

November 25, 1983

GROUNDWATER POLICY : THE STATE SOLUTION

INTRODUCTION

The United States consumes 450 billion gallons of water each day--or about 2,000 gallons per citizen. Groundwater (that is, water in surface soil) supplies 25 percent of all requirements and approximately 50 percent of the drinking water. Yet today, news reports are suggesting not only that the nation's wells are running dry, but that what is left is becoming increasingly polluted.¹

While there are problems, groundwater contamination and depletion are not irreversible, nor is the U.S. about to run out of water. The nation has the technological and management skills to control its water resources--only the political will has been lacking.

As Congress considers a federal groundwater policy, it should avoid moves toward a centralized national policy. While groundwater is no respecter of state lines, an effective groundwater protection policy would best be administered by state and regional alliances. America's states and regions differ widely as to natural water assets, end-uses for water, and water-use approaches. These differences would quickly render a national policy unworkable.

Action must be taken soon, however. Groundwater contamination already has affected dozens of cities and it threatens hundreds more. Many underground water sources have been contaminated by

¹ See, for instance, "War Over Water: Crisis of the 80s," U.S. News and World Report, October 31, 1983.

toxic wastes leaking from approximately 14,000 active municipal and 75,000 active industrial landfills, and from industrial solvents and degreasers leaking from 16.6 million personal septic tanks.

According to the 1980 report of the Federal Council on Environmental Quality, which analyzed cases of groundwater contamination filed with regional EPA offices, "contamination has occurred in at least thirty-four states: in nearly every state east of the Mississippi River, and in the less industrialized western states as well." The report concluded that the country appears to be aimlessly poisoning one of its most precious assets.

Supply is also a major problem, affecting in turn the nation's food supplies. According to the 1975 report of the Federal Water Resources Council, there are surface water supply problems in all 21 of the nation's water resource regions, with 30 of the 106 subregions experiencing moderate to extensive groundwater overdrafting. In some areas, the water supply infrastructure, including pumps, pipes, purification plants, and storage areas, is literally falling apart. Instead of practicing water supply "damage control," governments at all levels must work together to solve the water supply and quality crisis. In reviewing their groundwater policies, states should consider the following steps:

- * establish user fees to help finance public works and agricultural irrigation projects--this would encourage water conservation and recycling;
- * ban the use of landfills as repositories for hazardous waste;
- * adjust state groundwater quality laws to reflect the water's end-use;
- * undertake a county by county reexamination of cesspool and underground fuel tank safety and construction standards; and
- * encourage small farmers, especially those situated over wells to decrease their reliance on chemical pesticides and shift to organic farming methods.

Congress could help these state and regional alliances by: (1) restoring all of the pre-1980 advisory responsibilities of the Federal Water Resources Council; (2) funding only economically efficient surface water supply alternatives to groundwater utilization; and (3) amending the 1965 Water Resources Planning Act and establishing Regional Groundwater Basin Advisory Commissions.

WHERE HAS THE WATER GONE?

Some Definitions

Groundwater is the residue of precipitation, beyond what wets the surface or evaporates, which infiltrates into the soil.

Some of this water is used by growing plants and ultimately returns to the atmosphere. The remainder eventually reaches the "zone of saturation." The upper level of this zone, if not confined by impermeable (that is, waterproof) material, is called the "water table."

An aquifer is an underground layer of permeable soil or rock that permits the passage of water. When water is confined within an impermeable formation, which reaches below the water table, an artesian well may be bored. If irregularities occur in surface topography or underground deposits, a water table can intersect the ground surface, thus forming a lake or spring.

An "overdraft" of groundwater occurs when the volume withdrawn from an underground source exceeds the amount replenished by infiltration and seepage. Recent data indicate that in the western states, overdrafts frequently exceed 20 billion gallons a day. In other regions, overdrafts have been less substantial, but may still exceed one billion gallons. Water usage today exceeds replenishment of the aquifers by enough water to irrigate 11 million acres--an area only slightly smaller than Vermont and New Hampshire combined.

The Overdraft Problem

This overdraft problem arises primarily because people do not always live near usable water resources. Some areas of the country are in serious trouble. For example, some 200,000 Ogallala² aquifer wells have been so overdrawn that local water tables have dropped 10 to 15 feet over more than 60,000 square miles. Today, the Texas portion of the Ogallala reservoir consists of abandoned farmland littered with rusting irrigation pipes that once carried water from aquifers.

Water generally reaches an aquifer or artesian well through a recharge zone--a permeable area in a surface water drainage basin (ranging greatly in size) through which water flows to the zone of saturation. The rate of replenishment effected in this way is normally quite slow (generally less than 10 percent per year), as is the movement of groundwater (10 to 30 feet per year depending on the soil's permeability). And unpredictable variables such as new precipitation, heavy rain, or sudden snow meltoff can easily cause oversaturation and flooding. On the other hand, if the rate of replenishment is low, the surrounding soil can dry out, become porous, and even subside. In the Houston-Galveston area, for example, the water table dropped so rapidly in early 1983 that roads, railroad tracks, and bridges simply broke up. In some seacoast states, such as Florida, the

² A large underground lake sprawling from northern Texas through parts of Oklahoma, New Mexico, Kansas, Colorado, Nebraska, Wyoming, and South Dakota.

falling water table has caused the appearance of dozens of sinkholes. As vivid television pictures showed at the time, these sinkholes can easily swallow automobiles, livestock, and even houses.

Overdraft also leads to saline (salt water) intrusion into underground fresh water supplies. Especially in Florida and Georgia, it is becoming a major threat, as seawater replaces freshwater overdrawn by wells. Savannah, Georgia, has so depleted its city wells that saltwater is slowly being drawn toward the city aquifers. This intrusion increases the saline content and decreases water purity. Saline groundwater contamination also comes from rock salt used to de-ice roads as well as salt from some 65,000 abandoned brine pits--once used for the now-outlawed disposal of saline by-products from petroleum drilling.

Reactions to Scarcity

For individual well owners, a scarcity of water often produces a "me first" attitude toward resource conservation. This can have three damaging consequences. First, when wells are close together, pumping one well beyond local recharge capacity reduces the pressure available to nearby wells. Second, the lower the water table, the greater the water lift or extraction cost. A cost-minimizing well owner will extract the water as quickly as possible if he feels that the water table will drop. And third, groundwater users who try to conserve water have no guarantee that some other user will not extract all of the common pool.

Ever since the western United States was settled, groundwater has been a matter of state control. In 1982, however, the Supreme Court decided in Sporhase v. Nebraska³ that groundwater came under the aegis of interstate commerce and therefore was subject to the Commerce Clause of the Constitution. The Court found that, since the groundwater source (the Ogallala Reservoir) extends through parts of eight states and services agricultural areas that provide food to national and worldwide markets, there is a federal interest in conservation. This ruling, that groundwater can--from a legal point of view--cross state lines, has caused states to become concerned that their individual interests will be superseded in times of drought by a "national" interest, determined by the federal government.

LIMITATIONS ON GOVERNMENT ACTION

Zoning

Although it is the most prevalent local groundwater protection method, zoning is actually of limited effectiveness. A tool for

³ 102 S. cf. 1424, 455 U.S. 935, 71 L. Ed 646 (1982).

segregating industrial, agricultural, and residential areas, such regulation of land use is practically worthless in protecting groundwater. Underground aquifers rarely respect town boundaries. Admittedly, certain multi-county aquifers could be zoned by the state, thereby having some impact.

Monitoring

Decisive government action is hampered by the lack of any systematic federal or state groundwater pollution monitoring system. Contamination surveys have only recently been conducted by the federal and state governments. Early results indicate that groundwater contamination is far more widespread than had been believed.

Legal Contradictions

Federal, state, and local groundwater protection laws are a complex and confusing patchwork of often contradictory laws, making sound policy difficult. The federal laws affecting groundwater include: the Clean Water Act; the Safe Drinking Water Act; the Resource Conservation and Recovery Act; the Toxic Substances Control Act; the Federal Insecticide, Fungicide, and Rodenticide Act; the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund); and the Surface Mining Control and Reclamation Act. Ironically, even though many of these federal laws overlap in coverage, gaps still exist. Then there are each state's groundwater protection statutes. And finally there is groundwater's lack of respect for state boundaries, which leads to jurisdictional problems whenever water becomes scarce or polluted.

Water Rights

Water rights are managed differently in different parts of the country. Most western states follow the Doctrine of Prior Appropriation, which ties water rights to use. These rights are not limited to surface use and are established on a first-come, first-served basis, with preference given to previous water rights holders. California, however, applies the Correlative Rights Doctrine, which differs from Prior Appropriations in two respects. First, if the groundwater demand exceeds supply, all surface owners must reduce their use on an equal basis. Second, where supply exceeds demand, water may be put to alternative uses.

Eastern states utilize the Reasonable Use Doctrine, which involves taking into consideration the demands of adjacent landowners to the common water supply.

These differing regional water policy doctrines have been determined by the higher annual precipitation experienced in the east and by the independent character and relatively recent settlement of the western states.

Patterns of Use

Water use patterns also vary widely from one region to another--creating shortages in some areas and surpluses in others. Although 90 percent of all irrigation water is drawn in the western United States, for instance, 90 percent of all water for industrial purposes is consumed in the east. According to the United States Water Resources Council, the nation's total average daily water consumption in 1975 (the most recent year for which statistics are available) was 106 billion gallons per day. Of this, 83 percent was used in agriculture, 6 percent in industry, and the rest by household consumers.

RECOMMENDATIONS

Groundwater problems cannot be solved by a new federal program. To the contrary, a national solution would only exacerbate the difficulties by interfering in what is actually a state and regional responsibility.

Recently, in response to the federal Safe Drinking Water Act, public awareness has improved, and better scientific testing methods have enabled communities to look for chemical contaminants in their water supplies. The findings have often shocked communities and shaken their confidence in both government and industry.

Contrary to some stories in the media, however, the situation is not yet a disaster. It is just more apparent. But several steps must be initiated to avoid a major water crisis.

Regional Commissions

Congress should amend the 1965 Water Resources Planning Act by establishing regional Groundwater Basin Advisory Commissions. Their purpose would be to assist states and regional alliances in planning their groundwater protection policies.

Water Resources Council

The Reagan Administration should remove control of water policy advisory responsibilities from the Interior Department because of the agency's vested interest in water projects and transfer the function back to the Federal Water Resources Council. All pre-1980 advisory responsibilities should be restored to the Council, such that it could once again serve as a clearinghouse and repository of information on groundwater conservation and treatment techniques. The Council should report directly to the President, and through him to the federal Regional Groundwater Basin Advisory Commissions. The Regional Commissions could in turn advise bilateral and multilateral state alliances formed to protect groundwater sources extending across interstate boundaries.

User Fees

Congress should expand the user fee principle to help finance necessary public works and agricultural irrigation projects and to help the nation rebuild its water supply, distribution, and treatment infrastructure. A 1980 Interior Department study of 18 irrigation projects in western states found that the federal government provides between 57 and 97 percent of these projects' lifetime costs. Unfortunately, such subsidies distort the consumers' perception of what water really costs and therefore encourage waste. If consumers were to pay fees reflecting the market value of water, they would quickly adopt innovative water conservation techniques.

Conservation

Congress should also make equitable and reasonable water conservation practices a condition for providing funding for public works and irrigation projects. Such conservation techniques include drip irrigation, permanent furrow systems and storage ponds to collect rainwater and surplus irrigation water, clay or cement linings on irrigation ditches to prevent seepage, low water-intensive crops, water-efficient fixtures on bathroom facilities and household spigots, and properly scheduled water delivery systems to decrease evaporation.

State Alliances

By not enacting a national groundwater program, Congress would encourage states and regions to form bilateral and multi-lateral groundwater protection alliances. These alliances might also improve cooperation in other areas of environmental policy, such as the control of improper interstate disposal of hazardous waste and cleaning up interstate surface water pollution.

State Incentives

States should adopt systems of tax incentives and credits to induce industry, individual homeowners, and agribusiness to recycle as much water as possible. Saving as little as 7 percent of the water used for agricultural irrigation would equal all of the water used in American homes. There are hundreds of examples of recycling that jurisdictions might adopt, were such incentives enacted. They include a Denver business complex, which recaptures its wastewater, treats it, and uses it to water the company's golf course; and a West Virginia coal mine, which recycles water used in its coal slurry transport system. The economic benefits of such innovations are so significant that tax incentives could probably be phased out after a few years, once the advantages to business were more clearly appreciated.

Ban on Landfills

States should ban immediately the use of landfills as repositories for any hazardous or toxic waste. Landfills leak and have

the potential both to contaminate groundwater and to expose citizens to possible carcinogenic substances. The ban could be accomplished either by amending state hazardous waste control statutes or by passing new ones specifically designed to eliminate this danger.

Reassessment of Quality Standards

States should reexamine the water quality standards in their groundwater laws. The regulation of groundwater quality, where possible, should reflect its end-use--which may not necessarily require drinkable water. For example, groundwater for certain irrigation, industrial cooling, or coal slurry pipelines should not have to meet the tough standards required for drinking water.

Construction Bonds

Coastal states and communities threatened by saline intrusion should float bond issues for the construction of modern desalination plants. States and communities could mount an aggressive desalination program, and recoup some of their expenses by selling the salt. Sunbelt areas might utilize solar-powered plants to reduce operating costs.

Amending Disposal Laws

States should require local communities to reexamine their septic tank and cesspool construction laws. These subsurface disposal systems annually discharge over 800 billion gallons of contaminated wastewater into the ground, often causing the contamination of nearby wells.

Alternative Supplies

States and regions should explore economically efficient surface water supply alternatives to groundwater. Efficient use of surface water will lessen demand for groundwater, and hence speed replenishment.

Scholarships

States should establish scholarship programs for undergraduate and graduate students interested in groundwater hydrology. The supply of groundwater hydrologists is extremely low, while the demand is considerable--and rapidly increasing. States could tie the award of such scholarship grants to appropriate in-state work on groundwater problems after graduation.

Privatization

Entire groundwater basins could be privatized. Private owners would have an economic incentive to pursue the most economic rate of water extraction, since usage would reflect the present value of anticipated water stocks. In particular, private water charges would take into account replenishment forecasts, pumping costs, and other factors.

CONCLUSION

Groundwater contamination and depletion are serious environmental problems that need immediate action. The steps recommended would mitigate the situation and ensure a steady supply of water for all the nation's needs in the foreseeable future.

All water users, citizens, industry, and agriculture, will begin to practice conservation and recycling techniques if rational economic incentives and pricing policies are instituted. And it makes economic sense to begin practicing conservation now, when costs are relatively low--rather than later, when the price of water in some areas could become very high.

A constant supply of uncontaminated groundwater is essential for sound economic development and a healthy environment. It is time for the federal, state, and local governments together with regional commissions to cooperate to ensure that, when America turns on the tap, water still comes out.

Prepared for The Heritage Foundation
by Paul T. Langerman, a Cambridge,
Massachusetts, based policy consultant