WHY HAS INTEGRATED MANAGEMENT SUCCEEDED IN SOME STATES BUT NOT IN OTHERS?

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INTRODUCTION

This paper begins with a brief survey of the legal framework for groundwater and surface water management in the Western states. This is followed by some hypotheses, based on historical trends, to explain why integrated management has been adopted in some states, but not in others.

In 1994, in a more detailed earlier study, I surveyed the theoretical framework in the eighteen western states, but did not attempt to evaluate how well any of the programs in those states are working in practice. In practice, effectiveness can be limited by monitoring and enforcement problems, political pressures or inadequate funding. Evaluation is also difficult in states where water is so plentiful that few conflicts have developed to test how the systems would work if tested. Finally, where water rights have not been adjudicated, protection of prior rights is difficult. Descriptions in this paper refer only to how the system would work if there were no other mitigating circumstances.

There is no uniformity throughout the West. Each state has a unique program. Thirteen states have some form of coordinated management to prevent harm to surface water rights holders from groundwater pumping, while five states do not. The management systems range from completely unified water management statewide, with all forms of water treated as part of a common source, to limited management only in special parts of the state. Some states do not even regulate groundwater pumping on a statewide basis. Some states have ways to share water shortages while others simply limit new pumping entirely in critical areas, or allow new wells only if corresponding water rights are retired.[1]

SOME GENERAL QUESTIONS

When determining how to coordinate management of ground-water and surface water numerous questions must be considered:

- How should it be determined whether there is a connection between an underground aquifer and a surface water supply? Should such a connection be presumed?
- Who should have the burden of proof in determining whether a connection exists? Should new water users have to demonstrate that they will not affect other water rights holders, or should those who object have to demonstrate that there will be a problem?
- If senior surface water rights are damaged by a groundwater pumper whose rights are junior, who should pay?
- Should the surface water appropriation system be extended to groundwater, or should a different method apply to groundwater?
- Should water rights be judged only on a first-come-first-served basis, or partly also on determination of public interest? How should public interest be determined? Should economic or environmental considerations be included?
- Should coordinated management be statewide or only in districts with special needs?

The Western states have reached very different answers to these questions.

SOME HISTORCAL BACKGROUND

The Western surface water appropriation system began to develop in the mid-1800s, in response to disputes over water for mining, and later for agriculture. Groundwater legislation, however, generally did not develop until technology made it possible to pump large quantities of water from deep underground, in the first quarter of the twentieth century.

In almost all states which developed a groundwater code, the law was generally developed before scientists really understood how groundwater moved or the relationships between surface water and groundwater. Although this seems to be generally true, a book on water rights in the West published in 1909, specifically addressed this issue. Weil generally discussed four different types of groundwater and believed most of them related to surface water. He said:

> "But more recent scientific investigation has dispelled most of the mystery concerning the movement of underground water. It is demonstrated fairly well now that there is an underground circulation near the surface (technically the 'Vadose' circulation), beginning with rainwaters on the summit of a watershed and substantially making its way underground to lower levels until it finally reaches the sea, finding its way by percolation to a large extent in the channels of some water courses in this downward travel. ..."[2]

He went on to argue that existing water law should already cover this percolating water. He was far ahead of his time. Gradually over the next ninety years, thirteen western states have updated their legal framework to keep pace with the advancement of scientific knowledge and recognition of water shortages, but five states have not done so.

A VARIETY OF MANAGEMENT STRATEGIES

All eighteen states consider surface water to belong to the public and manage their surface water basically under the appropriation system, although three states have vestiges of riparian and pueblo rights. Fifteen states have some mechanism for preserving instream flow. The Eastern states tend to use a riparian system and were not compared because of differences in circumstances as well as differences in the basic legal framework.

There are three basic management approaches.

- **Separate management** - treats the two types of water as legally separate systems, although management may be integrated in one or more special districts.
- **Integrated management** - manages groundwater and surface water in two separate systems, but integrates management so that permit applications in one system are reviewed for their effects on the other type of water.
- **Unified management** - deals with both types of water in one system, making no legal distinction between groundwater and surface water.

States that manage groundwater and surface water separately (Figure 1)

Five states, Arizona[3], California[4], Nebraska[5], Oklahoma[6] and Texas[7], manage groundwater and surface water as separate systems, without coordinating their management. These states make a clear distinction between groundwater "in definite underground streams" and other types of groundwater. Water in underground streams is regulated as surface water, subject to appropriation, but all other groundwater is handled quite differently, as if there were no connection between groundwater and surface water.

Neither Texas nor California has a statewide permit system for groundwater. In these states, rights to pump groundwater are considered to go with land ownership. As long as that water is "beneficially used" the state does not control pumping. California has no statewide groundwater permitting system, but some parts of the state are organized into water districts which may have their own system of controlling groundwater withdrawals. Nebraska requires well registration, but not permits except in a few areas. Arizona has a groundwater permit system only in specially designated areas. In other areas, groundwater rights go with land ownership. Oklahoma controls groundwater pumping, but sets a very short depletion life for aquifers.

All five states are heavily dependent on groundwater for irrigation and municipal use, although both California and Arizona have major water projects providing water from distant surface water sources. None of these states has commercially important reasons to keep water flowing in streams, except for hydropower uses along the Colorado River and a few other places. There are few commercial fisheries or water-based transportation corridors. Some of these

states have recognized the aesthetic and recreational value of flowing water, however. Efforts made by Arizona to keep undammed flows in Arizona's Grand Canyon are a good example of this type of value.

Texas, Arizona and California are the final U.S. states on major interstate rivers—the Rio Grande and Colorado River. These states have made major efforts to assure that water flows downstream to their states, in some cases affecting how upstream states manage streamflow.

All of these states have experienced problems with diminished surface water flow. In Arizona, the major water courses have lost not only their surface flow, but often any connection between groundwater and surface water, because the water table has dropped too low from groundwater pumping. Even the Colorado River has lost most of its flow by the time it crosses the Mexican border. The Rio Grande is but a shadow of its former self when it reaches the Gulf of Mexico.

States that integrate management of groundwater and surface water (Figure 2)

Idaho[8], Colorado[9], New Mexico[10], South Dakota[11], Oregon[12], Wyoming[13], and Washington[14] manage the two types of water under separate systems, but integrate them so that permits for one type of water may be reviewed for their impacts on other types of water, at least in certain areas.

Each state has developed a different way of integrating water management. Colorado manages surface water under an adjudication system. Permits are required for wells, except for nontributary groundwater. The two allocation systems are integrated so that impacts on one type of water may affect granting of rights to another type of water. Water rights may be bought and sold. Where there is no unappropriated water, this system makes room for newcomers, without harming previous rights holders. Nontributary groundwater is outside this system.

Idaho appropriates groundwater under the same type of system by which it appropriates surface water. The priorities are unified and rights to one type of water may not affect prior rights to another type. Some watersheds have a more intense type of management. New Mexico appropriates surface water but has a separate permit system for groundwater. The courts have affirmed coordinated management of both types. In some water basins new water rights may only be obtained if prior rights are retired. Oregon incorporates groundwater management into the overall water statutes. The groundwater act explicitly makes granting of new permits subject to consideration of effects on surface flow. South Dakota operates separate groundwater and surface water allocation systems, but explicitly unifies criteria and priorities for allocation. Washington regulates groundwater and surface water conjunctively, under the presumption that they are related. The state has adopted a policy of attempting to resolve conflicts through negotiation in which, for example, all parties may have a role in reducing water use to maintain flow. Wyoming regulates groundwater and surface water separately, but explicitly integrates them in the allocation process. The presumption is that waters are not connected unless proven otherwise.

States that unify management of groundwater and surface water (Figure 3)

Alaska[15], Kansas[16], Montana[17], Nevada[18], North Dakota[19], and Utah[20], consider all types of water to be publicly owned, without distinguishing between water above or beneath the ground. Nevada, for example, speaks of "the water of all sources of water supply within the boundaries of the state whether above or beneath the surface of the ground. ..." North Dakota and Utah had this approach as early as the turn of the twentieth century. Nevada adopted it in 1913. Alaska, the newest state discussed here, proclaimed a unified approach to water at statehood in 1959. It was able to develop a system with full knowledge of modern scientific opinion and could profit from mistakes made by older states. The other states discussed here developed unified systems as a result of perceived problems in their states. Each of these states deals with unified water management somewhat differently. Each has a mechanism for preserving minimum streamflow.

Alaska appropriates all water under an appropriation system, in which the state is responsible for determining if new water rights will interfere with existing rights. Kansas, too, has a unified appropriation system. It also has

"Groundwater Use Control Areas" which may be closed to all new appropriations, whether surface or groundwater. Resolution of conflicts may include sharing of shortages among users. Permit approval in certain areas is subject to minimum streamflow requirements. While Montana theoretically operates a unified system, there has been little conflict to test how it works in practice. A recent conflict has led to a study to look at how to deal with pumping which affects surface flow. Nevada's joint management has been affirmed by the court.

A lack of adjudication of water rights, however, has made implementation difficult in some cases. North Dakota and Utah manage all water under an appropriation system.

HISTORICAL PATTERNS IN WATER ALLOCATION

From an historical perspective, the tendency has been toward increased control of water allocation. The earliest attempts to allocate water basically were squatters rights, whether for gold mining or agriculture. Efforts to mediate between competing users gave rights to those who came first. As pressures for water increased, many states adopted new approaches, first for surface water and then for groundwater. Where the possibilities of new water supplies were limited and the amount of nonrenewable water insufficient to supply demands, some states developed systems which assured the rights of old-timers while supplying water for newcomers. Only one state, Oklahoma, reversed itself. After passing stronger management laws, Oklahoma rescinded them under pressure from vested interests. All other states either started out with comprehensive management laws (Alaska) or gradually developed them as the need arose.

Most states found ways in their water allocation systems to coordinate management of groundwater and surface water in some fashion, recognizing that most water is interconnected to some degree. States which did this before the pressures became too great succeeded, while those who waited until crises arose had more difficulty reconciling competing demands. Oklahoma is the only state which tried conjunctive water management strategies and ultimately rejected them. The states that adopted conjunctive management strategies appear to be satisfied with their choices, although many further refined their systems to make them even more effective.

HOW STATES DEAL WITH CONFLICTS

States have developed a variety of mechanisms for dealing with conflicts beyond the general systems described above.

In states without conjunctive management no mechanism exists for collecting damages if a surface water rights holder is harmed by groundwater pumping. Some of the states with conjunctive management have some mechanism for determining liability, placing cost burdens either on the prior water rights holder or the new one or both.

Some states presume that groundwater and surface water are interconnected unless proven otherwise. In other states, the presumption is that they are not connected. Applicants in certain states must show that their withdrawal would not harm other users; while in other states it is up to prior water rights holders to object and show possible harm.

Some states have dealt with conflict by emphasizing negotiation and sharing of water shortages. Others allow new pumping if existing rights are retired, leading to an active water rights market in some areas. Other states have simply prohibited new pumping in certain areas.

WHAT INFLUENCED THE DEVELOPMENT OF CONJUNCTIVE MANAGEMENT?

How did such a wide variety of approaches develop? One general comment was alluded to earlier - most laws developed in advance of modern scientific knowledge of the relationships between groundwater and surface water and changing laws is usually more difficult than doing them correctly the first time. It would seem that states with water shortages should have the best systems for managing water and for dealing with conflict, but they do not. In general, the states with the most water have the most comprehensive systems. Why do some states with plentiful water supplies manage their resource more effectively than some arid states where water conflicts are a problem? (Figure 4)

Some explanations follow:

- Where there is no shortage, there will be little conflict and thus few vested interests to argue for their rights. Where there are shortages, people with vested rights fear losing them to a changed system. Water-rich states such as Alaska, Oregon and Washington should have less conflict than the water-poor states such as Texas, California or Arizona.

- In Oregon, Washington, Alaska and Idaho commercial fisheries, transportation, hydropower and tourism are important, all uses of surface water in the stream. There are strong pressures not to allow streams to be depleted. Groundwater is of secondary importance.

- In states such as Oklahoma, Texas or Arizona, where groundwater pumping was necessary for important economic interests such as irrigated agriculture, or oil production, preservation of stream flow was considered less important than preserving the right to pump groundwater. Here the demands of groundwater users tend to prevail.

- Another strong incentive leading states such as New Mexico to manage groundwater and surface water conjunctively was the existence of an interstate treaty requiring delivery of a minimum amount of water to another state. If full delivery can only be made by limiting groundwater pumping, then such pumping must be limited.

- States with rapidly increasing populations (Figure 5) and scarce water supplies have had to find ways to provide water for the newcomers within a surface water appropriation system that favors old-timers. The alternatives are groundwater, importation of water, reuse, recharge, and/or conservation measures. Groundwater pumping is often the easier solution politically or economically, especially as imported water becomes less and less available or economically feasible.

- (Figure 6) Alaska is a special case in which a model law developed from statehood. Statehood did not come until the 1950s when the connection between groundwater and surface water was clear. To develop a new law based on old science was unthinkable, especially in a water-rich area with few if any water conflicts.

- The importance of economics must, however, be tempered by the fact that some states value their flowing streams for other reasons. Montana places high value on fly fishing; Arizona values the naturalness of the Grand Canyon; and Oregon is proud of the scenic Columbia River, for example. Many states stress in their laws the importance of preserving wildlife, recreation, and aesthetic values for their own sakes.

ENDNOTES

1. The general works most useful in understanding Western water law are: Grant, D.L. 1987. The complexities of managing hydrologically connected surface water and groundwater under the appropriation doctrine. Land and Water Law Review. 22(1). 63–95; Johnson, N.K. and C.T. DuMars. 1989. A survey of the evolution of western water law in response to changing economic and public interest demands. Natural Resources Journal. 29 (347–387); and Trelease, F.J. 1982. Conjunctive use of groundwater and surface water. Rocky Mountain Mineral Law Institute. 2 (1853–1894).

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3. Arizona Revised Statutes 45.

4. Weatherford, G., K. Malcolm and B. Andrews. 1982. California groundwater management: the sacred and the profane. Natural Resources Journal. 22 (1031-1043); and California Water Code 1-1-100 and 2-1-1-1200.

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7. Skillern, F.F. 1992. Texas water law. Sterling Publishing, Inc. Riverside Texas. 210 p.; and Texas Water Code Annotated, 11.

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11. Garton, W.A. 1976. South Dakota system of water management and its relation to land use and economic development. South Dakota Law Review. 21(3-37); and South Dakota Water Law, Chapters 1-40.

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15. Alaska Statutes, 46.15.145 and 46.15.260.

16. Windscheffel, A. 1954. Water law in Kansas. Journal of the Kansas Bar Association. 23 (171-177); and Kansas Statutes Annotated, 82a.

17. Josephson, R.M. 1987. An analysis of the potential conflict between the prior appropriation and public trust doctrines in Montana water law. Public Land Law Review. 8(81-114); and Montana Code 85-2.

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19. North Dakota Century Code, 61-01.

20. Swenson, R.W. 1984. A primer of Utah water law: Part 1. Journal of Energy Law and Policy. 5(166-196); and Utah Code Annotated, 73-3.

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Figure 1

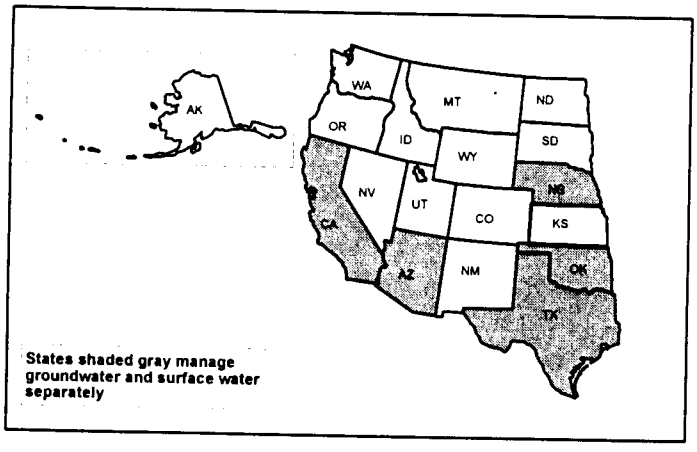

Figure 2

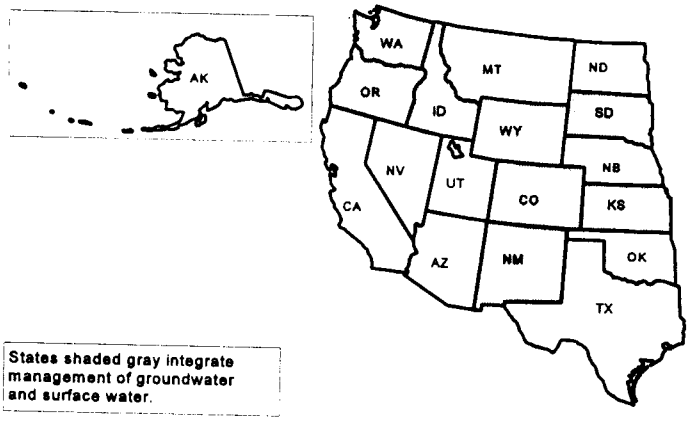

Figure 3

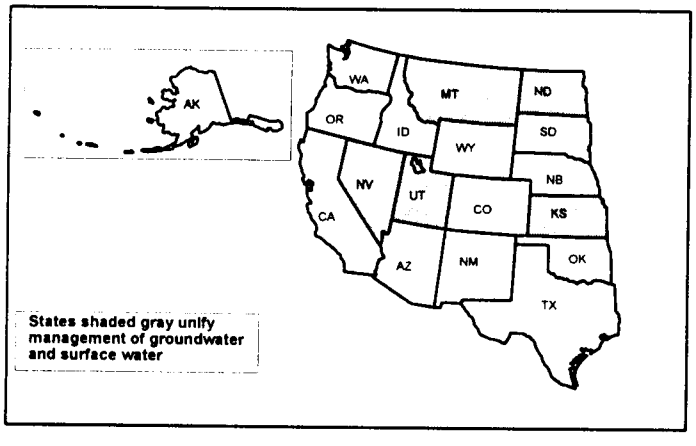

Figure 4

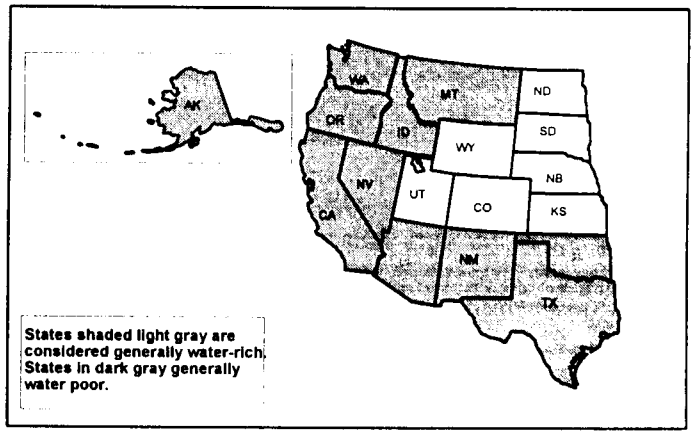

Figure 5

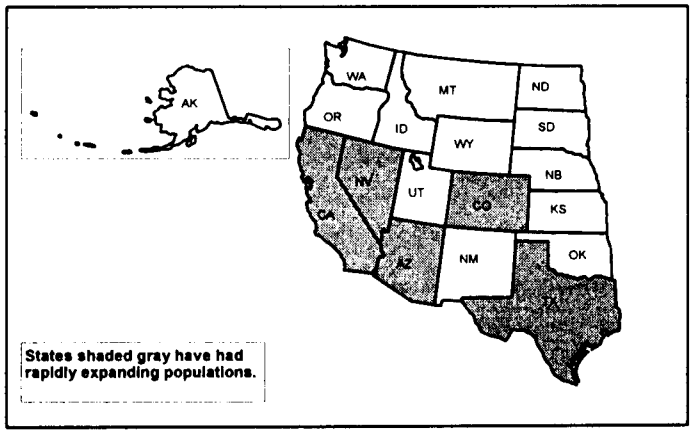

Figure 6