

Fifth In A Series

Water's Role

Water management will be the range profession's most compelling challenge for the 21st century.

By Thomas L. Thurow

Editor's Note: From the symposium entitled "Rangeland Professionals and Society: Future Directions" at the 2001 annual SRM meeting in Kona, Hawaii.

Throughout history, water has played an important role in the development—and demise—of civilizations. Many make the link between the destabilization of ancient civilizations in Middle East, China, and the Americas, and three factors related to water management: 1) failure of water supply due to depletion of groundwater or a climatic shift resulting in warmer and/or drier conditions; 2) gradual degradation of soil and water quality associated with chemical-contamination, particularly salt accumulation, or erosion; and/or 3) the inability of the water-allocation system to adjust to social or economic changes.

Today, these themes are pervasive in contemporary news headlines, especially global warming, drought, aquifer depletion, water quality, and ongoing conflicts associated with partitioning water supply. As human population continues to rise, we will hear more about water management, and the frequency and severity of conflicts will increase.

Evolution of Natural Resource Management

An important impetus of early wildland management legislation in the U.S., as elsewhere, was to prevent land

uses resulting in degradation of plant communities that, in turn, often led to accelerated erosion and flooding.

For instance, a primary goal of the initial forest management legislation introduced to the U.S. Congress in 1876 was to protect watersheds. A primary goal in forming the Soil Erosion Service (now the Natural Resources Conservation Service) and the Bureau of Land Management was to control accelerated erosion and runoff from agricultural land and rangeland. Furthermore, "the crown jewel of scientific achievement by the first generation of range scientists was the innovative concept that changes in the species composition of plant assemblages provided the most biologically sensitive index of range condition" (Young 2000). Consequently, it is no accident that when the Society for Range Management and Society for American Foresters were formed they were known as ecology-based organizations, which focused on resource assessment and restoration issues.

As progress was made in halting and reversing resource degradation, land management agencies and the associated professional societies shifted toward an emphasis on sustainable utilization techniques for cash-generating commodities such as livestock or timber. In the minds of many – whether justified or not – this shift of disciplinary emphasis made range manage-

ment synonymous with livestock production management, and forest management synonymous with timber production management.

Today, urban interests in water and recreation are creating a political and economic environment in which livestock and timber production are relegated to a lower priority. Indeed, large areas of the U.S. national forests are no longer open for timber sales, and there is an increasing pressure to remove livestock from public land based primarily on aesthetic, water quality and biodiversity considerations (Donahue 1999).

Wildland management will focus, increasingly, on water quality and quantity management. This is because water supply is, at best, stable but is declining in many places, and demands from human populations are both growing and shifting.

During the 20th century there was significant depletion of aquifers and streams in many semi-arid and arid regions of the world. For example, consumptive water use in the western U.S. exceeds recharge by an estimated 2.7×10^{13} liters per year (22 million acre-feet per year). In the southwestern U.S. streamflow is more than 70% depleted in an average year (van der Leeden et al. 1990).

Similar or worse water supply and demand imbalances exist for most arid and semi-arid rangelands throughout



*Photo by
Betty Kolb*

the world. Such persistent water imbalances have numerous ramifications for the range management profession.

Water Increasingly Being Controlled By Urban Areas

To date, urban growth in the western U.S. has been enabled by a series of dam and water diversion projects on the major drainages, most of which were built during the period 1930-1980. For example, the Colorado River flows through seven states and Mexico, but most of the beneficiaries of Colorado River water reside outside the basin as a result of federally subsidized trans-basin water diversion projects.

Consequently, the citizens who reside within the Colorado River Basin may derive very little benefit from land management policies intended to improve water quality and quantity for the benefit of distant urban areas outside the watershed. These circumstances have the potential to create conflict because the citizens required to make changes to their production practices (such as changing land management to conform with Total Daily Maximum Load regulations) do not see substantive benefits returned within their region.

The era of dam and trans-basin diversion projects basically ended when a suite of environmental legislation was passed in the late 1960s and early 1970s, including the National Environmental Policy Act, the Clean Water Act, and the Endangered Species Act. This environmental legislation has led to a significant investment in reclaiming aquatic ecosystems and riparian habitat (often this environmental legislation is implemented and monitored by range management professionals trained in rangeland hydrology).

Rather than accessing new sources of water using engineering solutions, urban areas in the western U.S. are increasingly focused on procuring water rights from farmers and ranchers. Agricultural industries currently consume about 87% of western U.S. water. Why do ranchers and farmers use so much water? Water is still relatively cheap and is applied to fields using inefficient techniques like flood irrigation. (Alfalfa production is one of the most water-consuming crops in the West.)

Ultimately water flows to money. Urban areas are willing and able to pay for developed water currently being consumed by agriculture. To shift from one use to another, a host of

complex legal reforms must take place within each state. Many western states are in the process of easing restrictions on water use transfer to accommodate one of the fastest growing populations in the U.S.

For example, if half of the agricultural water in the western U.S. were shifted to municipal consumption at current urban use rates, the eleven western states – whose current population is approximately 55 million – could provide enough water for 200 million more residents (Riebsame 1997). This population increase could be accommodated without significant new water development. These statistics counter those who hope that the character of the current western U.S. would be preserved because aridity would limit population growth and development in the region.

Instead, the western U.S. is on a trajectory of becoming much more urbanized. One of the reasons people are drawn to the West is for the recreational and aesthetic benefits of open rangelands. Management of these lands will, therefore, become increasingly dominated by recreation, aesthetic, and water concerns.

What Are The Implications For Rangeland Managers?

1) Much of the jargon used by range managers is confusing to the general public. For example, water quality is an important focus of land management agencies, and its importance will undoubtedly increase as a pivotal criterion in the regulation of rangeland use. Consequently, rather than being expressed in terms of complex species composition criteria, measures of condition and trend analysis will likely have to address non-specialists questions, such as: "Is the quality of the water coming off this land excellent or not?"

The management implication of this criterion is straightforward: if the water quality is not judged to be excellent, then the land use should be changed so that it is excellent.

2) One ramification of water use transfer is evident in the increasing volatility of hay futures prices in the commodity markets. Municipalities are risk adverse, and, consequently, they procure significantly more water rights than they normally need. The municipalities lease back the water to farmers and ranchers in good rainfall years but exercise their options to use the water during drought.

This exacerbates the sensitivity of hay prices to drought. This increase in feed prices during times of stress increases pressure on livestock owners to proactively manage drought risk, an area of range and ranch management that is poorly developed (Thurow and Taylor 1999).

3) Another implication of the increased value of water and the gradual easing of use transfer barriers will be pressure for traditional ranching operations to sell to non-ranchers. If sold to a developer, land may be subdivided, imposing great changes to the aesthetics of open space; to wildlife that could coexist with the livestock enterprise but not with a subdivision; and to voting patterns in communities (as county commissioners change, so do local land use laws). If rangeland is sold to a rich person and developed as

a retreat, the emphasis on livestock production is usually either diminished or eliminated.

4) The debate regarding tradeoffs between vegetation management and water quantity is likely to intensify. For example, areas dominated by trees or shrubs tend to be preferred recreation sites. However, because trees tend to consume more water than grass, many areas that have experienced significant increases in tree or shrub cover over time show a corresponding decrease in water yield. Consider that water districts on the west slope of the Colorado Rockies document long-term decreases in water yield attributed to fire suppression policies and reduced timber harvests. Likewise, water yield has dropped on some rangelands in Utah and Texas where shrubs such as juniper have increased.

Communication Important

Understanding the realities of the changing demographics of the western U.S. and other rangelands of the world is essential for range professionals who have a tremendous role to play in these dynamic management situations. Many urban dwellers and their political representatives will continue to advocate a back-to-nature, minimal management policy for public rangelands and forests.

However, much of the public does not understand that a passive management policy will not achieve their desired results, but will rather produce unintended negative outcomes (e.g. resistance to prescribed burning often creates a vulnerability to catastrophic wildfire).

In the face of these trends, perhaps the most compelling challenge and opportunity for range professionals is engagement in dialogue to promote appropriate and proactive management consistent with the changing objectives of the population that resides on urban or suburban rangelands.

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References

- Donahue, D.L. 1999.** The Western Range Revisited: Removing Livestock from Public Lands to Conserve Native Biodiversity. Univ. of Oklahoma Press. Norman, Okla.
- Riebsame, W.E. 1997.** Atlas of the New West. W.W. Norton & Co. New York.
- Thurow, T.L. and C.A. Taylor, Jr. 1999.** Viewpoint: The role of drought in range management. *J. Range Manage.* 52:413-419.
- van der Leeden, F., F.L. Troise and D.K. Todd. 1990.** The water encyclopedia. Lewis Publishers, Chelsea, Mich.
- Young, J.A. 2000.** Range research in the far western United States: The first generation. *J. Range Manage.* 53:2-11.