Groundwater Exploitation in the High Plains

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The right to pump and use groundwater in the High Plains states is dependent on the legal framework that has gradually evolved in each state over the past century or so. Most jurisdictions apply different rules of law to surface water in streams, atmospheric moisture, surface runoff or diffused surface water, and underground water—all evidence of a failure to recognize the interconnected nature of water moving in the hydrologic cycle. The result is a veritable hodgepodge of unrelated and often competing water rights. The water law concerning these various classes of water developed as the ability evolved to use each class effectively. Thus, the law of surface water rights is much more detailed and voluminous than that pertaining to groundwater, which in turn is much more voluminous than that concerning atmospheric moisture.

A massive common aquifer, the Ogallala formation, underlies the largely semiarid High Plains states of Texas, New Mexico, Oklahoma, Colorado, Kansas, and Nebraska. Even though they share this common resource in a similar environment, the groundwater law in these states could hardly be more diverse. In each state the legal institutions that control the ownership and allocation of groundwater are usually a complex blend of early common-law principles expressed in court decisions. Common law prevailed until the state legislatures developed statutory frameworks, which often modified or supplanted the preexisting legal principles. Further, administrative policies of state and local agencies have provided still more specific regulation. The allocation of water resources is generally controlled by the states, and essentially no body of federal regulation oversees the use, management, and conservation of groundwater except as it relates to interstate diversion and to the regulation of interstate commerce.

From the perspective of a geographer/lawyer I shall discuss the groundwater law of the six High Plains states, focusing on key court decisions that have interpreted the common law and on a growing body of legislative statutes and administrative regulations. Generalizations about water-law systems are difficult, can be misleading, and of necessity
many specifics must be omitted. Nonetheless, this study should make evident the more significant differences and similarities among the several states.

TEXAS GROUNDWATER LAW

Texas courts generally divide subsurface water into two legal classes: (1) water flowing in well-defined underground streams and (2) percolating groundwater (Hutchins 1961). It is extremely difficult to prove the existence of water in definite underground streams, and the law concerning it is not well established. If proven, the water would probably be subjected to the same rules as surface streams, with the same kinds of public and private rights attaching. However, Texas courts presume that all groundwater is percolating (Templer 1976).

Corwin Johnson (1982a), a leading water-law scholar, has observed that Texas groundwater law is striking in its "paucity" when compared to surface water law and in its "uniqueness" when compared to the groundwater law of other western states, including the five other High Plains states. Many western states once recognized the common law or "English" rule, which gives the overlying landowner the right to capture and use percolating groundwater beneath the land. Currently, only Texas and some eastern states still retain the common-law rule; the other High Plains states have developed greatly contrasting and diverse groundwater-law systems.

The common-law rule was firmly established shortly after the turn of this century by the Texas Supreme Court in Houston & T. C. Ry. Co. v. East (1904). Under this rule, the overlying landowner may, in the absence of malice or wanton conduct, capture and use the water beneath the land, whatever the impact may be in depriving adjoining or more distant water users of underground or surface water supply (Templer 1976, 1978, 1989a, 1989b). This landmark case involved a groundwater dispute in Denison, north of Dallas, in the humid eastern half of Texas. The defendant railroad company dug a large well on its property and pumped about 25,000 gallons per day (gpd) to supply its locomotives and shops, a minuscule amount by today’s standards. As a result, the plaintiff’s shallow well went dry, and he sued the railroad. In deciding in favor of the railroad, the court relied on an 1843 English case, Acton v. Blundell, and an 1861 Ohio case, Frazierv. Brown, which was quoted with approval in East:

as between proprietors of adjoining land, the law recognizes no correlative rights in respect to underground water percolating, oozing,
or filtrating through the earth; and this mainly from considerations of public policy: 1) because the existence, origin, movement, and course of such waters ... are so secret, occult, and concealed that any attempt to administer any set of legal rules in respect to them would be involved in hopeless uncertainty, and would therefore, be practically impossible.

In the *East* case, it was concluded that

the owner of the land is the absolute owner of the soil and percolating water, which is a part of and not different from the soil.

Since that time, the rule has not been modified to any great extent though it has been elaborated and clarified in a few subsequent court decisions (Tex. Water Dev. Bd. 1968), and it is now established that

1. landowners can dispose of their groundwater rights by sale as with any other type of property;
2. groundwater can be used on the land from which it is pumped or away from that land;
3. and, by firm presumption, all groundwater is percolating, unless clear proof exists to the contrary of the presence of a well-defined underground stream, a very difficult burden of proof that has never been sustained in Texas cases.

A half-century after the *East* decision, the Texas Supreme Court considered another important groundwater case, *Corpus Christi v. Pleasanton* (1955). During the prolonged South Texas drought of the early 1950s, the city of Corpus Christi purchased groundwater produced from the Carrizo-Wilcox formation in Atascosa County. The discharge from four large artesian wells, approximately 10 million gpd, was allowed to flow down the dry bed of the Nueces River for over 100 miles to Lake Corpus Christi and the city water-intake plant. This unrestricted flow diminished the underground water supply of adjacent landowners and nearby towns. Evidence indicated that as much as three-fourths of the water was lost to evaporation and seepage before reaching its final destination. Plaintiffs contended that this was wasteful use under statutes controlling waste of artesian groundwater, but the court upheld the common-law rule (Templer 1976).

More recently, the Texas Supreme Court had another occasion to examine the common-law rule in *Friendswood Development Company v. Smith-Southwest Industries, Inc.* (1981). This decision also reaffirmed the basic doctrine of *East*, but it was admitted in the opinion that "some aspects of the English or common law rule are harsh and outmoded." *Friendswood* was a suit for damages by landowners who alleged that
surface subsidence of their lands was caused by the defendants’ pumping of groundwater for industrial purposes. The court did decide, however, that in future cases of land subsidence caused by withdrawals of groundwater, liability would be imposed for damages resulting from negligent pumping (Johnson 1982b; Kenyon 1979). In the Friendswood case, the court took great care to limit its decision to cases of damage resulting from surface subsidence, a significant problem only along portions of the Texas Gulf Coast (Graf 1982b). In sum, groundwater law as developed by Texas courts has undergone only minor modification, remaining almost static for nearly nine decades.

Underground Water Conservation Districts

The need for some form of groundwater management has long been recognized in Texas, and in 1913 the newly created Texas Board of Water Engineers pointed out the desirability of regulation. Not until the 1930s, however, when irrigation using groundwater in the state was rapidly expanding, did this need become more widely recognized. Demands for regulation to prevent overdevelopment and waste were made repeatedly, and legislation that might have accomplished these objectives was unsuccessfully introduced in 1937, 1939, 1941, and 1947 (Templer 1976). Finally, in 1949 a statute passed (Texas Water Code 1981, chap. 52); providing for the establishment of local underground water conservation districts (UWCDs). Green (1973) and Rayner and McMillion (1960) explored the difficulties of passing this law and the history of the early districts’ formation.

These local districts exercise virtually the only control over landowner rights, though the validity of private groundwater rights is specifically acknowledged in the statute. In addition to the districts formed under this general law, special legislation has created other entities, some with powers and responsibilities considerably different from those of general-law districts (Templer 1978, 1983a).

Since the passage of the 1949 UWCD statute, the most significant revision of Texas groundwater law occurred in 1985. The legislation was part of a comprehensive water package designed to implement the 1984 revised Texas Water Plan, and it addressed many long-standing surface- and groundwater problems as well as bay and estuary protection. The 1985 groundwater legislation applies only to general-law UWCDs and not to districts created by special legislation. Its most significant provisions are as follows:

1. It eliminates the requirement that UWCD boundaries coincide with those of an aquifer or an aquifer subdivision, allowing other factors such as political boundaries to be considered.
2. As had long been recommended by local district advocates (Graf 1985), it expands the powers of general-law UWCDs to sell and distribute surface or groundwater and to exercise the power of eminent domain in some instances. Further, it expands the jurisdiction of UWCDs to smaller wells, including those capable of producing 25,000 gpd or more.

3. Most important, it authorizes the state to designate "areas with critical groundwater problems" and to push for creation of UWCDs in these areas. The Texas Water Commission (TWC) is empowered to establish a regional advisory committee, prepare a report on regional groundwater problems, recommend creation of a UWCD, hold local hearings, and eventually order an election in which local voters decide whether to establish a UWCD (Templer 1987).

The reforms of the 1985 legislation demonstrate that the state of Texas remains committed to the local district approach to groundwater management. Until recently, only a few districts had been formed under the 1949 statute or by special legislation. Prior to 1985 twelve UWCDs had been created, and most of these older, larger, multicounty districts were formed under the general law, commonly acknowledged to be a lengthy and cumbersome procedure. The pace for creating the districts accelerated in 1985, probably in partial response to the new legislation. Two new UWCDs were created in 1985, including one that replaced a smaller, preexisting district; three were created in 1986 and six in 1987, for a total of twenty-two districts in 1988. All but two of the new districts consist of one county or less in size, and most conform to county rather than to aquifer boundaries. Except for one, all the new UWCDs were created by special legislation, and in a few instances groundwater management powers have been conferred on preexisting surface water districts. In 1989 the rate of district formation increased even more rapidly. The Seventy-first Legislature, which convened in 1989, considered the creation of eighteen more UWCDs, thirteen of which eventually received legislative approval. Thus there may be thirty-five UWCDs in Texas if local confirmation elections for each of the new districts are successful, as expected (Templer 1989b). Most of the districts, old and new, lie west of San Antonio in Bexar County. Though the number of UWCDs has increased, several areas with heavy groundwater withdrawals are not yet included within a district. In 1973, for the second time, voters in seven south Plains counties overlying an intensively developed portion of the Ogallala Aquifer rejected the creation of a proposed UWCD (Templer 1976). Some long-established UWCDs are relatively inactive, for example, the small Dallam County UWCD No.1 in the northwest Panhandle (Templer 1983a).

General-law districts have comprehensive statutory powers to make and to enforce conservation rules. Typically, however, the most signifi-
cantly enforced rules are those controlling off-farm waste of groundwater (Graf 1982a, 1982b). None of the general-law districts, such as those overlying the Ogallala Aquifer of the Texas High Plains, has attempted to control on-farm waste or has attempted direct control of groundwater production. Several of these districts do have well-regarded programs for demonstration, research, and education that strongly promote groundwater conservation (Templer 1983a, 1983b, 1985).

The more numerous special-law UWCDs have widely varying powers; for example, those of the Edwards UWCD, which overlies the Edwards limestone aquifer in south-central Texas, are very limited when compared with other districts. Only the Harris-Galveston Coastal Subsidence District regulates groundwater production from wells through use of permit fees based on the quantity of water extracted (Templer 1983a), though at least two new UWCDs have reported plans for imposing pumpage controls (Templer 1989b).

In 1986, and in response to the new 1985 legislation, the TWC designated seventeen areas with critical groundwater problems. In these areas groundwater is extensively used for irrigation or for municipal or industrial purposes; all are now experiencing or will soon have overdraft problems, complicated in some instances by subsidence or by salt-water contamination or both. As yet, however, none of the critical-area designations has resulted in a UWCD. Some critics view the 1985 legislation as just a tentative first step toward more effective groundwater management, especially since it contains only the most limited of the proposals considered for inclusion in the comprehensive water package. Kramer (1986) described the groundwater management provisions as "the lengthiest, but perhaps the least meaningful, part of the 1985 water package." Among the perceived weaknesses of the new provisions, first, there are many exemptions of different kinds of wells from the provisions. Any new UWCDs created must issue permits to existing wells within their jurisdictions, thus "automatically grandfathering existing overpumpage and depletion problems." Second, voters in designated critical areas may or may not create new UWCDs, and there is no assurance that districts will operate effectively even if formed (Kramer 1986).

The major leverage given the TWC to assure the creation of new UWCDs in designated critical areas is a provision that would deny state financial assistance for water projects to those political subdivisions where voters have rejected UWCDs. A bill before the current legislature would give the TWC the authority to assume management jurisdiction over critical areas where the creation of a UWCD is voted down. A new Water Districts and River Authorities Committee created by the legislature has also recommended that the TWC be given authority to impose
minimum criteria for groundwater regulation by UWCDs. Such a provision should help ensure that local districts remain active and reasonably effective.

The gradual depletion of some nonrenewable aquifers, such as the Ogallala formation, is only one of several diverse groundwater management problems affecting different areas of the state. The gradual groundwater-depletion problems of the Ogallala of the Texas High Plains have yet to generate much concern, either at the local or at the state level. Movement of groundwater under unconfined conditions in the Ogallala is relatively slow, and thus ownership of the surface generally means control of a reasonably definable amount of water (Stagner 1988). Most residents appear to be satisfied with the limited controls and the research/education programs of the existing UWCDs. Of course, these districts have always contended that local regulation already achieves a desirable level of groundwater conservation without impeding economic development or compromising private property rights and that the local UWCD system is the only desirable management strategy (Graf 1982a, 1982b; Wyatt 1982). The vast majority of irrigation farmers in west Texas share this view (Shelley 1983).

For over eight decades in Texas, largely unregulated private rights to groundwater have become firmly entrenched. Over thirty years ago, Hutchins (1958) noted that Texas court decisions had welded the absolute-ownership doctrine into a rule of property that would be most difficult to overturn. Notwithstanding recognition of the "absolute ownership" of percolating groundwater, Johnson (1982a) contended that Texas landowners lack effective groundwater rights because each has the right to pump at will from a common source, a point with which Thomas (1972) agreed:

"A landlord is clearly lord of his land, and he cannot be denied the right to drill a well in it and extract water therefrom. If he stops the flow of a neighbor’s spring or dries up his well, the neighbor has no recourse; if his neighbor gets the jump on him he is the loser. In the world of absolute rights it is not easy to protect private interests from themselves or for themselves.

Countless proposals for revising and reforming Texas groundwater law have been put forth, ranging in scope from imposing a statewide appropriation system for groundwater to more stringent regional or local regulation; all of these proposals are based on relevant constitutional, statutory, or case-law precedents (Booth 1974; Castleberry 1975; Cisneros 1980; Hobby 1974; Johnson 1982a, 1982b; Patterson 1982; Smith 1977; Snyder 1973; Stagner 1988). Realistically, however, even the most fervent
advocates of stricter regulation admit the improbability of achieving sweeping change. It is most unlikely that a court decision will overturn the basic tenets of groundwater law in Texas, nor is it likely that the legislature will impose sweeping change. More likely, as in the past, special legislation will be directed toward solving the specific problems of particular areas, a piecemeal approach on an emergency basis, long after the particular problem has become serious. Those who advocate a "radical redefinition of Texas groundwater law ... which will move the State into the mainstream of water management in the West" (Stagner 1988) cannot reasonably expect to achieve such sweeping goals, given the gradual historical evolution of Texas groundwater law.

NEW MEXICO GROUNDWATER LAW

Some evidence indicates that New Mexico courts first followed the absolute-ownership doctrine of the English common law, as did a number of other western states. Modification of the doctrine ensued, however, because of numerous conflicts over the use of underground water that occurred in the 1920s. Thus New Mexico can be distinguished from the other western states in that early in its history of groundwater use the state legislature discovered the need for changing the law. New Mexico's prior appropriation permit system of groundwater law was enacted in 1927, and it became the first of the High Plains/Ogallala Aquifer states to establish state control over groundwater development. Though this initial law was declared unconstitutional because of a technical error, the New Mexico Supreme Court did uphold the principles and intent of the act. In 1931, new legislation corrected the law's technical defects and the constitutionality of groundwater appropriation by the state was upheld in 1950. Despite numerous amendments and additions to the 1931 act, it still provides the basis for current groundwater law in New Mexico (Aiken 1984; DuMars 1982; Smith 1988).

Given the authority to issue permits for groundwater development in designated basins, the New Mexico state engineer's office has developed regulations intended to cope with the problem of groundwater depletion. Only groundwater within declared basins is subject to state control, and no permit or license is required to appropriate waters outside such basins. In 1985 the New Mexico Water Code was amended, prohibiting the issuance of a groundwater permit if it is found to be "contrary to the conservation of water or detrimental to the public welfare of the state" (Smith 1988). Recently, thirty-one designated basins have been declared by the state engineer, encompassing almost 85,000 square miles. Because these basins include over 90 percent of the usable groundwater supplies
in New Mexico, the permit requirement is virtually statewide (Aiken 1984). Two designated underground water basins cover portions of the Ogallala Aquifer on the Llano Estacada of eastern New Mexico.

For aquifers having a significant hydrologic relationship to a stream, a situation rarely pertaining to the Ogallala, the state engineer estimates the pumping effect of the proposed well on streamflow and requires the groundwater appropriator to purchase and retire sufficient surface water rights to compensate for the well's effect. This procedure generally applies to artesian aquifers, which are treated differently from unconfined aquifers. Where large amounts of groundwater are in storage but little recharge occurs, as with the Ogallala Aquifer, maintaining economical pumping depths for irrigators serves as the limiting factor. When annual water-table decline exceeds 2.5 feet within a 9- to 25-square-mile area (depending on aquifer transmissivity), no new groundwater appropriations are allowed. For aquifers with less total storage, maintaining domestic water supplies dictates the limits; the test that applies restricts depletion to 66 percent in forty years. When this depletion rate is exceeded within a 9- to 25-square-mile area, no new permits will be issued. Permits are routinely granted for small wells devoted to providing water for livestock and domestic purposes, however. The state engineer can revoke groundwater permits if the holder does not put the water to beneficial use within four years and fails to proceed with development within one year after receiving notice from the state engineer. Such forfeited rights revert to the state, and the water is subject to further appropriation.

Since the early 1980s New Mexico has been involved in an ongoing
dispute with the city of El Paso, Texas, which has long been interested in developing a municipal water supply from groundwater basins in southern New Mexico. As a result of the 1982 U.S. Supreme Court decision in *Sporhase v. Nebraska*, which declared groundwater an article of commerce, in 1983 a federal district court struck down New Mexico's statutory prohibition on the export of groundwater as an unconstitutional restriction on interstate commerce. Subsequently, the New Mexico Legislature passed a new law establishing a permit system for the appropriation of groundwater to be transported out of the state. The law includes a requirement that the permit not be contrary to the conservation of water within the state and not be otherwise detrimental to the public welfare of New Mexico's citizens. In 1984 a New Mexico federal district court upheld the transportation-permit requirement, finding that "if applied in a manner which does not burden interstate commerce, the regulation of groundwater appropriation for the purpose of promoting conservation is constitutionally permissible" (Smith 1988). The courts broadly define public welfare to include health, safety, and recreation as well as aesthetic, environmental, and economic interests, though considerable disagreement still continues over the proper interpretation of conservation and public welfare. This ongoing and as yet unresolved dispute is not relevant to the Texas-New Mexico High Plains border, but in the future it could have a significant impact on possible interstate transportation of Ogallala groundwater from New Mexico to Texas (see Banks 1981; Clark 1982; Fischer 1974).

In sum, New Mexico's groundwater law has a lengthier legislative history and stricter state control policies than the other High Plains/Ogallala Aquifer states, and it attempts to restrict groundwater development through an administratively established depletion policy. Still, the state does not impose withdrawal limitations on existing users, except through adjudication of groundwater appropriations in artesian conservancy districts; moreover, its policies protect existing users at the expense of potential users rather than requiring present and potential users to share shortages (Aiken 1984).

**OKLAHOMA GROUNDWATER LAW**

From 1890 until 1937 Oklahoma followed English common-law doctrine of absolute ownership for groundwater. Unlike Texas, Oklahoma does not distinguish between percolating groundwater and water flowing in underground streams. In 1937, in *Canada v. City of Shawnee*, Oklahoma courts adopted the doctrine of reasonable use, also known as the American rule. The state enacted statutory appropriation laws in 1949 that de-
dared a policy of groundwater conservation based on a permit system requiring the Oklahoma Water Resources Board to make a determination of the annual yield of each groundwater basin measured by the average annual recharge. The legislation prohibited the issuance of permits that would result in overdrafting, recognized the existence of prior rights, and established a judicial method for adjudicating these rights (Smith 1988).

In 1972 the 1949 law was repealed and a more comprehensive groundwater code was enacted establishing a permit requirement for all groundwater withdrawals except for domestic uses and regulating well spacing. The new law vested primary responsibility for the management of groundwater in the Oklahoma Water Resources Board. The board establishes groundwater allocations after it has conducted a hydrologic survey of the particular groundwater basin or subbasin and then determines the allocations according to the basin’s maximum annual yield. The board considers the area of land overlying the aquifer, the quantity of water in storage, the natural recharge and total discharge, the aquifer’s transmissivity, and the likelihood of groundwater pollution from natural sources, among other factors. Each landowner overlying an aquifer is entitled to an equal allocation, except for instances in which grandfather clauses give prestatutory users higher allocations (Aiken 1984; Smith 1988).

Groundwater allocations are subject to a minimum twenty-year aquifer life from July 1, 1973, and administrative provisions ensure continued domestic use beyond the minimum aquifer life. In establishing the maximum annual yield for each aquifer, the board excludes overlying land where the aquifer has a saturated thickness of less than 15 feet, and withdrawals of prestatutory users are subtracted. State allocations of groundwater are enforced through a required annual water-use report. The board may require well-metering only if a majority of landowners in the designated basin request it, however, thus weakening enforcement.

Oklahoma law also provides for the organization of irrigation districts upon the petition of landowners irrigating from a common source or sources. Irrigation districts have broad powers, including the ability to establish equitable rules and regulations for the distribution and use of water among landowners within the district. Similar powers are given to conservancy districts, which have dealt mostly with surface-water development. Though relations between the Oklahoma Water Resources Board and local irrigation districts have been adversarial at times, most of the substantive decision-making power concerning groundwater management still rests with the board.

In most basins where hydrologic surveys are currently underway, irrigators receive a 2-acre-foot temporary allocation, which later may be reduced in their regular permit allocation. Those with reduced allocations are reportedly reducing their irrigated acreage, and some in western
Oklahoma are abandoning irrigation altogether because of increased pumping costs. By enacting the 1972 groundwater law, the state has sanctioned the eventual depletion of the Ogallala Aquifer in Oklahoma. Through adoption of permit allocations based on a minimum twenty-year life for each aquifer, the state legislature has opted for an orderly exhaustion of the state's groundwater resources.

The Oklahoma approach to groundwater management is based largely on state control and pro rata withdrawal reductions, except for prestatutory uses. According to Aiken (1984), despite having been implemented too late to have a lasting effect on conserving groundwater supply, Oklahoma's groundwater allocation policies are the most equitable of any High Plains state and are recommended as a model for other states. Yet it should be noted that Oklahoma water law does not establish priorities for the possible beneficial uses of groundwater. In 1978 the Oklahoma Supreme Court upheld the Water Resources Board's contention that all beneficial uses share the same priority. Some see this as a failure of the system, especially in western Oklahoma where rapid depletion of groundwater is occurring, and predict that the legislature will soon act to remedy this situation (Smith 1988).

COLORADO GROUNDWATER LAW

Though Colorado was one of the first western states to develop a body of prior-appropriation law for surface water, it enacted laws dealing with groundwater much more recently. The first legislative step concerning groundwater came in 1953 and consisted only of a requirement for the filing of well logs and the authorization of groundwater studies; at the same time the state engineer assumed that the position had no authority to regulate wells. Conflicts began in the 1960s when many wells were drilled in the alluvial valleys of rivers flowing onto the Great Plains, where ground and surface water often interconnect; competition arose between junior groundwater users and senior holders of surface-water rights (Smith 1988).

In 1965 the state repealed its earlier legislation, replacing it with the Colorado Groundwater Management Act, which subjected groundwater, including percolating groundwater, to a form of appropriation designed to obtain reasonable use and maximum economic development of groundwater resources. The state engineer then attempted to shut down the Arkansas River valley wells, which were the worst offenders in depleting streamflow. The Colorado Supreme Court, in Fellhauer v. People, ruled against the state, finding this exercise of authority to be arbitrary and capricious, but the court did uphold the general power of the state
Wray is a farm service center in the High Plains of eastern Colorado.

engineer to cap wells interfering with senior rights, and it set forth standards that if followed would result in valid regulation of groundwater pumping (Hillhouse 1975; Smith, 1988).

Colorado divides groundwater into three classes: tributary groundwater, designated groundwater basins, and confined groundwater. In tributary groundwater basins, which are hydrologically connected to streams, extractions are regulated by the state engineer to minimize the effects of groundwater withdrawals on holders of senior surface water rights (Smith 1988). Colorado's major tributary groundwater systems are those interconnected with the South Platte and Arkansas rivers. The major confined groundwater basin extends along the foot of the Front Range from north of Denver south to Colorado Springs.

Colorado groundwater law requires state restriction of groundwater development in designated basins, which are not interconnected with surface water sources, but only within a 3-mile radius of the proposed well. This approach does not unnecessarily preclude additional development in areas with less groundwater development or more abundant groundwater supplies. Groundwater depletion, such as is occurring in the Ogallala Aquifer, is dealt with principally through designated basins. Statutes authorize the establishment of designated basins by the Colorado Groundwater Commission, which is authorized to restrict withdrawals by junior appropriators for the benefit of senior appro-
priators. Water is not available for appropriation in a designated basin if its withdrawal is "materially in excess of the reasonable anticipated average rate of future recharge" (Aiken 1984).

Designated basins restrict all wells of 50 gallons per minute (gpm) or greater in capacity and deny all applications for new appropriations if, in addition to existing withdrawals, the proposed withdrawals will deplete groundwater within a 3-mile radius of the proposed well more than 40 percent in twenty-five years from the permit application date. Requirements for a half-mile well spacing and flow meters have also been established in designated basins. In the two designated basins on the High Plains, the commission has set annual groundwater allocations at 2.5 acre-feet per irrigated acre for the northern basin and 3.5 acre-feet for the southern basin. Outside the designated basins, appropriation of non-tributary groundwater is restricted by a test to assure a 100-year minimum useful aquifer life (Aiken 1984; Smith 1988).

Groundwater management districts may be established in designated basins by petition and referendum. A district, after consultation with the commission and a public hearing, may regulate groundwater withdrawals and well spacing. Ten districts have been formed, most in the northern High Plains designated basin. Most districts have adopted regulations limiting withdrawals. Methods include requiring a public hearing and district approval to export groundwater from the district, half-mile well spacing for high-capacity wells, and a 2.5 acre-foot groundwater allocation (Aiken 1984).

Thus, Colorado employs state restriction of groundwater development in its essentially nonrecharging groundwater basins based on administratively established depletion policies that will result in eventual exhaustion of the resource. These policies establish withdrawal limitations on existing users and protect them at the expense of potential users instead of requiring shortages to be shared by both present and potential users. The major shortcoming of these policies is the failure to require gradual reductions in groundwater withdrawal, possibly allowing greater development of the resource or prolonged aquifer life (Aiken 1984). Some observers believe that potential conflicts between current and future groundwater users will be mitigated, largely because Colorado water rights are transferable to a much greater extent than those in most other states (Smith 1988).

KANSAS GROUNDWATER LAW

As one legal scholar described the evolution of Kansas water law: "Our entire water law is similar to the homesteader's house- it just grew as
demand dictated" (Windscheffel 1978). In 1881 in *Emporia v. Soden* the Kansas Supreme Court followed the English common-law doctrine and found groundwater to be the private property of the overlying landowner. As late as 1944 the Kansas Supreme Court reaffirmed the common-law doctrine in *State ex rel. Peterson v. State Board of Agriculture*, finding that the state was without authority to hold hearings on an application to appropriate groundwater or to regulate those appropriations. Kansas imposed only a duty not to pollute groundwater and prohibitions against diminishing underground streamflow (Smith 1988). As early as 1886 Kansas had passed legislation making its surface waters subject to appropriation. In 1927 authority for administering water rights was transferred from the Kansas Water Commission to the Division of Water Resources of the State Board of Agriculture, where it remains today. Following the *Peterson* decision, the Kansas governor appointed a committee to evaluate state water law and to make recommendations for changes (Smith 1988).

From these recommendations came the Kansas Water Appropriation Act of 1945, which subjected underground water to state regulation. The state continues to rely on these appropriation permit statutes, the constitutionality of which has been affirmed. This permit system is administered by the chief engineer of the Division of Water Resources. The 1945 act and subsequent amendments give significant powers over the management of groundwater to the chief engineer, without whose approval no one can appropriate water or acquire water rights in Kansas. Domestic uses, meaning water for household purposes or for irrigation of up to two acres, are exempt from the permit requirement. Other provisions give the chief engineer authority to require groundwater users to install measuring devices in pumps and to report the readings. (Smith 1988).

Kansas groundwater depletion policies reflect a political conflict between state and local groundwater control. Although groundwater allocation is generally a state responsibility, authority relating to groundwater depletion is shared between the Kansas chief engineer and local groundwater management districts. In 1968 the Kansas Legislature passed measures allowing the creation of groundwater management districts (GMDs); the action proved inadequate because of confusion over who could take the necessary steps to create a district. In 1972 this law was repealed and reenacted as the Kansas Ground Water Management District Act, which reflects the preference of groundwater users and landowners for control of groundwater management at the local level (Kromm and White 1981). Smith (1988) observed that legislators were not averse to sharing groundwater management with local entities, thus taking some pressure and responsibility off the state for the solution of groundwater-depletion problems in western Kansas. In fact, depletion of groundwater
reserves is the main issue facing the GMDs, which are attempting to slow depletion so as to avoid unnecessary disruptions of the predominantly agricultural economy and to provide a smooth transition for those farmers forced into dry-land farming. The districts can be organized by local water users and may charge up to sixty cents per acre-foot for groundwater withdrawals. They may propose groundwater development policies that subject new development to depletion guidelines; these policies are adopted and enforced by the chief engineer however, rather than by the districts. Since passage of the 1972 act, five districts have been organized, three of which cover portions of the High Plains/Ogallala Aquifer. The GMDs have established well-spacing regulations and depletion guidelines used by the chief engineer in evaluating appropriation applications.

The chief engineer may also regulate groundwater withdrawals, including those of existing users and of new users, but this authority has not yet been exercised. In areas not regulated by a GMD, the chief engineer manages groundwater either on a safe-yield basis, where groundwater basins have adequate recharge, or by allowing the mining of basins where there is little or no recharge (Smith 1988). On a personal motion, the chief engineer can establish special groundwater regulations in control areas of intensive groundwater use outside a district or within a district at its request or at the request of its local water users. Designation criteria include excessive groundwater declines and withdrawals approaching or exceeding recharge. In control areas of intensive groundwater use the chief engineer may close the area to further appropriation, restrict withdrawals of junior or of any appropriators, and require rotation of pumping. In one such control area, well-metering requirements, a well-drilling moratorium, and water-use reporting requirements were decreed (Aiken 1984). The depletion rates established by either the GMDs or the chief engineer range from 1 percent a year to 40 percent over a twenty-five-year period (Smith 1988).

In Kansas, state-level policymakers have apparently decided that most groundwater management decisions should be made on the local level whenever local entities request that authority. Change of this policy would be difficult because farmers constitute one of the most powerful interest groups in the state. The shortcomings of a purely local groundwater management approach have been ameliorated to some extent by expansion of the chief engineer's authority. Yet the extent to which this administrative discretion will be used to reduce the adverse effects of groundwater depletion remains unclear. The state's groundwater management policy has been primarily to limit new developments through district-initiated depletion policies with the chief engineer developing moratoriums, thus protecting existing users at the expense of future users. In sum, Kansas faces the same legal problems in
implementing a policy of gradually reducing groundwater appropriations as do other western states that apply the appropriation doctrine.

NEBRASKA GROUNDWATER LAW

Historically, the development of Nebraska groundwater law evolved largely from a series of court decisions, with only limited and infrequent legislative action. The lack of legislative involvement can be explained in part because Nebraska has a wealth of groundwater, which has postponed the conflicts prompting groundwater management legislation in many other states, and because the political power of the irrigation lobby and the rugged individualism of Nebraska’s farmers have played an important role in delaying and preventing centralized control of groundwater (Aiken 1980).

In 1933 in Olson v. City of Wahoo, the Nebraska Supreme Court established what has become known as the Nebraska rule of reasonable use:

The owner of land is entitled to appropriate the subterranean waters found under his land, but he cannot extract and appropriate them in excess of a reasonable and beneficial use upon the land which he owns, especially if such is injurious to others who have substantial rights to the waters, and if the natural underground supply is insufficient for all owners, each is entitled to a reasonable proportion of the whole.

In 1981 the Nebraska Supreme Court confirmed the essence of the Nebraska rule in State ex rel. Douglas v. Sporhase but further declared that groundwater in Nebraska was public property. Later, in Sporhase v. Nebraska, the United States Supreme Court overturned the decision because it found that a Nebraska statute requiring a permit for transporting groundwater out of the state was unconstitutional and a burden on interstate commerce. It did not, however, address the declaration of public ownership of groundwater by the Nebraska court. The Nebraska court decision suggests to some observers that groundwater remains public property even after capture, indicating that the legislature could regulate use as well as withdrawals (Smith 1988). Both the Nebraska Constitution and its water statutes recognize preferential use of the state’s waters. Domestic use has preference over all other uses, and agricultural use has priority over manufacturing and industrial use.

Although the legislature has played a small role in groundwater management, in 1957 it created the Department of Water Resources,
Among the natural hazards experienced in the High Plains is hail. This field was damaged by hail in Holt County, Nebraska.

which maintains water-well registrations. In 1969 legislation reorganized 150 single-purpose water districts into 24 natural resource districts (NRDs), which are concerned with the planning and management of soil, water, and wildlife. In response to increasing concerns over groundwater depletion, Nebraska enacted the Ground Water Management Act in 1975, which was amended and recodified in 1982 as the Ground Water Management and Protection Act. This was not an attempt to establish comprehensive control of groundwater under any one state agency; instead, without specifically stating that private property rights over groundwater are precluded, the statute set up an administrative control system with various agencies having duties. Its purpose was to empower NRDs to request establishment of control areas if the groundwater supply was determined to be inadequate to meet present or reasonably foreseeable needs of beneficial use. Thus, groundwater management remains largely a subregional responsibility. NRDs can be set up at the local level, and they have broad powers in resource planning and development (Aiken 1980, 1984; Smith 1988).

Groundwater control areas may be designated by the state director of Water Resources at the request of local districts if water development and use have caused or are likely to cause an inadequate groundwater supply to meet present or reasonably foreseeable needs or if groundwater
pollution is likely to occur. With state approval, districts in control areas may restrict total withdrawals, prohibit well drilling, restrict well spacing, require rotation of pumping, and require irrigation scheduling to prevent agricultural chemicals from percolating into aquifers. Three groundwater control areas have been established by the state director. Local districts have imposed well-spacing requirements in two control areas, and well-metering and withdrawal limitations have been imposed in the other (Aiken 1984).

In 1982, legislation gave NRDs the power to establish management areas, which, unlike control areas, do not require state approval but do require a management plan, including establishment of a groundwater reservoir-life goal. Districts then may adopt regulations such as limiting withdrawals, requiring rotation in pumping, and restricting well spacing. No groundwater management areas have yet been established in Nebraska. This same legislation officially adopted the Nebraska rule of reasonable use as the state standard. In 1984, legislation required all NRDs to prepare groundwater management plans by January 1, 1986. These plans had to identify an aquifer-life goal and any regulations needed to implement it. Most of the plans submitted by the NRDs have received approval by the director of the Department of Water Resources (Smith 1988).

Thus, Nebraska has set up local controls over groundwater, not unlike those of Texas, with two important distinctions: Membership in natural resource districts is not voluntary, and local NRDs are subject to state control. Nebraska vests the capacity for management of various aspects of groundwater in six state-level agencies. Most of Nebraska is both fortunate and unique in currently having ample groundwater supplies to provide it with a larger margin for managerial error than the other Ogallala Aquifer states. Unlike Texas, it has time to implement more stringent controls if the local management approach should prove to be inadequate, and the required preparation of groundwater management plans statewide may be the first step in that direction.

Water law is quite specific and does not lend itself well to sweeping generalizations or to comparisons among states. Many, if not most, of the subtle nuances of the groundwater law of each state have been omitted. Groundwater-law systems in this region run the gamut of degrees of state control, from the long-established prior appropriation system of New Mexico to the relatively unaltered strict common-law rule of Texas, surely providing excellent examples that could be used to refute determinist theories. Still, all the states are moving at different rates toward more rigorous management and control of groundwater. Many legal scholars have extolled the virtues of the prior appropriation system in comparison
to what they deem to be the outmoded strict common-law rule. Still, we have no definitive proof or evidence that one system is superior to the other in encouraging the more efficient use and conservation of groundwater from nonrenewable aquifers such as the Ogallala. Possibly the local district approach that pertains in Texas, Kansas, and Nebraska is just as effective in encouraging farmers to conserve groundwater and in preserving the regional economy as are the more rigidly managed systems of New Mexico or Colorado. Even in the states with prior-appropriation rules, nonrenewable groundwater is usually managed in such a way that it will eventually be depleted. When this will occur probably depends more on the adequacy of groundwater reserves than on specific legal doctrines or management approaches.

Certainly, once a legal system becomes firmly established that recognizes private property rights over groundwater or that favors local control, it is most difficult to replace or to modernize it. Irrigation farmers in Texas, Kansas, and Nebraska have political power, and the imposition of more stringent state control over groundwater faces many political obstacles. The opinions of legal scholars favoring one system or another that would significantly change the local status quo will probably not be very convincing to local groundwater users whose wishes must certainly be considered. In those states where local control is the preferred management system, the most significant changes will probably continue to be through special legislation directed toward particular local problems, a system long favored in Texas, rather than through sweeping change.

REFERENCES


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