Source-to-Sea Protection for the Rio Grande: Strategic Concepts for Re-watering a Thirsty Basin

by Steve Harris, Rio Grande Restoration

The great challenge for water managers in the Rio Grande is to somehow balance important environmental/ economic, and development goals for the basin's water and to integrate competing interests into a strategy that sustains uses of the river and its water into the foreseeable future. Today we are failing to answer this fundamental challenge, as witnessed by the fact that the ecological benefits of streamflow, in at least four segments of the river (Table 1), have been sacrificed to diversionary uses. This suggests that the river is not being considered in its proper role as a water user and provider of essential services.

The river has not yet been accorded real recognition or protection in the legal constructs governing the waters of the basin. The river has no effective seat at the table in our strategic forums. This concept paper, in suggesting a basin-wide strategy for protecting streamflows, is based on four assumptions: (1) the present state of affairs on the Rio Grande is not sustainable; (2) water uses by the river and the natural environment should be balanced with consumptive uses; (3) present consumptive uses can be balanced with environmental requirements; and (4) contrary to tradition, water is actually for cooperating over.

Rio Grande "Hydro-Reality Check"

The basic environmental condition of the Rio Grande basin has been accurately described as "a state of drought, occasionally mitigated by periods of abundance," Before the present one million acres of irrigated agriculture were developed in the basin, the river flowed with great springtime surges from the melting of mountain snow packs, receded in the hot months of summer, then often filled again during the monsoons of July through October. At approximately 20-yr intervals, the moisture from winter storms would fail to come, as it still does, quite often for periods of 2-5 yrs.

On an annual average, less than 2.5 million acre-ft were (and are) produced by the river's headwaters. Years of abundance, with up to twice this amount were (and are) balanced by years of scarcity, with as little as half the average quantity. Diversions of water for irrigation claim nearly 95 of the average annual flow of the river. Water rights claims to the waters of the Rio Grande, most of which are legally unadjudicated, exceed the actual supply. The basin's water supply picture would be even bleaker without the addition of 96,000 acre-ft of San Juan River water imported into the Rio Grande, ground-water subsidies through wastewater discharges, and the 20,000-plus annual acre-ft salvaged by the Closed Basin Project in Colorado. Today, on average, just 5 of the river's production of water survives diversion to appear as streamflow at Fort Quitman, the division point between the upper and lower Rio Grande basins.

Institutional Stakeholders

It is estimated that 89% of the basin's water resources are devoted to irrigation (Ellis et al., 1993). Since about 1870 the basin's economic dependence on irrigated agriculture and the waters supplied by the river meant that security against the caprices of nature was intensely desired. In a watershed plagued with frequent shortages and wildly variable precipitation, the Federal Reclamation Service addressed the need for water storage by constructing the Rio Grande Project, including Elephant Butte (1916) and Caballo (1936) reservoirs, with 2.5 million acre-ft in storage capacity. Today, the U.S. Bureau of Reclamation plays an essential role in managing the basin's water resources, including El Vado Reservoir (1936), Heron Reservoir (1963), and the Rio Grande Project. Its sister agency, the U.S. Army Corps of Engineers, also manages two large reservoirs, whose primary purpose is flood control: Abiqum (1963) and Cochin (1975).

After decades of conflict, the U.S-Mexico Treaty of 1906 and the Rio Grande Interstate Compact of 1939 apportioned water among the major irrigation sections in the states of Colorado, New Mexico, Texas, and Chihuahua. As a result, the flow of the Rio Grande in its upper basin is largely determined by water delivery requirements of the Rio Grande Compact.

Major irrigation districts further apportion water among farmers in the basin's major valleys. These quasi-governmental local districts include: Rio Grande Water Conservation District (San Luis Valley, CO), the Middle Rio Grande Conservancy District (Albuquerque, NM), Elephant Butte Irrigation District (Las Cruces, NM), and El Paso County Water Improvement District #1 (El Paso, TX).

New surface water uses continue to increase demand on the river. The burgeoning cities of Albuquerque and El Paso are busily planning projects to help them convert from ground-water mining to "renewable" surface water uses. The river, already at a competitive disadvantage, will soon shoulder the burden of new depletions for urban uses.

Why Streamflow Protection? Why Now?

Dry rivers equate to dead fish. The least hardy species that evolved in the river have disappeared, and the most hardy are considered threatened or endangered. Compliance with the Endangered Species Act will require water. Rio Grande pueblos have "prior and paramount water rights" that have never been quantified. It is but a matter of time before tribes seek to assert specific water entitlements. The resolution of Pueblo Nations' water claims will require water. Even New Mexico's ability to honor its obligations under the Rio Grande Compact may be in jeopardy, as consumption of water increases.

The institutional arrangements that arose in response to 19th-century needs recognized only the irrigation economy as a purpose for the water supplied by the river. Today's realities include vastly larger demands for urban drinking water, new industries, and new social values, such as equity for Native American tribes and environmental quality. The sum of these demands presently subjects four critical reaches of the Rio Grande to dewatering in most years (Table 1).

Today, we are at the threshold of an important decision—will we attempt to belatedly include the river in our water supply strategies? If this region insists upon clinging to the institutional status quo, the river simply will cease to live. Only a bold, intentional change in the way we do our water business will offer hope of preserving existing uses, and balancing them with developmental aspirations and the river

ecosystem. Whether we realize it or not, the decision we are making is between a living river and a dry ditch.

An honest effort to satisfy this full range of modern-day water demands will require difficult institutional adjustments and shifts in the allocation of legal rights to Rio Grande water. Securing beneficial streamflow regimes will, in large measure, depend upon some agreeable modifications in existing institutional arrangements, and small but significant accommodations by current users. Such an effort will satisfy the public interest in protecting the river-dependent natural environment from further degradation, or else we will dry up the river and flood the courtrooms.

Ironically, the basin's brightest hope is that so much of the Rio Grande's water is so inefficiently used (85% of the basin's farms use the least water-efficient methods available). If, as a basin, we could realize our water conservation potential, we could shift the savings to the environment and other new uses.

Wet Water's for Drinkin', Paper Water's for Fightin' Over

In the Western United States today, two kinds of water exist. Most citizens understand "wet water", the kind that flows downhill in response to the laws of God or nature or gravity. Wet water moves through the natural landscape in rivers and streams, and around the human landscape in ditches and pipes. Fewer understand about the second kind of water, which is paper water. Paper water, it is said, "flows uphill to money", a nifty feat whose accomplishment requires lawyers. Paper water flows through courthouses and statehouses. Unfortunately, our paper-water-rights system has over-allocated the river (assigned more rights than wet water) and given the region its knottiest problem.

Wet water, like the air around us, is an absolute requirement of life on our beautiful, blue-green planet, an entitlement that all creatures share. Paper water is too often a commodity to-be captured and consumed, haphazardly, for short-term economic purposes. Our society could clearly be more deliberate in our use of water, more thoughtful of our neighbors, both natural and human.

Presently, water rights are unadjudicated in large sections of the river. In the present context of legal uncertainty, immediate progress toward legitimate river restoration goals must be made with the voluntary cooperation of a broad range of affected institutions. But time in which to make the critical adjustments to our water management institutions grows short.

In the event that we cannot place the river into the proper management context, society within the basin will likely be forced to sacrifice some or all of the environmental benefits the river has historically provided. Failure to maintain a functioning ecological base will make continued human occupation of the basin problematic. Much is at stake.

This paper suggests that a thoughtful combination of reservoir re-operations, water conservation, and water rights acquisitions, applied in the broadest interests of the users and environment, can reverse the Rio Grande's unmistakable trend toward extinction.

Streamflow Protection? How?

Maintaining Rio Grande streamflow requires maintenance of a precarious, wet-water balance. The river clings for its life to a small wet-water surplus and the obligation of several states to provide agreed-to consumptive amounts to their downstream neighbors. The wet water that accrues to the river today is entirely subject to tomorrow's consumptive uses. To achieve sustainable water for environmental needs, three conceptual criteria must be met: (1) acquisition of 8% of Rio Grande basin purchase or donation; (2) obtain dedicated storage pools in major reservoirs, explicitly for environmental water needs; and (3) utilize the regulating capacity of reservoirs for timing releases to achieve the greatest social and environmental benefit

It is important to note that the amount of wet water proposed for protection is small relative to the Rio Grande basin's average water production. A basin-wide water conservation target of 8% of existing uses is believed to be achievable, if institutions and users are offered sufficient incentives. To offset impacts of acquisitions on existing systems will require the most efficient possible use of water in cities and farms, and application of conserved wet water to the environmental pool.

Securing conserved water and protecting it from future depletion will require a serious public commitment to provide water explicitly for the environment. The path of least resistance in our present free market view of the resource is to secure, by purchase, lease, or other voluntary transfer, a sufficient quantity of water for the river's minimum survival needs.

While considerable resources may be required to fund water acquisition and capital improvements for water conservation, not all environmental water needs must be purchased. Delivery of downstream entitlements form part of the conceptualized future streamflow regime. The process will require a unified commitment by the public, decision makers, and water management officials for funding, data acquisition, and monitoring.

A streamflow protection program will also require some storage in the basin's reservoirs and an integrated understanding of delivery systems and increased ability to manage flows. Congressional reauthorization of some, if not all, facilities would be required to enable storage set-asides specifically for environmental use. Storage may, in some cases, need to be purchased. With a dedicated storage pool and improved water management operations, 210,000 acre-ft of environmental water in the upper basin is attainable (Table 2) without impacting existing users.

Finally, the river's own share of water must be shepherded through a complex natural system and a maze of man-made diversions. An increased understanding of the river's natural system will be necessary to optimize streamflow regimes, protect existing beneficial uses, mimic the shape of the natural hydrograph, and prevent desiccation of the river. In other words, the science of the Rio Grande must continue to improve.

A Last Word

The difficult task of balancing the Rio Grande's existing uses and development goals with the needs of a declining natural environment demands that the leaders of the basin devise new strategies to sort through the conflicts among competing water uses and integrate conflicting management institutions. Today we see urban leaders confidently planning the future conversion and ultimate consumption of tribal water, agricultural water, and the river's water. Individual water users recognize few connections to other user groups and to the river. Agriculture, already at the mercy of capricious markets, continues to build bunkers around existing water institutions, which includes their own massive diversions. Water management institutions are long on paper-water administration tools, and short on substantive knowledge about the wet-water system.

Like a fault line in an earthquake zone, great pressures are building around the Rio Grande's scarcity of water. The basin's headlong slide into the crack might be arrested gradually by application of good faith by many water users and the hard work of collaboration. The alternative, of course, is a cataclysm, the old fashioned rumble over water and a conflict with many potential losers. The living river would surely be one of the first casualties.

Perhaps we will continue to hide behind the strict constructions of our water management institutions and argue that the proposals contained here won't work—that we can't afford to devote water to rivers. We must recognize that these are rationalizations that focus on our fear of losing things that water rights holders can't bear to lose. To be sure, there are risks to water users and other decision makers in the Rio Grande basin in shouldering this task, but there are much Greater risks in failing to try.

Reference

Ellis, S. R., Levings, G. W., Carter, L., Richey, S. E, and Radell, M. 1993, Rio Grande Valley, Colorado, New Mexico, and Texas. Water Resources Bulletin, v. 29, no. 4, p. 617-646.

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TABLE I—Upper Rio Grande stream segments presently subject to dewatering.

River reach	Length (mi)	Typical minimum flow (cfs)__	Recurrence frequency	Season
Colorado above NM state line	-60	25	4 yrs in 10	July-Oct
San Acacia to Elephant Butte	-60	0	1 yr in 2	July-Oct
Below Caballo	-40		Annual	Nov-Feb
Below Fort	-160		Intermittent	May-Aug

TABLE 2_Major storage reservoirs on the Rio Grande, storage capacities, and proposed storage for environmental water.

Reservoir	Total storage (1,000 acre-ft)	Owner/Operator	Primary use	Proposed environmental storage (1,000 a.f.)
Heron	400	USBR	Storage/delivery of San Juan-Chama Project water	10
El Vado	180	MRGCD	Irrigation storage	none
Abiquiu	1,200	USACOE	Flood/sediment control and storage	30
Cochiti		USACOE	Flood/sediment control, fish and wildlife & recreation	20 in recreation pool
Jemez Canyon	15	USACOE	Flood/sediment control	>5
Elephant Butte	1,900	USBR	Flood/sediment control, irrigation storage	50
Caballo	30	USBR	Irrigation storage	I0
Amistad/ Falcon	3,900	IBWC	Flood control, irrigation storage	60
AquifersUnknown		Permitted water rights	Domestic/municipal supplies	40
Upper Basin totals	5,300			
Lower Basin totals	5,900			