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## The State of the Environment in Paso del Norte, Coahuila, Nuevo León, and Tamaulipas

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### ABSTRACT

The Río Bravo, as it is called in Mexico, which runs for more than 1,200 miles, delineates the border between Mexico and Texas. Seven sister cities have grown up along this thin slice of green within the Chihuahuan Desert: Ciudad Juárez-El Paso, Texas; Piedras Negras-Eagle Pass, Texas; Ciudad Acuña-Del Rio, Texas; Nuevo Laredo-Laredo, Texas; Reynosa-McAllen, Texas; and Matamoros-Brownsville, Texas. The climate in the Rio Grande river basin ranges from arid to semi-arid.

The population in the seven sister cities has doubled every 20 years and is expected to reach 8 million in 2030. Large influxes of Mexican workers who have moved into the Border Region from the interior of Mexico to work in the maquiladoras (assembly plants) accounts for the population increases on the Mexican side. On the U.S. side, increases in the need for trained military personnel accounts for a portion of the rise in population (Schmandt 2002).

In this arid region, drought conditions are part of the normal cycle. However, with the staggering increase in population, normal agricultural and municipal needs may not continue to be met (International Boundary and Water Commission 1993).

### *Regional Economics*

The North American Free Trade Agreement (NAFTA) has no doubt fueled economic growth on the border between Mexico and the United States. For the whole period between 1970 and 1997, the region has expanded beyond the U.S. growth rate in the economic sectors of manufacturing, transport, wholesale and retail trade, real estate, finance, and services. In particular, manufacturing averaged a 1.85% increase over the 0.2% loss nationally, while wholesale and retail trade showed a 2.88% increase over a 2.2% increase nationally (Hanson 2001). Fruits, vegetables, sorghum, and corn are important import/export commodities in the Lower Rio Grande Valley. Agricultural outputs make up a about 10% of the economic output in the region (Schmandt 2002).

Expansion of maquiladoras has been rapid over the past two decades, which has led to the increase in employment, value-added, and import inputs on both sides of the border (Hanson 2001).

### *Air Quality*

Degradation of air quality along the border cities has been an issue for more than a decade. Three cities on or near the Texas-Mexico border (Anthony, N.M., Sunland Park, N.M., and El Paso, Tex.) reported exceedances of the U.S. National Ambient Air Quality Standards for particulate matter (PM<sub>10</sub>), ozone (O<sub>3</sub>), and carbon monoxide (CO) (EPA 2000a). On the Mexican side, Ciudad Juárez, Chihuahua, had exceedances for CO, O<sub>3</sub>, and PM<sub>10</sub> (EPA 2000b). Unfortunately, there are no air quality monitoring stations in other Mexican border cities such as Ojinaga, Ciudad Acuña, or Piedras Negras so a large portion of the Mexico-Texas border has not been assessed (Muskerjee 2000).

Additionally, the air quality of specific cities is important in that degradation trends tie in with the NAFTA. Specifically, the maquiladora exports increased from \$14 billion in 1990 to \$52 billion in 1998 (U.S. International Trade Commission 1997 and 1999). Exhaust fumes contribute increased levels of nitrogen oxides (NO<sub>x</sub>), CO, and elevated levels of lead (Mukerjee 2001). Along with this, a particularly harmful chemical combination of gases termed “urban aerosol,” forms chemically from gases (NO<sub>x</sub>s) less than 2 microns and are particularly harmful because at this size, they are the most respirable and most damaging to lung tissue (Manahan 1999).

The Rio Grande airshed in Texas is greatly affected by the arid climate and wind erosion, which tend to elevate levels of PM<sub>10</sub>. A contributing factor is the lack of paved streets, especially on the Mexican side of the border. Other origins of particulate matter are dumping, burning, and barren croplands, which contribute to the degradation of the airshed (EPA 1998).

The Big Bend Regional Aerosol and Visibility Observational (BRAVO) Study is an effort to quantify the air quality at Big Bend National Park. A summary of this study is located on the internet at [www2.nature.nps.gov/ard/bravo](http://www2.nature.nps.gov/ard/bravo) (Muskerjee 2000).

Both countries are involved in improving the air quality trends on the border via the 1996 La Paz Agreement, which seeks to decentralize control of environmental management, improve interagency cooperation, and develop community awareness of environmental issues (Muskerjee 2001).

### *Water Quantity*

The Drought Preparedness Council of Texas monitors rainfall in the region. In the Trans Pecos region, only “slightly wet” conditions exist according to the Palmer Drought Severity Index (PDSI) and the Crop Moisture Index (CMI) shows it is “moisture adequate.” Other regions along the border are experiencing “normal to moderately wet” conditions, with stream flow conditions described as in “very good condition.”

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The major source of subsurface water in the upper part of the Rio Grande basin is the Hueco Bolson. Because of accelerated withdrawals in the past few decades, the bolson is projected to run dry by 2025. However, a \$50 million desalinization plant is in the process of being constructed to treat the brackish water contained in a secondary aquifer, the Mesilla Bolson (Schmandt 2002). However, on the Mexican side of the border, there are no resources to build a large-scale water treatment facility. Through proper water management, which has been accomplished through an international, non-governmental body called the Paso del Norte Water Task Force, there is hope that there will be enough water for future needs (Schmandt 2002).

Water in the Lower Rio Grande Basin is mainly supplied from the Mexican side of the border. The subsurface aquifers present have low-quality water that cannot be used even for agriculture. Therefore, a two-reservoir, jointly owned U.S.-Mexico system was established in the 1950s and 1960s (Schmandt et al. 2000). Current water storage in the Amistad and Falcón reservoirs is up by only 2.27% from last year. The data collected in December 2003 indicates the U.S. holds 34.76% (1,156,077 acre feet) conservation capacity and Mexico holds 23.71% (587,764 acre feet). However, these levels are still not adequate for both agriculture and municipal needs for the present year (Drought Preparedness Council 2003).

Present conditions indicate that the only region to experience agricultural concerns is the far west portion of Texas, including Brewster, El Paso, Hudspeth, Terrell, and Presidio counties. These counties are experiencing “significant moisture stressed conditions,” which means these farming communities will have to re-strategize their crop mixes, number of acres planted, and possibly re-design water delivery systems to accommodate low water supplies (Drought Preparedness Council 2003).

#### *Water Quality*

The Army Corps of Engineers have noted an increased incidence of water-borne disease along the border due to raw sewage dumping, mostly on the Mexican side into the Rio Grande (Army Corps of Engineers 1992). The NAFTA agreement has put in place the necessary monies to sponsor the building of wastewater treatment plants along the border to rectify this problem.

#### *Natural Resources*

Big Bend National Park is located in West Texas at the point where the Rio Grande River flows sharply south. In 1976, the park was designated as a U.S. Biosphere reserve because of the great diversity of flora and fauna within its 801,000 acres (NPS 2003). A 196-mile portion of the Rio Grande from the Chihuahua/Coahuila state line in Mexico to the Terrell/Val Verde county line in Texas is designated as wild and scenic. The upper 69 miles of this designated portion lie within Big Bend. The designation as “wild” is those portions only accessible by trail; “scenic” means that the water flow is free of impoundments

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with only limited access via roads. This area is the largest protected area of the Chihuahuan Desert in the U.S., which is important in continuing the functioning of the fragile desert ecosystem (NPS 2003b).

### *Land Use*

The driver of change within the Rio Grande Valley is, again, accessibility of water. The Paso Del Norte Water Task Force in El Paso has shown that both sides of the border can work together to come to consensus within the framework of a rather complicated issue.

Urbanization/industrialization has cost the agricultural sector land and water rights. Since market conditions can vary from year to year, for example, because of drought or freezes, farmers may be forced to sell both property and water rights to municipalities (Schmandt 2002).

Agriculture in the Lower Rio Grande Valley is a significant portion of the economy there (10%). However, the amount of irrigated land can vary significantly from year to year due to the occurrences of drought. In Mexico, the lower Río Bravo irrigates approximately 240,000 hectares, which is the largest producer in the region. In Texas, the amount of irrigated lands have seen steady decline, from a high of 2.7 million hectares in 1982 to 1.5 million hectares in 1992 (Schmandt 2002).

### *Environmental Disasters*

No major environmental disasters have plagued this region. For the 2003 fire season, wildfire concerns are high, according to the Keetch-Byram Drought Index (KBDI), in Brewster, El Paso, Presidio, Reeves, and Terrell counties (Drought Preparedness Council 2003). The ongoing drought and the yearly increase in population have given rise to several water quantity and quality problems within the region.

### *Environmental Health Risks*

The environmental health risk in the El Paso-Juárez region is significant. Air quality studies in the El Paso-Juárez region have shown considerable health risks associated with exposure to heavy metals by inhalation and ingestion of contaminants (Davila 1976; Barron 1999; Jeon et al. 2001; Li et al. 2001). Thus, metal-contaminated hazardous desert waste sites such as smelters and tanning operations have become a significant problem. Heavy metal contamination has become an issue in very recent history. The U.S. Environmental Protection Agency (EPA) is in the process of considering certain sections of El Paso located downwind from a smelter plant as a Superfund site due to elevated levels of lead and arsenic. The EPA is in the process of determining the levels of metal contamination and is conducting soil sample tests.

Pesticide use is largely restricted to agricultural applications. Studies conducted on the transport of pesticides in water from land applications have shown there is

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is significant non-point source pollution along the Rio Grande. In the Lower Rio Grande Basin, a study conducted at four *resacas* (oxbows) on the heavy metal and organochlorine insecticides (DDE) contents in water and fish tissues was conducted. All of the fish showed elevated levels of DDE and fish caught in a *resaca* near downtown Matamoros had high levels of arsenic (Mora et al. 2001).

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