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SHARING WATER INTERNATIONALLY, PAST, PRESENT AND FUTURE—MEXICO AND THE UNITED STATES*

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ABSTRACT

Conflicts over the sharing of the Rio Grande/Rio Bravo and Colorado Rivers between the United States and Mexico are usually understood in spatial terms. In this paper we argue for the need to add a temporal horizon. A larger historical context will reveal that water management, including water allocation and river politics, has always been influenced by larger social-political and cultural frameworks. These temporal shifts are sequential, but overlapping so that current policies as cultural constructs operate within the framework of previous treaty obligations though the historical contexts have changed. The Rio Grande/Rio Bravo is still defined as a border separating two countries. There is emerging at the grassroots level an understanding of the watershed as an ecological resource that unites the two countries. Bringing together the cultural definitions of the river as political boundary that separates and a basin that unites is already underway.

Conflicts over the sharing of the Rio Grande/Rio Bravo[1] and Colorado Rivers between the United States and Mexico are usually understood in spatial terms. In this paper we argue for the need to add a temporal horizon. A larger historical context will reveal that water management, including water allocation and river politics, has always been influenced by larger social-political and cultural frameworks. This is important to acknowledge since it means that tentative shifts in current social-political configurations might promise fruitful directions for conflict negotiation strategies.

We will specifically foreground two recent cultural developments, namely, the growing emphasis on and interest in public participation (Gregory 2000; McDaniels, Gregory, and Fields 1999; Mumme and Brown 2002; Walsh 2004), and the increasing acknowledgment of the relevance of environmental flows (Poff et al.

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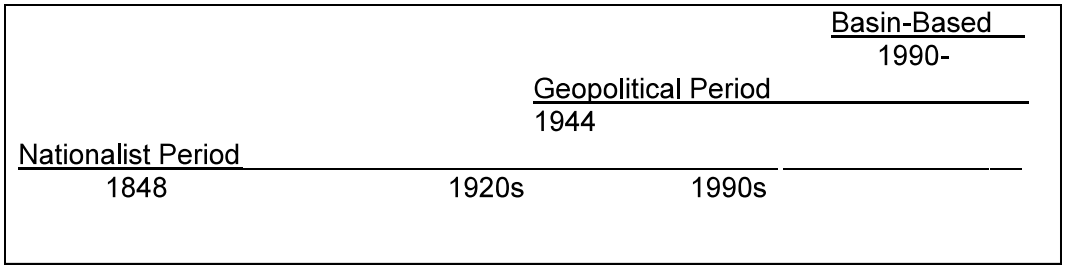
[1]The River is referred to as the Rio Grande on the American side and the Rio Bravo in Mexico.

1997; Postel and Richter 2003). Both are crucial new directions pointing to a shift toward basin-wide perception and management of the rivers. We conclude that this has the potential of acting as a catalyzing force in trans-boundary water tensions between the United States and Mexico.

For purposes of analysis we determine two distinct historical periods leading up to the current era—each of roughly 100 years. The first period extends from the end of the Mexican-American War in 1848 to the Second World War. The second historical period begins with the signing of the 1944 Treaty and continues until today. That treaty was the result of intense negotiations between the seven states in the Colorado watershed and the Federal Government. Water rights in the United States are a state and not a federal prerogative. Recent events suggest that we are transitioning into a new period that we envision may become the dominant discourse. We label the three layers of cultural discourse the Nationalist Period (1848–1944), the Geopolitical Period (1944–), and the Basin-Based Period (1990–). Figure 1 illustrates a conceptual framework. We do not mean to suggest that the discourse of one period completely ceases when another period begins. We envision a layering of cultural meaning and policy as new concerns arise. We still need to account, however, for issues raised in previous periods. While the Basin-Based narrative may already be underway, the discourses of the Nationalist and Geopolitical Periods still dominate discussions of river management. With our article we hope to facilitate an explicit transition toward a Basin-Based era.

Figure 1. Historical Periods in Water Management on the Rio Grande/Rio Bravo



THE NATIONALIST PERIOD (1848–1944)

The contemporary story begins with the Mexican-American War (1846–1848) after which the Rio Grande/Rio Bravo became the new boundary between the United States and Mexico. The war resulted in Mexico's loss of half its national territory as well as control over the headwaters of the Colorado River that would

prove to complicate relations between the two neighbors to this day. In 1889 the International Boundary Commission (IBC) was established to negotiate continuing boundary disputes. From a cultural perspective, the meaning given to the Rio Grande/Rio Bravo became explicitly a boundary. On the U.S. side, the boundary was marked further by a different name for the river, the Rio Grande. Postel and Richter (2003:186) note "Historically rivers have often been used to delineate national and state boundaries, so on a political map they often appear to divide countries." In other words, the Rio Grande/Rio Bravo would become a touchstone for often competing national interests between the United States and Mexico.

Sharing water between the United States and Mexico was not a major issue until the end of the 19th century. Unlike the United States, Mexico was not yet diverting water for irrigation. When it did become an issue, the IBC in 1896 suggested an international storage dam for Mexico and the United States near what is today El Paso. Congressional debate at the time suggested that the United States was giving some if its land to Mexico. No agreement was made until the United States could deal with its own domestic policy regarding land and water. This policy was finally incorporated into the 1902 Reclamation Act.

Congress agreed to a treaty with Mexico in 1906 that applied to the upper basin from Fort Quitman (Texas) to Elephant Butte Dam (New Mexico) and guaranteed Mexico 60,000 AF a year[2] from the Elephant Butte reservoir as well as water for El Paso and Ciudad Juarez. The principle of proportionality was applied so that in years of drought irrigators in the U.S. and in Mexico would receive proportionally the same amount of water. These were years of abundant rainfall and Mexico was taking more than its allocation of 60,000 AF without any problem for the United States. Caballo Dam (New Mexico) was next built for flood control purposes. Diversion dams were built below Caballo to keep all the water within the United States. The 1906 treaty waters of 60,000 AF were kept in the river for diversion into Mexico's canal for irrigation purposes further downstream. Meanwhile Mexico built the Boquillas Dam on the Rio Conchos in 1915 and began to plan for storage dams that would reduce water flows on it as well as the Rio San Juan and the Rio Salado, all tributaries of the Rio Grande/Rio Bravo.

In 1924 there was a severe flood and both Mexico and the U.S. looked to further flood control measures on the Rio Grande/Rio Bravo. Accordingly a treaty in 1933 called for the straightening of the Rio Grande/Rio Bravo as it passed through El Paso. In the process the river was shortened by 85 miles. As had become the

[2] An acre foot (AF) is equivalent to the amount of water standing one foot high in an acre of land. One AF is equal to 325,865 gallons.

custom, the costs were covered by each country based on the benefits to each country. The United States assumed 85% of the construction costs, but Mexico and the U.S. share evenly the costs of maintenance.

During this first period both sides negotiated based upon their particular national interests, but with little concern for an integrated, basin-wide approach. The Rio Grande/Rio Bravo was a boundary and its waters were designated for the use of each country. The United States was especially vigilant that its waters not be usurped. Mexican concern about the quantity and quality of the Colorado flow would increase as the western states began to draw down on the Colorado River.

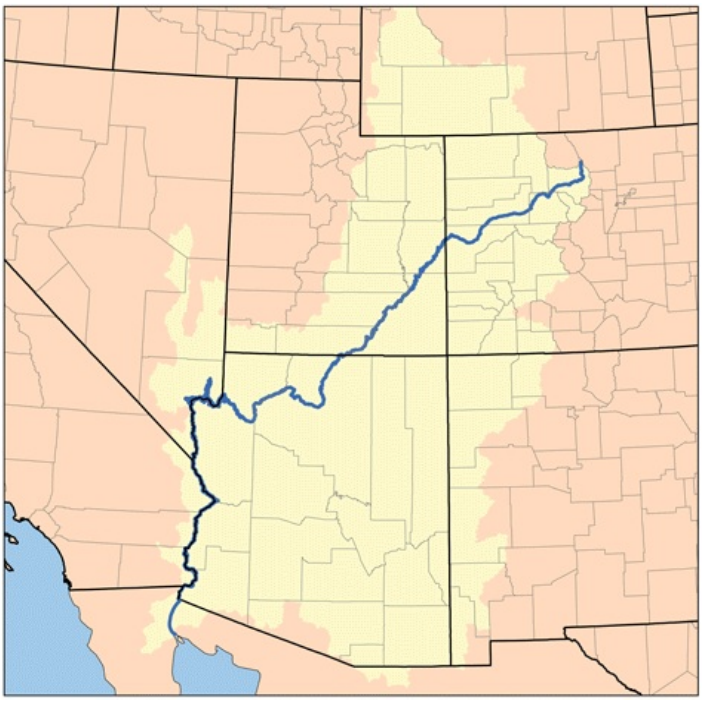
THE GEOPOLITICAL PERIOD (1944–)

The transition to the second historical period of river politics between Mexico and the United States can be found in the 1920s, but the signing of the 1944 Treaty will mark its explicit beginning. The 1920s witnessed the increased American use of the Colorado River specifically by Colorado, New Mexico, Utah, and Wyoming in the upper basin and Arizona, California, and Nevada in the lower basin. Mexico's fear was that the United States would manipulate water flows on the Colorado and create a scarcity downstream in Mexico. On the American side there was no hydrologic control of the Colorado River at the time. Building of dams on the American stretch of the Colorado would come later. Thus, the division of the waters of the Colorado River with Mexico was not yet an issue, but, as the Mexicans feared, it would become such during the Great Depression.

The Colorado flows along a 24-mile international boundary and then into Mexico to discharge into the Gulf of California. However the geology of the delta is such that a part of its drainage is to the west where much of the irrigated agriculture in this isolated part of Mexico was owned in the 1920s by U.S. citizens. The Colorado then turns northwards into the Imperial Valley, eventually winding up in the Gulf of California.

In the 1930s U.S. water projects were brought under the purview of the Reclamation Act. The federal government needed to employ workers and was ready to institute flood and hydroelectric dams on the Colorado. Since water management is the prerogative of the states, the federal government brought the upper basin states (Colorado, New Mexico, Wyoming and Utah) and lower basin states (California, Nevada and Arizona) to the table, promising to build dams but only if they agreed among themselves regarding the sharing of the Colorado River waters,

Figure 2. The Colorado River Basin in the United States and Mexico.



Source: Wikipedia 2008.

estimated to have an annual yield of 15 million AF. While the proportion to each state was disputed, the seven states finally agreed that the upper and lower basin states would share the water evenly or 7.5 million AF each. California would receive 4.4 m AF, Nevada 700,000, Arizona 2.4 m AF. The federal government would not agree to the compact or build the dams until Mexico was guaranteed 750,000 AF.

With nationalism on the rise in Mexico during the Cardenas presidency (1934–1940), Mexico demanded three million AF. The Colorado River had been part of Mexican territory until the Treaty of Guadalupe Hidalgo (1848) and the Gadsden Purchase (1853). The loss of that river was still very much part of the Mexican national consciousness and may account for its demand. California did not want a treaty for three m AF, arguing that sharing waters with Mexico on the Lower Rio Grande/Rio Bravo was a "Texas problem." Geopolitical concerns would soon trump domestic disagreements.

With the rise of the Axis powers in the 1930s President Roosevelt was promoting the Good Neighbor policy with Mexico, concerned that the Axis might influence the neighbor to the south to demand the return of lands lost in the U.S.-Mexican War. Mexico was also ready to develop irrigated agriculture in the Lower

Rio Grande/Rio Bravo Valley much like had been under way on the U.S. side. There existed a threat of mutual unregulated diversions. With World War II underway a treaty with Mexico was seen to be an issue of national security as well as good domestic policy, but California was the major obstacle.

Figure 3. Falcon and Amistad Dams on the Rio Grande/Rio Bravo

Source: U.S. Fish and Wildlife Service 2004.

The Department of State formed a group of 14 (two from each basin state) thereby weakening California's resistance to a Treaty. Mexico agreed to a 1.5 million AF diversion from the Colorado from "any and all sources." That amounted to half of what Mexico had demanded, but much more than Mexico was using at the time. (The terms "groundwater" and "return flow" are not in the Treaty language, but that would be the understanding of the U.S.) The term "utilization" meant for the Mexicans that the water would be "usable" for irrigation.

As for the Rio Grande/Rio Bravo, Mexico agreed to share one third of the waters from the Rio Conchos and several smaller tributaries, averaging at least 350,000 AF annually in a five-year cycle. If drought conditions prevented Mexico from fulfilling its obligation in a given year, the difference could be made up within the five-year period. Mexico and the U.S. would share flood control, water monitoring, conservation/storage, and power generation at Falcon and Amistad Dams.

Administrative control would go to the newly created 1944 International Boundary and Water Commission (IBWC). The IBWC would have two sections, United States and Mexico, and two Commissioners, each side covering its own costs except for the costs that both agree should be shared. The U.S. included wording in the 1944 Treaty that preferential treatment would be given to sanitation in that the U.S. was concerned that untreated wastewater from the Mexican side would pollute the River. Table 1 summarizes the water allocations between Mexico and the United States on the Rio Grande/Rio Bravo and the Colorado Rivers, commonly called "treaty waters."[3]

The quality of the waters delivered to Mexico on the Colorado River was not covered in the treaty. This absence would lead to a severe problem for Mexico, namely, that increased salinity in the Colorado, a result of runoff from irrigation agriculture in the United States, would render "useless" its share of the water for irrigation. The salinity problem would later become a major point of controversy during the Eisenhower, Kennedy and Nixon administrations. The conflict was eventually settled by the construction of the Gila Canal and eventually a desalination plant at Yuma, Arizona.[4]

[3] Treaty waters are outlined in the 1944 treaty. "Of the waters of the Rio Grande, the Treaty allocates to Mexico: (1) all of the waters reaching the main channel of the Rio Grande from the San Juan and Alamo Rivers, including the return flows from the lands irrigated from those two rivers; (2) two-thirds of the flow in the main channel of the Rio Grande from the measured Conchos, San Diego, San Rodrigo, Escondido and Salado Rivers, and the Las Vacas Arroyo, subject to certain provisions; and (3) one-half of all other flows occurring in the main channel of the Rio Grande downstream from Fort Quitman. The Treaty allots to the United States: (1) all of the waters reaching the main channel of the Rio Grande from the Pecos and Devils Rivers, Goodenough Spring and Alamito, Terlingua, San Felipe and Pinto Creeks; (2) one-third of the flow reaching the main channel of the river from the six named measured tributaries from Mexico and provides that this third shall not be less, as an average amount in cycles of five consecutive years, than 350,000 acre-feet annually; and (3) one-half of all other flows occurring in the main channel of the Rio Grande downstream from Fort Quitman" (International Boundary and Water Commission 2008).

[4] The salinity issue has its origins in the building of the Wellton-Mohawk Irrigation district in western Arizona that drains to the Gila River and in turn the Colorado. The Gila River of Arizona

Table 1. TREATIES GOVERNING SHARING WATERS OF THE COLORADO AND RIO GRANDE/RIO BRAVO RIVERS BETWEEN MEXICO AND THE UNITED STATES.

TREATY DATE	TREATY WATERS IN ACRE FEET	DAMS AND RESERVOIRS
1906	Rio Grande To Mexico - 60,000 AF	Elephant Butte
1933	Flood Control	Straightening of Rio Grande/Rio Bravo through El Paso
1944	Colorado River To Mexico - 1.5 m AF To United States - 13.5 m AF	Pass through
	Rio Grande/Rio Bravo To United States - 350,000 AF	Falcon (1954) Amistad (1968)

had been excluded from the Colorado allotment. However, the return flows from irrigation and municipal uses entered the Colorado and flowed downstream to Mexico. The Morelos Dam was built in the 1950s to divert the 1.5 m AF that Mexico received from the Colorado Compact. The Glen Canyon Dam was built in the 1960s, which restricted flows of the Colorado into Lake Powell at Hoover Dam. The Gila River water became more polluted as the Wellton Mohawk district pumped salty groundwater from the fields and dumped the salty water into the Gila. The salinity content of the water in Morelos Dam rose from 900 parts/million to 27,000 ppm. Mexico argued that water with a salt content greater than 1,000 ppm is no longer "usable" and so the United States was violating the Treaty of 1944. The United States argued that Mexico agreed to take water from all uses. In 1965 a five-year agreement was signed to create the Gila Canal, which would carry the saline water to a point below the Mexican diversion. Still, in 1971 President Echaverria of Mexico argued that the water in the Canal was not "usable" and that those waters could not be treated as "treaty waters." Nixon promised a solution. The Group of 14 was reconvened and the "any and all sources" and "usable water" were "pidgin-holed" as a negotiable solution was sought. It was agreed that all downstream water would have a higher degree of salinity than that upstream so salinity at Imperial Dam (U.S. water) would be the norm for the water in the Morelos Dam reservoir. Secondly, it was proposed that all water from the Wellton-Mohawk reservoir would be carried on an extension of the Gila Canal through Mexico to the Gulf of California. Arizona would lose a return flow credit on the Colorado so that was jettisoned in favor of a desalination plant on the Gila at Yuma, Arizona. It came online in 1992, but its operation was suspended soon thereafter as surplus conditions returned to the Colorado River. More recently, drought conditions are forcing the U.S. to restart the plant.

The second period highlights the strategic and geopolitical nature of water negotiations between the two countries. The Rio Grande/Rio Bravo continues to be a boundary, now marked by flood control and water distribution projects. The cultural meaning the river acquires in this era is that of an engineered space where dams control floods, reservoirs store water, and levees and diversions direct river flow to irrigated fields or to treatment plants for municipal use. Massive irrigation projects in the American Southwest did affect the quantity and quality of Colorado water reaching Mexico.

A similar process of engineering the river was underway on the Mexican side of the Rio Grande/Rio Bravo. Mexico began an ambitious program in the 1960s of dam and reservoir construction for flood control and irrigation on the headwaters of the Rio Conchos, the major tributary of the Rio Grande/Rio Bravo below Fort Quitman. Management of the Mexican reservoirs has become an issue for the United States. In non-drought years Mexico often released water that would better have been stored for use in drought years. Mexico's rationale seemed to be that the1944 treaty water from the Rio Conchos and other treaty tributaries was a junior right[5] to the senior right of Mexican irrigators upstream of their confluence with the Rio Grande/Rio Bravo. With the expansion of irrigation projects in the Rio Conchos basin since the signing of the treaty in 1944, there was less treaty water available as it was considered a junior right.

The Current Conflict

The definition of "extreme drought" and availability of water in the Rio Conchos to meet treaty obligations lies at the heart of the controversy over the Mexican water debt in 2002. Hydrological charts and the regulatory capacity of dams to store water in Mexico suggest that "extreme drought" between 1987 and 2002 may have occurred in only two of those 15 years. Yet, Mexico would give preference to irrigators in the Rio Conchos basin before releasing treaty water to the Rio Grande/Rio Bravo.

Some 1,700 farmers on the Texas side of the Rio Grande/Rio Bravo between McAllen and Brownsville, Texas (the Lower Rio Grande Valley) depend on its water to supplement the average 26.5 inches of rain that fall within a four-month period. Since 1996, however, the lower Rio Grande Valley has received less than its average yearly rainfall, forcing some to buy irrigation water, normally priced at $7.00 an acre foot at an inflated $45 an acre foot (*San Antonio Express News*, May 23,

[5] The rule is "first in time; first in right" and is common in appropriation of surface water to users.

2002.) Like the Texans, Mexican farmers on the opposite side of the Rio Grande/Rio Bravo in the state of Tamaulipas experienced the negative effects of the diminished flow from the Rio Conchos (Walsh 2004).

Simultaneously, a 50-page report by the U.S. Section of the International Boundary and Water Commission confirmed that the state of Chihuahua used ten times more water than that owed to the United States under the 1944 treaty (*Valley Morning Star*, May 22, 2002). On the other hand, the water released by the United States from the Colorado River into Mexico was so salty that it was unfit for their agricultural use between the Arizona-Mexico border and the Gulf of California.

There seemed to be no political settlement possible until nature intervened and provided needed rainfall in the summer and fall of 2002. The reservoirs were partially filled and farmers on both sides of the river had ample rainwater, needing less for irrigation. Mexico was able to repay its outstanding water debt. Nature had intervened, but the conditions for the re-emergence of the conflict remained. It is to these aggravating conditions and their origins and possible solutions that we now turn our attention.

Analysis of the Current Conflict[6]

At the root of much of the conflict between Mexico and the United States over the provisions in the 1944 Treaty for continuing management of the Rio Grande/Rio Bravo water are two different negotiating strategies. Mexican negotiators prefer to take a large-scale approach. In such a case the definition of "extreme drought" would be applied to the upper basin as well as the lower basin of the Rio Grande/Rio Bravo. By contrast, U.S. negotiators prefer to approach the water issues of the upper and lower basins separately.

Depending on which of the two approaches prevails, one side or the other has some advantages in the negotiations. A large-scale approach gives Mexico the argument that the drought of 1996–2002 included not only the Rio Grande/Rio Bravo/Rio Conchos watersheds, but also the upper basin in New Mexico and Colorado. In fact, on even a larger scale, they would argue that it extended into the Midwestern states. This level of analysis would lend credence to their argument that Mexico was just part of a larger extreme drought that affected the Rio Conchos and extended northward into areas of the United States. Drought is common in the Rio Grande/Rio Bravo watershed. With the expansion of irrigation projects in the

[6] The authors wish to acknowledge the assistance of Roberto Ybarra, former Secretary of the US Section of the IBWC, now retired, for background on this section.

Rio Conchos basin since the signing of the treaty in 1944, less and less water has been considered "treaty water." For the United States this "artificial scarcity," based on definitions of junior and senior rights on the Rio Conchos, lies at the heart of the controversy over the Mexican water debt in 2002. By treating treaty waters as "junior rights," in effect priority is given to irrigators in the Mexican state of Chihuahua over those in the state of Tamaulipas. Not surprisingly irrigators in the state of Tamaulipas maintain a position close to that of the United States as regards the interpretation of the 1944 treaty and definition of "extreme drought." When political decisions are made upstream in the state of Chihuahua not to release treaty waters, based on claims of "extreme drought," irrigators on both sides of the Lower Rio Grande/Rio Bravo suffer, but proportionally more those in Tamaulipas (Walsh 2004).

By contrast, U.S. negotiators would prefer an approach based on the two existing treaties. The Treaty of 1906 applied to the upper basin from Fort Quitman to Elephant Butte Dam and guaranteed Mexico 60,000 AF a year from the reservoir as well as water for El Paso and Ciudad Juarez. The principle of proportionality applied in the 1906 treaty. Based on that treaty, U.S. negotiators argued that in years of drought irrigators both in the U.S. and in Mexico should receive proportionately less water. The U.S. position can be summed up in three principles:

1. The Treaties of 1906 and 1944 are the basis for all negotiations.
2. Mexico and the United States must have a plan of operation of the reservoirs that meets the needs of both parties within the terms of the treaties. "Treaty water" must have priority over any other rights.
3. Both countries must abide by the rule of proportionality in the 1906 treaty.

According to the treaties Mexico has rights to two thirds of the water in the Rio Grande/Rio Bravo that arrives from the Rio Conchos and smaller tributaries. In turn, this water is stored in the Amistad and Falcón reservoirs and allocated just like credits and debits would be allocated in a water bank. Any surplus water due to flooding will be released and that surplus belongs to irrigators both in Mexico and the United States and are to be shared evenly. The United States has a right to one third of the total volume of 1,050,000 AF from five Mexican tributaries that arrive to the Rio Grande/Rio Bravo at an annual average of 350,000 AF in consecutive cycles of five years. The other two thirds (700,000 AF) belongs to Mexico and is designated by Mexico to the irrigators in Tamaulipas. When the rains finally came in the summer and fall of 2002, Mexico canceled its water debt

without having to address the interpretation of senior and junior rights of treaty water on the Rio Conchos.

The future of water sharing between Mexico and the United States will involve continuing negotiation over the backlog of Mexico's 1.3 million AF debt built up over the past several five-year cycles. Complicating this further are the two different starting points for negotiating the release of treaty waters from the Rio Conchos and lack of definition of what constitutes "extreme drought." The definition of the debate in the current Geopolitical Period has shifted from one of assuring Mexico's neutrality during the WWII to new "wars'" on terrorism and drugs. The immigration debate in the United States highlights the Rio Grande/Rio Bravo as a boundary to be militarized against the perceived threats of terrorists and drug traffickers. In none of these cases does the river itself enter the equation, at least not until recently.

TRANSITIONING TO A BASIN-BASED PERIOD (1990s–)

We may be transitioning into a third historical period of water negotiations between the United States and Mexico on the Colorado and the Rio Grande/Rio Bravo. In the time since the treaty was negotiated in 1944 two other issues have emerged that are commanding more attention. The first is public participation in watershed management and the second is a river flow sufficient to maintain, or more accurately, to restore, a healthy environmental habitat. These two issues could contribute to successfully address the more complex issue of negotiating treaty waters.

To return to the earlier reference to Postel and Richter (2003:186), they note, "Historically rivers have often been used to delineate national and state boundaries, so on a political map they often appear to divide countries. Ecologically, however, rivers run through the middle of a watershed that spans those same countries; hence on a physiographic map, rivers appear to unite countries." The U.S. and Mexico need to come together on environmental issues (Mumme 2001). The NAFTA-created Border Environmental Cooperation Commission (BECC) is an important actor in sustainable development projects within the North American Development Bank (NADB) and has encouraged the formation of *Consejos de Cuenca* (Basin Committees) on the Mexican side. The committees are looking at conjunctive use of surface and ground water. Putting these laws into practice is complicated because Mexican states are at odds over established water rights and their transfer. *Consejos de Cuenca* may be a forum for dispute resolution, but there is a need for the Mexican

federal government to insure that individual state governments abide by domestic water law and treaty rules.[7]

On the Texas side of the Lower Rio Grande/Rio Bravo, state-mandated regional planning groups are moving ahead, but are hampered by having two sets of water laws, one for groundwater and another for surface water (Klaver and Donahue 2005). Recently at the Binational Rio Grande/Rio Bravo Summit in November of 2005 water district councils in the Lower Rio Grande/Rio Bravo Valley considered meeting with their counterparts in the *Consejos de Cuenca* on the Mexico side of the river.

Prospects for a Basin-Based Period

Stakeholder involvement throughout the basin is a sign that could bode well for the future of the river, if stakeholders can see a new vision for the river. A paradigm shift must occur at local, national and international levels that will incorporate a vision for the Rio Grande/Rio Bravo that goes beyond narrowly defined national and geopolitical interests. For humans to survive in the Rio Grande/Rio Bravo Basin, the river must survive. Efforts to share and utilize its waters must themselves become junior rights to the senior rights of the river. On another level long-term successful human adaptation in any and all environments demands that we balance the real needs of the environment with presumptive human rights to the resources of the environment. Growing concerns about sustainable development and watershed restoration are hopeful signs that planet politics are being taken seriously within the local watershed of the Rio Grande/Rio Bravo.

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[7] During the 1996–2002 conflict the governor of the state of Chihuahua overrode the Mexican federal regulators controlling the gates at Conchos Dam. The Mexican government did not or could not enforce the 1944 Treaty. At issue is whether domestic rights to water from the Rio Conchos are senior to treaty rights.

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