
THE GROWING WATER CRISIS: PUBLIC POLICY VERSUS PRIVATE PROPERTY RIGHTS

By James D. Timmons and Lara Womack

Water is the staff of life. We cannot survive without it. We drink it, cook with it, bathe in it, play in it, irrigate crops with it, and use it in manufacturing. Will water be in the 21st century what oil was to the last? It is quite possible that vast fortunes will be amassed by those who control water and nations will go to war to preserve access to one of earth's most precious resources.

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GLOBAL PERSPECTIVE

From a distance, Planet Earth looks like a beautiful blue sphere. This special color arises from the vast amounts of water found on Earth. However, the apparent abundance of this life-giving source is an illusion. Almost all the water on Earth is salt water in the oceans and is not useful for normal human consumption. Only about 2 percent is fresh water, and of that, less than half is available for use by the nearly six billion people around the world.

Global consumption of water is doubling every 20 years.¹ That is twice as fast as the world's rate of population growth, and according to United Nations data, more than one billion people on Earth already lack access to fresh drinking water. The U.N. estimates that by 2025, approximately 2.7 billion people will face severe water shortages if consumption continues at current rates.²

Obviously, some areas, like the Amazon River basin, have a surplus of water. Other parts of the world, such as the arid deserts of Africa and the Outback region of Australia, have very little. Water shortages are likely to grow as the world population increases and as the number of "mega-cities" continue to expand. In the past, many cities were located next to rivers. Today, a growing number of large cities, such as Mexico City and Los Angeles, depend upon distant outside sources for their water supply. Drought, pollution and unsanitary sewage conditions, and private control of water rights are some of the factors escalating the urban water crisis. History is littered with tales of major cities that disappeared mainly because they ran out of water. Can what happened in the past, happen again in the future?

U.S. PERSPECTIVE

This article will focus on water issues in the United States. North America is a region that is generally rich in water resources. In the U.S. most of the health problems associated with poor water quality have been alleviated, but we still may be facing a water crisis. Throughout the country, a recent drought and population growth have placed a premium on water. In many states, the days of plentiful water are gone. As the population grows and droughts occur, states will face continuing pressures on their limited supplies. To a large extent, the way we deal with this issue will determine our economic future and the quality of life we enjoy.

Who owns the water, and how will it be distributed for human consumption, agricultural needs, and recreational uses? The politics of water are becoming quite interesting. Private property rights will be severely tested as urban areas find they cannot sustain growth without securing water rights that may come from great distances. City dwellers will compete with farmers and ranchers for adequate amounts of affordable water. States sharing water resources such as rivers, lakes, and underground aquifers are already battling their neighbors when they perceive an unfair overuse of this precious commodity.

It is certainly true that water is no longer a "free good" so abundant and so commonly available that no person has to pay for its use. Rapid population growth, especially in the American "Sun Belt," has led to numerous conservation efforts, and in some cases outright rationing. Water seems to have suddenly become a valuable commodity,

and cities, individuals, and businesses have found that it has become much more expensive. Mark Twain once commented "whiskey's for drinking, and water's for fighting." This may have always been true out West, and today it may be true in many parts of the country.

DROUGHT

The Rio Grande was running so dry last spring that the famous Texas river, that shares an eight hundred mile border with Mexico, failed to reach the Gulf of Mexico for the first time in fifty years. Across America water supplies ran out, drained by drought and rising consumption. Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region. For the record, 2002 was the 19th warmest year in the United States since record keeping began in 1895.³ Those above average normal readings, combined with lack of moisture across much of the nation, plunged more than half the country into drought by summer. It is part of a record-breaking cycle in which the 10 warmest years have occurred since 1987, nine of them since 1990. The year ended with approximately 36 percent of the nation still in drought, about the same amount as when 2002 began. That figure far exceeds the average of 20 percent of the country in drought annually since 1900.⁴ The most extensive drought on record in the United States was in July 1934, when 80 percent of the country was parched during what is often referred to as the "Dust Bowl." Researchers say global warming, which is the heating of the Earth's atmosphere because of exhaust gases from the burning of fossil fuels, is a major cause for the drought. Natural fluctuations in climate also affect temperature.

The abnormally warm weather conditions and accompanying drought have focused attention on U.S. water problems. This was particularly true last summer on the Eastern Seaboard, a region that is not as accustomed to drought. Heavy precipitation during the last three months of 2002 and early in 2003 helped to reduce long standing moisture deficits across the Eastern Seaboard.

Those who live in the Eastern part of the United States often do not realize that water is a scarce commodity until they actually experience a prolonged period of drought. And when a drought does occur in the East, it is generally the agricultural community who is hardest hit. Westerners are rediscovering a truism obscured during the

1980s when they experienced a relatively long, wet cycle that coincided with a period of unprecedented population growth: They live in a near-desert where water is a limited resource.

Despite semi-arid climates and public perception, the Rocky Mountain States are actually water rich. Winter snowfall provides an abundance of water. The challenge for water providers is to adapt the timing and location of snowmelt to meet the timing and location of water demands. Generally, this means storing spring snowmelt in reservoirs for use in other seasons. It also means moving water from resource-rich areas to demand-intense areas. A good example of this would be West Slope snowmelt moving to East Slope irrigation needs in Colorado.

URBAN GROWTH ISSUES

The desert Southwest is home to many of the nation's fastest growing cities, and none of them has grown faster than Las Vegas. It is the fastest growing major metropolitan area in the United States. Since 1980, the population has grown from 480,000 to 1.5 million. During the decade of the 1990s Las Vegas grew by almost 45 percent.⁵

Las Vegas is not the only example of a Southwestern boomtown. Phoenix, Tucson, Albuquerque, San Antonio, and many other western cities, have experienced substantial growth in recent years. All of these cities consume more water per person per day than cities in other regions of the country. In 1995, the U.S. Geological Survey reported that per-capita water use per day in its Lower Colorado River district was 120 gallons compared to only 70 gallons in the Northeast part of the U.S.⁶ Las Vegas uses 400 gallons per day per person, and Phoenix, the city with the next highest use consumes 310 gallons per day per-capita. Largely due to agricultural irrigation, total per capita "off-stream" water use in Colorado and other interior Western states exceeds 3,700 gallons/day. Off-stream use refers to water used for domestic purposes, commercial and industrial applications, thermoelectric power generation, irrigation, livestock, and mining. Off-stream use in Western states is nearly three times the national average of 1,280 gallons/day.⁷ Nearly eighty percent of the water used in Western states goes to agriculture and ranching, activities whose survival has been based upon federal subsidies related to massive water projects.

California and Texas have especially great water needs, and may be viewed as special cases in the water policy debates. California is the nation's most populous state, with 35 million citizens. Twenty-one million residents call Texas home, making it the nation's second most populous state. These two states perhaps face the greatest challenges of any state with regard to limited water resources being available to quench their enormous population demands. Both states have been actively involved with water rights issues for some time.

California relies for its existence on massive hydraulic works that move enormous quantities of water from areas of relative abundance, both within and outside the state, to areas of relative scarcity. Despite such impressive technological achievements, Californians are currently using more water than will be available on a long-term basis. It is estimated that they run a 1.6 million acre-foot deficit annually, and during years of drought, the shortfall can rise to over 5 million acre-feet. Currently, the shortage is made up from groundwater coming from aquifers that are being pumped of water faster than they can be recharged by nature.⁸

California's growth, and particularly that of Southern California, is directly tied to the 1922 creation of the Colorado River Compact. Los Angeles needed more water, and the Golden State's power let it take the lion's share of Colorado River resources. Arizona, Nevada, and five other states got what was leftover. The relationship between California and its neighbors, the junior partners in Western growth, was made clear by the allocation of water. Nevada got 300,000 acre-feet compared to California's 4.4 million acre-feet.⁹ This disproportionate sharing was not a real problem until the 1980s when other Western states started to grow even faster than California.

In 1999, the U.S. Secretary of the Interior told California that it had to cut its use of water from the Colorado from the 5.2 million acre-feet of actual use to its legal allocation of 4.4 million acre-feet a year. California was given three years to work out a plan for reducing consumption, and then until 2015 to phase it in. If the state could not come up with a plan, the department would simply cut off its share of the surplus water supply. Oddly enough, the deadline passed on December 31, 2002 without a plan, so the department has turned off

the tap. The Southern California Metropolitan Water District will lose one quarter of its water supply. Seventeen million people are served in this water district. Luckily, reservoirs have two years' supply to buffer the shock, and plans will speed up for building desalination plants and cutting consumption. Why did California not develop a plan? The sticking point that prevented a deal was the ongoing strife between cities and farms. Farmers account for only 3 percent of the state's economy, but use 80 percent of the water.¹⁰ The battle between urban water demands and agriculture's long standing access to water will continue to cause strife.

Texas also has its share of water problems. Texas is a growing state, with population expected almost to double by 2050. Rather than being uniformly distributed, growth will focus most heavily around urban centers. Although most rural communities and small cities are growing, they are not growing as fast as those areas near urban centers. This trend will create issues of resource sharing and competition between rural and urban areas.

By 2050, the Texas Water Development Board (TWDB) estimates that almost 900 cities, representing 38 percent of the projected population, will need either to reduce demand or develop additional sources of water beyond those currently available to meet their needs during droughts. Twenty percent of irrigation demand cannot be met by existing sources if a drought-of-record were to occur today. Seven percent of municipal demand cannot be met by existing sources of water were a drought to occur now. However, the TWDB estimates if a drought occurs in 2050, almost half (43 percent) of the municipal demand could not be satisfied by current sources of water. These dire forecasts have motivated Texas to pass two major water resource plans within the past six years.

In 1997, for the first time in their state's history, Texans mixed the concepts of development, conservation and management with the state's most precious resource--water. The state legislature passed a comprehensive statute that called for a statewide water plan to cope with drought, population growth, and environmental issues. One of the primary elements of this initiative was to change the planning process to one based on public participation at each step of the process and local and regional decisions to produce regional water plans, which will form the basis of the State

Water Plan. Approximately 450 representatives having a broad array of interests, including 11 special interest groups required by statute, worked for more than 3 years to develop their 16 regional plans.

Using the great wealth of information and the recommendations provided by the Planning Groups, the state enacted Water for Texas--2002, the first state water plan since the 1997 legislation. This action approved four of the six recommendations common to all of the regional plans. The changes were to continue the planning process, provide adequate funding for regional water planning, provide adequate funding for implementing water plan recommendations, and to clarify provisions in the 1997 act on unique stream segments.

In Texas all surface water is considered public, but groundwater is privately owned. In Texas the "right of capture" allows a landowner to take as much groundwater as he or she desires without regard for their neighbors, as long as the water is put to a "beneficial use." Back in 1991, Ron Pucek brought many of South Texas' water issues to a head when he opened his Living Waters Artesian Spring Catfish Farm just outside of San Antonio. News reports indicated Mr. Pucek was using enough water to raise catfish as would be necessary to support about 250,000 people, approximately the amount of water used by one fourth of the population of San Antonio.¹¹

Pucek had spent over \$1 million to drill the world's largest water well, a well that was capable of producing 40 thousand gallons of water per minute. Was this use of water a waste? Should anyone be able to use that much water? Certainly the City of San Antonio had grave concerns about their future supply of water, most of which comes from the same Edward's Aquifer that Mr. Pucek was pumping from. The law and the agricultural community were definitely on his side. And they found it easy to point out that his use of water to grow a food crop seemed much less wasteful than using water to keep lawns green in the summertime.

The catfish farm was fully operational for only one season before it was forced to shut down because they did not have the proper permit to discharge wastewater in the nearby Medina River. In 1996, Pucek reopened the project on a smaller scale, using a holding pond so that no water would escape from the property. Mr. Pucek did not need

any discharge permits if the water did not leave his land. The Edwards Water District determined that the project's holding pond design was faulty and that water was indeed still being discharged into the Medina illegally.

Faced with the prospect of enormous legal fees, Mr. Pucek agreed to once again shut down. In the farming community, and in the eyes of those who champion private property rights, Mr. Pucek's use of all the water he wanted was totally lawful and proper. Many hoped he would continue his fight to validate a property owner's legal right of capture. The city of San Antonio was relieved that the catfish farm wasn't operational, but was still very concerned about their capability to assure future water needs. Some believe Mr. Pucek and his backers were merely angling for a big buyout of their water rights. The fact is that on December of 2000 the San Antonio Water System agreed to buy the catfish farm and its water rights for \$9 million.¹² The sale brought an end to almost a decade of contentious squabbling and terminated the possibility of future litigation. The sale may also have caught the attention of other Texas entrepreneurs who know how to make a buck.

Texas is well known for its oil barons, but it may become known for its water barons. Water, not oil, may become Texas liquid gold. T. Boone Pickens, the former oilman and corporate raider whose takeover bids once struck terror in boardrooms, is now actively trying to corral and market water. Pickens owns ranchland on the high plains of the Texas Panhandle. His land sits atop the southern tip of the Ogallala Aquifer, one of the world's largest underground reservoirs. The Ogallala is the source of groundwater and irrigation for eight states in a 174,000 square mile area that stretches from South Dakota to Texas.¹³

Pickens has offered neighboring ranchers \$350 per acre for their water rights if he can secure enough acreage to provide adequate supplies of water for export to major Texas cities. He believes he can build billion dollar pipelines to cities such as San Antonio, El Paso, and Dallas and Fort Worth. He is betting that rising demand for water will cover the costs of the massive project and make a profit. Mr. Pickens is not the only big-time operator to see the possibility of megabucks in water. Billionaire brothers Ed and Lee Bass of Fort Worth, also oil barons, bought 45,000 acres of water rights in Southern California in 1997. They sold those water

rights to U.S. Filter Corporation, which provides water to a thirsty San Diego. The water rights brought a cool \$250 million, and the brothers are said to be interested in repeating their success in Texas. Not everyone in Texas is happy about transporting water from the Texas Outback to fast growing urban centers, but the movement of water over long distances to urban centers is an ongoing theme around the country.

FEDERAL WATER POLICY

In the Western United States, much of the land is still owned by the federal government. It is not unusual for more than forty percent of the land in Western states to be owned by the U.S. Government. In Nevada, for example, the figure is almost 83 percent, in Idaho 62 percent, Utah 64 percent, and 45 percent in California. For this reason, and many others, it is not unusual that the federal government has been involved in developing water projects for a variety of purposes. For more than a century, the federal government has been active in flood control, navigation, power generation, irrigation, and settlement of the West.

Two federal agencies are most actively involved in water projects throughout the country. The Bureau of Reclamation, in the Department of Interior, operates nearly 350 storage reservoirs and approximately 250 diversion dams that provide water to 17 states, over 31 million people, and irrigation to 9 million acres of land.¹⁴ The Bureau controls significant (40-85%) portions of river flows in nearly all major river basins in the West.¹⁵ The other federal agency that actively carries out water policy is the U.S. Army Corps of Engineers, which is housed in the Department of Defense. The Corps operates hundreds of flood control, navigation, and multi-purpose works throughout the country. Over the last decade, both the Corps and the Bureau have undertaken projects or programs aimed at mitigating or preventing environmental degradation due to the construction or operation of large water projects. These initiatives have been quite controversial since each involves many stakeholders at federal, state, regional, and local levels. Water users, landowners, farmers and ranchers, commercial and sports fishermen, urban water suppliers and users, navigational interests, hydropower customers and providers, recreational users, and environmentalists are all parties-at-interest in an ongoing debate over water policy.

Developing new water through new dams and reservoirs has become increasingly difficult, large-

ly due to concerns over environmental protection and the fact that the most obvious water projects have already been built. Moving already developed water from one location to another is often a more practical option, but can bring negative consequences for rural agricultural areas. Development of deep, mostly non-renewable, groundwater is also an attractive option in some situations, but it is not a permanent solution to the water demands of growth. For many Rocky Mountain States, the real issue is not one of impending shortages, but the very real problems of environmental, economic, and social costs that must be paid to keep the water flowing to growing regions. The cost of water will likely go up as competition increases for limited supplies.

STATE WATER LAW

There are two major approaches to determining legal rights to water in the U.S. One is the riparian rights system, which is generally followed in states east of the Mississippi River. The other is the system of prior appropriation, followed in Western states. The two systems are similar in that they determine who has the right to use the water. They do not determine who owns the waterway. As water becomes scarcer, and thus more valuable, there is a growing concern that neither of these systems adequately protects the rights of the general public.

The system of prior appropriation allows parties to acquire rights to water that exist independently of any other property interest. The acquisition of such rights is based upon actual use of the water. There must be a diversion of the water. Then the water must be applied to a beneficial use. When this appropriation is complete, the rights are treated similarly to real property rights. They can be conveyed, mortgaged, or otherwise encumbered. In states that recognize prior appropriation, the water rights thus acquired can be sold to remote buyers without regard for the interest of the public located in the area from which the water was derived.¹⁶

Riparian rights refer to the rights of those through whose land a natural waterway flows to make reasonable use of that water. The water right is part of the land that borders on or contains the water flow. It is limited to a right to use the water on the riparian land. The water cannot be diverted to non-riparian property, even if the same party owns that property. The right is not however, dependent upon actual use. Ownership of the property, not previous use of the water, is the derivation of the right.¹⁷

There are several criticisms of the riparian system. One is that because the rights are not adequately defined, the system does not encourage investment in water development. Also, it depends upon litigation for enforcement of rights, and it lacks protection for environmental and other public values. Finally, because it is based upon ownership of the adjacent land, it places geographic limitations of the use of water.¹⁸ The riparian system has worked when the supply of water was sufficient, but these limitations have caused it to fail in areas affected by drought.

As concern over the quantity of water grows to include all states, not only those in the west, there is also growing dissatisfaction with the existing systems for establishing water rights. Some favor a public trust system that would reaffirm the public's paramount interest in water as a resource. This could be coupled with a regulated riparian system, which would allow those owning property adjoining the waterway to make reasonable use of the water, but would require a permit for any withdrawal over a stated amount. The water left after reasonable use would be for the benefit of the public and the environment. Others favor the privatization of the water use system. This would allow each user to appreciate the true cost of using water, and might best promote the conservation of this resource.

CONCLUSION

Many Americans take water for granted. For most of us, it took the recent drought to focus some attention on water shortages, and remind us how precious and perhaps scarce water can be. City dwellers in particular often have little appreciation for the difficulties that are associated with acquiring and transferring water. We turn the tap and water appears. In the United States, water is generally safe to drink, doesn't cost much, and we often don't make much of an effort to conserve it.

As our urban areas continue to grow, particularly in the arid southwest, the demand for water will create an even greater friction between those who use this limited natural resource. Urban growth will pit agricultural users against city dwellers. Ultimately, the political power and economic muscle of urban users will wrestle control of water away from those who have traditionally controlled its use. In the Western part of the country, water will be transported great distances from areas of surplus to areas of need. Federal, State, and local

jurisdictions will all take an active and direct interest in deciding how water is gathered and who shall have access to it.

As water becomes scarcer, and therefore more valuable, it will take on many characteristics of another important commodity-- oil. Water will become more expensive to many users, and those users who have the most money or political clout will get the water. Entrepreneurs may also get an opportunity to control water resources and exploit water's value. Undoubtedly, private property rights will be challenged as the public's need for water expands. The challenge of providing water, however, will vary greatly throughout the country. All states will protect their water resources. Water rich areas will have fewer concerns about water shortages, and may even find that their excess water provides a monetary benefit. Those areas of the country that are experiencing water shortages will continue to aggressively develop new approaches to deal with their water problems. These approaches will include water conservation, water marketing, the long distance transfer of water, waste-water reclamation, and probably an assault on private property rights as the general public requires greater amounts of water.

1. Barlow, Maude, "The Global Water Crisis and the Commodification of the World's Water Supply" 31 May 2002 Available at <http://www.ifg.org/bgsummary.html>.
2. Barlow, Maude, "The Global Water Crisis and the Commodification of the World's Water Supply" 31 May 2002 Available at <http://www.ifg.org/bgsummary.html>.
3. O'Driscoll, Patrick, "Warmer World Driving Weather," *USA Today*, December 18, 2002, p. 3A.
4. O'Driscoll, Patrick, "Warmer World Driving Weather," *USA Today*, December 18, 2002, p. 3A.
5. Rothman, Hal, "Urban Oasis Cash Keeps Las Vegas Lush ... and It should," *Urban Ecology*, Spring 2001, pp. 14-8.
6. Rothman, Hal, "Urban Oasis Cash Keeps Las Vegas Lush ... and It should," *Urban Ecology*, Spring 2001, pp. 14-8.
7. Kenny, Douglas, "Frequently Asked Questions about Water and Growth in Colorado" Available at <http://www.colorado.edu/Law/NRLC/waterandgrowth.html>.
8. Hundley, Norris Jr., *The Great Thirst: Californians and Water History*, Revised Edition, University of California Press, Berkeley and Los Angeles, California, 2001.
9. Rothman, Hal, "Urban Oasis Cash Keeps Las Vegas Lush ... and It should," *Urban Ecology*, Spring 2001, pp. 14-8.
10. *The Economist*, "Water Policy in the West Pipe Dreams," January 11, 2003.
11. Eckhardt, Gregg A., "Ron Pucek's Living Waters Catfish Farm," 28 February 2002 Available at <http://www.edwardsaquifer.net/pucek.html>.
12. Eckhardt, Gregg A., "Ron Pucek's Living Waters Catfish Farm," 28 February 2002 Available at <http://www.edwardsaquifer.net/pucek.html>.
13. Shirley, Kathy, "Pickens Jumps into Water Market" 28 February 2002 Available at http://www.aapg.org/explorer/archives/07_01/pickens_water.html.
14. Water Issue and the United States Government, "Water Issues," 28 February 2002. Available at <http://environment.about.com/library/weekly/blwater2.html>.
15. Weinberg, Marca, "Assessing a Policy Grab Bag: Federal Water Policy Form," *American Journal of Agriculture Economics*, Vol. 84, no. 3, pp. 541-56.
16. Joseph W. Dellapenna, "The Law of Water Allocation in the Southeastern States at the Opening of the Twenty-First Century," 25 U.Ark. Little Rock L. Rev. 9 (2002).
17. Id.
18. George A. Gould, "A Westerner Looks at Eastern Water Law: Reconsideration of prior Appropriation in the East," 25 U.Ark. Little Rock L. Rev. 89 (2002).