# THE ROLE OF WATER CONSERVATION IN WATERSHED MANAGEMENT

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## INTRODUCTION

Water conservation measures, have been shown to provide many benefits for water suppliers, water users, and their communities. The major benefits include lower water delivery costs, lower water supply treatment costs, stretching wastewater treatment capacity, and delaying expense of new water supplies.

Water conservation, both urban and agricultural, can also be a tool to help meet watershed or river basin goals that are agreed to by all major parties in a watershed. These agreed-upon goals can include balancing water supply for all uses, better flood control, instream flows for environmental benefit, or water quality improvement.

A watershed based approach is becoming more popular in settling disputes about water use and water quality in river basins, particularly in the west. The watershed approach involves sitting all interested parties down, agreeing on goals, and together developing strategies to meet them. Communities increasingly find themselves to be one stakeholder in a watershed process, in partnership with other stakeholders, including upstream agriculture and environmental interests.

Some urban water suppliers have undertaken water conservation studies within the context of integrated resources planning for water supply and wastewater services for their community. Some agricultural water users have considered water conservation as a means to stretch limited water supplies or meet environmental goals. In some river basins, communities have taken the next step: participating in a watershed planning effort that sets agreed upon goals and considers the role of water conservation, as well as other tools, in meeting the needs of the entire watershed or river basin.

The U.S. Bureau of Reclamation and its sister bureaus in the Department of the Interior have been involved as a partner in a number of watershed efforts that apply water conservation measures, both urban and agricultural, to help meet agreed upon watershed goals. Five cases involving the Bureau of Reclamation are described here: California's San Francisco Bay/Sacramento-San Joaquin Delta, the Yakima River Basin, the Platte River, the Colorado River basin, and the lowest stretch of the Colorado.

### California's Bay Delta

In California's San Francisco Bay/Sacramento-San Joaquin Delta, the competing demands of endangered species and increasing water supply needs (urban and agricultural) have pushed this ecosystem to the brink, and sent fisheries populations crashing. The federal government and the state of California organized a team of state and federal agencies, including Reclamation and other Interior bureaus and implemented a cooperative approach to address this problem. CalFed has proposed a plan to restore the fragile environment of the Bay and Delta and to assure stable, high quality water supplies for California cities and agriculture.

The December 1998 release of this proposed plan highlights the role of water conservation. In all the alternatives considered in the CalFed process, water conservation, both urban and agricultural, is built in. The multi-year $4.4 billion plan for Bay-Delta restoration proposes significant efforts ($1.8 billion) in water conservation, both urban and agricultural, and water recycling, as well as a baseline level of water use efficiency as a condition for permitting new surface storage projects.

Some parts of this proposal, including the water conservation part, are controversial. Environmental groups wonder if the plan underestimates the contribution of water conservation to long-term reliable water supply. Agricultural groups are concerned about reliability of savings, costs of instituting measures, and the water conservation strings attached to new offstream storage

facilities. Still, this proposal represents a major advance for the acceptance of water conservation as a tool in watershed management and restoration.

Yakima River Basin

Irrigation, instream flow needs for anadramous fish, and water for future development of the Yakima Indian Reservation all compete for available water supplies in this river basin. Several years of drought dramatized the problem: in 1994, some irrigation water rights holders received only 37 percent of their entitlement, while chinook salmon and steelhead populations were dropping.

Phase 2 of the Yakima River Basin Enhancement Project, approved by Congress in October 1994, authorized Reclamation to address conflicting water needs in the Yakima River Basin and to reduce water diversions. Voluntary implementation of water conservation measures is a key component of the program, both improving conveyance and distribution systems, and improving farm water management. Two thirds of the conserved water will be used to increase streamflows and supplement drought needs. The other third remains with the farm. The 1994 law also provides for target instream flows.

A basin-wide conservation plan was completed in 1998, with goals to improve reliability of irrigation water supply, improve water quality and wetland wildlife habitat, and improve fish habitat by increasing instream flows. A conservation advisory group formulated the basin conservation plan. Reclamation, the State of Washington, Yakima Indian Nation, Bonneville Power Administration, Yakima River Watershed Council and irrigation groups all participated. Individual irrigation districts are developing their own conservation plans within this framework.

The project cost shares development of water conservation plans, feasibility investigations of conservation measures, and design, implementation and evaluation of conservation measures. In FY1998, $8.5 million in federal, and $17.5 million in state, funds were available.

Colorado River Basin

The Colorado River basin has long been plagued by high salinity levels, exceeding water quality standards, causing economic damage to agriculture, and creating problems with the downstream Mexican government. River water is withdrawn, used, and returned to the river multiple times along its length, increasing salinity along the way. A 1974 compact with 7 states and the U.S. Department of the Interior created the interagency Colorado Salinity Control Program.

The program was revamped in 1995 to allow a new basin-wide approach to salinity control, rather than the specific project construction authorizations of before. It also brought in the U.S. Department of Agriculture and its onfarm capabilities.

To meet water quality standards for salinity in 3 downstream locations near the Mexican border, the program now offers cost sharing for water management projects (including public and private, structural and nonstructural), that can most cost-effectively prevent salt from entering the river. This allows a much wider range of salinity control alternatives than before. Onfarm and systemwide water efficiency improvements have rated high in this approach, as they promise high salinity reductions for less cost. The project selection process also considers variations in risk, including reliability. For example, canal lining in different places yields very different results in terms of salinity reductions, in part due to natural geology and soils.

The program now invests some $10-15 million each year in agricultural water conservation measures, both on-farm and systemwide. Coordinated projects include measures such as piping existing laterals to gain pressure, and linking to on-farm pressurized sprinklers, with water savings approaching 50 percent and corresponding reductions in return flows and salinity control.

Platte River

The Platte River Basin is the scene of a precedent-setting cooperative agreement for recovery of Platte River endangered species, signed in July 1997 by the Secretary of the Interior and the Governors of 3 states: Wyoming, Colorado and Nebraska. The agreement included a commitment to examine water conservation opportunities that may help endangered species recovery by increasing streamflow or returning water supply to critical habitat. Other aspects of the project look at other water management approaches, environmental resources monitoring, and habitat protection.

The governance committee, comprised of 3 states, Interior, water users and environmental groups, is undertaking a basin wide study of water conservation and supply augmentation opportunities. They selected a contractor in

early 1999. The next step is to develop criteria for selecting among the many water conservation and supply augmentation alternatives.

At the same time, the federal government has begun an environmental impact statement on species recovery alternatives. This study will also address the role of water conservation as a fundamental part of the alternatives for better managing streamflow.

The outcome of these studies regarding the relative contribution that water conservation can play in this particular situation is not yet known. But building water conservation into the earliest stages of a river basin management process is an exciting trend.

Lower Colorado River: San Diego/Imperial Irrigation Districts

A very specific example of the potential role of water conservation in river basin management is at the downstream end of the lower Colorado River. A tentative water transfer agreement was announced in December between Interior and two southern California irrigation districts. It is one key element in a plan to transfer as much as 200,000 acre feet a year of water from Imperial Valley farmers to the coastal city of San Diego. The water to be transferred would be made available through a variety of water conservation measures, including lining distribution canals, on-farm conservation improvements, and groundwater conjunctive use.

This single, highly complex, water transfer can significantly reduce California's dependence on Colorado River water, freeing the water for other upstream uses. But to work, many other institutional pieces must fall in place. Other elements of the plan include agreements with San Diego to buy the water, Metropolitan Water District to move the water, and State of California to fund canal lining.

While this arrangement primarily benefits water supply, it may also have a positive impact on the health of the lower river basin. Environmental groups such as the Southwest Center for Biological Diversity, a watchdog of southwestern endangered species, believe any shift in the lower river's water use patterns can help restore the Colorado River Delta, where the river ends at the Gulf of California on the Mexican border. Delta habitat has dramatically been reduced in acreage and quality over the years as upstream water uses have increased. The transfer is not likely to have a significant effect on several endangered species of fish in the lower Colorado.

## ISSUES TO CONSIDER

Communities and other stakeholders in a watershed partnership can introduce the concept of water conservation as a tool for resolving watershed issues. When doing so, several issues are worthy of attention: 1) attitudes toward water conservation; 2) how the institutions in a river basin address conservation; 3) estimating savings from water conservation; 4) environmental effects; and 5) economics of conservation measures. Squarely addressing these issues early in the watershed process can increase the effectiveness of water conservation as a tool in a particular watershed or river basin.

Attitudes Toward Water Conservation

Attitudes can play a great role in whether water conservation is taken seriously as a potential tool.
Ask if all the water users in a river basin accept water efficiency as a reliable tool for improved watershed management, rather than a potential obstacle. Consider also whether those designing comprehensive watershed and river basin programs understand water conservation's potential and consider it useful.

How the Institutions Address Water Conservation

The institutional climate in which water conservation measures are undertaken varies by state. In many western states, water rights laws can reduce the effectiveness of some types of water conservation measures. On the other hand, some states have recognized, and institutionalized, the interaction between municipal water conservation and streamflow. For example, the states of Oregon and Massachusetts both have programs requiring individual municipal water conservation plans within a river basin.

Watershed partners will want to address how the split between state water management and water quality programs is addressed in their watershed. They will also want to explore whether there is a potential for effects on individual water rights, and if so what adjustments can be made.

Estimating Savings from Water Conservation

Even the experts disagree on how reliably we can predict the long-term effects of water conservation measures and the range of potential savings. In a drought prone climate, concern about reliability may result in very conservative estimates. Assumptions about how much water conservation may be required may result in overestimates. In a given watershed, the success of water conservation as a tool in watershed protection depends on whether the group is being realistic about how much water savings can be achieved, the possible range of results, and the specific assumptions behind the estimates.

Environmental Effects of Water Conservation

The localized environmental effects of a particular water conservation measure may well be different from the general benefits to the watershed. The group should consider how the watershed plan will account for the unintended negative consequences of specific water conservation measures, for example the loss of wetlands that were first created by agricultural drainage. In addition, some water conservation measures may have significant third party effects that must be addressed in order for the watershed plan to succeed.

The Economics of Water Conservation Implementation

As with any other watershed protection measure, the various stakeholders in the process must perceive that the costs of the measures are spread fairly. The group may need to wrestle with such issues as who bears the cost of water conservation measures in a river basin if the benefit is basin wide, and whether the relative costs of all the potential water conservation measures, both urban and agricultural, are considered.

## CONCLUSION

Water conservation can be a powerful tool in watershed management. The examples described earlier are not isolated incidents. Across the country, especially in the West, cooperative watershed based approaches to resolving water supply and environmental issues are increasingly turning to water conservation as a tool to meet watershed goals. Success in applying water conservation as a watershed protection tool is more likely if a number of issues are considered at the beginning of the watershed management process, and if all interested parties are consulted.

In many situations, water conservation can make a significant contribution to resolving watershed issues. Consideration of the role of water conservation should be built in up front into the watershed planning process.

NOTE: The opinions expressed here are solely those of the author and do not represent the views of the U.S. Bureau of Reclamation or the Department of the Interior.