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ESSAY

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Water and the Arid Southwest: An International Region Under Stress*

The United States-Mexico border area is a region under stress. In a larger sense, this region would include the southwestern United States and Northern Mexico. A region in which ecological and hydrologic systems have been divided by an international frontier as well as numerous state boundaries.

As we face the arrival of a new century, the region is confronting the question of "How do we cope with twice as many people on the same amount of water?"

The region is marked by three key features—limited water supplies, rapid population growth and divided political authority—this is a challenging "collision course" of forces at play.

If we quickly scan along the border itself, we find four cities each of which is larger than the city of San Francisco. Juárez has something over a million inhabitants, and when these are added to the 600,000 or so of El Paso, they form a city which is approaching two million in population. Mexicali and Tijuana each stand a million strong and the population of San Diego is over 2.5 million. Tijuana and San Diego are, in reality, one combined urban area with a population of 3.5 million reaching for four million.

The stretch of the border reaching from El Paso to the Pacific is marked by low rainfall, high temperatures and rapid population growth. For example, the Mexicali valley reach of the border has over 90 days a year of 100° plus temperatures and less than 3" of rainfall per year.

The Major Rivers

The border is crossed or formed by two major rivers—the Colorado and the Río Grande. The Colorado is one of the most developed rivers in the world.

Its surface flows mostly do not reach the sea except at flood stage. Its waters are diverted and consumed throughout its reach, and

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many of its biggest users are not even within its drainage basin. It is a most unusual river in that there are no major cities located on the river itself, and many of the cities that depend on the waters of the Colorado are located outside the drainage basin itself so that those waters are totally consumed in that there are no return flows to the basin. Starting from the top of the basin, Denver diverts water out of the basin for its growing population, as does Albuquerque and other cities in New Mexico. In the case of Denver and Albuquerque, the waters are taken from the Pacific watershed and transferred across the continental divide to the Atlantic watershed. Tucson and Phoenix divert major volumes through the concrete canals of the Central Arizona project. Next in line, San Diego and Los Angeles extract water from the Colorado and move it outside the Colorado drainage basin through a transmountain aqueduct to the maritime areas of southern California. Finally, Tijuana, also on the water short Pacific coast, derives major supplies from the transmountain aqueduct on the Mexican side. These repeated municipal diversions, plus all of the irrigation and industrial uses, mean that the once mighty Colorado is reduced to a relative trickle much of the time by the time it reaches the sea, and often it does not reach the sea. It is a "River no more."

On the Río Grande, we have a similar picture. Rapid population growth and economic development are placing increasing demands on a finite water supply. For example, over one-half of the population of the State of New Mexico lives in the Río Grande basin. The population of the State in 1980 was 1,300,000. By 1990, it had grown to 1,519,000 and is projected to reach 1,800,000 by the year 2000, and two million by about 2010. Robust growth likewise marks the Río Grande Valley in Texas.

Compacts and Treaties: A Century of Negotiations

In the context of these growing demands for water, how have we allocated the use of these waters? The answer is that a complex mosaic of treaties and compacts have allocated these waters between nations, between regions and between states. Most of the first half of this century was devoted to torturous negotiations on both the Colorado and the Río Grande. The "dividing of the waters" of these two major rivers is a major achievement. On the Colorado the waters are divided by one treaty and two interstate compacts. The waters of the Río Grande are allocated by two treaties and one compact. The flow of the Colorado was divided interregionally by the 1922 Colorado River Compact. The compact apportioned seven-and-one-half million acre-feet each to the upper basin and the lower basin with the dividing point at Lee Ferry in Arizona. The Upper Colorado Basin Compact of 1948 then divided the upper basin's share between the upper basin states of Wyoming, Colorado, New

Mexico, Utah and the upper basin portion of Arizona. Then, thanks to the Supreme Court and congressional legislation, the shares of the lower basin states were finally determined in 1963 in the landmark case of *Arizona v. California*.

The international apportionment was achieved by the United States-Mexico treaty of 1944 in which Mexico is guaranteed 1,500,000 acre-feet each year. These apportionments by compact and treaty are monumental achievements; they were achieved only after long and bitter negotiations which consumed two-thirds of the 20th century. They divided the use of every drop of water of the Colorado between states, between regions and between the two nations.

The story is quite similar on the Río Grande. Here there are two treaties and one compact allocating the flows of this interstate and international river. In the late 19th century, dramatically increased diversions for irrigated agriculture in Colorado led to shortages in the Ciudad Juárez area, and this caused a major dispute in United States-Mexico relations. Mexico pressed for a secure water supply and the treaty of 1906 was the result. Under the treaty, the United States is obligated to deliver 60,000 acre-feet to Mexico at Juárez.

The interstate disputes were just as severe. Texas blamed New Mexico for shortages and New Mexico, in turn, blamed Colorado. After years of failed attempts the states of Colorado, New Mexico and Texas reached agreement and the Río Grande Compact was born in Santa Fe, the city of the Holy Faith, in 1938. This compact, based on a complex input-output model, obligates Colorado to deliver specified quantities to New Mexico, and New Mexico must deliver pre-determined amounts to Texas and southern New Mexico based on the amounts received at established measuring stations.

The last building block in the edifice of allocation was the 1944 treaty with Mexico which divided the flow of the lower Río Grande on a roughly 50/50 basis—half to Mexico and half to the United States. The lower Río Grande basin runs from Ft. Quitman south of El Paso to the Gulf of Mexico. The treaty also put the International Boundary and Water Commission in charge of measuring deliveries and overseeing compliance with the treaty which it has done in a professional and prudent manner. The water relations on these two major rivers are an admirable success story—one that is cited as a model around the world.

The Groundwater Agenda

However, there is important unfinished business to be dealt with if damaging conflict between the two countries is to be avoided. That is the question of groundwater. Although we have successfully apportioned the two major rivers that we share in common, we have not reached

agreement on groundwater. We have no treaty allocating the use of water from transboundary aquifers. Consequently, no one knows what their share of these waters is. No one has certainty of water supply nor security of water right. Groundwater has been out of sight and out of mind. Nonetheless, major problems loom—as we have seen the Ciudad Juárez and El Paso constitute one metropolitan area that is approaching two million inhabitants. The two cities share the same transboundary aquifer—the Hueco Bolson. Juárez depends totally on the aquifer for its water supply and El Paso relies on it for three-fourths of its supply. Each city pumps the aquifer on its respective side of the border (some estimates place withdrawals at 20 times the natural recharge rate), and yet there is no agreement as to how much each is entitled. Neither city has secure groundwater rights. Other problem areas are in the Nogales area and in the Mexicali Valley—the All American Canal area in California.

Mexico and the United States are on a collision course with conflict over groundwater as population and competition for water resources increase. However, the admirable success in reaching amicable agreement on the major rivers provides a model for the two countries to build on in settling the allocation of the use of transboundary groundwater in the border region. A groundwater treaty should be consummated now rather than later in order to reduce the risk of conflict and to provide some security and certainty to the inhabitants on each side in their water relations. Someone has said that "whisky is for drinking and water is for fighting." It would be better if we could settle our groundwater affairs so that we could use the water for the whiskey and avoid the fighting.

A Look at the Future

So back to our initial question: "How do we in the southwest and the border region cope with twice the population on the same limited water supply?" The answer can be summed up in two words—stretch and switch. We need to stretch our existing water supplies through conservation. We need to make what we have go farther, and there is lots of room for saving water through conservation both in agricultural and in municipal and industrial usage. Our greatest new source of water will be in water not wasted or used inefficiently.

Then, in addition, we are in the process, throughout the west, of switching water from irrigation to industrial and municipal uses as populations increase. Many of us may regret this, but generally industry can produce more with an acre-foot of water and therefore can afford to pay more for it. The market place is operating to transfer water from many agricultural uses to cities and towns.

In addition, the water rights of many Native-American tribes have not been resolved. They are slowly being settled through negotiations and litigation. Recently, for example, the state of New Mexico and the Jicarilla Apaches reached agreement through negotiation and thereby settled the water rights of the tribe.

Summing Up: Where Have We Come From and Where Are We Going?

So to sum up what we have seen in this helicopter view of the Southwest Border Region? Six major points stand out. They are as follows:

1. Increasing demand is being placed on the limited water supplies of the region by rapid population growth and economic development.
2. These water supplies have been allocated through a hierarchically complex structure of international treaties and interregional and interstate compacts.
3. We are going to have to stretch and switch the use of the water supplies to meet the ongoing growth and to stay within the limits of the "equitable apportionments."
4. Nonetheless, we have to confront the reality that there are limits, that there is an ultimate maximum carrying capacity of the water supplies available to the region. We have to plan for and achieve a sustainable economy for the region. In so doing, we also have to protect the quality of these waters, and we have to protect the habitat of other creatures and plant species with whom we share these life-giving waters.
5. Native-American water rights in the region are being slowly determined through negotiation and litigation. This process must be continued and accelerated in order to provide security and certainty to Indian and non-Indian users alike.
6. Finally, the United States and Mexico have done an exemplary job in settling our disputes amicably on the Colorado and the Río Grande, and we must now address the questions of transboundary groundwater allocation along our common border.