

GROUNDWATER MANAGEMENT AREAS: AN EXAMPLE OF THE MANAGEMENT DOCTRINE

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Introduction

Laws governing groundwater withdrawals started out as property-based rules of capture giving rights of unlimited use. As demand for groundwater increased and it became apparent that some control over withdrawals might be necessary, court decisions began to shift from rules of capture to rules favoring proportional sharing of groundwater as a public resource. Along with this shift, many state legislatures began taking a more proactive role in establishing groundwater management programs. Some of the goals of these management programs have been to minimize competition, protect groundwater resources, help ensure wise development of groundwater resources, help maintain regional economic stability, and diminish the historic reliance on courts to settle groundwater disputes.

This emphasis on managing groundwater as a shared public resource has been termed the emergence of a “management doctrine” for groundwater. One aspect of that has been the decision in 27 states to pass specific legislation allowing for the designation of special groundwater management areas where withdrawals are managed differently than they are in the rest of the state. Such management areas are often (but not always) designated in areas that have severe or recurring groundwater supply problems, where groundwater demand routinely exceeds supply. Regulations in groundwater management areas are normally tailored to the hydrogeologic conditions of

the area and to the specific management needs. For this reason, groundwater management area programs are very diverse from state to state and within states. They are often used in conjunction with statewide groundwater regulations. They’re one example of the increased tendency for local, regional, and state governments to attempt to manage groundwater resources rather than simply react to competition and conflict over the resource.

In Search of a Groundwater Management Paradigm

American courts and legislatures have experimented over the last hundred years or so with methods for governing groundwater withdrawals and for resolving competition where groundwater shortages are a problem. At one time, groundwater was regarded as private property; rules governing its use were property-based rules of “capture” giving rights of unlimited use. Rules of capture for groundwater are roughly equivalent to saying “if you can pump it, you own it.” In a preindustrialized society, this was not an unreasonable way to “manage” groundwater resources; demands on the resource were limited and scattered so as to minimize possibilities for well interference. It didn’t take long, though, for growth and the associated expansion in groundwater use to exert challenging new pressures on the courts’ early inclination to abide by rules of unrestricted pumpage, which they often did even when that pumpage impeded a neighbor from

obtaining his own fair share of groundwater. Cities, industries, agricultural irrigation — all meant more demand for groundwater, which led to more competition for groundwater in some places. Given that groundwater resources are limited, free-for-all competition for them is clearly not in the best interests of the users as a whole. The problem, as with most common pool resources, is this: no one wants to be cheated out of his share. Rather than risk reducing pumpage to save for the future and having another user pump the water for present use anyway, most users will use as much water as they can for as long as they can. This presents obvious problems when the demand exceeds the supply; when more water is being extracted than is being replenished over the same time period, the total quantity of water available to all users is diminished. So, the idea that groundwater can be used without liability to other users gradually came under increased scrutiny. Eventually the rules governing groundwater withdrawals began shifting from simple rules of capture to rules requiring proportional sharing (Bowman and Clark, 1989; Gould, 1986; Goldfarb, 1988; Tarlock, 1985). Today there is general recognition in many courts and legislatures of the common pool nature of groundwater; there is a reciprocal dependency in which one pumper's rights can affect and be affected by all pumpers' rights (Bowman and Clark, 1989). A landowner's pumpage rights are qualified in that they are exercised in consonance with the similar rights of other landowners over the same groundwater supply (Clark, 1967).

As the search for an adequate groundwater management paradigm rages on, groundwater laws are evolving from property-based rules of capture to an assortment of rules requiring conservation and sharing among claimants of groundwater as a public resource (Tarlock, 1985). This is evident in most parts of the country in both the courts and in state legislatures. First, in court decisions, the original common (case) laws of groundwater ownership have been replaced in many cases by the concept of shared allocation of limited groundwater resources. These changes have emphasized conservation and proportional sharing of limited groundwater. Second,

there has been a heightened role by legislatures toward comprehensive groundwater management through statutes, also emphasizing conservation and sharing of groundwater as a public resource. These shifts have led to the emergence of what has been called a "management doctrine" for groundwater, which (1) acknowledges groundwater as a shared resource, and (2) allows flexibility to regulate withdrawals suitable for a particular aquifer (Bowman and Clark, 1989; Goldfarb, 1988; Gould, 1986).

Groundwater Management Areas—a Management Doctrine Model

At one time, groundwater users competing with each other over a limited supply found themselves with little recourse but to battle it out in court. Today, states are much more likely to have some kind of groundwater management program in place that works to prevent such competition whenever possible, and minimize reliance on courts to settle groundwater disputes. These programs normally address two main types of groundwater problems: well interference and supply interruption, and the broader problem of long-term aquifer depletion. This is accomplished with use permit requirements, water use monitoring and reporting, well construction standards, prioritized allocations, restricted usage in times of shortage, and other similar management mechanisms.

Some states employ groundwater use restrictions statewide. Others limit groundwater management to specific groundwater management areas rather than imposing statewide regulations. Portions of states suffering from severe or recurring groundwater supply or quality problems are designated as special or critical groundwater areas and managed differently than the rest of the state. Such areas may be established in addition to statewide permitting systems and other regulatory measures, or they may be the only areas in a state where groundwater use is

regulated. Programs like these clearly represent a significant departure from the original laws of groundwater ownership; they are examples of the proactive stance many states are taking in protecting groundwater resources.

A recent survey shows that 27 states have groundwater management area (GWMA) programs (see Table 1). Bear in mind that some of these states also have statewide groundwater management regulations, and, of course, many of the states that do not have GWMA programs do have other groundwater management regulations. GWMA programs are one example of the expanding roles by state, regional, and local governments in management of groundwater resources; they are an example of management that bears closer examination because of their diversity and widespread nature.

Table 1. States with Groundwater Management Area Legislation

State	GWMA Legisl. Used	GWMA Legisl. Pending	No Active Areas*
Alaska		X	
Arizona	X		
Colorado	X		
Connecticut		X	
Delaware			X
Florida	X		
Hawaii	X		
Idaho	X		
Illinois	X		
Indiana			X
Iowa			X
Kansas	X		
Louisiana	X		
Mississippi	X		
Montana	X		
Nebraska	X		
Nevada	X		
New Jersey	X		
New York	X		
New Mexico	X		
North Carolina	X		
Ohio		X	
Oregon	X		
South Carolina	X		
South Dakota			X
Texas	X		
Utah	X		
Virginia	X		
Washington	X		
Wyoming	X		

*GWMA legislation exists, but no management areas designated

Groundwater management area programs are mainly used to control groundwater withdrawals in parts of states where groundwater demand normally exceeds supply. In some states they are also used to address problems of subsidence and groundwater pollution. GWMA programs got their main start in the 1950s, '60s, and '70s in the High Plains for controlling regional irrigation water use and expansion. Since then many states have adopted GWMA programs, often because of stresses from heavy localized groundwater use for agricultural irrigation. Although not all irrigated states have GWMA programs, the GWMA approach has seen its greatest development in states most heavily irrigated from groundwater, where economic and groundwater management concerns have often clashed (Aiken, 1980; Keller et al., 1982).

Regional groundwater use is controlled in GWMA's through issuance of water use permits,

water rights or allocations, pumpage fees, well-spacing requirements, emergency water use restriction powers, and so on. Often, regulations also include mandatory irrigation scheduling, water use metering and reporting, well production limits, and others. These are the same types of regulations imposed in statewide groundwater management

programs; limiting them to specific areas within a state allows for the regulations to be tailored to each localized groundwater problem and helps avoid unnecessary regulation. This flexibility is one of the clear benefits of the GWMA approach; it is also partly responsible for the vast diversity in GWMA programs across the country.

Most groundwater management area programs have been motivated by an overpumpage problem or some other type of groundwater quantity problem. Some have been motivated by a groundwater pollution or contamination problem. At least 13 states have GWMA programs that allow for special regulations to be imposed within the designated areas to address both quantity and quality problems. In most states with GWMA programs, the individual management areas are designated by a central state agency of water or natural resources. That is, hydrologists from an agency identify the problem area, initiate a process to designate it as a GWMA, and define its boundaries. In most cases, this initial formation process allows for some level of input by local interests. There are a number of states in

which the local interests hold the balance of authority for initiating GWMA formation; the High Plains states of Colorado, Kansas, Nebraska, and Texas stand out in this regard. Most states, including the four High Plains states mentioned, have more than one process for initiating and forming a management area.

Management area boundaries are defined along surface watershed lines, groundwater basin lines, and political lines such as townships and counties. Most states report using political boundaries only as a last resort for administrative convenience. The administration of management areas is carried out in most states by a central state agency; that, agency develops a management plan (usually with input from local interests), oversees the implementation of the plan, and pays for administrative costs out of general state revenues. Some states give considerable formal authority to the local management districts themselves to develop and implement management plans and pay for administrative costs with local property taxes, pumpage fees, permit application fees, and so on. Again, the four High Plains states stand out in this regard.

There is a great deal of diversity in GWMA programs. The heavily irrigated High Plains states with GWMA (Colorado, Kansas, Nebraska, and Texas) have allowed the groundwater users to administratively impose controls on themselves by forming management areas and restricting withdrawals. Most of the other states have GWMA programs that are controlled by a central state agency. Presumably, in the four High Plains states, groundwater is so closely tied to the local irrigation economies that maintaining control over its regulation is a jealously guarded tradition among local groundwater users (Aiken and Supalla, 1979; McCleskey, 1972).

Conclusions

Comprehensive groundwater management

programs are being developed in many states as the laws governing groundwater withdrawals shift from property-based rules of capture to rules requiring proportional sharing of groundwater as a public resource. One aspect of this new “management doctrine” for groundwater is the designation of special groundwater management areas. While the programs vary in their specifics, their basic form is fairly standard: areas that have severe and recurring groundwater supply problems and/or groundwater quality problems are designated as a special or critical management area. Groundwater withdrawals in those areas are then regulated differently than in the rest of the state. Specific regulations (including everything from well spacing to drilling moratoria, from emergency water use restrictions to transfer of water rights) are tailored to the specific needs of the area. In some cases, the management areas are used in conjunction with statewide groundwater management regulations, and in some cases they are the only places where groundwater use is managed. They are an example of the increased efforts toward managing groundwater as a public resource.

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