PERC Case Studies

Colorado River Water Bank:

Making Water Conservation Profitable

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Ranchers in western Colorado think about more than flood irrigation when they see flowing water, they think about income. In fact, a group of west slope ranchers devised a model for water banking that could make water conservation more profitable than irrigating, and now they are working with state agencies and conservation organizations to turn that idea into reality.

Still in the development stage, the Colorado River Water Bank would allow municipalities on Colorado's Front Range to buy water consumption rights from irrigators on Colorado's west slope who reduce their water consumption. This market-based approach to water conservation means water has value beyond irrigation—water itself is becoming a profitable crop.

This case study explains why water conservation is paramount in Colorado and how water banking is the most cost-effective approach to water conservation. The conclusion offers recommendations for other groups considering water banking as a way to get more value out of water.

BACKGROUND

Water is a scarce commodity in the Rocky Mountain West, yet the region has one of the fastest growing populations in the country. Population growth along the Front Range of Colorado, where the state's largest cities are located, is driving water demand past the limits of water supplies. Colorado's population grew by 2 percent from 2007 to 2008, making it the third fastest growing state in the country, yet decades-long drought means fewer water resources are available to meet the needs of the burgeoning population. In addition to the hydrological constraints on water consumption, legal requirements may force Front Range municipalities to consume even less water.

The Colorado River Compact is a 1922 agreement between the seven states in the Colorado River Basin requiring Upper Basin states (Colorado, New Mexico, Utah, and Wyoming) to deliver water at a rate of 7.5 million acre-feet of water per year on a 10-year rolling average to Lower Basin states (Arizona, California, and Nevada). Since drought began in 2000, the average annual flow has dipped below 10 million acre-feet per year.

If the 10-year rolling average falls below 7.5 million acre-feet, the Lower Basin states may institute a forced reduction in Upper Basin water consumption, also known as a "compact

The Colorado River Compact is a 1922 agreement among seven states in the basin of the Colorado River.

curtailment." Junior water rights established after 1922 (when the Compact was signed) would be cut until the 10-year rolling average went back above the Compact minimum. Senior water rights on the other hand, those perfected before 1922, would be unaffected.

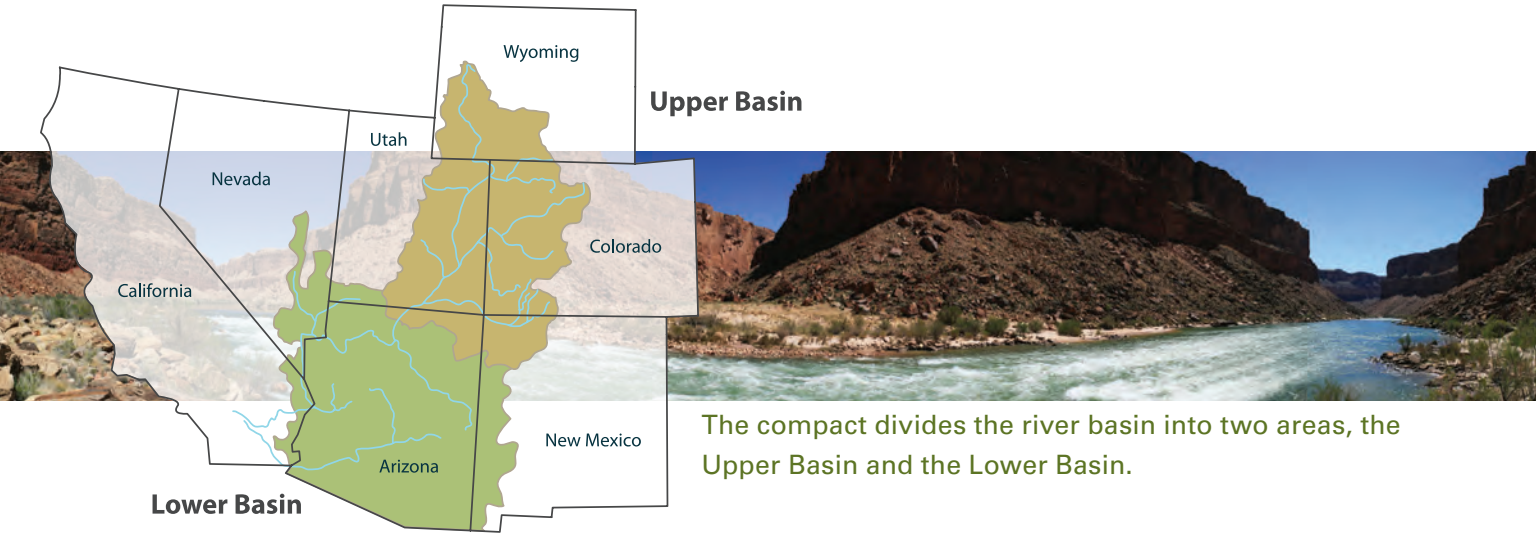
Front Range municipalities hold primarily junior water rights, rights that would be cut in the event of a compact curtailment. The potential inability of these municipalities to provide basic water and sanitation service means government officials are scrambling to find not just water, but long-term water solutions.

WATER BANKING BASICS

State governments typically respond to water shortages by imposing water use restrictions, enforcing priority dates, mandating water conservation technology, or using some combination of these policies. But low flow toilets and lawn watering schedules have done little to curtail Colorado's water consumption. Indeed, water use has only increased due to the state's population growth and subsidized water rates. Water banks offer a solution, one that promotes voluntary conservation by harnessing the incentives of water users.

MARKETS AS AN IDEAL TOOL

When water users in western Colorado confronted perhaps the biggest challenge to the future security of water use in Colorado—a curtailment of water under the multi-state Colorado River Compact of 1922—they envisioned water markets as a key component of the solution. The results: A proposal for a Colorado River Water Bank.



The compact divides the river basin into two areas, the Upper Basin and the Lower Basin.

Water banks promote efficient water use by facilitating agreements between users who can reduce water consumption cheaply (sellers) and those who cannot (buyers). The potential profits from conservation agreements force water users to consider the opportunity cost of their consumption, that is, whether the water is more profitable diverted for irrigating water intensive crops or left instream to meet the Compact requirement. This contract-based approach allows water users rather than government agencies to determine the most cost-effective means of allocating scarce water. In this way, a water bank is similar to a cap-and-trade approach to reducing air emissions.[1]

Water banks also reduce transaction costs, which include the time and expense of locating contracting parties, negotiating agreement terms, and monitoring performance under those terms. Water banks can reduce these costs by standardizing agreement terms and monitoring performance. By reducing these costs, water banks expand the room for negotiation between conservation buyers and sellers—meaning more water conservation deals take place.

This reduction in transaction costs promotes not just economic efficiency, but also water conservation for environmental purposes. Specifically, the water bank allows environmental organizations concerned over low flows and dewatered streams to purchase water consumption rights from west slope irrigators. Instead of consuming an offsetting amount, as would a Front Range municipality, the environmental organization could

"retire" the consumption right and leave the water instream for fish and other aquatic species.

MARKET OPPORTUNITY

Several factors make water banking a viable strategy for Colorado. First is the uneven distribution of senior Colorado River water rights throughout the state. Senior water rights were perfected before the Colorado River Compact was signed, so they are impervious to curtailment. Of the 1.3 million acre-feet of Colorado River Basin (CRB) water consumed annually on Colorado's west slope, more than 1 million acre-feet come from senior water rights. Conversely, of the Front Range's roughly 500,000 acre-feet in annual CRB water consumption, 490,000 acre-feet or 98 percent come from junior water rights.

This unbalanced distribution in senior water rights means a compact curtailment would have a more significant impact on Front Range water users than it would on west slope water users. Purchasing water consumption rights from west slope irrigators allows the Front Range water users to minimize this exposure and west slope irrigators to earn higher returns on their water.

A second and related factor that makes water banking a viable option for Colorado is the difference in water prices on the Front Range and west slope. In irrigation, the estimated price per acre-foot ranges between $28 and $100, depending largely upon the crop in irrigation.[2] But Front Range municipalities currently pay between $9,000 and $15,000 per-acre foot for new water supplies and would pay $15,000 to $45,000 in acquisition costs for large water development projects currently under consideration. This disparity in water values means water users on the Front Range and west slope have flexibility when negotiating mutually beneficial water conservation contracts; the water's

COMPACT CALL

The Colorado River Compact requires Colorado and the Upper Basin states to deliver 7.5 million acre-feet of water per year on a 10-year rolling average to the Lower Basin states. If the rolling average dips below this amount, the Lower Basin states have legal authority to institute a "compact call," which would curtail water consumption in the Upper Basin states.

By facilitating trades between groups of water users, the Colorado River Water Bank will make it cheaper for Upper Basin states to send more water downstream. This reduces the costs of compact compliance, the likelihood of a compact call, and the cost of curtailment should a compact call occur.

The water bank idea came from west slope ranchers who understood that the value of their water could be higher in conservation than in irrigation.

value in conservation for west slope ranchers will often be less than the water's consumptive value for Front Range municipalities.

BANK STRUCTURE AND FUNCTION

The simplicity of the proposed water bank structure is worth noting. No physical transfer of water is required; instead, the Front Range municipalities with junior water rights can simply pay the west slope ranchers with senior water rights to use less water. The municipalities can then consume a proportional amount of water without increasing the state's total consumption.[3] So long as the conservation to consumption ratio is greater than 1:1, the water bank would increase the amount of water flowing to Lower Basin states and thereby function to prevent a compact curtailment.[4] As such, the Front Range users and west slope irrigators would be trading water right seniority rather than physical water.

The water bank could also function to insure against losses in the event that a compact curtailment occurs. Specifically, if the 10-year rolling average dips below the minimum amount, junior water rights would be curtailed until the minimum requirement was once again reached. Such a curtailment poses great risk to Front Range municipalities that hold few senior water rights but must still meet the basic water and sanitation needs of large populations. By purchasing non-curtailed (senior) consumption rights from west slope ranchers either directly or through option contracts, these municipalities can use the water

bank to minimize their exposure under the Colorado Compact.

LESSONS FROM AGRICULTURE-MUNICIPAL PARTNERSHIPS

The water bank idea did not come from Front Range municipalities desperate to secure rights to additional water consumption. Instead, the idea came from west slope ranchers who understood that the value of their water could be higher in conservation than in irrigation. As revenue-cost margins shrink on traditional ranching activities, the profits these ranchers stand to make from water banking could be the difference that keeps some ranchers on their property.

Ranchers and farmers in other regions can gain from this insight into the dynamic value of water. Although many characteristics of the Colorado River Water Bank are location-specific, this program provides valuable insights for landowners throughout the country.

1. ***Use Competition to Your Advantage.*** Identify willing buyers and establish a competitive bidding atmosphere so that the contract price for water conservation reflects the highest value of that water. Legal requirements may help with buyer identification: ask which water uses would be cut first and whether those users will pay something to avoid curtailment. A bidding process whereby several water conservation buyers compete for the conservation credits (or for the water itself) will ensure that conservation sellers get the best deal possible.
2. ***Transfer Rights Instead of Water.*** It is cheaper to supply water consumption rights than it is to supply water, so profits from trading water right seniority can be higher than profits for selling the physical water. The obvious caveat here is that water consumption rights may or may not be transferable in states following the riparian doctrine. But, even if physical delivery is unavoidable, one should still try to minimize delivery costs when selecting a water buyer.
3. ***Maintain Flexibility.*** Short-term water leases provide more flexibility and protect current land uses better than do long-term leases or outright transfers. When water is severed from land, the land's agricultural potential is often lost. The Colorado River Water Bank's structure allows for yearly deals between west slope irrigators and Front Range municipalities and for rotational fallowing agreements among west slope irrigators. Both features protect ranching operations from permanent water transfers and fallowing.
4. ***Engage Stakeholders.*** Seasonal crop fallowing influences other individuals and businesses in the community. Hence, the indirect impacts of fallowing on workers, retailers, and buyers should be considered. These interests

may oppose the water banking program if there's no provision for their lost revenues. Engaging these stakeholders may be necessary for a successful program.

5. ***Pursue Multiple Partnerships to Minimize Risk.*** Engaging conservation organizations may increase the number and profitability of water conservation agreements. Specifically, these groups may supplement the price conservation buyers are willing to pay—meaning more money for conservation sellers. They may also lend credibility and political capital to the water banking program.

For groups considering water banking as one method to capture water values beyond agricultural uses, the Colorado River Water Bank offers an excellent learning opportunity. By treating water as a crop, the water bank will facilitate *voluntary* transactions between agricultural and municipal water users, improve the efficiency of water allocation in Colorado, and create new profit opportunities for west slope ranchers.

NOTES

1. During the 1990s, cap-and-trade programs efficiently reduced total emissions of the acid rain precursors SO_2 and NO_x by allowing regulated parties to trade emission permits. These permits gave regulated parties the right to release certain quantities of emissions into the atmosphere each year, much like water rights allow irrigators and municipalities to divert a certain amount of water each year. Regulated parties who could reduce emissions cheaply sold their permits to parties who could not, thus ensuring that emission reduction progressed as cost-effectively as possible.
2. Figures from Colorado State University, Extension Farm Crop Enterprise Budgets, 2005–2008.
3. The state of Colorado will most likely run the bank: the Colorado Division of Water Resources administers water rights for the state of Colorado, and the Colorado Water Conservation Board of the Colorado Department of Natural Resources administers most of the water conservation programs and intrastate water agreements.
4. Whether the 10-year rolling average was above or below 7.5 million AF/year will determine the appropriate conservation to consumption ratio.

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