WATER MANAGEMENT IN THE WESTERN UNITED STATES

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Abstract
All water is local and local conflicts, drought and growth affect the economic and environmental viability of a community. Many regions in the Western United States have experienced high rates of growth concurrent with extreme drought. The conflicting demands on water supplies for a multitude of uses ranging from irrigated agriculture, endangered species, and urban growth have created modern "water wars". Ground and surface water contamination issues further complicate the uses and conflicts in water management. This paper explores these issues and local efforts to address the conflicts and improve water management practices. Examples and best practices will be provided to highlight efforts by local communities to conserve water, reduce contamination, and collaborate on water management opportunities

Key Words: watershed, conservation, collaboration, United States, climate, sustainable, growth, environment.

Whiskey is for drinking – Water is for fighting.

The Western United States has been gifted with abundant natural resources, grand scenery, open skies, clear air, and independent hard working people. The Wild West was not nearly as wild as Hollywood has portrayed, but there is a history of fighting over gold, land, and most especially water.

While the battles continue over water and its myriad uses, the real issue is land – land uses and the human impacts that affect water and water management. With the passage of the U. S. Clean Water Act in 1972, federal, state and local governments have focused their efforts on improving water quality and addressing inadequate water management and treatment across the country. Other regulatory programs have been developed to improve drinking and air quality, prevent storm water pollution of surface waters, and clean up leaking underground storage tanks and former hazardous waste disposal sites. All of the environmental programs and the issues they address are important and necessary. However, from a practical level they have failed. We have a "silo" effect in regulatory management where one issue is addressed independent of the others. The result has been the transmittal of contamination and environmental impacts from one medium to another. Additionally, litigation has become a common method to respond to environmental harm, especially in regard to endangered species and limited water supplies within regions of the Western United States. In the past twenty years, there has been a growing recognition that the traditional approaches to environmental issues and the regulatory framework have not fully met the goals of improving environmental quality and ensuring a sustainable future for our communities. New ideas and processes are emerging to provide environmental improvements at a local level while retaining community values and planning for future needs.

New approaches and water management strategies must provide consideration of, and integrate, all aspects of land use management and water needs. Collaborative, integrated strategies can be used to address issues such as urban and rural growth, water quantity and quality, the water energy nexus, climate change, endangered species, air quality, open space preservation, providing a secure food supply, drought and flooding, economic issues, and native American water rights and relationships.

Collaboration, not litigation provides the foundation for real improvements in environmental quality within our communities. Collaboration is especially effective when conducted in the landscape and watershed where all parties come to the table to share common visions and move from defending positions to addressing the interests and issues that will ensure a sustainable

community. Collaboration requires patience and respect for alternative views and interests. Collaboration may take time, however litigation can last much longer with less chance for shared success and at a very high economic and community cost.

The Western United States has unique characteristics that form the underlying foundation that must be addressed and considered in order to meet the water and land use challenges today and into the future.

Growth

The Western United States has experienced rapid growth over the past twenty years and the region has 15 of the 20 fastest growing metropolitan areas in the United States. (Western Governors' Association, 2006) The U. S. Census Bureau (2005) projections for seventeen western states for the period from April 1, 2000 to July 1, 2020 show the population will increase almost 24% with the largest gains occurring in Arizona, California, Nevada, and Texas.

California's population is projected to increase by more than 8 million people in those twenty years. (U. S. Census Bureau, 2005) In 1990, Las Vegas had a population of 750,000 people using 287.33 square kilometers of land. In 2000, 1 million residents lived in the Las Vegas area and today more than 2 million people receive their water through the Southern Nevada Water Authority. (Southern Nevada Water Authority, 2009)

Rural areas have also seen increases in population due to new methods of communication and the ease and relatively low cost for travel. Many urban residents have moved to suburban and agricultural areas to escape crowds, noise, pollution, and traffic congestion. A number of western communities are seeing an increase in retirees who appreciate a more rural environment and lower cost of living. Growth in the suburban areas and rural communities results in land use changes, expanded or new roads, increased demands on water supplies and water treatment facilities, and changes in the community economics and values.

Water Quantity and Quality

Water use in the west is also increasing with the changes in demographics and impacts of growth. Two of the fastest growing states in the nation, California and Texas accounted for 17% of the total United States surface-water withdrawals in 2000. Ironically, some of the fastest growing states in the west are also the driest states. (Hutson et al., 2004)

The U. S. Geological Survey (Hutson et al, 2004) data on freshwater intensity withdrawals show that California and Idaho are the highest ranked states in water use intensity.

Thermoelectric power production uses the largest percentage of water withdrawals at 48%. Irrigation followed at 34% of the total water withdrawals in the United States. In 1950, the United States used 336,901,649 kiloliters per day to irrigate agricultural lands. By 2000, irrigated water use increased to 518,601,414 kiloliters per day. The increase is attributed to more acres of irrigated land and in response to drought conditions experienced in locations across the United States. (Hutson et al., 2004)

In the Western United States, Alaska and Idaho have the lowest populations served by a public water supply at 67% and 72% respectively (U. S. Geological Survey, 2004).

The World Water Council (2009) estimates human use of water will increase by about 40% over the next two decades and 17 percent more water will be needed to grow the world's food.

Water quantity laws in the west are based upon the priority in time in which a source of water was put to beneficial use. "Water quantity laws in the West were primarily developed to provide for an organized way to have economic development." (Smith, 2008) Western water laws are complex and continue to evolve as states deal with overdevelopment of water supplies, over allocation of surface waters, drought, and conjunctive management of surface and ground waters within watersheds and regions. Wyoming Governor Dave Freudenthal in speaking at the Western Governors' Association (2008a) meeting in June 2008 stated that Western water law fundamentally lacks incentives for conservation and efficiency.

Water in the west is also cheap and ultimately there will be cultural impacts if we

have to pay the full cost for our water. (Meyer, 2009) Western residents and businesses do not fully value the resource due to its low cost. However, much of the infrastructure that supplies some of the cheapest water in the west is also 100 years old and in need of significant investment in repairs and replacement. (Western Governors' Association, 2008b) The water of the future is not likely to be as cheap as the water developed in the past.

In terms of water quality, many western communities continue to deal with point source pollution and total maximum daily load (TMDL) issues for discharges to surface waters. The U. S. Environmental Protection Agency (EPA) lists 6,321 impaired waters in Region X (Alaska, Idaho, Oregon and Washington). (Environmental Law Institute, 2009) The EPA is developing TMDLs for many waterways in the Western U. S. for pollutants such as phosphorus and temperature. Land use practices and urban development directly affect water quality in urban and suburban areas. Improper storm water disposal harms surface and ground water across the country. In regions such as Idaho with extensive historic mining areas and mineral rich soils and rock, both ground and surface waters can be impacted by naturally occurring contaminants such as arsenic and selenium. Human caused pollution affects drinking water supplies in many rural and urban areas due to improper wastewater and hazardous waste management and disposal practices.

Climate Change

Brad Udall, director of the Western Water Assessment at the University of Colorado stated at a presentation to the Western Governors' Association (June 2008a) that "Water has long been a zero sum game in the West. Climate change introduces the possibility that it will become a negative sum game."

The Western United States has experienced an increase in average temperature during the last five years that is 70 percent greater than the world as a whole. The west is predicted to have smaller snow packs, earlier snowmelt, more extreme flood events, more frequent and significant wildfires, less recharge and therefore less groundwater, and greater evaporation from land, streams, lakes and reservoirs. (Saunders et al., 2008)

What Does This All Mean?

The significance of the issues facing the Western United States cannot be understated nor underestimated. The challenge becomes how to best manage the number of issues and the complexity of the issues related to water and land uses while ensuring a sustainable future for communities throughout the Western United States.

Water is local and water issues affect the lives and livelihoods of the residents of a community on a very personal level. Addressing issues at a local or regional scale is proving to be an effective method to ensuring success in designing solutions and then implementing the solutions.

The Western Governors' Association Policy Resolution 07-4 (2007) sets the principle for neighborhood solutions to national problems. Watershed councils, stakeholders, and community-based groups within watersheds should work to reach consensus on solutions to complex water problems. In this, manner localities take ownership of those solutions. The Western Governors "favor collaborative, incentive driven, locally based solutions to environmental and natural resource based problems…" (2007)

In an analysis of successful efforts to address water conflicts, no one approach fits all needs or issues; however, a common understanding of the issues is required. Additionally, all environmental issues must be considered rather than using the historic single environmental media or regulatory approach. All environmental issues are intricately related and they directly relate to the land on which a community lives, works, and plays. A community cannot solely address a water quantity issue and ignore water quality – if there is plenty of water but it is highly contaminated, the water has little value to the community. The following examples show community, collaborative approaches to creating a shared vision, addressing interests rather than positions, and working from an integrated watershed planning model.

Community Examples

Portland, Oregon

Portland, Oregon is located along the Columbia and Willamette Rivers in northwestern Oregon. Portland's population

in 2008 was estimated to be about 576,000, the thirtieth largest city in the U.S. (Population Research Center, 2008). There are approximately 2 million people living within the Portland metropolitan statistical area, the 23rd most populated community in the U. S. (U. S. Census Bureau, 2006)

In 2005, Portland initiated a Community Visioning Project (City of Portland, 2009a) to engage the public in planning the future of the city. More than 17,000 Portland residents participated in the process. The vision provided direction on the built landscape, economics, environment, educational and social future for the city. Portland has developed a strong environmental vision for its future and has implemented a number of successful water and land use management programs that serve as examples to communities throughout the Pacific Northwest and Western United States.

As a wet western city, (approximately 109 centimeters of precipitation per year) Portland has problems with combined sewer overflows during the wet months while dealing with low precipitation (less than 12.7 centimeters) in the summer months. (Weatherbase, 2009) Portland has adopted low-impact development practices and uses many techniques to provide for storm water flows including rain gardens, vegetated curb extensions, porous pavements, urban reforestation, and restored wetlands. The low impact development practices have also provided improvements to water quality by ensuring minimal levels of treatment to storm water prior to discharge to waterways or through infiltration to the groundwater. Additionally, storm water improvements reduce residential and commercial basement sewer backups, lessen flooding, and reduce erosion that adversely affects water quality and fish habitat. Since 2003, Portland has installed 475 public "green" street facilities. (City of Portland, 2009b)

Desert Hot Springs, California

Desert Hot Springs represents a small community with a big commitment to water. It is located in the Coachella Valley, a very hot, dry inland city in southern California. The community of 23,000 residents has a cold-water aquifer for drinking water supplies and a geothermal aquifer that attracts visitors from around the world. Desert Hot Springs began active community based protection of its aquifers in 1995 through the Groundwater Guardian program developed by the Groundwater Foundation in Lincoln, Nebraska. (Groundwater Foundation, 2009)

Groundwater Guardian communities must form a community team representing businesses, educators, citizens and government representatives. Communities are self-defined and each team determines the issues within their community to protect and conserve groundwater resources and then develops an action plan to address the issues or concerns. The community plans use a simple framework of plan, do, check and act which are termed Results Oriented Activities (ROA). The Groundwater Foundation following the review of the submitted ROA plans and annual reports recognizes groundwater Guardians annually. (Groundwater Foundation, 2009)

The Desert Hot Springs High School has been designated a Groundwater Guardian since 2000. The high school provides instruction to almost 2,000 students in grades 9-12. Groundwater protection practices include integrated pest management techniques, updated landscape irrigation technology, arid landscaping, and educational activities to the students on water conservation and protection. (Groundwater Foundation, 2009)

Panhandle Health District, Idaho

The Panhandle Health District is a regional governmental organization servicing several counties in northern Idaho. The largest county, Kootenai County has a population of 137,475 (U.S. Census Bureau, 2009) and uses groundwater for most of the county's drinking water supplies. The Spokane Valley Rathdrum Prairie aquifer is a federally designated, sole source aquifer that is highly vulnerable to contamination from land use practices.

The Panhandle Health District has actively educated and engaged citizens, businesses and elected officials to address the threats to the aquifer water quality since the 1980's. Due to their efforts, Kootenai County voters approved Idaho's first Aquifer Protection District in 2006. The district assesses fees to provide for water quality sampling, public awareness, sewage management oversight, facilitation of aquifer recharge projects, and

development of a critical materials ordinance. The Panhandle Health Department inspects 850 facilities in Kootenai County that manage 64,352 kiloliters of fuels, solvents, waste fluids, pesticides and other hazardous materials. The public continues to support the protection of the Spokane Valley Rathdrum Prairie Aquifer and values ensuring high quality and adequate supplies of water for the cross state aquifer that services thousands of citizens, businesses and industries in the area. (Panhandle Health District, 2009)

Southern Nevada Water Authority, Las Vegas, Nevada

The Southern Nevada Water Authority (SNWA) was created in 1991 as a regional water management agency. The authority provides water to the Las Vegas Valley area. A seven-person board representing the member organizations governs the SNWA. The SNWA's mission is to "manage the region's water resources and develop solutions that will ensure adequate future water supplies for the Las Vegas Valley." (Southern Nevada Water Authority, 2009)

The Las Vegas Valley as noted earlier has grown from 263,000 in 1970 to more than 2 million people in 2009. The SNWA relies on water supplies from groundwater and the Colorado River to meet the growing demand for water within the valley. In 2009, the SNWA Board of Directors adopted a water conservation goal of 753.3 liters per capita per day by 2035. The goal will save more than 189.3 liters per capita per day, which equals approximately 340,440,940.9 kiloliters of water per year by 2035. (Southern Nevada Water Authority, 2009)

Due to ongoing drought conditions in the Colorado River Basin, the SNWA citizen advisory committee in 2005 provided the authority with a number of recommendations for temporary drought response measures. These recommendations are now being evaluated for permanent implementation. The measures included landscape development codes, assigned water schedules, and golf course water budgets. The SNWA uses a variety of demand and supply side management tools to ensure adequate water supplies for the valley. Conservation is a significant tool to water supply management since residents of the valley use approximately 59% of the system's water and most of that is used consumptively for outdoor landscaping. (Southern Nevada Water Authority, 2009)

Water pricing which uses increasing rate blocks is one of their most effective water conservation tools. Other techniques include "water smart" incentive programs such as a landscape rebate program for commercial and residential customers which provides a payment of $1.50 US to remove the first 464.5 square meters of lawn and $1.00 US for each additional .093 square meter of lawn removed after the first 464.5 square meters. A maximum rebate of $300,000 US is allowed. To date, more than of 12,000,000 square meters of lawn have been removed which saves an estimated 26,497,882.5 kiloliters of water each year. (Southern Nevada Water Authority, 2009)

SNWA (2009) believes that education is an important component to water conservation and provides a conservation telephone hotline, publications, speaker's bureau, and advertising, as well as demonstration gardens that highlight low water landscaping techniques.

Henry's Fork Watershed Council, Idaho

The Henry's Fork WaterShed is located in eastern Idaho and Western Wyoming. The Watershed covers an area greater than 6,800 square kilometers and has more than 4,800 kilometers of rivers, streams and canals. (Henry's Fork Watershed Council, 2009) The Henry's Fork is a major tributary of the Snake River. Land uses includes timber production and grazing in the uplands, with irrigated and dryland farming in the lower plains. The recreational resources in the upper basin are outstanding, with international recognition for quality fishing experiences. (Idaho Water Resources Board, 1992)

Only about 40,000 people live within the water shed. The watershed includes a corner of Yellowstone National Park and the western slope of the Teton Range (part of the Rocky Mountain Range, Continental Divide). More than 951 square kilometers of farmland are irrigated in the watershed using surface and groundwater supplies. Recreation and tourism are also very important to the local economy. (Henry's Fork Watershed Council, 2009)

Contentious and divisive issues such as hydropower development and irrigation dams resulted in the Henry's Fork Basin Plan, which was approved by the Idaho State Legislature in 1993. Water quality, fish and wildlife habitat, and irrigation water conservation are all components of the plan.

The watershed council is a grass-roots organization that provides a community forum for "non-adversarial, consensus based approaches to problem solving and conflict resolution among citizens, scientists and agencies with varied perspectives." (Henry's Fork Watershed Council, 2009) The council is co-facilitated by a representative from the Fremont-Madison Irrigation District and the Henry's Fork Foundation. Funds have been provided by the state of Idaho to defray council administrative costs and to pay for projects within the basin. Private contributions are also received and used for watershed management activities. (Henry's Fork Watershed Council, 2009)

The council uses a "Watershed Integrity Review and Evaluation (WIRE)" process for project proposals within the watershed and an annual conference is held to monitor the progress of approved projects. WIRE projects have a watershed perspective, are credible, address an identified problem and propose a workable solution, must demonstrate an understanding of the water supply, employ good management practices, set realistic periods, emphasize a sustainable ecosystem, address social and cultural concerns in the watershed, promote economic diversity, maximize cooperation, and must be legal and respectful of agency legal responsibilities. (Henry's Fork Watershed Council, 2009)

The Henry's Fork Watershed Council has been successful in addressing water conflicts due to its local focus and by building trust. The council believes in a watershed based, collaborative process which uses cooperation, coordination and working on common goals. It involves respect for others and requires a civil approach to problem solving. (Brown, 1996)

Conclusion

The Keys to Success in Reducing Conflict and Ending Water Wars

Water wars can be avoided and water issues resolved when communities use effective tools. The key tools are a local perspective with an understanding of the global issues, a land-based, community oriented process; clear rules are established for the process which address all necessary regulatory requirements, ensure respect for individual perspectives, think creatively, bring all parties to the table, negotiate and collaborate based upon issues and interests – not positions.

In the end, integrated, watershed based collaboration, not litigation will prove to be the most effective, efficient, timely, and least costly method to ensuring our current and future water needs are met and land use issues addressed.

Cicero wrote, "Patria est communis omnium parens." Our native land is the common parent of us all. When we recognize the common values we share in caring for, living, working, and playing within our communities, we can find common ground to protect our land and water for future generations.

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Biography

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Catherine serves on the board of directors of the Groundwater Foundation, Idaho Water Education Foundation, Boise WaterShed Exhibits, Inc. (an environmental education center) and is a founder of Idaho Water Awareness Week, an environmental education program for elementary students. She has presented and been a keynote speaker at state, regional, and national environmental conferences. Catherine and her husband have been married for 30 years and have a son (23) and a daughter (20). They enjoy the beauty of Idaho, hiking and exploring the desert and mountains.