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# Water and Population in the American West

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SMALL SCHOOL.  
BIG VALUE.

## Water and Population in the American West

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### ABSTRACT

The American West is justly famed for its sunshine and wide skies.<sup>1</sup> However, there is a potent combination of low rainfall and growing population in the West that ensures that water, or the lack of it, will remain another well-known feature of the region. As the number of people sharing already stressed water supplies increases, the economic, ecological, and social costs of providing water become more evident. Agriculture consumes about 90% of the water that is extracted in the West, and the transfer from agricultural to municipal and industrial uses is invariably complex. Increased water extraction has resulted in the loss of species across the western landscape. Groundwater mining is a looming crisis in the West; however, as an issue it is hidden from public consciousness and typically solved by costly water projects. The movement toward sustainability will require a reorientation of public policies to recognize the need to balance human uses with ecological functions, and to incorporate the true costs of water into decision-making. It is important that the public learns that public entities make decisions throughout the year that affect the availability and management of water supply. Issues that should be of concern to consumers include water rates, whether rivers will be tapped for municipal supplies, achievement of water quality standards, whether new development and industry will be encouraged, as well as other issues that profoundly affect the future of western rivers.

### INTRODUCTION AND BACKGROUND

The amount of water available for human use is determined by the hydrological cycle. While there is a relationship between population growth and stresses on water supplies, the relationship is not linear. Increased human populations typically result in reallocation of current resources rather than the development of new water sources. Water supplies in the American West are particularly limited and, with newcomers lured by bright skies and new economic centers, population growth in the region has outstripped the rest of the country in recent years. Yet it is unlikely that a resident of a new subdivision in the American West will want for water, as a resident of a city in the developing world might. It is more likely that the water for a new subdivision will be procured at the cost of a river ecosystem or with a change in agricultural practices.

Irrigated agriculture consumes 90% of the water extracted in the region.<sup>2</sup> The amount of water extracted for agriculture peaked at 150 million acre feet (maf) in 1960, and declined to 139.6 maf in 1990.<sup>3</sup> In part, this is a reflection of a dramatic change in the nature of farming and ranching in the last half century. Trends of corporate farming and consolidation have led to larger farms, which has led to a decline from 2.7 million farms in 1969 to 1.9 million in 1992.<sup>4</sup> Western irrigated agricultural lands are responsible for 45% of the value of U.S. crop commodity exports.<sup>5</sup>

Agriculture occupies a very different place in the West's economy than it did a half century ago. The popular portrayal of the West continues to be one of running cattle, mining, and living off the land. Building on these images, lobbyists routinely represent agriculture as the mainstay of the West's economy. *However, farming, ranching, mining, and agricultural and mineral processing account for only 6% of employment in the region.*<sup>6</sup>

<sup>1</sup> For the sake of this discussion, the "West" is defined as the American states west of the 100th meridian, excluding Hawaii and Alaska. There is enormous variation within this large area, but with respect to water it is appropriate to characterize this as a region.

<sup>2</sup> Western Water Policy Review Advisory Commission. 1992. *Water in the West: the Challenge for the Next Century*. Denver, Colorado: 2-24.

<sup>3</sup> *Ibid*: 2-22, 2-23, fig. 2-10.

<sup>4</sup> *Ibid*, 2-19.

<sup>5</sup> *Ibid*, 2-18 and 2-19.

<sup>6</sup> *Ibid*, 2-18.

The federal government and tribal governments play unique roles in the West. The Bureau of Reclamation and the Corps of Engineers built storage and hydropower facilities across the West, enabling agricultural and then industrial development. The era of building large-scale dams is now at an end, but these agencies still operate and maintain these facilities, ensuring a federal presence on western rivers.<sup>7</sup> Further, the Endangered Species Act has thrust the responsibility of managing most major western rivers onto the U.S. Fish and Wildlife Service and the U.S. Department of the Interior. The Corps of Engineers, in its role as operator of dams, struggles against the Bureau of Reclamation for dominion through flood control construction projects and through other river-related functions. Finally, tribal governments hold large, but unquantified claims to western rivers, and the federal government has a fiduciary relationship to these governments.

State governments typically administer water rights in western states. These rights are based on the prior appropriation doctrine, which was developed in response to the aridity of the West. Under this doctrine, the basis for claims was the “beneficial use” of water, so it has been difficult to reconcile the protection of instream flows with this fundamental tenet of western water law. State governments aggressively assert their sole control over water, but the reality is that power is shared among many authorities. Many of the water rights that were established under the prior appropriation doctrine came into existence when stagecoaches were crossing the West. In fact, it is common for current adjudications to involve rights that were established a century earlier. Under the *Winter’s*<sup>8</sup> doctrine, tribal rights will be even older. Although water rights can be transferred or sold in many states, historical patterns still weigh heavily.

Finally, municipal governments, urban water districts, and other substate entities are growing in importance as population booms in the West. By imposing charges for water, they become formidable competitors where there are water markets. These authorities are inextricably linked to the other entities involved with western water. For example, a California municipality might be directly affected by the Colorado River compact as well as the actions of the Secretary of the Interior, tribes, other western states, and other municipalities. However, these groups have been less dependent on federal funding, and are therefore somewhat more independent of federal decision-making than agricultural interests. In the West, the adage is that “water flows uphill to money,” which has certainly been confirmed by the vigorous expansion of western cities.

## MAJOR ISSUES

The major issue in western water is the effect of population increases on water resources. Expanding populations exacerbate the stresses that are already being felt in the system, and test whether society will be able to find water solutions that provide for long-term sustainability in the West. Water stresses in the West stem from a variety of causes:

<sup>7</sup> The demand for new storage facilities may result in some additional dams, off-stream reservoirs, groundwater recharge or desalination facilities, but most of the sites for large-scale dams have already been used. The federal government’s role in providing these additional storage facilities is an open question.

<sup>8</sup> *Winters v. United States*, 207 U.S. 564 (1908).

*In the West, the adage is that “water flows uphill to money,” which has certainly been confirmed by the vigorous expansion of western cities....The major issue in western water is the effect of population increases on water resources.*

- (1) Rivers have been developed without regard for their ecological functions, resulting in threats of species extinction;
- (2) Most rivers are fully allocated, so that it is hard to find water for environmental and ecological uses;
- (3) Groundwater is being mined in some regions – when these sources are exhausted, new supplies will be sought;
- (4) Water prices do not reflect the value of water, which means that consumers are making decisions without full understanding of the implications of their choices; and
- (5) Water quality has been impaired, which has affected water supplies, therefore constraining water uses.

The population of the West grew by 32% during the last twenty-five years, compared to 19% in the country as a whole.<sup>9</sup> An interesting challenge to the myth of the wide-open western life is that 86% of all westerners live in or near cities.<sup>10</sup> Eight of the ten fastest growing cities in the United States are in the West,<sup>11</sup> which is evidenced by the overall development pattern towards a number of large cities dubbed “urban archipelagos.”<sup>12</sup> These cities include Boise, Salt Lake City, Spokane, Denver, Colorado Springs, Las Vegas, Sacramento, Eugene, El Paso, Dallas, Albuquerque, Tucson, Phoenix, and Missoula.<sup>13</sup>

The U.S. Geological Survey (USGS) has chronicled the withdrawal and consumption of water in the West. In 1960, withdrawals in the West totaled 135 maf, compared with 179 maf in 1990.<sup>14</sup> During that same timeframe, agricultural withdrawals declined as a percentage of the whole from 86% to 78%, with increases in the relative shares of thermoelectric and domestic consumption.<sup>15</sup> A report to the Western Water Policy Review Advisory Commission asserts that all “withdrawals in the 19 western states appear to have stabilized”<sup>16</sup> and this is borne out by the USGS projections for increases in demand. Over a 30-year period, from 1990 to 2020, the population of the West is projected to increase by 51%, but the demand for water is projected to increase by only about 5%.<sup>17</sup> However, the USGS has suggested caution regarding the reliability of water use projections in another context: “The projections by these agencies and commissions vary greatly, reflecting the availability of reliable data and reflecting different assumptions for population growth, economic conditions, energy-resources development, and environmental regulations.”<sup>18</sup>

The ecosystems of rivers, streams, springs, and other bodies of water have been drastically altered by water development in the West. The causes and result of river disruption were succinctly summarized in a 1998 article:

Little debate occurs among fisheries professionals about the causes of imperilment and extinction of southwestern fishes. Most frequently mentioned causes are construction of dams, loss of physical habitat, habitat degradation, chemical pollution, overexploitation, and introduction of nonindigenous species. Dam construction and regulation probably had the greatest adverse effect on native fishes of

<sup>9</sup> Case, Pamela J., and Alward, Gregory S., 1997. *Patterns of Demographic, Economic and Value Change in the Western United States: Implications for Water Use and Management*. The Western Water Policy Review Advisory Commission, Springfield, Virginia: 7.

<sup>10</sup> *Ibid.*

<sup>11</sup> Riebsame, William E., with James L. Wescoat and Peter Morrisette. 1997. *Western Land Use Trends and Policy: Implications for Water Resources*. The Western Water Policy Review Advisory Commission, Denver, Colorado.

<sup>12</sup> Western Water Policy Review Advisory Commission. 1992. *Water in the West: the Challenge for the Next Century*. Denver, Colorado: 2-15; See also, Tarlock, Dan A. 1999. Growth Management and Western Water Law: From Urban Oases To Archipelagos in *Hastings West-Northwest Journal of Environmental Law and Policy Winter*: 163-201.

<sup>13</sup> *Water in the West: the Challenge for the Next Century*. Western Water Policy Review Advisory Commission, Denver, Colorado (1998) at 2-15.

<sup>14</sup> *Water in the West: the Challenge for the Next Century*. Western Water Policy Review Advisory Commission, Denver, Colorado (1998) at 2-23, figure 2-10. Solley, W.B., Pierce, R.R., Pearlman, H.A., 1998. Estimating Water Use in the United States. *Water in the West: the Challenge for the Next Century*. 2-23.

<sup>15</sup> *Ibid.*

<sup>16</sup> Western Water Policy Review Advisory Commission. 1992. *Water in the West: the Challenge for the Next Century*. Denver, Colorado: 2-21.

<sup>17</sup> Western Water Policy Review Advisory Commission. 1992. *Water in the West: the Challenge for the Next Century*. Denver, Colorado: 2-22. (Demand here probably means actual withdrawals.)

southwestern rivers, while the effects of excessive groundwater pumping have imperiled many spring systems and their associated fauna. The number of nonindigenous fish species in the Southwest is considerable: Arizona has 71 species; New Mexico, 75 species; Utah, 55 species; and Texas, 96 species.

As a whole, fishes in the western United States are clearly more imperiled than those in the eastern United States. More than half of the fishes listed as endangered or threatened by the U.S. Fish and Wildlife Service, or being considered for such listing, occur west of the Continental Divide. The commonly observed pattern is the disappearance of the most sensitive fishes, followed by the collapse of whole fish faunas in major western river basins. If current efforts directed at recovery of native western fishes are not continued and successful, we could witness the disappearance of most of the region's endemic fish fauna.<sup>19</sup>

Water in the western United States will also be affected by global climate change. Although the exact nature of the impact is not known with certitude, the following is a projection of the potential effect of climate change on water in the southwest:

Since most of the water supply in the West comes from melting snow during the spring and early summer, changes in storm tracks, in the proportion of precipitation that falls as snow during a water year (October-September), and in seasonality and vertical temperature lapse rates are likely to result in an earlier melt season, diminished snowpack, increased evaporative losses, and lower runoff. Obviously, this translates to less water being available for storage within the network of western reservoirs.<sup>20</sup>

The issues relating to population and freshwater resources will intensify in the short term. As a non-geographer, my impression is that the new West, the West of the great urban archipelagos, has developed without regard to where water is naturally abundant, or perhaps in inverse ratio to abundance. No one who has been to the desert cities of Las Vegas or Phoenix could discern the ecological rationale for their display of water abundance. This is for the poets and artists to interpret. The assumption behind this growth is that agricultural water supplies are more than sufficient to provide for urban uses and that technological fixes such as piped water, desalinization, and recycling will provide water into the only future that is relevant to the present.

There is a choice as to how natural systems are treated as this growth occurs. Environmental awareness has resulted in a virtual about-face in the Bureau of Reclamation, as well as in much of the Corps of Engineers. State agencies in the West have been slower to embrace the need for balance in water management, but the momentum is towards more tempered treatment of the environment. Protection and restoration of natural systems is possible, even with the new

<sup>18</sup> United States Geological Survey, Estimated use of water in the United States in 1990; Trends in Water Use, 1950-1990. <http://water.usgs.gov/watuse/wutrends.html>. *Estimated use of water in the United States in 1990; Trends in Water Use, 1950-1990* (visited February 6, 2001) <http://water.usgs.gov/watuse/wutrends.html>.

<sup>19</sup> Bogan, Michael A. 1998. Changing Landscapes of the Middle Rio Grande in *Status and Trends of the Nation's Biological Resources*, 2: 562-563.

<sup>20</sup> Diaz, Henry F. and Craig A. Anderson. 1995. Precipitation Trends And Water Consumption Related To Population In The Southwestern United States: A Reassessment in *Water Resources Research*, 31: 713-720.

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population, climate, and supply stresses. However, it is not ensured, as discussed below.

## POLICY RECOMMENDATIONS

Sustainability should be at the center of western water policy. Instead, the current policies reflect the exigencies of developing water for irrigation, power, and the cities of the West. This is compounded by bureaucratic competition and conflicting mandates. The posture of western state water administrators tends to reflect the time-honored policies of these bureaucracies more than it does contemporary public opinion. Polling shows broad support for environmental expenditures and controls, but from the statements of some western water officials, one might think that “the public” is comprised entirely of irrigators. This discrepancy is frustrating to environmentalists, but common in the West with respect to resource development issues, where the “old West” maintains its purchase in political offices. The imperatives of the natural world have found little hold in western water policy, and the results of that denial are visible in virtually every western river system.

Natural systems are a key aspect of sustainability. Although the Endangered Species Act (ESA) has led to restoration efforts on some stretches of western rivers, public policy does not generally encompass protection of the ecological functions of rivers. At the national level, legislation has been reintroduced to limit the effect of the ESA on western water allocation decisions, reaffirming the preeminence of state allocation schemes.<sup>21</sup> The effect of this legislation, if adopted, would likely be the eventual dissolution of the initiatives to balance ESA concerns with water allocation on rivers throughout the West. In contrast, legislation to further sustainability would provide for a national restoration initiative, as called for by the Western Water Policy Review Advisory Commission’s Report, *Water in the West*.

Subsidies and failure to recover the full cost of water extraction and distribution are shaping water policy at all levels of government. Within this context, the key issues are regulation of groundwater mining, assessment of appropriate water charges, and poorly placed development. Of equal importance is designating water for environmental purposes, such as fisheries, channel scouring, riparian vegetation, aesthetic purposes, and recreational uses. The western states impose taxes on the severance of minerals, oil, and gas to pay for required infrastructure and societal needs, and a similar system could be established to secure water for environmental uses (with appropriate measures to protect low-income consumers). The costs imposed by charges on water transfers and water withdrawals, and other types of water development, would engender better water policy decision-making by increasing the portion of the financial burden allotted to the consumer.

Water quality in the West will only be protected when the interrelationship between water quality and allocation is incorporated into our systems. Because water supply is limited in the West, there is often a direct relationship between

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<sup>21</sup> S. 446, 107th Cong. (2001).

flows and chemical parameters of water quality. Additionally, the protection of habitat and biodiversity is more likely to be dependent on hydrology than water quality. The Clean Water Act was originally intended to protect all of these values, without distinction as to the causes of their impairment. Non-point source pollution is a challenge to water quality throughout the country. Recent policies from the Environmental Protection Agency (EPA) have emphasized a watershed approach, and citizens are rallying to protect many rivers and streams. Nonetheless, without regulation of some sort, the prospects for achieving compliance with stream standards are dim. Congress recently attempted to suspend EPA regulations by implementing the Total Maximum Daily Loads program, which was the product of litigation against recalcitrant states and the EPA. Federal and state policies should ensure that no class of dischargers is exempted from the Clean Water Act.

### PUBLIC EDUCATION AND MEDIA INVOLVEMENT

Western newspapers are full of water stories, because conflict lends itself well to media coverage. A quick review of local papers reveals stories about housing developments seeking water supplies, wells that must be abandoned because of contamination, interstate and tribal conflicts, flood damage and droughts, Endangered Species Act litigation, and state appropriations for water development. Television and radio stations devote less space to these stories. However, polling shows that westerners are keenly aware of water issues, which is a hopeful indicator of the environmental awareness of the American public.

What is missing from these stories is the identification of the policy choices that have led to these conflicts. Also lacking is information about the right of private citizens to become involved in these decisions. Public participation in water management is frequently portrayed as being limited to conservation. However, while conservation is a worthy endeavor, it is not sufficient. The media and the public should be enlightened as to the more fundamental moments in which water policy is shaped.

That said, from the record of public involvement at the time of decision-making, one would have to conclude that policy makers view the development of water policy as too important to be left to the public. An example of this is the process by which federal agencies procure funding for projects in western states. The President's budget recommendations are secret until they are released to Congress. While there may be Congressional hearings regarding water policy, the first notice that citizens of a state have of a new federal project may be when their Congress member announces new appropriations for the district. The term "iron triangle" describes the relationship among state water administrators, local agency officials, and powerful Congressional appropriators. These relationships have resulted in water projects across the West that arguably may have served broad public interests, but did not result from broad public involvement. Because of environmental and administrative revolutions in public participation, more avenues for public involvement have become

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available. Environmentalists, tribal governments, and other outsiders are now able to influence policy. Nonexperts, however, have limited opportunities to shape these policies. Ballot initiatives, bond issues, and water rate hikes may be the only forms in which water questions are posed to a larger public.

I believe that the democracy movement will extend to western water politics. One example of this is the watershed movement, in which community members of varying ideological persuasions work with professionals from a range of agencies, attempting to remedy pollution and sometimes address water allocation issues. These voluntary entities represent a reordering of the traditional relationships, where remote regulatory authorities might control a few “point sources” of pollution, without exposing most landowners and dischargers to any regulatory or exhortatory measures. Watershed entities are voluntary, and seek to persuade citizens to participate in their endeavors. The movement is shaky, but was able to gain the support of the Clinton administration through its Clean Water Action Plan.

On a larger scale, basin management efforts, chronicled in the report of the Western Water Policy Review Advisory Commission, provide for public participation and much greater transparency where a single federal agency manages a western river. These efforts are harder to characterize than watershed management, but as used here, involve multiple levels of government and operate under federal laws guaranteeing open processes. One has only to compare the power-amassing approach of the Corps of Engineers on the Mississippi River with its relatively humble role in the California Bay-Delta, or the Columbia River, to realize how effective basin management can be in bringing federal agencies back to serving the interests of more diverse constituencies.

The planned growth or antisprawl movement also reflects a movement towards democratization of water decision-making. Because the limited water resources of the West are fully allocated, a decision to allow one type of growth is a commitment to pay the costs of providing new water through reallocation from one use to another. Once the development has occurred, one can be assured that a public entity will provide water. The effect of new development on water resources has become part of the debate over land use policies. This debate is complicated, because in some settings agriculture protects open space, provides wildlife habitat, and is part of the history of western communities. At the same time, irrigated agriculture may use more water than the subdivisions that often replace it. These factors have led to new alliances and modifications in prized positions.

## CONCLUSION

Western water policies have been made with too little regard for the long-term sustainability of the people and natural resources of the region. The necessity of wise management of water is increasing daily as people crowd into the urban centers in the region’s driest regions. We must increase participation in water decision-making and reorient our water policies around the challenges of living in an arid region in better harmony with nature.

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## **Human Population and Freshwater Resources: U.S. Cases and International Perspectives**

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