The Mexico–USA Border Region: The Filling of an Empty Land

Glen Kaye
Southwest Region, U.S. National Park Service, P.O. Box 728, Santa Fe, New Mexico 87504-0728

TO EARLY SPANISH EXPLORERS, MOST OF TODAY'S BORDERLAND between Mexico and the United States was "el despoblado," the uninhabited place. The vast expanses of hot, arid Sonoran and Chihuahuan desert required long, suffering journeys to cross, and the lands held little attraction for Spanish colonists seeking fortune and promising settlement. A 1728 map of the provinces of New Mexico reveals the consequences of this condition and the priorities of the colonial government in Mexico City: the Spanish settlements and presidios in the northern provinces are few and small.

Nevertheless, continued growth of both the United States and Mexico brought inevitable claims for the region and armed conflict from 1846 and 1848 over territorial rights to the land. The 1848 Treaty of Guadalupe Hidalgo, which ended the Mexican-American War, defined most of the international border that exists today between the two nations. Since then, the growth of this border region has been shaped by its international status and the policies, economies, and population growth of the two nations.

Today, a distinguishing feature of the border is the pattern of paired cities—often derived from military forts or ranchos. For example, with the Rio Grande (the Rio Bravo of Mexico) serving as the new border between the nations, Brownsville, Texas, began to grow around Fort Brown, opposite the older Matamoros, Mexico. Some residents of Laredo, Texas, loyal to Mexico, crossed the river after the Mexican-American War and established Nuevo Laredo. Reynosa, Mexico, appeared opposite McAllen, Texas, and El Paso, Texas, began to grow opposite the village of El Paso del Norte, today's Cuidad Juarez. Nogales, Mexico, and Nogales, Arizona, grew into villages opposite one another, as did Tijuana, Mexico, and San Diego, California. This pattern, with cities socially and economically intertwined, is even more pronounced today. About 98% of the border population—within the 25 U.S. counties and 39 Mexican municipios contiguous with the border—is concentrated in twin cities.

Although the United States had no strategy for development of the border region, its population in the region grew with the development of agriculture, energy and service industries, military bases, and the migration of retirees. Much earlier, Mexico saw the region as important to its future. Mexico lost half its territory in the treaty of 1848, and apprehension of further U.S. expansion prompted the government to encourage migration into the region. Likewise, the Bracero Program of the 1940s, '50s, and early '60s, promoting the use of Mexican nationals in the United States for agricultural field work, encouraged migration from southern to northern Mexico, as did Mexico's Border Industrialization Program.

But the systemic force driving population increases in the border region has been the sustained level of high fertility throughout Mexico. During the first half of the twentieth century, the total fertility rate exceeded six children per woman. In

spite of relatively high mortality rates, Mexico's population grew to 28 million by 1950 and to 89 million by 1990. As the population has grown disproportionately younger, and agricultural lands have become less available, the Mexican economy has been unable to absorb the swelling numbers trying to enter the work force. Thus, for decades, the border region has held promise to those in the interior of Mexico. The plight has been described by Professor Juan Castañeda of the National University of Mexico: "The consequences of not creating nearly 15 million jobs in the next 15 years are unthinkable. The youths who do not find them will have only three options: the United States, the streets or revolution." "For every two rural Mexicans who migrate to the city," reports the United Nations Population Fund, "one now crosses the border into the United States."

The consequences are evident in the census records for the border region for 1930, 1960, and 1990, as noted in Table 1. More revealing are Figures 1-3. The border population grew to 1.1 million in 1930, to 4 million in 1960, and to 9.3 million in 1990—an increase of 830% in sixty years. For each U.S. Border resident in 1930, there were 6.2 in 1990. For each Mexican border resident in 1930, there were 14.4 in 1990. This population, essentially 500 years in the making, will double again in 22 years. If the fertility rate in Mexico continues at 3.2 children per woman, the population of the region will likely reach 20 million in 2010. If it can be brought down to 2.0 children per woman, an unlikely prospect, the border population in 2010 will still grow to 16 million people. The exponential effect of compound population growth is clear.

Other variables, including the North American Free Trade Agreement (NAFTA) and the growth of the maquiladora industries, will influence the rate of population increase. The forecasts are sobering. El Paso County is projected to have a population of 940,000 in 2010. Its twin city of Cuidad Juarez is projected to hold 2,250,000 residents—creating an urban metropolis of 3,190,000. Nogales, Mexico, not long ago a village, is officially forecast to have a population of 498,700 in 2012. The "unofficial" estimate from officials of Nogales is 932,300 residents in 2012.

Recognizing the problems caused by such growth, in 1974 Mexico instituted a General Law of Population. In 1977 it defined the national objective of reducing its growth rate from 3.2% per year to 1.0 % per year by the year 2000. In 1984, Mexico's General Health Law gave priority to family planning. Among the efforts toward this end, the Secretary de Salud instituted public health extension services to those rural communities with 500 to 2,500 residents.

But population changes, generations in the making, require generations to correct. There is no quick fix. The biological reality is that of "braking distance." Even if fertility rates decline to replacement levels (2.1 children per woman), two to three generations are required for a population to level out. Because of the growing population, a nation can continue to increase at the same numerical rate, even if it has a decline or leveling-off of fertility rates because of the large percentage of reproductive-age women. All the while, any rate of increase results in an inevitable doubling of a population. The current population growth rate of 3.2% in Mexico translates into a doubling of the population in 22 years. Even a seemingly innocuous growth rate of 1% per year will double a population every 72 years. Although the fertility rate is 2.5 children per woman for the border region, its growth continues to exceed the national growth of Mexico due to migration.

To manage for the needs of the growing population in this arid re-

Table 1. Population of Mexico-USA border municipios and counties: 1930, 1960, 1990 (in thousands)

Municipio/County (State)	1930	1960	1990
Tijuana (Baja California)	11.3	165.7	742.7
Tecate (Baja California)	–	8.2	51.9
Mexicali (Baja California)	30.0	281.3	602.4
Ensenada (Baja California)	7.1	64.9	260.9
San Luis R.C. (Sonora)	–	42.1	111.5
Puerto Penasco (Sonora)	–	5.7	35.9
Caborca (Sonora)	4.9	12.4	58.5
Altar (Sonora)	2.2	3.0	6.4
Saric (Sonora)	1.9	1.8	2.1
Nogales (Sonora)	15.6	39.8	107.1
Santa Cruz (Sonora)	1.0	1.3	1.5
Cananea (Sonora)	16.7	21.0	27.0
Naco (Sonora)	–	3.6	4.6
Agua Prieta (Sonora)	6.7	17.2	39.0
Janos (Chihuahua)	2.2	4.4	11.1
Ascencion (Chihuahua)	2.8	6.0	16.6
Juarez (Chihuahua)	43.1	277.0	797.7
P.G. Guerrero (Chihuahua)	5.6	6.5	8.4
Guadalupe (Chihuahua)	4.9	9.1	9.1
Ojinaga (Chihuahua)	12.0	20.4	23.9
M. Benavides (Chihuahua)	–	4.6	2.8
Ocampo (Coahuila)	4.0	8.3	8.0
Acuna (Coahuila)	7.1	22.3	56.7
Jimenez (Coahuila)	6.5	7.1	7.9
Nava (Coahuila)	3.3	4.4	16.9
Pied Negras (Coahuila)	19.1	48.4	98.2
Guerrero (Coahuila)	3.3	3.4	2.4
Hildago (Coahuila)	0.6	1.0	1.2
Anahuac (Nueva Leon)	0.5	18.5	17.2
Nueva Laredo (Tamaulipas)	23.1	96.0	217.9
Guerrero (Tamaulipas)	3.2	4.2	4.3
Mier (Tamaulipas)	0.8	5.2	6.0
Miguel Aleman (Tamaulipas)	–	12.9	21.1
Camargo (Tamaulipas)	9.9	29.3	15.0
G. Diaz Ordaz (Tamaulipas)	–	–	17.6
Reynosa (Tamaulipas)	12.3	134.9	281.6
Rio Bravo (Tamaulipas)	–	–	93.9
Valle Hermosa (Tamaulipas)	–	43.0	51.3
Matamoros (Tamaulipas)	25.0	143.0	303.4
Total, municipios	**286.7**	**1,577.9**	**4,141.7**
San Diego (California)	209.7	1,033.0	2,498.0
Imperial (California)	60.9	72.1	109.3
Yuma (Arizona)	17.8	46.2	106.9
Pima (Arizona)	55.7	265.7	666.9
Santa Cruz (Arizona)	9.7	10.8	29.7

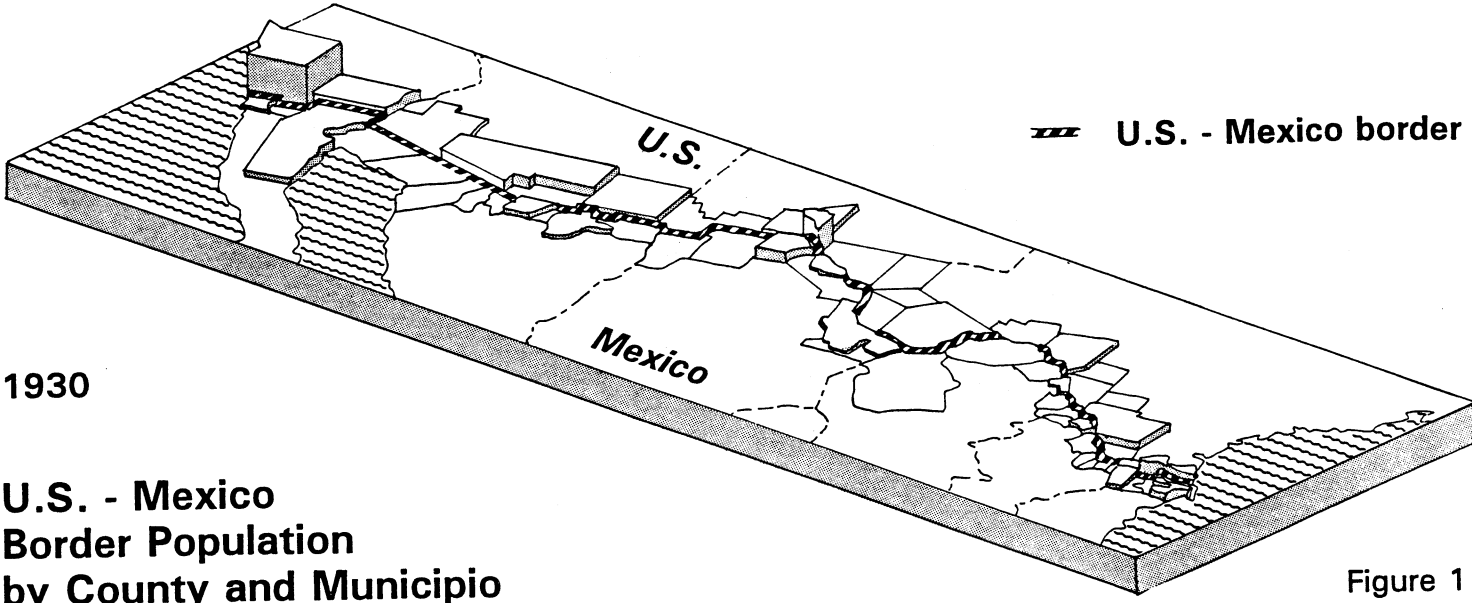
Table 1 (continued)

Cochise (Arizona)	41.0	55.0	97.6
Hildago (New Mexico)	5.0	5.0	6.0
Luna (New Mexico)	6.2	9.8	18.1
Dona Ana (New Mexico)	27.5	59.9	135.5
El Paso (Texas)	131.6	314.1	591.6
Hudspeth (Texas)	3.7	3.3	2.9
Culberson (Texas)	1.2	2.8	3.4
Jeff Davis (Texas)	1.8	1.6	1.9
Presidio (Texas)	10.2	5.5	6.6
Brewster (Texas)	6.6	6.4	8.7
Terrell (Texas)	2.7	2.6	1.4
Val Verde (Texas)	14.9	24.5	38.7
Kinney (Texas)	4.0	2.5	3.1
Maverick (Texas)	6.1	14.5	36.4
Dimmit (Texas)	8.8	10.1	10.4
Webb (Texas)	42.1	64.8	133.2
Zapata (Texas)	2.9	4.4	9.3
Starr (Texas)	11.4	17.1	40.5
Hildago (Texas)	77.0	180.9	383.5
Cameron (Texas)	77.5	151.1	260.1
Total, counties	**836.1**	**2,363.7**	**5,199.9**
BORDER REGIONAL TOTAL	**1,122.8**	**3,941.6**	**9,341.6**

gion, the United States and Mexico began apportionment of transboundary surface waters in 1899. In 1944, the two nations further defined their obligations and management with the Treaty for the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande. Water diversions and impoundments proliferated, as did allocations of water for agricultural, municipal, and industrial use. Today all of the Colorado and Rio Grande waters are over-allocated beyond average stream flows, and water consumption of both rivers is more than 40% of stream flow.

The collective effect of the assortment of impoundments, water withdrawals, and degradations of water returned to the rivers has been profound. The activities have reduced flows, altered historic flow patterns, altered estuarine ecosystems and reduced stream productivity, impeded sediment transport, increased stream erosion, and caused flooding of resources. They have degraded water quality by reducing oxygen levels, altering temperatures, and introducing nutrients, toxic wastes, and pathogens hazardous to people. For example, there is still no wastewater treatment along the Mexico side of the border between Nuevo Laredo and the Gulf of Mexico, although Mexico and the United States have jointly funded a $70 million project for Nuevo Laredo. A detailed description of the multitude of impacts is beyond the scope of this paper, but highlights of impacts to water, land, and air are worth noting.

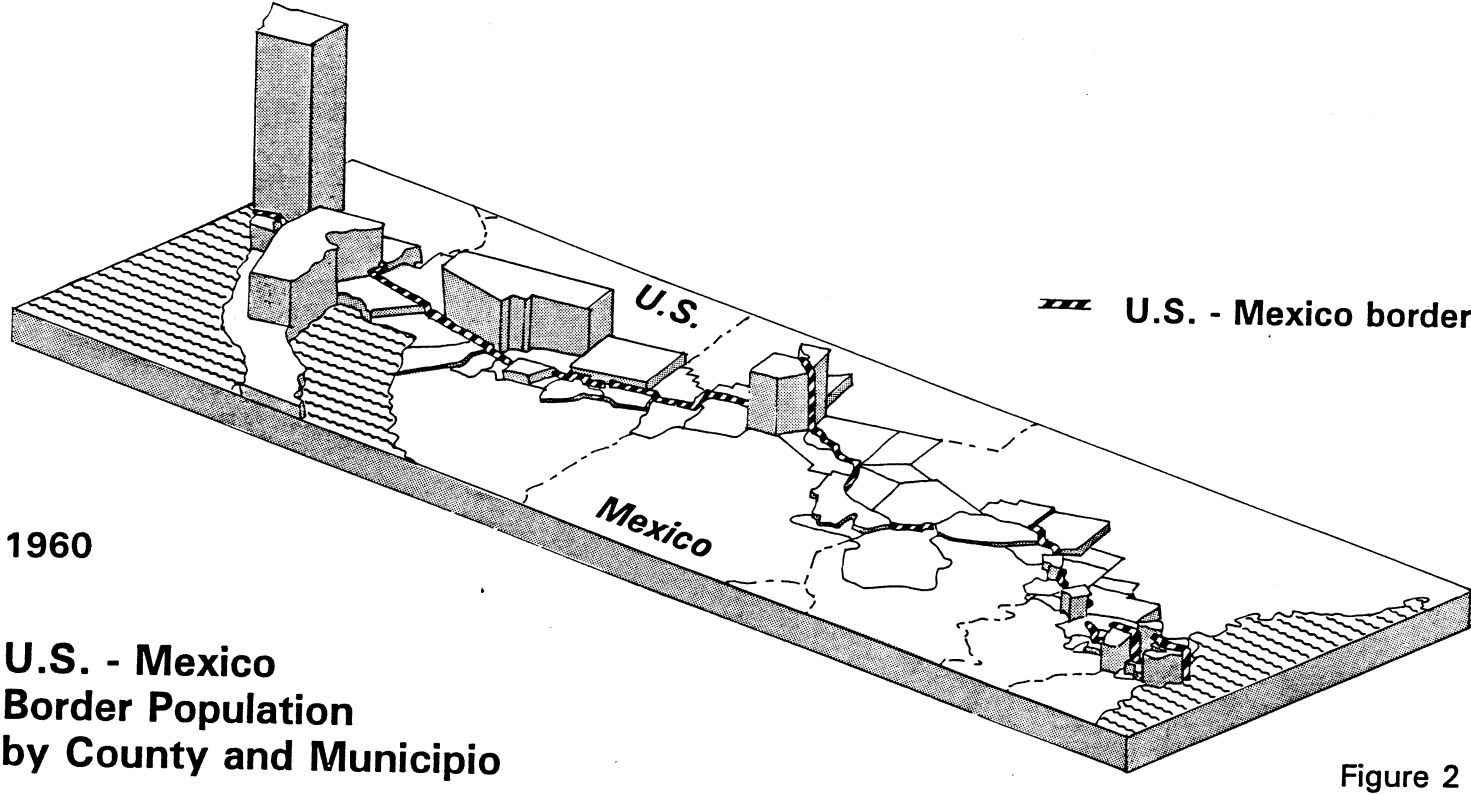
Only in the wettest of years does Colorado River water reach the Gulf of California. The Rio Grande, passing by Chamizal National Memorial in El Paso, Texas, is concrete-lined. Below El Paso, the Rio Grande river bed is bone dry most of every year. Only during years of peak precipita-



1930

U.S. - Mexico Border Population by County and Municipio

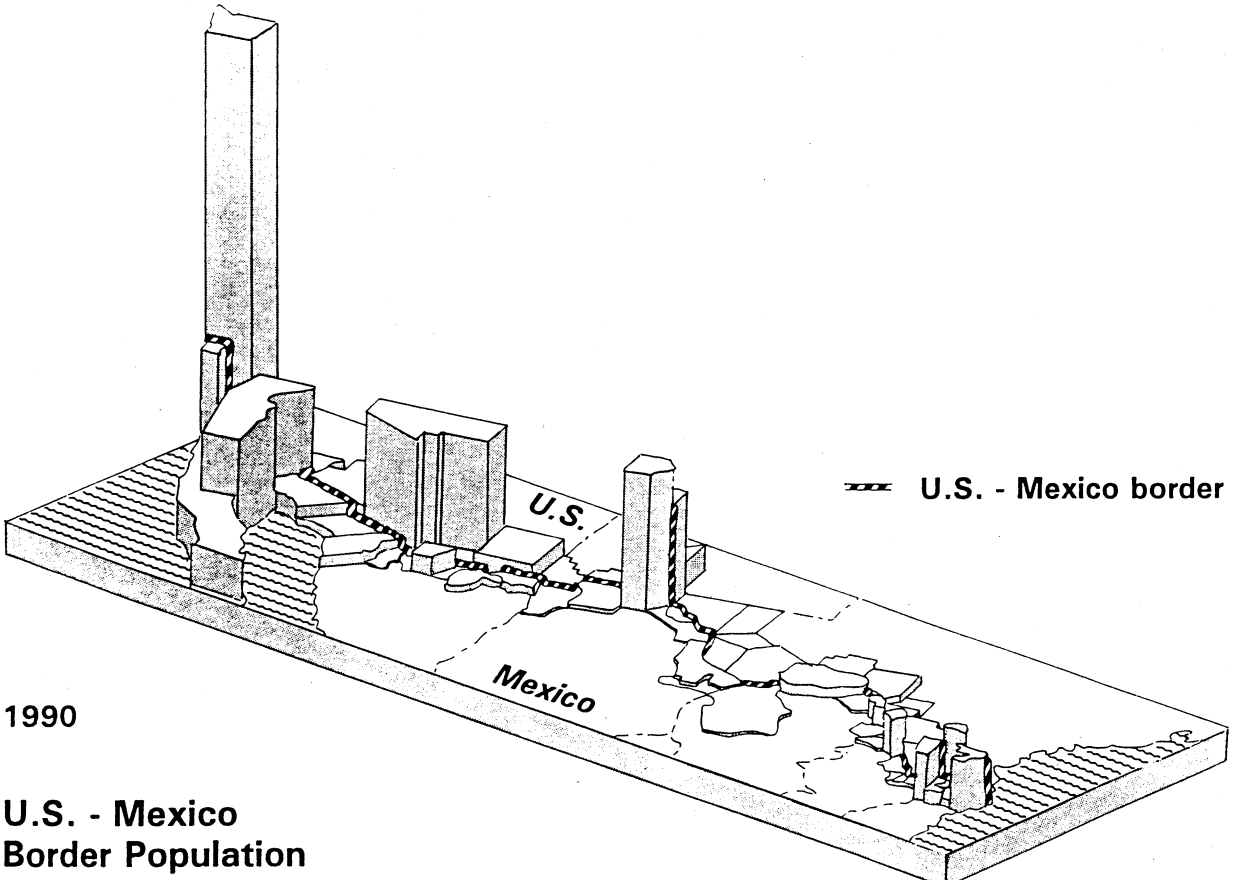
Figure 1



1960

U.S. - Mexico Border Population by County and Municipio

Figure 2



1990

U.S. - Mexico Border Population by County and Municipio

Figure 3

tion is water released to flow in this section between El Paso and Presidio, Texas. Sediments are intercepted by all impounding structures, but in the Rio Grande particularly by the major impoundments of Elephant Butte Dam, New Mexico; Amistad Dam, Texas-Mexico; and Falcon Dam, Texas-Mexico. As a result, the riparian systems of both rivers have lost their upstream sources of sediment and riverbanks and sandbars continue to erode away for lack of nourishment. Without the flooding of earlier years, the riparian systems, particularly the cottonwood "bosques," are moving toward extinction.

Salinization has increased with water withdrawals and the return of irrigation water to the Rio Grande, allowing the silverside, *Menidia beryllina,* to move upstream from the river mouth. In 1853, 18 species of native fish were noted in the area of Matamoros, Mexico; none of these remained in 1982. Changing water quality and the degradation of river habitat has resulted thus far in the loss of at least six fish species within the lower Rio Grande; other species are threatened. In its lower reaches, the Rio Grande has lost 85% of its original volume.

Rio Grande stream flows have been profoundly reduced through Big Bend National Park, reducing the season for river rafting and diminishing the wilderness and wild river experience. Large unseasonal releases from dams in Mexico also complicate the recreational use of the river and are profoundly changing stream flows and river channels. Further diminishment of the Rio Grande through Big Bend is certain, as 80% of the stream flow at this point is derived from the Rio Conchos of Mexico. Within the Rio Conchos watershed, continuing deforestation and water development to meet population needs are drying up springs and streams. Inevitably, the Rio Grande within Big Bend will be a trickle or disappear for part of the year.

Impacts extend upstream and down. At Amistad Reservoir, archeological sites at the confluence of the Rio Grande and Pecos River are flooded. Padre Island National Seashore, no longer nourished by sediment emerging from the Rio Grande, is eroding at its southern end at the rate of about six inches each year.

Unfortunately, the international agreements for water management have not yet extended to groundwater and the three great aquifers that straddle the United States-Mexico border. To meet the needs of the El Paso-Cuidad Juarez population, the Hueco Bolson aquifer, some 3,000 square miles in area, is being pumped at a rate that could exhaust it in 35 years. In this world of high evaporation, what water is returned is increasingly saline. The City of El Paso is already planning to pipe water from Elephant Butte Reservoir upstream to meet its needs.

Extensive withdrawals have also commenced on the 7,450-square-mile Mesilla Bolson aquifer between Chihuahua and New Mexico, and the 3,000-square-mile Mesa de San Luis aquifer beneath the Baja California-Sonora and California-Arizona region. However, the two nations have not even begun negotiations to manage these essentially finite resources. At Organ Pipe Cactus National Monument in southern Arizona, water withdrawal from the aquifer was two and a half times the recharge rate when agricultural irrigation was tried on the Mexico side of the border. Monitoring wells within the monument have shown a drop in the water table.

The once pristine air of the border region has also profoundly changed. Air pollution emissions from the industrial areas in northern Mexico have been shown to be substantial contributors to visibility impairment in the southwestern U.S., as have sources along the Texas

Gulf Coast. The 1,200-megawatt coal-fired power plant known as Carbon I, 125 air miles from Big Bend National Park in Rio Escondido, Coahuila, is soon to be joined by Carbon II, a 1,400-megawatt plant, in order to meet the growing power demand of the region. Neither the existing nor the new units of these power plants have air pollution controls for sulfur dioxide. Carbon I and II meet international and Mexican emission standards, but do not meet U.S. emission standards for sulfur dioxide, particulates, or nitrogen oxides. When the last of the four Carbon II units comes on line in early 1996, sulfur dioxide emissions from the two plants will range between 190,000 and 260,000 tons per year, ranking them as one of the largest carbon dioxide sources in the U.S. Based upon preliminary USNPS estimates, the already-degraded air quality at Big Bend, designated as a Class I area under the U.S. Clean Air Act, will experience as much as a 60% reduction in visibility on the cleanest days as a result of the Carbon II emissions alone.

Beyond their extensive record on water management, the governments of the United States and Mexico have numerous other multilateral agreements dealing with natural resources. The two nations signed the Convention for the Protection of Migratory Birds and Game Mammals in 1936, the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere in 1940, the International Plant Protection Convention in 1951, and the Convention on Wetlands of International Importance Especially as Waterfowl Habitat in 1971.

Also in place are the La Paz Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area, signed in 1983, a Memorandum of Understanding on Cooperation in the Management and Protection of National Parks and other Protected Natural and Cultural Heritage, signed in 1988, and a recent Integral Binational Plan for the Improvement and Protection of the Environment in the Border Area. The North American Free Trade Agreement of 1993 also includes millions for clean-up of toxic wastes, to enforce air pollution standards, and to fund construction of sewage treatment plants in Mexican twin cities. To enhance cooperation in the region of the Organ Pipe Cactus National Monument, an International Sonoran Desert Alliance now involves federal and state land managers on both sides of the border, the O'odham Indian Nation, conservationists, residents, and business leaders. A similar coordinating council is being developed for the Trans-Pecos region of southwest Texas.

But still, the exponential growth of the human population in this terribly arid region is causing the extraction of resources and impacts on an unprecedented scale. The once-isolated national parks and monuments of the border region are no longer immune to change and impacts of the growing wave of humanity. Resource managers will be challenged as never before. Working with institutions external to the parks will be demanded as never before.

"You won't have any trouble in your country as long as you have few people and much land," Thomas Carlyle penned more than a century ago, "but when you have many people and little land, your trials will begin."

Selected References

American Rivers. 1993. *Endangered Rivers of America–A Report on the Nation's Ten Most Endangered Rivers and Fifteen Most Threatened Rivers of 1993.* American Rivers, Washington, D.C.

Barreiro, Francisco Álvarez. 1992. Plano Corográphico de las Provincias del Nuevo Mexico, 1728. The Hispanic Society of America, New York.

Castañeda, J.R. 1985. Mexico at the brink. *Foreign Affairs* (64), 1985.

Méndez, Silvia. 1987. Border populations, economic activity, and maquiladoras. Presented at the Binational Symposium on Population Issues Along U.S.-Mexican Border. Tijuana, Mexico.

Mendoza, Eliseo. 1982. Historia de los programas federales para el desarrollo enonómico de la frontera norte. El Colegio de México.

Szekely, Alberto. 1993. Emerging boundary environmental challenges and institutional issues: Mexico and the United States. *Natural Resources Journal* (33:1).

Teitelbaum, Michael S. 1985. *Latin Migration North: The Problem for U.S. Foreign Policy.* Council on Foreign Relations, New York.

Texas Water Resources Institute. 1993. The Rio Grande–A confluence of waters, nations & cultures. *Texas Water Resources* (19:2).

United Nations Population Fund. 1991. *Population, Resources and the Environment–The Critical Challenges.* London.

Weeks, John R., and Roberto Ham-Chande. 1992. *Demographic Dynamics of the U.S.-Mexico Border.* Texas Western Press, El Paso.