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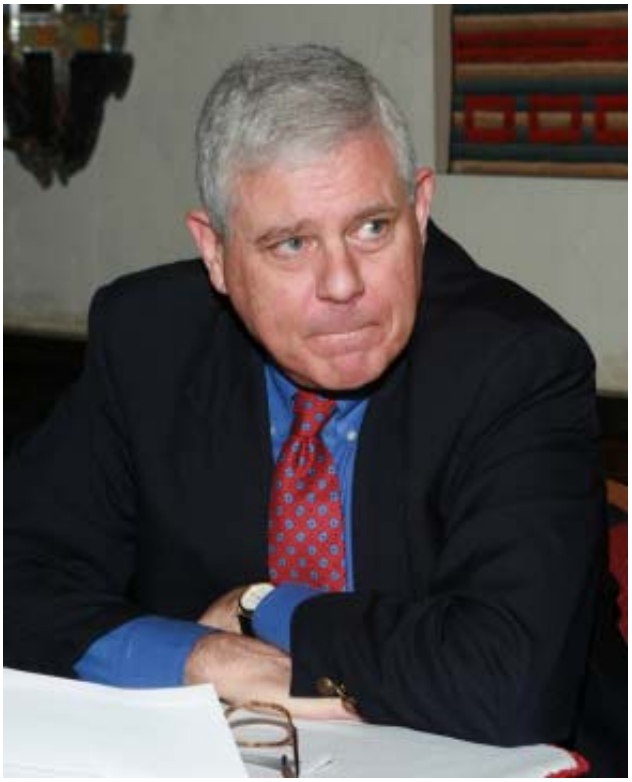

MARKET PRICES AS MEASURES OF WATER SCARCITY IN NEW MEXICO AND THE WEST

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Good afternoon. I'm pleased to have this opportunity to talk with you today about market prices for water and water rights in New Mexico and the West. Water limitations are increasingly shaping the way we live and work in this region, and the prices which emerge from the marketplace provide a socially important instrument in our collective management of this precious resource. Prices warn us when a commodity is in short supply, provide incentives to both conserve and seek additional supply, and guide us in reallocating it from uses that produce less economic value to those that produce more.

This afternoon I am going to report recent prices from various basins around New Mexico and other western states, draw a few conclusions about patterns in those prices, and then conclude with an assessment of just how well markets are functioning in measuring the relative scarcity of the resource. I have obtained price information for New Mexico from numerous sources on an ad hoc basis since there is no organized market or other mechanism for tabulating and reporting prices. In fact, as a non-disclosure state by statute, price information in New Mexico is proprietary, and it is increasingly difficult to obtain in the very places, for example the Middle Rio Grande, where it is most important. As a consequence, I cannot confirm the accuracy or timeliness of all of the prices I report. For basins in the rest of the western states, I have made

use of the Water Strategist, a California publication that regularly reports water transactions around the West.[1]

Before presenting and discussing the prices I have tabulated, I need to make two important distinctions about the units whose prices are being reported. First, we need to draw a fundamental distinction between sales of water rights and sales of what I term 'bulk water.' The latter term refers to the raw water commodity itself and is perhaps more commonly known in the trade as leased or rented water. Water transactions occur in both forms, and unfortunately occasional failures to carefully distinguish between the two have led to confusion and even litigation.

Second, water rights themselves are measured in different units across states and even across basins in the same state. In the Lower Pecos and Gila basins in New Mexico, for example, it is customary to refer to 'water right acres' as the number of irrigated acres to which a property owner holds water rights. In most other New Mexico basins, rights are measured in terms of the number of acre-feet of consumptive use per annum (afcu/yr) to which the owner is entitled. In the tables that follow, I have separated prices for water rights and prices for bulk water. And, in New Mexico at least, I have converted all prices to acre-feet of consumptive use per annum. I have not been able to determine the units of measurement used by the Water Strategist, though the publication does distinguish between sales of water rights and sales of bulk or leased water.

Table 1 reports recent prices of water rights across a number of basins in the West. I have ranked them roughly from the highest to the lowest price, treating the Water Strategist values as though they are based upon consumptive use rather than diversion. All of the New Mexico values measure consumptive use rights. I'm going to leave this slide up for you to review while I make a few observations about its content.

- The highest reported price consists of entitlements to recycled water, and the proceeds from the sale are used to pay for the recycling plant. Nevertheless, this appears to be a bona fide transaction which represents actual willingness to pay for water rights by a residential development on the Monterey Peninsula of California. Per capita income in the residential development is over $70,000, compared to around $30,000 for New Mexico and $54,000 for Los Alamos County, the latter having the highest per capita income in the State. This price of $250,000 per acre-foot per annum is the highest price I have personally seen reported.
- Prices in the Santa Fe tributaries are the highest in New Mexico and rival prices paid for Truckee River rights in the Reno/Sparks area of Nevada. While expensive, they are well below the Monterey Peninsula area.
- Generally speaking, prices of tributary rights are higher further up in the watershed compared to lower in it. That circumstance arises from the fact that you can transfer tributary rights to the main stem but not the reverse. Therefore, the tributary price should always be greater than or equal to the main stem prices, and if there is any development whatsoever in the tributary, the price there should be above the main stem. In New Mexico that behavior can be observed in the progressively higher prices in the Lower Pecos paid for water rights in the southern Rio Hondo, tributary to the Pecos.
- Let me call attention to the diverging prices in the Middle Rio Grande. There is now a premium being paid by buyers wishing to transfer water rights to the Santa Fe area. This greater willingness to pay is influencing the basin market generally but even more so it has driven up rights in Sandoval County, which don't face as many protests as do water rights transferred from Socorro County to the Buckman well field or direct diversion. The higher prices in the reported range for the upper portion of the Middle Rio Grande are being paid for rights in Sandoval County.
- It appears that prices paid for water rights to be transferred to the upper portion of the Middle Rio Grande have now passed comparable values in the Colorado Big Thompson (CBT) District in Colorado. The CBT is the State of Colorado's largest transbasin diversion project through the continental divide above Denver and is one of the oldest water markets in the West. It is noteworthy that (1) more CBT shares are now owned by municipal and industrial users than irrigators and (2) CBT shares were the object of speculative investment in the late 1970s and early 1980s, which caused the prices to increase to six times their previous value before falling back to the previous level. Subsequently, of course, prices there began climbing again but more slowly over time.

TABLE 1
RECENT PRICES OF WATER RIGHTS IN WESTERN STATES
(AF is acre-feet of consumptive use per annum in New Mexico; unknown otherwise)

STATE	PRICE RANGE (per acre/foot)	BASIN/DISTRICT	QUANTITY
CA	$250,000	Monterey Peninsula Water Mgmt District	6 AF
NM	$35,000 to $45,000	Santa Fe tributaries	various
NV	$5,500 to $45,000	Truckee River	1858 AF
NM	$20,000 to $35,000	Middle Rio Grande (upper basin use)	various
CO	$12,500 to $19,167	Colorado Big Thompson Project	844 AF
NM	$9,000 to $20,000	Middle Rio Grande (lower basin use)	various
NM	$10,500 to $14,000	Rio Hondo (upper tributaries)	various
AZ	$12,000 to $12,700	Prescott Active Management Area	136 AF
NM	$10,000 to $12,000	Taos tributaries	various
NM	$7,000	Rio Hondo	various
NM	$3,000 to $5,000	Lower Rio Grande	various
AZ	$2,000 to $3,000	Tucson Active Management Area	137 AF
UT	$800 to $2,500	Central Utah Water Conservation District	59 AF
NM	$2,300 to $2,400	Roswell Artesian Basin	various
TX	$2,000 to $2,250	Lower Rio Grande	281 AF
CO	$1,852 to $2,160	Little Thompson District	32 AF
TX	$2,000	Edwards Aquifer Authority	5572 AF
WA	$1,750	Cities of Olympia, Turnwater & Lacey	up to 7000 AF
AZ	$1,000 to $1,500	Phoenix Active Management Area	1111 AF
OR	$700	John Day River	1000 AF
OR	$302-$900	City of Madras	48 AF

- As a general statement, prices of water rights in New Mexico are somewhat higher when compared to other basins around the West. Nevertheless, there is considerable variation in prices from one basin to another in the State. But the low prices in Oregon have not been seen in New Mexico for a long time. In the early 1960s prices in the Middle Rio Grande were between $200 and $300 and were still stable around $4,000 as recently as the 2000 to 2002 period.
- The rapid escalation of prices in the Middle Rio Grande began around 2004 and is the result of numerous factors, in no particular order: (1) a change in State Engineer policy that now requires rights to be purchased in most of the basin before pumping rather than when the effect of pumping reaches the Rio Grande, (2) a sharp increase in building permits beginning in late 2003, (3) the limited supply of pre-1907 water rights, (4) an increasing number of protests, and 5) speculation.
- Prices along the main stem of the Lower Pecos prior to the Lease/Purchase program instituted by the New Mexico Interstate Stream Commission were about half of what they are now, due in large measure to that program. However, dairies and pecan farms have also contributed to the higher prices. Yet, even at current price levels, adjudicated rights in the Lower Pecos main stem are decidedly below Middle Rio Grande levels.
- Prices for groundwater rights in the Lower Rio Grande initially sold for around $500 shortly after the basin was declared and were still around $2,000 in 2002 before climbing recently.

Table 2 reports recent prices paid for bulk water in western states. Again, I have ranked them roughly in descending order of magnitude and, again, I have assumed that all units are in consumptive acre-feet. Let me make a few comments about these prices as well.

- The longer the term of the lease, generally speaking, the higher the price.
- Volume does not appear to make much of a difference.
- The Tucson and Flagstaff prices are for reclaimed water.
- New Mexico is generally in the mid-range of these prices.
- Prices per acre-foot are generally quite lower than the implied price of bulk water derived from prices of water rights. That is, if the water right is considered a capital asset that yields bulk water each year, then a 5%-10% return on capital would imply significantly higher prices for bulk water than the market is producing. For example, if a water right is worth on average, say $20,000 in the Middle Rio Grande, then with a 5%-10% rate of return an acre-foot of bulk water would be worth $1,000-$2,000. That is not the case. See CBT water particularly.

TABLE 2
RECENT PRICES OF BULK WATER IN WESTERN STATES
(AF is acre-feet of consumptive use per annum in New Mexico; unknown otherwise)

STATE	PRICE RANGE (per acre-foot)	BASIN/DISTRICT	TERM
OK	$645	City of Owasso, City of Bixty	40 years
AZ	$610	City of Tucson	long-term
NM	$500	Jicarilla/Santa Contract	50 years
AZ	$308 to $726	City of Flagstaff	long-term
CA	$90 to $300	San Joaquin River Exchange Contractors Water Authority	5-yr lease
TX	$30 to $500	Lower Rio Grande	1-yr lease
CA	$20 to $185	Mohave River Basin	1-yr transfer
NE	$100 to $125	Platte Republican Resources Area	10-15 yr lease
NM	$100	Carlsbad Irrigation District	1-yr lease
CA	$70 to $125	Department of Water Resources/Yuba River	1-yr lease
NM	$17 to $100	San Juan Chama Project	various short-term
OR	$30 to $86	Klamath Basin Water Bank	1-yr lease
TX	$75 to $80	Edwards Aquifer Authority	one year?
CO	$10 to $80	Board of Water Works of Pueblo Colorado	1-yr lease
ID	$5 to $39	Magic Valley	1-yr lease
WY	$3 to $40	Boisen Reservoir	1-yr lease
AR	$9	Arkansas Valley	1-yr lease

- Only the Jicarilla-City of Santa Fe contract and the Carlsbad Irrigation District lease approximate that rate of return. The former is due to be reset next year based upon market prices for water rights in the Middle Rio Grande.
- This divergence between market prices for bulk water and market prices for water rights only makes sense, however, if the expectation of market participants is that the price of bulk water will climb substantially in coming years.
- Alternatively, current market prices for water rights may contain a substantial speculative element.

With this empirical background available to us, let's turn now to the implicit question implied by the title of my presentation. Namely, are market prices doing a satisfactory job of measuring the scarcity of water? To get an answer, we turn to the situations in the Middle Rio Grande and Lower Pecos.

Given the new policy of the State Engineer that requires water rights to be acquired in advance of pumping, I think it is fair to say that demand for water rights can no longer be postponed and therefore offers no reason to believe the prevailing price is artificially low. What problems may exist instead occur on the supply side. Three factors stand out. First, in the absence of adjudication there is dispute over the stock of water rights that have been perfected and are therefore available for potential transfer. This dispute encompasses both pre-1907 rights and rights held by the Middle Rio Grande Conservancy District, not to speak of tribal rights. Second, we are currently substituting mined groundwater for renewable surface supply, and there are ample reasons to believe that groundwater is undervalued. Third, according to the most recent analysis of the Middle Rio Grande water budget by S.S. Papadopulos for the New Mexico Interstate Stream Commission,[2] the Middle Rio Grande faces a chronic deficit situation in deliveries under the Rio Grande Compact. To the extent that each of these factors affects the supply of bulk water and water rights, then the price signal emerging from the marketplace misrepresents the scarcity of water.

All three of these problems have existed in the Lower Pecos, so New Mexico's experience in addressing the problems there are instructive, though only by illustration since the parameters of the Lower Pecos are quite different from the Middle Rio Grande. Adjudication in the Lower Pecos is almost complete; the artesian aquifer is reasonably stable, and we appear to be finally resolving our problem of under-delivery under the Pecos Compact. As I reported above, the net result of the first and third solutions is that prices for water rights have about doubled, and prices of bulk water seem to be approximately in line with prices of water rights. Stabilization of the artesian aquifer dates to a much earlier time period, and it would take a more extensive analysis to see what price effect occurred as a result of the formation of the Pecos Valley Artesian Conservancy District and its actions to stabilize the aquifer.

In short summary, it would appear that prices in the Lower Pecos are good measures of water scarcity there, but that we have some work to do before that is the case in the Middle Rio Grande. Comparable analysis would be required for other basins.

[1]Water Strategist, published by Stratecon, Inc., P.O. Box 963, Claremont, CA 91711, www.waterstrategist.com

[2]"Middle Rio Grande Water Supply Study, Phase 3," S.S. Papadopulos & Associates, Inc., November 24, 2004