serious water crisis in the future, according to State Rep. Ron Lewis. With 18 million people, Texas is the second most populous state. The population is projected to double in the next 50 years, due mainly to immigration. Texas also will become a more urban state, further concentrating demand for water in already strained cities.

Additionally, to supply the increasing demand for this life-giving substance, Texas must be prepared to withstand the natural cycle of drought that occurs at least every 10 years. The 1996 drought in Texas was devastating to many regions in the state, according to Linda Fernandez, who helped document the drought conditions for the Texas Natural Resource Conservation Commission. Fernandez described how reservoirs across the state were drained to as little as 25 percent to 50 percent of capacity.

In a single year agricultural producers, industries and residents in Texas use about 15.7 million acre/feet of water. (An acre-foot is the amount of water required to cover one acre to a depth of one foot, or 325,851 gallons.) Rep. Lewis noted that as the Texas economy shifts its

focus from oil and agriculture to trade, water demands will increase in the cities. Although agriculture currently consumes the majority of the state's water, the amount used by cities is projected to increase from 25 percent to 33 percent by the year 2050.

Water Marketing in Other Regions

Terry Anderson, an economist who runs an environmental policy think tank in Montana, described how an efficient set of water property rights evolved in the American West during the last half of the 19th century, when entrepreneurs set up projects for storing and delivering water. In the beginning of the 20th century, however, governments, concerned about third-party effects such as pollution, took over water distribution, eroding much of the basis for private, market-based solutions.

Anderson noted that government involvement in water allocation often resulted in inefficient use of water, such as "use it or lose it" laws. These laws led irrigators to use water they did not need in order to maintain their rights. The government also spawned projects such as the Central Utah Project, under which farmers pay \$8 per acre-foot to produce crops where the water's value added is about \$30 per acre-foot—at a taxpayer expense of \$400 per acre-foot.

In response to growing scarcity, however, water markets are beginning to redevelop across the world, Anderson said. Water marketing is taking hold in the western United States, Australia, Chile and South Africa. He added that environmentalists, outdoor sportsmen and other private groups are looking at water marketing to meet their particular needs. Groups such as Trout Unlimited, Ducks Unlimited and the Nature Conservancy have

raised funds to protect fish and wildlife by purchasing rights to keep water in streams.

In 1991 drought forced California to look at different ways to allocate water. In response to the drought, the California Water Bank began a program to buy water—mostly from water-rich agricultural areas—and sell it to water-poor metropolitan areas—principally Los Angeles. The organization discovered that the economic value of the water was about \$25 per acre-foot to the agricultural users and about \$400 per acre-foot to the metropolitan areas. Since 70 percent of the water was being consumed by agriculture, there was a lot of room for both buyer and seller to profit.

Richard Howitt of the University of California at Davis told how in 1991 the California Water Bank acquired and sold 396,000 acre-feet of water at \$175 per acre-foot, providing a much-needed supply of water to urban users. As the drought eased in 1992 and 1994, the price dropped to \$72 and \$68, respectively, per acre-foot. When market solutions were first discussed, many thought farmers would refuse to sell and, if they did, the farming communities would dry up and turn to dust bowls. Howitt concluded, however, that neither case was true. He estimated net gains to California from the 1991 California Water Bank program at \$104 million in income and 3,741 jobs.

Property Rights and Water Marketing

Floy Lilley, a lawyer and free enterprise expert with the University of Texas at Austin, stressed the importance of private property rights in the face of water scarcity. She gave as an example the scarcity of salt 140 years ago. Because salt was needed to preserve meat, it was highly valued. When salt

became scarce, she explained, the government proposed regulating the salt supply. What happened, however, was that in our “wealth-creating, property-protected country,” entrepreneurs sought out other alternatives. One result was the invention of refrigeration.

Solutions to water scarcity will emerge so long as people are allowed to benefit from them, Lilley said. “Let us keep every option open by strictly protecting private property rights so that the only resource that matters—that is, [the one] between your ears—can percolate.”

Although water marketing is a viable tool to allocate scarce water, the Public Trust Doctrine and the Endangered Species Act represent limitations to private property rights for water. Nonetheless, noted Ray Huffaker, an agricultural economist at Washington State University, water marketing has many benefits, and water markets exist in Washington despite these legal

restraints. He recommended that water marketing efforts always consider the environmental and public impacts of the water transfer and try to include environmental groups and policymakers if there are any potentially negative third-party impacts.

Water Marketing for Urban and Agricultural Areas

Bob Collinge of UT–San Antonio compared the emerging water crisis with the energy crisis of the 1970s and early 1980s to see what lessons might be gained for public policy. He noted that price increases—not conservation pleas and government mandates—are what motivated people to conserve energy. Similarly, the appropriate pricing of municipal water would balance the supply and demand and prevent shortages.

Collinge proposed a “fee-bate” approach that would allow municipal users to sell water to each other. Each user would receive a certain allocation at a

Headwaters to Economic Growth

Conference Speakers

Terry L. Anderson, Executive Director, Political Economy Research Center, and Professor, Montana State University, Bozeman, Montana

Robert A. Collinge, Associate Professor, Division of Economics and Finance, University of Texas at San Antonio

Gregory M. Ellis, General Manager, Edwards Aquifer Authority, San Antonio

Linda Fernandez, Editor, House Research Organization, Texas House of Representatives, Austin

Richard E. Howitt, Professor of Agricultural Economics, University of California at Davis

Ray G. Huffaker, Associate Professor of Agricultural Economics, Washington State University, Pullman, Washington

Lonnie L. Jones, Professor of Agricultural Economics, Texas A&M University

Ronald A. Kaiser, Professor, Department of Recreation, Park and Tourism Sciences, Texas A&M University

Tommy R. Knowles, Deputy Executive Administrator for Planning, Texas Water Development Board, Austin

Ron E. Lewis, State Representative, District 19, Texas House of Representatives

Floy Lilley, Program Manager, Clint W. Murchison Sr. Chair of Free Enterprise, College of Engineering, University of Texas at Austin

David Lopez, Environmental Engineer, Sony Semiconductor Company of America, San Antonio

base price, and any water above that amount would have to be purchased from other users at market price. The price would equate the amount of surplus allocation offered and the amount demanded by those consuming more than the allotment. Excess usage fees would be paid to individuals in the form of conservation rebates. As water demand increases (or supply decreases), the fee-bate would rise to dampen purchases from high-valued users and entice low-valued users to sell. Thus, the fee-bate approach would efficiently allocate water to high-valued users, ensure a base level of low-cost water to all users, and give all users an incentive to conserve.

Marketing of Ground Water

Ground water in Texas is governed by the rule of capture, which allows the landowner to pump as much water as he desires. If water moves fairly freely in the aquifer, the rule of capture means that the surface owner has no true ownership of the water; if other pumpers use more, he has less. The water is thus a common good owned jointly by all landowners above it. Lacking clear rights to the water, users have no incentive to conserve it, and selling it is difficult because no one has an enforceable right to any defined amount of water.

The Edwards Aquifer Authority (EAA) was created by Texas Senate bill 1477 to ensure that water is conserved for future use by Bexar County and seven surrounding counties that cover the aquifer. Gregory Ellis, EAA general manager, described several tools the EAA uses to promote water conservation. First, the EAA issues permits that allocate to each user a certain amount of water based on the total available supply and the individual's past usage. Each permit holder's

allocation can be used, left unused or sold. Second, the EAA has the power to restrict usage during drought periods. And third, the EAA promotes and studies programs that test water markets as the solution.

Ellis cited the success of the Irrigation Suspension Program, which used water markets to pay irrigators not to irrigate. Different entities interested in "water availability insurance" pledged over \$2.3 million to 41 bids given by irrigators covering approximately 10,000 acres. This program proved that Texans are interested in ensuring water availability in the future and that they are also willing to pay for that availability.

Water for the High-Tech Industry

While the importance of water to households is obvious, this resource is also significant to industry, particularly the fast-growing semiconductor business. Texas manufactures more computer chips than California, said David Lopez of Sony Semiconductor Company of America, and water is critical in semiconductor production. In fact, Lopez said, semiconductor plants typically use up to 4 million gallons of water a day. The Sony plant in San Antonio uses well over a million gallons a day, making it the San Antonio water system's largest customer.

Because new semiconductor plants typically cost in excess of \$1.2 billion, Lopez said, manufacturers want to be assured of an adequate future supply of water before building a plant. Because of its concern about water availability in San Antonio, Sony is constructing a \$70 million water recycling plant that will reduce the company's demand by about 15 million gallons per month—about 50 percent.

Another approach, suggested by Lonnie Jones of Texas A&M,

Texas' current water policy must center on reallocation of water from agricultural to urban users through water marketing and reuse.

would be for water-intensive industries, including computer chip makers, to fund new, water-conserving irrigation technology for agricultural users in exchange for water rights. Therefore, farmers would not incur the high-ticket costs of the new technology; rather, the beneficiaries of ample water supply would pay for the investment.

Senate Bill 1 and Water Marketing

In spite of the optimism surrounding water markets, Ronald Kaiser and Tom Knowles warned of the complexity of the water issue in Texas. Kaiser, a water law expert from Texas A&M, said Texas' current water policy must center on reallocation of water from agricultural to urban users through water marketing and reuse. The days of building reservoirs are over, mostly because of environmental constraints; yet many facets of water market development remain to be addressed, including legal elements of property rights and interbasin transfers, technical barriers such as a much-needed water-transfer system from East Texas to West Texas, institutional support by government agencies, and political support at both local and state levels.

Senate bill 1 addresses some of these water marketing issues. One provision of the bill, however, states that sales of water rights from one entity to another must be a junior right—that is, if the local community of the selling water district experiences a drought, it can suspend the transfer of water to the purchasing district. This provision “kills substantial efforts to transfer water between basins,” Kaiser said.

Knowles, an official with the Texas Water Development Board in Austin, stressed the first priority of Senate bill 1 is to establish water planning regions. These

regions would define and implement the water conservation objectives of the bill and promote such practices as innovation transfers, lower transaction costs, compensation to optimal water conservationists, voluntary water marketing and sale of treated effluent. The goal is to have a state plan in place by 2001.

Summary and Conclusions

Mark Twain once said that whiskey is for drinking and water is for fighting over. This statement summarizes much of the emotion surrounding water in Texas. While the benefits of water marketing are clear, the implementation of water markets often involves tough decisions. In the case of groundwater, landowners who in the past were allowed to pump as much as they desired would be allocated a fixed amount, and their wells would be metered. The rules used to allocate water will never be optimal to all parties involved, and no doubt some users will feel that they are not treated fairly. However, the current system, lacking incentives to conserve, could leave many users with no water at all.

There are also fears that if agricultural users sell water to the expanding metropolitan areas, farm communities will suffer greatly. The experience of California suggests otherwise. Also, the revenue generated by water sales, much like that from oil, could be a boost to many communities.

One thing remains clear: in the future, water will become more scarce in Texas, and the laws and allocation systems that are in place will determine the amount and efficiency of water use in the state. Free markets for water are growing across the world as a solution to water scarcity. As stated in *Water Markets: Priming the Invisible Pump*

by Terry Anderson and Pamela Snyder, “Some would say that water cannot be entrusted to markets because it is a necessity of life. To the contrary, because it is a necessity of life, it is so precious that it must be entrusted to the discipline of markets that encourage conservation and innovation.”³

—Keith Phillips
Bicri Hernández

Notes

¹ See “Liquid Assets: A Bass Play in Water May Presage Big Shift in Its Distribution,” *Wall Street Journal*, July 11, 1997.

² For a review of Texas water law and the potential for water marketing, see Ronald A. Kaiser, “Legal and Institutional Barriers to Water Marketing in Texas,” Technical Report no. 167, Texas Water Resources Institute, Texas A&M University, November 1994.

³ Book published by the Cato Institute, Washington, D.C., 1997.



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Design: Gene Autry
Production: Laura J. Bell

This publication is available on the Internet at www.dallasfed.org.

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August 21, 1998

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