

# APPLYING FAIR MARKET VALUE CONCEPTS TO WATER RIGHTS

*Five regional markets for water illustrate how state laws, geographic location, cultural influences and environmental concerns affect changes in water use.*

by Bonnie G. Colby

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**M**arket acquisitions of water rights are increasingly common in regions where existing water supplies are fully appropriated and development of new supplies is costly. Both market acquisition and development encourage new water users to bid water away from current right holders. Urban growth, environmental disputes and Native American claims to water all create incentives for acquisition of water supplies. While water right acquisitions often are essential to real estate development, they also are the subject of controversy in state and federal courts, legislatures and administrative agencies.

Water use and transfer is carefully scrutinized and highly regulated in most western states. Within this conflictual environment, water rights valuation has become an important task. Such appraisals provide essential information for potential buyers, many of whom are real estate developers and city governments seeking supplies for growing populations. Appraisers may assess fair market value for the courts to award compensation for damages or takings of water rights; for public agencies who supply water to farms, cities and business; and for conservation organizations who acquire water for wildlife refuges, wetlands and streams.

This article reviews several markets for water rights in the western U.S. and discusses the application of fair market value to water rights and how this differs from other real property in several critical ways.

## Background On Water Markets In The Western United States

The markets where water rights are traded vary by region, water source and types of buyers and sellers. Traditionally, a market is defined as a set of arrangements where buyers and sellers are brought together by the price mechanism. For water rights appraisal, it is the interaction of individuals who exchange water rights, water supplies associated with land and water-related infrastructure for other assets, such as money.<sup>1</sup>

A transaction that involves both land (and improvements) and water may still be considered a water transaction if the acquisition was motivated primarily by the desire to obtain water supplies. These transactions are common in Arizona where water transactions often include land acquisitions, due to specific provisions in state law. In Colorado, New Mexico, Utah and Nevada, water rights can be (and frequently are) bought and sold separately from land.

Information on major water sources and uses, transactions and prices for five water market

*Bonnie G. Colby, Ph.D., is associate professor of agricultural and resource economics at the University of Arizona where her work focuses on the value of water rights, recreation sites and environmental assets in the western states. During the last ten years she has been involved in numerous projects to determine the value of water rights and water-related assets in Arizona, New Mexico, Colorado, Utah and Nevada.*

**FIGURE 1**

Selected Market Regions in the Western U.S.



regions are briefly described in this article. Figure 1 identifies the five market areas which are located in Nevada, Utah, Colorado, Arizona and New Mexico. Price observations have been made as comparable as possible allowing for time and market areas. Prices have been adjusted, using the Gross National Product (GNP) price deflator, to 1986 dollar values. In addition, several conventions have been adopted to compare different water rights in terms of common units of measure. Water rights may be transferred in perpetuity (sold) or temporarily (leased). Unless otherwise noted, transactions described in this study are for sales rather than leases.

### Water Has Rights, Too

In quantifying water rights, it is important to distinguish between diversion rights and the consumptive use portion. Diversion rights refer to the maximum quantity of water which may be withdrawn per unit of time from a water source. Consumptive use refers to the portion of that diversion right which may be removed permanently from the hydrologic system through evaporation, transpiration or other means. The difference between diversion and consumptive use is the "return flow," or the portion of the diverted water which returns to the system and is available for appropriation and use by others. In many areas, transfers of water rights are

limited to the consumptive use portion of the water right. This limitation is enforced to protect other water users from having their own water rights adversely impacted as a result of the transfer.

If the water purchased is transferred completely out of the hydrologic system of origin, or if the rate of consumptive use differs between the original use and the new use, the quantity of divertable water that the seller of a right gives up in a transfer usually will not be the same as the quantity of water that the buyer is able to use. Unless otherwise indicated, all descriptions of transfers refer to the quantity of water that may be diverted for use by the buyer.

Buyers of water rights need to be concerned with the capacity of the water resource to satisfy their rights. If the hydrologic capacity of the water resource varies significantly over time, or if many other water users have a senior claim to rights from the same water resource, then the yield of a particular water right may not always be equal to the full amount of the right. Consequently, the actual long-term average yield of a water right often is less than the maximum amount specified in the water right. Unless otherwise indicated, all water transfers in this article are quantified according to their long-term average yield, in acre feet per year.

## Truckee Basin, Nevada

The Truckee River flows from Lake Tahoe in the Sierra Nevada Mountains into Pyramid Lake in the northwest Nevada desert. The Carson River flows just south of the Truckee Basin. Water from the two river systems is used conjunctively in the Truckee-Carson Irrigation District (TCID), located downstream and about 50 miles to the east of the Truckee Meadows. The cities of Reno and Sparks form the core of a rapidly expanding regional population in the Truckee Meadows. A federal water master oversees the administration of the Truckee River in compliance with the Orr Ditch Decree. Transfers of surface water and groundwater rights are subject to approval by the Nevada State Engineer.

The majority of water used in the area is primary flow or storage from the Truckee River. Rights to the Truckee River were adjudicated under the Orr Ditch Decree of 1944.<sup>2</sup> Reno and Sparks receive water from a privately owned utility, and Washoe County provides some water service to outlying communities. Irrigators are supplied with Truckee River water delivered by private ditch companies. Lake Tahoe and other reservoirs serve as storage facilities for the Truckee River.

Up to 300,000 acre feet per year of Truckee River water flows into Pyramid Lake.<sup>3</sup> The Pyramid Lake Indian Reservation and the Truckee-Carson Irrigation District are the major Truckee River water users located outside the Reno-Sparks area. Indians, irrigators and municipal users of the Truckee River have been locked in continuing litigation over water resources since the early 20th century.<sup>4</sup> Growth of the Reno-Sparks area has brought increasing numbers of developments and other enterprises which are willing to pay for water.

### *Pricing History*

Until the late 1970s, almost all transfers of surface water rights involved the sale of irrigation rights to the regional water utility. By 1979, urban interests became aware that water rights were not being acquired fast enough to keep up with the growing demand for service.<sup>5</sup> Increasing awareness of the scarcity of water has driven prices up more than twenty-fold since 1979 and has brought many new participants into the market. A precondition for project approval is that real estate developers acquire Truckee River water rights and then must dedicate them to the cities of Reno and Sparks. Rights acquired by the local governments through dedication are leased for 99 years to the water utility at \$1,500 per acre foot.<sup>6</sup>

Prices paid for water rights averaged about \$100 per acre foot between 1946-1959, rose to over \$150 per acre foot between 1960-1964, fell to \$140 per acre foot between 1965-1970, and fell again to less than \$75 per acre foot by 1979. Price offers by the regional water utility rose to over \$100 per acre foot in the early 1980s, but higher offers from other buyers, primarily real estate developers, left few individuals willing to sell at that price.

### *The Market For Water*

Since early 1985, the cities of Reno and Sparks have been soliciting urban owners to sell their old irrigation rights. The price offered of \$422 per acre foot is set by joint agreement of Reno, Sparks and Sierra Pacific, the private utility. The low offer price is intended to reflect the high transactions costs, primarily the title search, involved in transferring small quantities of water rights for lands which often have been subdivided and changed hands.<sup>7</sup>

Several private water brokers operating in the Truckee Meadows have been outbidding the cities. Typically the prices offered by the brokers range from \$600 to \$800 per acre foot, less a brokering fee. The brokers assemble several small water rights into a larger package for resale to a local real estate developer. Prices for these larger packages of urban water rights have exceeded \$2,000 per acre foot.<sup>8</sup>

The market for water has been heavily influenced not only by policies of the state of Nevada and local governments, but also by tribal governments and the federal government for a national wildlife refuge in the area. Litigation over water needs for the environment and for Indian tribes has contributed to upward pressures on water prices. Senior water rights are selling for \$2,600 per acre foot.<sup>9</sup>

## Lower Sevier Basin, Utah

The Sevier River flows north from the high plateaus of southwestern Utah, terminating in the Sevier Desert 140 miles southwest of Salt Lake City. Four mutual stock irrigation companies—Delta, Melville, Abraham and Deseret (the DMAD companies), control virtually all surface flow rights on the lower stretch of the river. Until recently, water delivered by DMAD was used exclusively for irrigation. In 1980, the Intermountain Power Project (IPP) bought 20% of DMAD company stocks, thousands of acre feet of privately held groundwater rights and 80% of the water stock in another ditch company upstream of DMAD. The total package of water rights, with a yield of 45,000 acre feet per year, cost approximately \$2,400 per acre foot. The water was acquired for cooling a new coal-fired power plant which began operations in the late 1980s. The projected size of the power plant operation was reduced after IPP had already purchased the water rights. Consequently, about half the water rights are not needed for power plant operations and IPP rents unused water to irrigators and plans to continue this practice.<sup>10</sup>

The vast majority of water transfers in this basin are seasonal water rights rentals among irrigators. Studies conducted between 1948-1964 indicate that there has been no long-term upward or downward trend in the real price of surface water.<sup>11</sup> Short-term price fluctuations, documented since the 1940s, have followed the hydrologic cycle of the river—rental prices are higher in dry years and lower in wet years. Over the last several decades, rental prices have varied between \$7 and \$75 per acre foot. Sales of mutual water company stocks (nearly always for irrigation) and groundwater rights purchases have generated prices ranging from \$300 to

over \$2,400 per acre foot since 1978. Prices rose sharply in the period preceding and immediately after IPP's purchases in 1980, but leveled off to between \$300 and \$500 per acre foot in 1985 and 1986.

### **Northern Colorado Water Conservancy District, Colorado**

The Northern Colorado Water Conservancy District (NCWCD) lies north of Denver and east of the Rocky Mountains. Urban centers include Boulder, Fort Collins, Loveland, Longmont and Greeley. Irrigation is extensive but has been declining in the face of urban growth.

Surface water supplies originate as snowmelt and runoff from the Rocky Mountains. Natural seasonal flows are erratic and highly variable. The majority of water supplies comes from surface water which is stored and then delivered by water supply organizations. The Colorado-Big Thompson (C-BT) project is the largest single supplier in the area, but does not operate local distribution systems. Instead, a large and sophisticated array of diversion, storage, distribution and treatment facilities are owned and operated by a variety of mutual water stock companies, municipal water systems, water districts and water user associations. Although the C-BT project originally was developed as a supplementary water supply for irrigation, approximately one-third of C-BT allotments now are in municipal or industrial ownership.<sup>12</sup> Water is used to offset fluctuations in natural surface water flows. C-BT annual releases range from 155,000 to 310,000 acre feet. In dry years, the NCWCD will release more C-BT water, and less in wet years.

Water right transfers in Colorado must be approved by a state water court. This procedure can be time consuming and expensive but generally is unnecessary in the case of water stock transactions within the service area of a water district.<sup>13</sup> Water rights represented by company water stock therefore are very marketable rights. The larger the company service area, the larger the area over which the water may be marketed without formal proceedings. The high value attached to C-BT water is because the project functions as a mutual stock water company, with the largest service area of any such organization in Colorado. Water rights controlled by the Colorado-Big Thompson project (represented by shares, or "units," each one entitling the holder to 1/310,000 of the water delivered by the project in a given year) may be used or transferred anywhere within the NCWCD.

Deliveries of C-BT water started in the late 1950s. In 1961, C-BT units sold for about \$97 each. Assuming a long-term average yield on C-BT units of about 0.75 acre feet per unit, that price was equal to about \$130 per acre foot. Prices per acre foot rose to \$440 in 1965, \$920 in 1970, \$1,090 in 1975, \$2,540 in 1977, \$3,050 in 1979, and peaked at about \$3,600 in 1980. Since 1980, the real price of C-BT water had fallen. In the mid 1980s it stood at about \$1,500 per acre foot. However by 1992 the price had increased to \$2,200.

### **Southern Arizona**

In Arizona, several distinct types of water rights have been purchased by real estate developers and municipal interests in the Tucson and Phoenix Active Management Areas (AMAs).<sup>14</sup> Active Management Areas were created by state law in 1980 to regulate groundwater use in regions where declining water levels were a concern. These include agricultural groundwater pumping rights that can be converted to nonirrigation uses, nonirrigation groundwater rights, groundwater rights originating outside of the AMAs, surface water flows and reclaimed sewage effluent. Unlike some other states, Arizona prohibits purchase of irrigation rights without simultaneous purchase of the farm land to which they are appurtenant.<sup>15</sup>

Within the Tucson AMA, the market for agricultural groundwater pumping rights is dominated by the city of Tucson. Tucson has been purchasing and retiring irrigated farmland in the neighboring Avra Valley since the early 1970s. Assuming that the land has no value apart from the water rights (not an unreasonable assumption in remote areas of the desert), and based on a transferable quantity of three acre feet of groundwater per irrigated acre, prices for Avra Valley water have increased from a range of \$400-\$500 per acre foot in the early and mid-1970s to a range of \$650-\$1,000 per acre foot in the late 1980s.

Numerous purchases of agricultural groundwater rights for conversion to urban uses have occurred in the Pinal and Phoenix AMAs. The city of Mesa, located in the Phoenix AMA, purchased over 11,000 acres of irrigated farmland, located in the Pinal AMA, generating about 30,000 acre feet of water that can be converted to nonirrigation uses. A Phoenix-area development group purchased farms in the Phoenix AMA with over 8,000 irrigated acres. The irrigation water rights are convertible to nonirrigation uses with a yield of over 20,000 acre feet per year. These and other transactions in the mid 1980s occurred at prices ranging from \$1,000-\$1,500 per acre foot.<sup>16</sup>

Type II groundwater pumping rights are held by golf courses, mines, power plants and businesses which obtain supplies of groundwater independently of municipal water service organizations. In contrast to other water rights in Arizona, Type II nonirrigation groundwater rights are transferable without an accompanying land acquisition, to other locations within the same AMA.<sup>17</sup> The supply of Type II rights is limited, and it constitutes only a small proportion of the total water rights in Arizona's Active Management Areas. Demand for Type II water rights is limited mostly to independently supplied nonagricultural water users and to new water service organizations. Typical prices in the Tucson and Phoenix AMAs have ranged from \$500-\$2,000 per acre foot between 1984-1991.

Numerous purchases of groundwater and surface water rights have taken place in Arizona outside of the Active Management Areas, mostly in western

Arizona. In 1984 the city of Scottsdale purchased the 8,400 acre Planet Ranch, with an estimated yield of 13,500 acre feet of surface water rights, for about \$900 per acre foot. The city hopes to transport water from the Bill Williams River to the CAP aqueduct, which would then carry the water to Scottsdale.<sup>18</sup> A series of acquisitions by real estate developers occurred in the 1980s, with prices ranging from \$550-\$950 per acre foot.

In 1986, the city of Phoenix purchased 16,000 acres in the McMullen Valley of western Arizona, for slightly over \$30 million. The city estimates that between six and seven million acre feet of recoverable groundwater are in the aquifer underlying the lands. The city plans to transfer approximately 30,000 acre feet of water per year to the city starting in the year 2005.<sup>19</sup> Since the McMullen Valley lies outside of Active Management Areas, legally Phoenix is free to pump as much water as it wants, so long as the water is being put to "beneficial use." However, under Arizona law, in principle, groundwater exporters can be held liable to pay damages to third parties who demonstrate that the export of the water is causing them harm.<sup>20</sup>

### Gila-San Francisco Basin, New Mexico

The Gila and San Francisco Rivers drain the southwestern corner of New Mexico. The Gila-San Francisco Basin is sparsely populated, but Silver City, a town of about 20,000 people, is located just on the other side of the Continental Divide. The Gila-San Francisco Basin effectively has been closed to additional groundwater appropriations since the late 1960s. New groundwater wells may still be developed, however, by converting a surface water right to a groundwater right and changing the point of diversion to the desired well location.<sup>21</sup> Since the 1960s, as changes in land use have created demands for water distant from old irrigation ditches, many surface water rights have been retired and exchanged for groundwater rights.<sup>22</sup> Water rights in the state of New Mexico are under the jurisdiction of the state engineer. Any change in the point of diversion, purpose of use or place of use of a water right must be approved by the state engineer.

Rights to the Gila and San Francisco river systems were adjudicated in the early and mid-1960s as a result of the settlement of the Colorado Basin lawsuit, *Arizona v. California*.<sup>23</sup> Approximately 30,000 acre feet of Gila and San Francisco River water may be used in New Mexico's Gila-San Francisco Basin. Until the mid-1960s, agriculture was the major user of water in the Gila-San Francisco Basin. The pattern of water use changed substantially in 1968, when a large mining company acquired land and approximately two-thirds of all the water rights in the Gila sub-basin. Developers and other buyers also have entered the market to acquire water rights.

Water rights purchases by area mines have constituted the largest volumes of water transferred during the 1970s and 1980s. Prices from these transactions are difficult to document, because mining companies generally are unwilling to disclose

information on their purchases and sales and prices for water rights are not a matter of public record. Data on private sales to the mines were made available from area realtors and sellers. The typical price for an acre foot for water rights ranged between \$1,500-\$1,800 in the early 1970s. Prices remained fairly constant until the late 1970s, when they rose to a range of \$2,000-\$3,200 per acre foot. Prices declined in the early 1980s to a range of \$1,100-\$1,400 per acre foot and rose again at the end of the decade to \$1,800 per acre feet in 1991.

### Summary of Market Descriptions

As these five examples illustrate, regional markets for water differ substantially from one another in terms of numbers of transactions, quantities of water traded and prices. Markets are heavily influenced by state laws which govern changes in water use and by conflict and litigation over water rights of Native American tribes, water for endangered species and water quality concerns.

### Water Markets And The Definition Of Fair Market Value

One definition of fair market value used in the appraisal profession is: "The most probable price, as of a specified date, in cash, or in terms equivalent to cash, or in other precisely revealed terms, for which the specified property rights should sell after reasonable exposure in a competitive market under all conditions requisite to fair sale, with the buyer and seller each acting prudently, knowledgeably, and for self interest, and assuming that neither is under undue duress".<sup>24</sup> There are several concepts included in this definition which require a careful interpretation when applied to water rights, and which must be adapted from their typical application to real estate.

First, in many areas of the west, the time period of "reasonable exposure" for a water right is one to three years. Potential buyers need time to satisfy themselves as to the legal and hydrologic characteristics of the water right. This often involves hiring an attorney and an engineering firm to assess:

1. the priority date of the right relative to neighboring water claims;<sup>25</sup>
2. its susceptibility (if any) to forfeiture or abandonment findings under state law;
3. ambiguities (if any) regarding title (title companies in some areas routinely exclude water rights from their policies);
4. the firm yield of the right during dry years (that is, the amount of water that can be used under the right when streamflows are very low);
5. the typical yield of the right during years of normal streamflow;
6. the probable quantity of water that could be transferred to new locations and uses (usually based on historic consumptive use);
7. threats to the exercise of the right stemming from litigation involving the stream or aquifer that is the water source for the right, endangered species, Indian water rights, Clean Water Act requirements, and so on;

8. financial, legal and engineering feasibility of conveying water to distant locations where its economic value is higher.

These inquiries typically take months and can take years for complex water acquisitions. Moreover, some potential buyers seek state approval for a transfer of the right to the buyers intended place and purpose of use before closing on the acquisition. The state approval process typically takes six to twelve months in Utah, Colorado, Arizona, and New Mexico. See Colby et al.<sup>26</sup> and MacDonnell<sup>27</sup> for a discussion of state procedures to review and approve changes in the place and purpose of use of a water right.

In addition to the lengthiness of reasonable exposure, water markets often deviate from markets for other real property in their "competitiveness," and this needs to be taken into account when evaluating fair market value. Water markets are typically "thin," meaning there are only one or two major water buyers in a region and there may be only a few potential sellers. It is not unusual for a water market to involve the one large city in an area as a buyer and a few farmers or a single irrigation district as potential sellers.<sup>28</sup> In some areas, a water right acquisition may only occur every few years, while in active areas there are several transactions a month.

The "undue duress" clause in the definition of fair market value also needs to be carefully interpreted with regard to water right transactions. Water acquisitions nearly always are motivated by some form of duress. Water utilities seek to acquire rights in order to prevent water shortages within growing service areas, to improve water quality so as to comply with state and federal regulations, or to replace water supplies that were lost or restricted through endangered species or other environmental litigation. Municipal, state and federal agencies, as well as environmental organizations, acquire water rights to preserve fish and wildlife habitat and wetlands.<sup>29</sup> Drought motivates water users to purchase senior water rights that are less vulnerable to dry year shortages. Water use and management are heavily influenced by state and federal regulations and by litigation. For instance, a California court ruling in the mid 1980s (the Mono Lake Case) required Los Angeles to find alternative water sources so that its diversions from the high mountain streams feeding Mono Lake could be reduced in order to restore the ecological balance of the lake and environs.<sup>30</sup> This precedent-setting decision paved the way for further administrative and judicial decisions that affected access to water sources and rights for agriculture, cities and other offstream water users. Water right acquisitions in the west also may be stimulated by litigation over Native American water claims which sometimes are satisfied by federal acquisitions of water rights. In short, water acquisitions are typically linked to some regulatory or judicial requirement and therefore are seldom entirely free of duress.<sup>31</sup>

The self-interest motivation included in the definition of fair market value also requires careful interpretation. Financial profit frequently is not the primary factor motivating a water acquisition. Many buyers are public utilities which do not earn profits, or are environmental groups or government agencies with fish, wildlife, water quality or hydropower responsibilities that must be satisfied. Where water acquisitions are made by businesses for investment purposes, profits tend to be based on a long term return, rather than realized in one or two years.<sup>32</sup>

Real estate professionals frequently must assess the value of water rights, either as a portion of the overall value of real property, or as a separate asset that is bought and sold apart from land.<sup>33</sup> Water right appraisals require understanding of the unique characteristics of the regional market and prudent application of fair market value concepts. Water rights have a longer period of "reasonable exposure" on the market than other real estate and water markets typically are less active and less competitive than land markets. Moreover, transactions seldom are free of duress. Water rights acquisitions are heavily influenced by regulation and litigation and a profit motive may be absent. State and federal agencies and courts frequently make decisions which affect the sources and types of water rights available to water users and their actions motivate water acquisitions by the private and public sectors. These important differences between water markets and markets for other real property influence evaluation of fair market value for water rights.

#### NOTES

1. American Institute of Real Estate Appraisers, *The Appraisal of Real Estate*, Chicago, 1987.
2. *United States v. Orr Ditch Water Company*, Equity Docket A-3, D Nevada, Final Decree (1944).
3. Personal communication with Gary Stone, Federal Watermaster for the Carson and Truckee Rivers, May 1, 1985.
4. McNeeley, "Economic and Institutional Aspects of Water Transfers in Northwest Nevada," *Agricultural Experiment Station Bull. B27* (1971).
5. Robert Firth, Policy statement regarding expansion of Sierra Pacific Power Company's water service territory. Presented to the Nevada Public Service Commission (1979).
6. Personal communication with Chris Chercos, city manager for the City of Reno, Nevada, Apr. 30, 1985.
7. Personal communications with Sandy Landeck, property management agent for the City of Sparks, Nevada, Apr. 29, 1985 and May 22, 1986.
8. See note 7.
9. See Colby, B.G., McGinnis, M. and Rait, K. "Mitigating Environmental Externalities Through Water Transfers: The Truckee Carson Basin." *Natural Resources Journal* 31:757-783, 1991.
10. Personal communication with Manuel Perez, managing engineer for the Intermountain Power Project, Delta, Utah, May 7, 1985.
11. Stewart, *Operations of the Water Rental Market, Delta Area, Utah*, Utah State University. (1965).
12. Hobbs, Northern Colorado Water Conservancy District, Memorandum (1986).
13. See Colby, B.G. "Transactions Costs and Efficiency in Western Water Allocation." *American Journal of Agricultural Economics* 72:1184-1192, 1990. for a summary of costs and delays associated with state procedures for reviewing water right transfer proposals.
14. Active Management Areas (AMAs) were created under the 1980 Groundwater Management Act. AMAs are designated

- management areas for controlling groundwater overdraft, augmenting water supplies, and encouraging more efficient use of existing water supplies (*Ariz. Rev. Stat. Ann.* §§ 45-411 (1986 Supp.)).
15. *Id.* at *Ariz. Rev. Stat. Ann.* §§ 45-141, §§ 45-463, and §§ 45-465.
  16. Personal communication with Karl Kohlhoff, water resources management for the city of Mesa, Arizona, Dec. 9, 1985 and Jan. 7, 1987.
  17. *Ariz. Rev. Stat. Ann.* §§ 45-471 (1986 Supp.).
  18. Personal communication with Leonard Dueker, executive assistant to the city manager, Scottsdale, Arizona, Dec. 9, 1985 & Feb. 10, 1987.
  19. Personal communication with Carrol Reynolds, planning engineer for the city of Phoenix, Arizona Water Department, Dec. 22, 1986. *See also* James M. Montgomery, Consulting Engineers, Inc., City of Phoenix Water Resources Study, McMullen Valley (1986).
  20. *Ariz. Rev. Stat. Ann.* §§ 45-544 & §§ 45-545. (1986 Supp.).
  21. Harris, *New Mexico Water Rights*, New Mexico Water Resources Research Institute, Miscellaneous Report No. 15 (1984).
  22. Personal communication with David Alison, Office of the State Engineer, District 3, Deming, New Mexico, Mar. 8, 1985.
  23. *State of Arizona v. State of California*, 373 U.S. 546 (1963).
  24. American Institute of Real Estate Appraisers, *The Appraisal of Real Estate*, Chicago, 1987.
  25. The doctrine of prior appropriation governs water rights in most western states and rests on two principles: First, priority of right is acquired by virtue of established use and, second, individual's rights are limited to the quantities they are able to put to beneficial use. The "first in time, first in right" principle gives senior water rights holders priority over junior rights holders in times of low stream flows. Various western states implement this provision in different ways and in differing degrees.
  26. Colby, Bonnie G., McGinnis, M., Rait, K., and Wahl, R. *Transferring Water Rights in the Western States: A Comparison of Policies and Procedures*. Natural Resources Law Center, University of Colorado, Boulder, 1989.
  27. MacDonnell, C.J. "The Water Transfer Process as a Management Option for Meeting Changing Demands." *Natural Resources Law Center Report*, University of Colorado, 1990.
  28. Howe, et al., Brown, et al., and Saliba and Bush discuss the extent and the implications of imperfect competition in a number of western U. S. water markets. Brown, L., McDonald, B., Tyseling, J., and DuMars, C. "Water Reallocation Market Proficiency and Conflicting Social Values." In, *Water and Agriculture in the Western U.S.* Gary Weatherford, ed. Westview: Boulder, Colorado, 1982. Howe, Charles W., Schurmeier, Dennis R., and Shaw, W. Douglas. "Innovative Approaches to Water Allocation: The Potential for Water Markets." *Water Resources Research* 22:439-445, 1986.
  29. See note 9.
  30. *National Audubon Society v. Superior Court of Alpine County*, 33 Cal 3d 419, 659 p., 2d 709, 189 Cal. Rptr. 346(1983).
  31. See, for instance, Colby, McGinnis and Rait, note 9, for details on court rulings and regulations that influence market transactions
  32. Colby, Bonnie G. "Recent Trends in Southwestern Water Values." *Appraisal Journal* 59:488-500, 1991.
  33. Colby, Bonnie G. "Alternative Approaches to Valuing Water Rights." *Appraisal Journal* 57:180-196, 1989.