

**THE RULE OF CAPTURE, CHANGING PERSPECTIVES ON
WATER MANAGEMENT IN TEXAS, THE TRAGEDY OF THE
COMMONS, AND DEVELOPMENTS IN THE VALUATION OF
GROUNDWATER**

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CHAPTER 17

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THE RULE OF CAPTURE, CHANGING PERSPECTIVES ON WATER MANAGEMENT IN TEXAS, THE TRAGEDY OF THE COMMONS, AND DEVELOPMENTS IN THE VALUATION OF GROUNDWATER

INTRODUCTION

This paper is written from the perspective of a consultant whose background encompasses the fields of hydrogeology and economics. The author's objective is to address a number of issues related to the Rule of Capture doctrine and other matters of great interest to anyone involved in programs to market groundwater in Texas. The paper is divided into three parts: (1) the history of the Rule of Capture doctrine, (2) negative economic implications of the doctrine, and (3) a summary of transactions over the last decade. With regard to the first part of this paper, it is the author's intention to make a case that the Rule of Capture leads to waste and devaluation of groundwater.

PART 1: HISTORY OF THE RULE OF CAPTURE

Among the states of the southwestern and western areas of the United States of America, Texas stands alone with respect to the doctrine which grants access to and the use of groundwater. While most western states have adopted allocation programs based on systems of permits, correlative rights or prior appropriation, Texas has relied, instead, on the English Common Law principle of Absolute Ownership, also known as the Rule of Capture (ROC) as found in *Acton v. Blundell*, 12 M. & W. 324, 152 Eng. Rep. 1223 (Ex. 1843)) and subsequently restated in a case decided in 1861 in Ohio (*Frazier v. Brown*, 12 Ohio St. 294 (1861)). Under the ROC, landowners are granted the "right" to pump water from wells on their respective properties, notwithstanding the impact on others, provided that any pumping is (1) for "beneficial" use, (2) not a cause of environmental damage, and (3) neither for malicious nor wasteful purposes. A pumping right, under the ROC, does not allow a landowner to claim the right to a quantified volume of groundwater in storage beneath his property or to seek remedy in the courts for the drainage of groundwater beneath his property by other landowners.

The different water rights doctrines of the United States of America are explained in *Who Owns the Water: a Summary of Existing Water Rights Laws* (a 2003 Water Systems Council Report, available at http://www.watersystemscouncil.org/upload/bookstore/WSC_RIGHTS_03.pdf).

The Supreme Court of Texas enunciated the ROC in 1904 in *Houston & Texas Central Railroad Co. v. East* (98 Tex. 146, 81 S.W. 279 (1904)) and reaffirmed support for the doctrine over the next 95 years in several cases in which complainants sought to overturn or modify the doctrine in attempts to establish pumping limits. For a complete discussion of this history, the reader is referred to "History and Evolution of the Rule of Capture" by H.G. Potter, III, 2004, (Ch. 1, p. 10), in *100 Years of Rule of Capture: from East to Groundwater Management*, eds. William F. Mullican III and Suzanne Schwartz. Texas Water Development Board Report 361. Potter's paper is available at the following address: www.twdb.state.tx.us/publications/reports/GroundWaterReports/GWReports/Report%20361/1%20CH%20Potter.pdf

Ruling against the plaintiff in *East*, the Court quoted from the above-cited cases:

... the existence, origin, movement, and course of such waters, and the causes which govern and direct their movements, are so secret, occult, and concealed that an attempt to administer any set of legal rules in respect to them would be involved in hopeless uncertainty, and would, therefore, be practically impossible."

Furthermore, the Court ruled:

That the person who owns the surface may dig therein, and apply all that is there found to his own purposes at his free will and pleasure; and that if, in the exercise of such right, he intercepts or drains off the water collected from the underground springs in his neighbor's well, this inconvenience to his neighbor falls within the description *damnum absque injuria*, which cannot become the ground of an action.

The phrase *damnum absque injuria* (Latin) means "loss or damage without injury."

The Court's description of the flow of groundwater as "secret, occult, and concealed" has often been a source of pointed commentary by hydrogeologists in Texas (see Mace, R.E., Cynthia Ridgeway, and J.M. Sharp, Jr. (2004), "Groundwater is No Longer Secret and Occult – a Historical and Hydrogeological Analysis of the East Case," Ch. 5, p. 63-88 in **TWDB Report 361**.) The above paper (available at: rio.twdb.state.tx.us/publications/reports/GroundWaterReports/GWReports/Report%20361/5%20CH%20Mace.pdf) underscores what some have come to regard as a

sharp divide between the perspective of the legal establishment with respect to matters of groundwater evaluation and management, as opposed to that of hydrogeologists, who rely upon well-established principles of physics and hydraulics to describe, predict, and manage the flow of subsurface fluids.

The Conservation Amendment – Voters Throw a Monkey Wrench into the Works

In 1917, voters approved the Conservation Amendment of the Texas Constitution. (Const. art. XVI, § 59(a)) in the wake of droughts in 1910 and 1917. The amendment declared:

The conservation and development of all of the natural resources of this State ... and the preservation and conservation of all such natural resources of the State are each and all hereby declared public rights and duties; and the Legislature shall pass all such laws as may be appropriate thereto.

According to Potter (as cited above):

This constitutional amendment would become critical to water law issues confronting the courts from the time of its passage to the present and would form the basis for much of the judicial branch's reluctance to interfere with what it viewed as a legislative prerogative.

The Court, for example, cited the amendment in a 1996 ruling (*Barshop v. Medina County UWCD, et al.*, 925 S.W.2d 618 (Tex. 1996)). In *Barshop*, the Court determined that the State has the responsibility under the Texas Constitution to preserve and conserve water resources for the benefit of all Texans. **The effect of the ruling was to emphasize that the Legislature, not the Court, is responsible for natural-resource management** (emphasis added). (Refer to Bruce Wasinger, "Groundwater (Background & Recent Cases)," paper presented at Texas Water Law Institute – Water Law for the New Millennium; Austin, TX, Sept. 30 – Oct. 1, 1999. The paper is available at: www.bickerstaff.com/files/BEW_Groundwater_for_TWLI__Sept_1999_.pdf.)

In a case decided in 1999 (*Sipriano, et al. v. Great Spring Waters of America, Inc., et al.*, 1S.W. 2d 75, 77, 79-80 (Tex. 1999)) the Court commented on the Legislature's efforts to fulfill its responsibility for water management under the provisions of the Conservation Amendment:

By constitutional amendment, Texas voters made groundwater regulation a duty of the

Legislature. And by Senate Bill 1, the Legislature has chosen a process that permits the people most affected by groundwater regulation in particular areas to participate in democratic solutions to their groundwater issues. It would be improper for courts to intercede at this time by changing the common-law framework within which the Legislature has attempted to craft regulations to meet this State's groundwater conservation needs. Given the Legislature's recent actions to improve Texas's groundwater management, we are reluctant to make so drastic a change as abandoning our rule of capture and moving into the arena of water-use regulation by judicial fiat. It is more prudent to wait and see if Senate Bill 1 will have its desired effect, and to save for another day the determination of whether further revising the common law is an appropriate prerequisite to preserve Texas's natural resources and protect property owners' interests.

NOTE: Senate Bill 1 (SB-1) is a comprehensive water planning bill passed by the 75th (1997) Legislature primarily in response to a multi-year drought that wracked Texas during the 1990s. One, however, cannot overlook the effect of the Court's ruling in *Barshop* as a factor underlying passage of the bill. SECTION 1.01 of Senate Bill 1 amended SECTION 16.051 of the Water Code to read as follows:

No later than September 1, 2001, and every five years thereafter, the board shall adopt a comprehensive state water plan that incorporates the regional water plans approved under Section 16.053 of this code. The state water plan shall provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions, in order that sufficient water will be available at a reasonable cost to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the entire state.

The above language from SB-1 marks a sharp departure from the State's previous approaches to water management. In this writer's opinion, the program put into motion by SB-1 was the first step in a long process intended either to rectify the major shortcomings of the ROC or to develop a new doctrine

or set of doctrines governing groundwater rights in Texas.

The Court's rulings in *Barshop* and in *Sipriano* serve as much needed reminders that the Constitution of the State of Texas is the basis for the management of all of the State's natural resources. The rulings also served as stern messages to the Legislature that Representatives and Senators could no longer ignore problems associated with the ROC. It seems reasonable to infer that the Court will not intercede in matters involving the management of groundwater, as long as the Legislature takes seriously its obligation, as required by the Conservation Amendment, to manage the State's water resources for the benefit of ALL of the State's residents.

Attempts to Scuttle the Rule of Capture and the Emergence of Groundwater Conservation Districts

In 1949, the Texas Legislature authorized the establishment of "groundwater conservation districts" — GCDs. The establishment of GCDs was in response to recommendations in the 1930s and 1940s by the Texas Board of Water Engineers (TBWE), a predecessor of the Texas Water Development Board (TWDB), calling for a law to declare all underground waters of Texas to be waters of the State.

In his book *Land of the Underground Rain: Irrigation on the Texas High Plains, 1910 – 1970* (Green, D.E., 1973, The University of Texas Press, Austin, TX, p. 295), Donald Green quotes from TBWE's 11th biennial report (1934), which recommended a law:

... first to declare the underground water of the State to be the property of the State; second, to guarantee the vested rights of those who have already made beneficial use of underground water; and third, to exercise proper control over future underground-water development.

According to Green, TBWE reiterated, in its 13th report (1938), the recommendation to declare groundwater to be property of the State. This was followed by recommendations from urban and industrial interests who were concerned about falling water levels throughout the High Plains and other areas of Texas. Green also notes that bills dealing with State control of groundwater were defeated in the Texas Legislature in 1937, 1941, and 1947.

The issue of the control of groundwater came up again in the 1949 Legislative session, but opposition from High Plains irrigation interests was strong enough to defeat a proposal by the Texas Water Conservation Association (TWCA) that would have substituted a doctrine of Correlative Rights for the Rule of Capture

(Green, 1973). The Water Systems Council (2003, see reference above) describes the Correlative Rights doctrine as one which:

...maintains that the authority to allocate water is held by the courts. As a result, owners of overlying land and non-owners or transporters have co-equal or correlative rights in the reasonable, beneficial use of groundwater. A major feature of the Correlative Rights doctrine, however, is the concept that adjoining lands can be served by a single aquifer. Therefore, the judicial power to allocate water permits protects both the public's interest and the interests of private users.

Negotiations between the TWCA and the High Plains Water Conservation Users Association (HPWCUA) led to a compromise bill that allowed for the voluntary creation of locally controlled Underground Water Conservation Districts (now Groundwater Conservation Districts, or GCDs). According to Green (1973), HPWCUA members regarded the compromise as a capitulation by TWCA. Green (1973) quotes the editor of *Southwestern Crop and Stock*:

Until such time as they deem it necessary to call in state assistance to protect the water supply, **West Texans can consider the water their own — to use or to waste as they please.** (Emphasis added.)

What did the editor of *Southwestern Crop and Stock* think would be gained by a doctrine that encourages a landowner to turn a blind eye to the **waste** of groundwater, especially in a semi-arid region of the State?

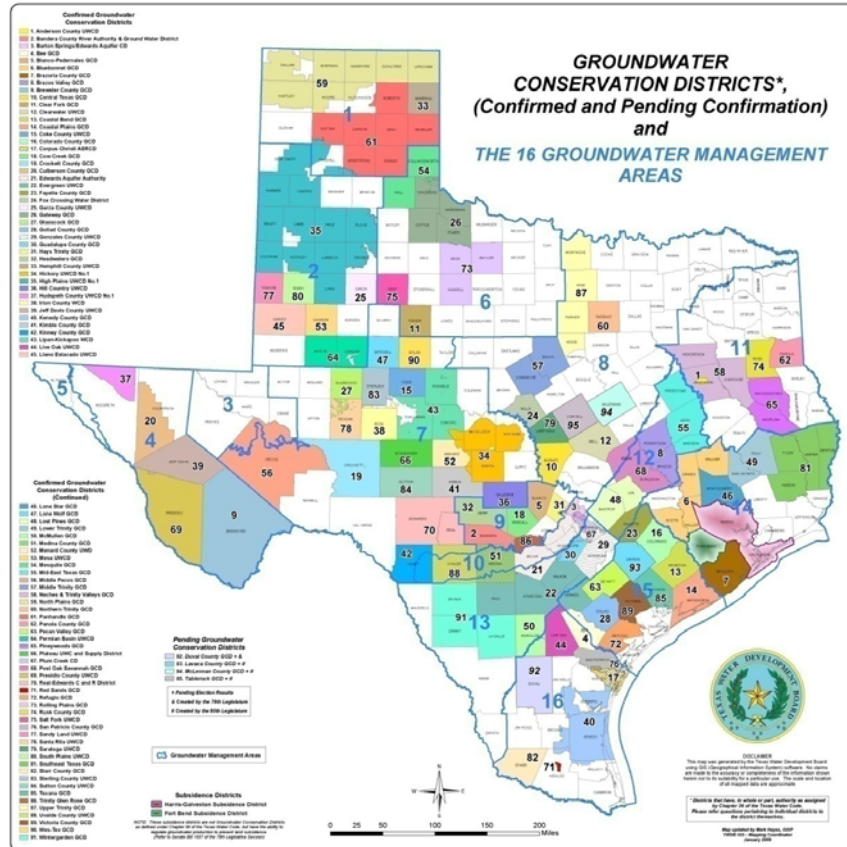
Under the 1949 law, GCDs could be established by special legislation or by a petition from landowners. In 1985, an amendment allowed TWDB and the Texas Commission on Environmental Quality (TCEQ) to recommend the formation of a GCD. As of 2009, there are 91 approved/pending GCDs (Figure 1). Most, however, are single-county districts, and there are still many counties of the State which are not under the jurisdiction of a GCD. GCDs are authorized to enforce the rules of Chapter 36 of the Texas Water Code by injunction or through the court system. A GCD's board of directors is authorized to levy civil penalties for violations of any of its rules.

A principal problem underlying the 1949 and 1985 GCD amendments was the failure to recognize that the flow of groundwater is not controlled by political, but by hydrogeologic, boundaries. Furthermore, there was no requirement to compel

GCDs overlying a common aquifer to develop a cooperative set of management plans. In most cases, there was no evidence that GCDs intended to develop plans that would have led co-operation or to minimal

departures from the ROC. Most GCDs, in fact, seem to have been committed to preserving the ROC under the guise of “local control.”

Figure 1. Groundwater Conservation Districts and Groundwater Management Areas



Groundwater Management Areas – A Step Beyond Groundwater Conservation Districts

As noted above, many GCDs were delineated on the basis of political — not hydrogeological — boundaries. Although the districts have been encouraged to work with each other to produce coherent management plans, prior to 2005, it was often the case that there was little interaction among the districts and that many GCDs pursued objectives which were not in sync with those of neighboring districts. To rectify shortcomings of the GCD system, the Legislature, in 2005, adopted House Bill 1763, which required joint planning among the districts within designated Groundwater Management Areas (GMAs) that cover all of the State’s major and minor aquifers.

The Legislature specified that TWDB was to use aquifer boundaries or subdivisions of aquifer boundaries in its delineation of each GMA. TWDB proposed 16 management areas (Figure 1), with boundaries which reflect those of the major hydrogeologic areas. (Mace, R.E., R. Petrossian, R.

Bradley, and W.F. Mullican, III, “A Streetcar Named Desired Future Conditions: The New Groundwater Availability for Texas;” presented at the 7th Annual *The Changing Face of Water Right in Texas*, State Bar of Texas, May 18-19, San Antonio, TX. The paper can be found at: www.twdb.state.tx.us/gam/03-1_mace.pdf.)

Under the provisions of the 2005 law, representatives of GCDs are required to meet at least once every year to conduct joint planning and to review groundwater management plans and accomplishments in their respective GMAs. The intended long-term effect is to get GCDs to work together under rules which will lead to a better understanding of hydrogeological conditions and the availability of groundwater throughout the State. From this, it is expected that coherent sets of regional management plans will be developed to ensure that groundwater resources will be available to residents of Texas through the year 2060.

**PART 2: ECONOMIC IMPLICATIONS OF THE
RULE OF CAPTURE – AN INTRODUCTION TO
THE TRAGEDY OF THE COMMONS**

Was anything ever to be gained by embracing the ROC as the principal groundwater doctrine of Texas?

Two factors which might be cited in favor of the ROC are:

1. The ROC encourages economic development through maximum utilization of a source or sources of groundwater; and
2. The ROC entails minimal government involvement in the operations of water wells.

It should be noted that “maximum utilization” is not synonymous with “optimal utilization.” Microeconomic theory emphasizes optimal over maximum utilization, as optimal utilization embodies the concept of economic efficiency, as measured by marginal cost/profit. Maximum utilization embodies neither. This is the equivalent of saying that one can produce a natural resource over a given period of time in a manner that would maximize total revenue (assuming that the marginal profit of the last unit produced is zero) instead of producing the resource over a shorter period of time, such that the production schedule fails to yield a marginal profit of the last produced unit of zero. With respect to the exploitation of nonrenewable natural resources (e.g. gold, oil, uranium), this is best explained by Harold E. Hotelling’s theory of the mine (The Economics of Exhaustible Resources, in *The Journal of Political Economy*, v. 39, pp. 137–175 (1931)), in which Hotelling postulates that optimal resource exploitation is achieved when the marginal profit of the last extracted unit is zero. Although Hotelling’s theory is most often applied to mining operations, it is reasonable to extend the theory to an exhaustible or potentially exhaustible resource, such as groundwater.

With regard to the second point above, there is nothing in economics to suggest that unfettered exploitation of a natural resource such as groundwater is economically efficient or amounts to sensible resource management. With respect to groundwater, “minimal government involvement” might be required to prevent over-exploitation, depletion, contamination, and, insofar as groundwater can be considered to be a “public good,” promotion of the health, safety, and welfare of the public.

Factors which might be cited as reasons to amend or replace the ROC with a different groundwater rights doctrine are:

1. The potential for overproduction and depletion;

2. Inefficient use and devaluation of the resource;
3. The potential for a Tragedy of the Commons; and
4. The ROC ignores the needs of future generations.

Points 1 and 2 are well-established consequences associated with the aggressive exploitation not only of water but of other natural resources that can be considered to form a commons (e.g., petroleum reservoirs, “forests, rangeland, and parks). As such, both are factors that underlie the devaluation and/or destruction of a commons, cited as point #3 above. An example of points #1 and #2 is found in the petroleum industry of Texas, particularly in the overexploitation of early giant fields such as Spindletop (Figure 2).

Discovered in January 1901, Spindletop attracted thousands of speculators and producers to Beaumont, Texas. Each producer sought to extract as much oil as possible from his small lease, under the assumption that other producers would drain “his” oil if he did not produce it first. The result was a proliferation of closely spaced drilling rigs, each producing from the same reservoir. The effect of the production frenzy was rapid depletion of reservoir pressure and rapidly decreasing output. Initial production was as much as 100,000 barrels of oil per day, and total production in 1902 was 17,500,000 barrels (47,945 barrels per day). By 1904, total production was 3,650,000 barrels (10,000 barrels per day) (<http://www.tshaonline.org/handbook/online/articles/S/dos3.html>).

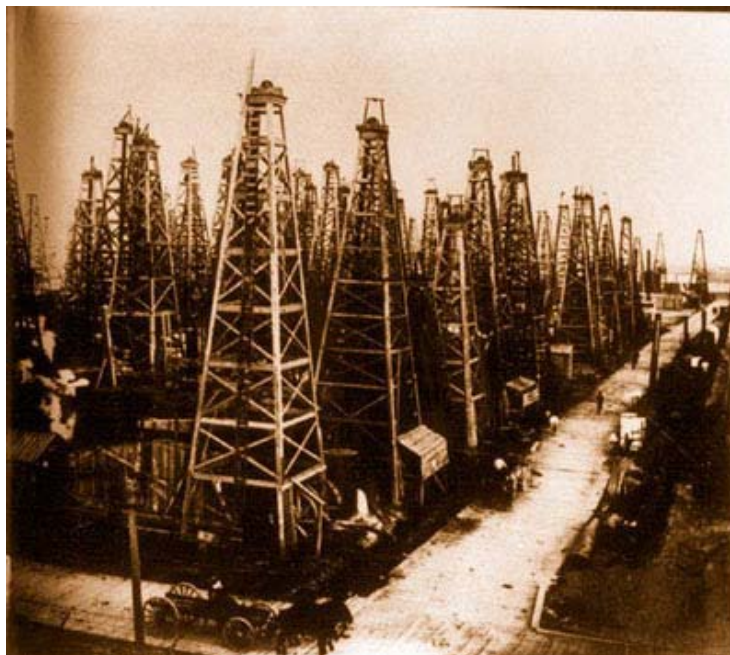
The Big Oil Fields website (<http://www.bigoilfields.com/texaswithouthoil.html>) notes the following:

Mineral rights to the oil under the leases worked according to the old English “rule of capture.” Under this principle, anybody who had property or a lease anywhere over the pool of crude had the right to suck it out of the ground as fast as he could.

With little understanding of the underground pressures of natural gas and water, the producers extracted too much oil too quickly. Water seeped into the reservoir. The flow of oil forced to the surface by pumps slowed to a trickle.

The original production area of Spindletop had been reduced to a minor oil field by 1909.

Figure 2. Spindletop oil field as seen along Boiler Avenue, 1903



Point #4 is a much-discussed and debated matter involving obligations of one generation to its successors. Given the opportunity to exploit aquifers, petroleum reservoirs, forests, and rangelands, it is reasonable to inquire whether the current generation has an obligation to generations yet to come to ensure that adequate resources will be available or that public lands will not be degraded from overuse.

Definition of a Commons and the Tragedy of the Commons

A "commons" is any resource which is used as though it belongs to all. An aquifer would easily qualify as a commons. If anyone can use a shared resource simply because one wants or needs to use it, then one is exploiting a commons. A commons can be destroyed by uncontrolled use.

Garrett Hardin described factors that underlie the destruction or degradation of a commons in his essay "The Tragedy of the Commons." (Refer to Science, Vol. 162, No. 3859, Dec. 13, 1968. The paper is also available at: www.sciencemag.org/cgi/reprint/162/3859/1243.pdf.)

Hardin's essay is developed around a parable about the grazing of animals on open pastureland. The owners of the animals are motivated to increase their personal wealth by adding one head of stock at a time to their respective flocks. However, each animal added to the total stretches the carrying capacity of the land. The degradation attributable to each additional animal

is small, yet if all owners pursue this strategy, the carrying capacity will be exceeded and the property severely damaged or destroyed. It is not necessary for all users of a commons to behave as described by Hardin. The destruction of the resource can occur if only one user attempts to dominate the commons.

Comanche Spring

One such example of damage to a commons involving the production of water is the matter of Comanche Spring, located at Fort Stockton, Texas (Figure 3). Comanche Spring was a source of water for animals and humans, and the substantial discharge (estimated to be as much as 21 million gallons per day (Mgd)) made the spring a hunting ground for Indians and an ideal location for an army post and a stagecoach stop. The spring also provided water for irrigation, and, in later years, it was the site of a large pool in a municipal park. The spring, however, ceased to flow in the early 1950s as a result of one landowner's pumping to support irrigation.

Figure 3. Photo of Comanche Spring pool before the spring ceased to flow.
The estimated daily discharge was 21 Mgd.



In “A Primer for Understanding Texas Water Law,” Timothy L. Brown describes the facts and legal issues at the core of the matter. (Brown’s paper can be found at: www.geo.utexas.edu/courses/391/Wat%20Law%20Primer.doc). The Comanche Spring case (*Pecos County Water Control and Improvement District No. 1 v. Williams*, 271 SW2d 503 (Tex.Civ.App–El Paso 1954, writ ref’d n.r.e.) is prominent in Texas water law. Brown’s account of the matter is reproduced below:

At Fort Stockton, Texas, there were large, prolific springs, named Comanche Springs. The springs provided a water supply for numerous irrigators in the Pecos County Water Control and Improvement District, which upon development, supplied water to irrigate over 6,000 acres.

Up gradient from the springs was land owned by Clayton Williams (Sr.) At the time the case arose, Texas was in the early stages of the Great Drought of the 1950s and Williams needed water for his crops. He developed a well field and began to pump water from the formation. The pumping resulted in drying up the springs, which cut off the water supply for the irrigators in the district. Litigation followed.

The irrigators asserted that they and their predecessors had owned the location and flow of the spring and that they had used the water beneficially for ninety years. By virtue of this, they alleged, they acquired the right to be protected in the subsurface source of the water. They also plead in the alternative

that if they did not own the source of the water supply, they were nevertheless entitled to a fair share of the source of supply. The gist of this argument was that they had a correlative right to the water. They also alleged that the spring was not fed by percolating groundwater, but rather by a well-defined underground stream in which they acquired rights by virtue of claims filed with the Board of Water Engineers. The remedy they sought was an injunction against Williams’ pumping.

Williams countered by filing exceptions to the plaintiffs’ petition. He asserted that the water was percolating groundwater and since no waste had been alleged, he was entitled to a judgment on the basis of the *East* case. He also asserted that the plaintiffs’ allegation about a well-defined underground stream was insufficient because the source, location, beds and banks and course of the so-called well-defined channel were not provided. The trial court sustained Williams’ exceptions. The irrigators appealed.

The El Paso Court of Civil Appeals affirmed the trial court judgment. The court held that Williams absolutely owned the water beneath his land and the plaintiffs had no correlative rights in it. As to the general allegation about the well-defined stream, Williams’ exceptions were well taken because there was no evidence to support the proposition. As to the failure of the spring when Williams pumped, that did not prove the existence of a well-defined underground channel.

On appeal to the Texas Supreme Court, the plaintiffs attempted to avoid the effect of the *East* case with an interesting argument. The argument was that the percolating groundwater referred to in the *East* case did not include water moving in well-defined underground strata. Percolating groundwater, according to modern hydrology, is divided into two classes: first, “diffused percolating water,” defined as slowly moving water which cannot be traced directly as the source of a natural stream, and, second, “percolating water feeding a natural water course,” defined as water which supplies a surface water stream. The former definition was what was used to define percolating groundwater at common law, so *East* did not apply.

The significance of this argument was, if the Supreme Court adopted the definitions, *East* would have been stripped of its significance. This is because the facts about most groundwater are known or subject to being known. Thus, once groundwater reached a known water sand, it would no longer be percolating water subject to private ownership as provided by *East*. This comports with the Attorney General’s earlier opinion.

The Supreme Court declined to take the case and did not write an opinion. By declining to take the case, we can only infer that the Supreme Court apparently rejected the proposition.

The Comanche Spring case stands out as an example of the destruction of a commons for several reasons:

1. By 1954, hydrogeology had advanced enough since the formulation of Darcy’s law in 1856 that the fundamental principles of hydrostratigraphy and the flow of groundwater on local to sub-regional scales were well understood.
2. By 1954, the effects of pumping on water levels were also well understood, many thanks to the work of hydrogeologists and civil engineers with the Water Resources Division of the United States Geological Survey.
3. Arguments that Comanche Spring was fed by “percolating water” (as understood in the *East*

case) instead of “water moving in well-defined underground strata” (as made on appeal) were clearly absurd. All that was required to counter the claims of Williams’ attorneys was an investigation of the hydrostratigraphy of the area, measurements of water levels in wells between Williams’ property and properties downstream of the spring, and evaluation of drawdown and recovery from pumping tests.

4. Williams’ pumping caused water levels to fall below the discharge point of the spring, and the lower water levels led to the cessation of discharge. This amounted to as much as 21 Mgd of captured flow to support Williams’ farm and to the loss of water to support irrigation on 6,000 acres that had been sustained by spring flow for many years. This effectively gave Williams a monopoly over a commons that had served a great many people for at least 90 years.
5. The cessation of flow also destroyed a rare water resource in west Texas and denied residents of Fort Stockton and the surrounding area the recreational and aesthetic equivalent of the springs of Balmorhea (Reeves County) or Barton Springs (Travis County).

Your author has not attempted to calculate the total economic loss stemming from the destruction of what might be referred to as the Comanche Spring commons. Suffice it to say that the losses were and remain significant, particularly in the form of lost agricultural production and incomes, and losses to the City of Fort Stockton associated with the recreational and aesthetic values of the spring. It is far easier to calculate economic damage caused by the loss of irrigation water, than it is to place a dollar value on the loss of a recreational and aesthetic resource to a city. Imagine Zilker Park and Austin without Barton Springs, and then ask yourself what is the value of the springs at the park to the City of Austin and to Travis County.

PART 3: THE ECONOMICS OF GROUNDWATER TRANSACTIONS IN TEXAS

With the advent of water planning in Texas and the realization by many landowners that looming water shortages will lead to efforts by cities and many areas of the State’s industrial sector to acquire secure sources of water, the interest in selling Edwards Aquifer water rights or pumping rights in areas under the ROC or in negotiating leases or supply contracts has grown substantially in the last decade. One of the first questions many potential sellers of groundwater ask is:

“What’s my water worth?” On the buyers’ side, the question is: “What’s it going to cost me to purchase that water or that landowner’s water right?”

It remains difficult to answer, with certainty, either of the above questions, especially in ROC areas, because there is not a discernible sense of order underlying most groundwater transactions. The reason for the uncertainty is that, outside of the southern Edwards Aquifer region, Texas lacks two of the most fundamental of components required for an efficient groundwater market to function: (1) a system of assigned, quantified, and transferable water rights recognized and enforced by the State, and (2) a means of making information on transactions available to all potential buyers and sellers. Information that participants need to make well-reasoned assessments of the market value of groundwater is not easily found, and there are very few consultants who follow transactions closely enough to have a clear understanding of market conditions and organization among sellers and buyers.

Each side brings its expectations to the bargaining table, hoping to negotiate the best possible deal. Unfortunately, it is not uncommon for speculation and misinformation to trump common sense. Applying economists’ standard linear supply-demand curves to groundwater transactions, one might conclude that selling groundwater in Texas is a guaranteed way to get rich. For some, that might be the case now, but for many others, the prospects might be better over the long run ... the very long run.

Before reaching conclusions about the market value of groundwater in any area of Texas, buyers and sellers should take heed of the lack of any defined market value for groundwater in the State. There are, instead, many potential market values driven by many factors that influence marketability. Landowners and water entrepreneurs often don’t consider these facts when first entertaining the thought of selling water or buying/selling water rights.

Any attempt to assign a market value to groundwater in one region of Texas based on prices in other regions of the State is not advisable. Accomplishing this task requires an understanding of variable market structures, market conditions, geology/hydrology, and the relative bargaining power of parties within the different regions of the State. Texas is very large and the population is highly concentrated in major urban areas. Hydrologic conditions are often so different from one region to another that it is advisable to break the whole up into smaller parts. All these steps are essential to developing a reasonable understanding of the factors which drive differences in market value both between and within regions.

For many years, groundwater in Texas had minimal established value, apart from its association with the overlying land. A standard practice of cities and industries was to acquire enough property to develop a well field, then to pump whatever water was needed to meet their respective requirements. This was possible under a strict interpretation and application of the ROC. The cost of groundwater was associated with the cost of the land, the well, the pump, the pipeline, and the electricity or the fuel needed to power a pump.

Determinants Of Marketability And Market Value

With a reasonable degree of certainty, one can identify at least eight factors which seem to be significant determinants of marketability and of the market value of groundwater in Texas. These factors are listed below, not necessarily in order of importance:

1. Number of Competitors for the Resource: Competition for groundwater should drive up the price of the resource. If there are few major users of groundwater in a region, then negotiated prices could be much lower than expected by landowners.
2. Number of Known Sources of Groundwater and Sellers of Land, Water Rights or Water: Competition among sellers, all other things being equal and assuming one major buyer or minimal competition among buyers, should act to lower price. Alternatively, if sellers are able to organize a groundwater cartel, then their bargaining position should be stronger and prices negotiated for water or water rights could be higher than under purely competitive conditions among suppliers.
3. Volume of Recoverable Water and Estimated Life of the Resource: Land with a large volume of water in storage *might* command a higher price than land with a small volume of recoverable groundwater. In addition, property overlying an aquifer which is recharged quickly *might* command a higher price than a property which lies above a “mined” aquifer. [A “mined” aquifer is for which the rate of withdrawal exceeds the rate of recharge.]
4. Proximity of the Resource to the Purchaser: Transporting water long distances can be very expensive.
5. Expected Costs of Installing Wells and Other Production and Treatment Facilities.

Infrastructure can add substantially to the total cost of a project.

6. **Estimated Production Costs and the Quality of Groundwater:** The investment required to develop a resource and to maintain, transport, and treat groundwater *might* be sufficient to justify a lower offer price, in the absence of other competitors, where the quality of the groundwater is an issue for the end user.
7. **Regulations Limiting the Volume of Water:** Regulations which limit the volume of water that can be pumped from an aquifer or which impose spacing requirements for wells must be taken into account, as such rules have the effect of amending/modifying the ROC.
8. **The Value of Agricultural Production Attributable to Irrigation:** Many farmers are potentially large suppliers of groundwater. They own land over aquifers which are capable of producing large volumes of water. In such cases, the value of groundwater can be related to the market value of crops if irrigated land is involved. For a landowner, the sale of groundwater or a water right represents an opportunity cost associated with the potential loss of income from irrigation. The sale of groundwater or of a landowner's water right (assuming no duress) should generate sufficient income to cover, at least, the income or any other income associated with the on-property use of groundwater or sale of groundwater for other uses.

It is not possible to precisely quantify the relative significance of each of the above factors in a transaction involving groundwater. Furthermore, one should not expect any factor to carry the same weight across Texas' many regions. While economic models typically assume access to information and rational behavior by buyers and sellers, few parties to a Texas water negotiation can claim access to all relevant information. Furthermore, there is no guarantee that all participants in a transaction will behave rationally even if all have access to the same data.

Overview of Groundwater Transactions

The author reviewed groundwater transactions in Texas over the period 1999 – 2008, as reported by *Water Strategist* (www.waterstrategist.com) and as recorded in notes of transactions for which he has offered advice to sellers or to purchasers of groundwater. Most of the groundwater transactions during these years took place in central, south, and

west Texas. Leases outnumbered sales, with lease terms typically ranging from 5-to-10 years.

Nearly all groundwater transactions involved leases of groundwater or the acquisition of groundwater rights to support municipal uses. Sales to industrial or agricultural interests were less common. Most lease prices for municipal use ranged from \$66 - \$77 per acre-ft per year, but the San Antonio Water System acquired Edwards leases for \$130 per acre-ft within the last year. Transactions involving the sale of groundwater rights (with no transfer of the surface estate) range from \$270/AF (Canadian River Municipal Water District) to \$250/acre (Mesa Water). In Central Texas, water rights associated with land overlying the Edwards aquifer sold for \$700 per acre-ft 10 years ago, then rose to \$1,750 to \$2,000 per acre-ft by 2005, and broke \$5,000 per acre-ft within the last two years. There have been a few undocumented sales of Edwards Aquifer rights of \$10,000 per acre-ft within the last year. If there is any doubt that a system of assigned water rights leads to higher market values for groundwater, then one need look no further than the disparity between prices for southern Edwards Aquifer groundwater rights and prices reported for groundwater in areas still under the ROC.

Clearly, there is no established market value for groundwater in Texas. It is necessary to consider the mix of factors outlined above before reaching any conclusion about current or future lease prices and permanent transfers of water rights. Such exercises are not trivial, especially where an outright purchase is involved transferring a water right in perpetuity. Nevertheless, many landowners are now looking at groundwater, which has traditionally been used to support ranching and farming operations, as a resource with potentially greater market value than associated with its traditional uses.

Final Comments

Expect market values of groundwater in many areas of Texas to rise over the next decade. This will be in response to efforts by cities and regional water authorities to acquire secure sources of water to meet projected long-term needs. As noted above, there are many factors which influence sales prices. For the foreseeable term, it is highly probable that landowners will prefer leases with terms of 5-to- 10 years, rather than longer-term leases or sales. This strategy will be an outgrowth of expectations by landowners that market values will continue to rise as the population of the state grows and as major users try to lay claim to secure supplies to avoid shortages and economic problems stemming from supply shortfalls. Buyers and sellers of groundwater would be wise to take stock of existing resources and the number of competitors and potential suppliers of water. Other factors to consider

include projections of water demand by the Texas Water Development Board and negotiated lease and sales prices, although such data can be difficult to find without the assistance of a consultant. It is advisable to assess both demand-side and supply-side structures and market conditions. By assembling reliable information, one can enter into negotiations as a well-informed participant, bargaining from the strongest position possible.