

## CIUDAD JUÁREZ

### INTRODUCTION

Since the La Paz Agreement of 1983, there have been advances in identifying the current state of the environment and the natural resources in the U.S.-Mexican border region. The compiling, updating, and systematizing of information has advanced without precedent. Similarly, the characterization of the current status of existing infrastructure for the environment has spurred the creation of binational agencies such as the Border Environment Cooperation Commission/Comisión de Cooperación Ecológica Fronteriza (BECC/COCEF).

On the other hand, the analysis of institutional capacity for environmental administration has strengthened the official requests for care of the physical environment in the border region, and has generally permitted greater public and governmental participation in building awareness of environmental problems. There has also been progress in monitoring the actions that have been undertaken. The applied research in the region has had a significant upturn that is linked to higher education institutions and consolidated institutions such as the Southwest Center for Environmental Research and Policy (SCERP).

Nevertheless, progress toward a sustainable region in real terms does not correspond directly to the institutional work of binational collaboration and exchange. The disproportionate pace of environmental deterioration and the aforementioned efforts manifests itself on the health of residents.

The Municipality of Ciudad Juárez, in addition to these characteristics, has an evident and deplorable contrast between the enormous industrial production and capital and the environmental shortfalls in sanitation infrastructure and the population's quality of life. This chapter intends to highlight some of the clearest demonstrations of this contradiction and the need to re-examine the ideas behind economic growth and social participation.

### GENERAL CHARACTERISTICS

#### *Geographic Location*

The Municipality of Ciudad Juárez, Chihuahua, is located on the central mesa in the north of Mexico and on the U.S.-Mexican border. Table 1 provides more details on the location. This municipality is part of the desert of Chihuahua, which is considered a fragile ecosystem.

#### *Climate*

Ciudad Juárez is one of the 67 municipalities of the state of Chihuahua separated from the United States on the east by the Rio Grande River (Río Bravo in Mexico). The region's climate is considered arid and extreme according to the following parameters described in Table 2.

### DEMOGRAPHY

According to the majority of those who study the U.S.-Mexican border, demographic growth in regions such as the Municipality of Juárez is the principal cause of environmental problems.

The total population Juárez is 1,218,817 residents (39.9% of the state's population), of which 612,799 are male (50.3%) and 606,018 (49.7%) are female. 97.4% of the

population lives in Ciudad Juárez. The history of population growth is shown in Table 3. Future predictions of demographic growth in the city are presented in Figure 1; according to these predictions more than half of the Chihuahua's state population will live in Ciudad Juárez by the year 2020.

#### ECONOMY AND PLANNING

Figure 2 shows the economically active population in Ciudad Juárez. Table 4 describes the composition of the economically active population (EAP) that has found permanent employment by sector of activity according to the Mexican Social Security Institute (Instituto Mexicano del Seguro Social or IMSS).

#### *The Maquiladora Industry*

The Border Industrialization Program (BIP, or maquiladora program), was initiated and launched in the 1970s and generated jobs for hundreds of thousands of residents along with sustained economic growth (See table 4). However, this growth was largely unplanned with regard to use of natural resources in the region and it did not consider the physical capacity of ecosystems to sustain the growth. In this context, there was more expansion of economic growth than there was economic development, which considers the demand for environmental services without considering supply. Table 5 displays historic growth of the maquiladora export industry in this region.

The current outlook for the maquiladora industry is uncertain. In the first trimester of 2003, and according to the National Council of the Maquiladora Export Industry (Consejo Nacional de la Industria Maquiladora de Exportación or CNIME), the maquiladora sector will have negative growth at the national level for the entire year. Industrial plants continue to leave, especially from Ciudad Juárez, Mexicali, and Monterrey, and are relocating to China, Costa Rica, Brazil, and Nicaragua. (El Diario Digital 2003)

On the other hand, the observed salary for the same period has shown a trend toward slow growth. According to the statistics from the National Minimum Wage Commission (Comisión Nacional de Salarios Mínimos or CNSM), the average income of permanent workers at the national level was estimated at 166.38 pesos per day per person. Chihuahua falls under the national median. In February 2003, the estimated daily income was 151.65 pesos, which is 14 pesos and 75 centavos less than the national median (El Diario Digital 2003). From 2001 through July 2002, in Ciudad Juárez 200,000 IMSS benefit-holders withdrew funds due to unemployment and as a result of the deceleration of the U.S. economy (El Diario Digital 2003).

#### AGRICULTURE

Irrigated agriculture in the region does not produce crops for human consumption, with the exception of family fruit farms using wells for irrigation. As indicated in Table 4, this economic activity is on the decline. Table 6 displays the main crops.

Water resources come from the sources listed in Table 7. In 2003, due to the drought in the United States, the Treaty of 1906 allocation of 47 million cubic meters was reduced considerably, which led to a reduction in planned crop production. In addition, the reduced water supply affects the quality of the water available to farmers. This is because at the distribution point, wastewater is mixed in with residual water from the Rio Grande for better dilution.

The environmental and health problems associated with the agricultural region are related to the use of wastewater from Ciudad Juárez. Authorities from the National Water Commission (Comisión Nacional del Agua or CNA) believe that the degree of water culture among farmers in the region has helped avoid the intensification of water-borne illnesses, which has been documented on various occasions by health authorities.

### *Limits To Planning*

If the absence of city planning during the middle of the last century marked a period of disorganized growth of the city and an overexploitation of human and natural resources, the current strategy of Ciudad Juárez's Urban Development Plan of 2002 (IMIP. Plan de Desarrollo Urbano de Ciudad Juárez 2002) has been impossible to implement. The principles of the plan include the following:

- Residents of Ciudad Juárez are the most important element in the planning process
- Planning and the processes of urban development require a long-term perspective
- The formulation of objectives, policies, and actions for municipal development should incorporate and integrate the aspirations of people and scientific knowledge
- Decision-making should be based on analysis of relative costs and benefits
- Decision-making in the public sector should generate a system of broad and transparent participation, in which access to information is easy and expedient for all
- Urban development should be conceived with strict respect for natural resources
- The city should be a forum for conditions that enable businesses to flourish and where competitiveness serves as a stimulus for economic development
- The vision of Ciudad Juárez should be framed in the context of a binational metropolitan region

### SOCIAL SECURITY

Of the total population of Ciudad Juárez, 741,625 are beneficiaries of social security. The rest of the population lacks social security. Of these beneficiaries, 57% are insured or employed by the IMSS. The conditions of the beneficiaries are shown in Figure 3.

On the other hand, in Mexico, according to IMSS authorities, "65 percent of family clinics are found to have poor conditions, with hardly one bed and 0.4 offices for each thousand beneficiaries. Nevertheless, the volume of investments for the institute in 2002 reached a modest sum of approximately 900 million pesos, when in previous decades the average funding was 4,500 million pesos" (La Jornada. México D.F. Martes 28 de enero de 2003).

"Another element for measuring the magnitude of the crisis experienced by IMSS is the nearly null number of new locations, which during the past decade only increased by 0.8%, while the number of beneficiaries has redoubled" (La Jornada. México D.F. Martes 28 de enero de 2003).

In particular, an important factor that explains the crisis of social security in Ciudad Juárez is the fact that of the 43% of the IMSS's overdue payments at the state level are found in this city; 4,483 businesses have not made their payments for the past five years (La Jornada. México D.F. Martes 28 de enero de 2003).

## WATER SUPPLY AND DISTRIBUTION

Ciudad Juárez faces a problem of water scarcity. This limitation is short-term—the next five years—which is the estimated time that the high-quality water resources will run out in the Hueco Bolsón aquifer. The Municipal Council for Water Supply and Distribution (Junta Municipal de Agua Potable y Saneamiento, or JMAS) is responsible for supplying and distributing water for the city. The water supply is groundwater and comes mostly from the Hueco Bolsón aquifer. Table 8 includes some characteristics of the supply system. The city has 80% coverage for sewage services and 75.8% coverage for wastewater treatment (Garza A, V. Estudio General del Caso: Valle de Juárez, México. OPS/HEP/CEPIS. 2001; [www.cepis.ops-oms.org/bvsaar/e/proyecto/complemen/casos/JUAREZ.pdf](http://www.cepis.ops-oms.org/bvsaar/e/proyecto/complemen/casos/JUAREZ.pdf)).

The number of residences occupied is 293,752, with 4.1 occupants per household (INEGI. Cuaderno Estadístico Municipal. Edición 2001). Figure 4 displays the number of homes with access to municipal services in which the shortage of potable water from tap and sewage access compared to access to electricity can be appreciated.

Currently there are a number of options being discussed to expand the sources of supply from JMAS, taking into account the demographic growth that various analysts have predicted will be at least 50% by the year 2020. The expansion in the capacity of treatment plants (north and south) seems to be one of the most viable options. After just two years of operation these plants have already reached the limits for advanced primary treatment.

## AIR QUALITY

Ciudad Juárez is temporarily out of compliance with the regulations established by Mexican authorities for ozone (O<sub>3</sub>), particulate matter (PM<sub>10</sub>), and carbon monoxide (CO). It is estimated that in Ciudad Juárez only 53% of streets have been paved. The city has 3,620 kilometers of roads. Thus, nearly 1,700 kilometers of roads are rough dirt tracks. One of the regions with the most unpaved streets is located in the west side, where about half of the roads are unpaved. This is the second main source of environmental pollution behind the vehicle fleet, which is comprised of about 500,000 vehicles (Garza A, V. Estudio General del Caso: Valle de Juárez, México. OPS/HEP/CEPIS. 2001; [www.cepis.ops-oms.org/bvsaar/e/proyecto/complemen/casos/JUAREZ.pdf](http://www.cepis.ops-oms.org/bvsaar/e/proyecto/complemen/casos/JUAREZ.pdf)).

One of the most important achievements with respect to controlling air pollution was the establishment of the 1998-2002 Ciudad Juárez Air Quality Administration Program (Programa de Gestión de la Calidad del Aire de Ciudad Juárez 1998-2002) by Mexico's environmental authorities. Evaluation of the program's effectiveness is still pending. In addition, the environmental impact of the proliferation of self-serve gas stations within the last year must also be evaluated.

## SOLID AND HAZARDOUS WASTE

Like the majority of communities in the border region, Ciudad Juárez faces problems with cross-border shipments and inadequate disposal of solid waste (especially tires). Health risks are posed by abandoned and/or contaminated sites like the Anapra region, where risks are related to the arsenic and lead slag left behind by the Asarco plant that is currently out of operation. The maquiladora industry is directly related to this issue and its growth is shown in Table 4.

## HEALTH

Health problems along the border are extreme and have an increasing reach. General poverty, lack of adequate access to medical attention, a great number of people without health insurance, a scarcity of health professionals, the low rates of immunization, lack of education, deficient plumbing, and risks of contamination are all factors that contribute to the dire health conditions of many communities in the region (Treat 2001). Table 9 shows the main causes of mortality in Ciudad Juárez and Table 10 shows the main causes of illness.

## BINATIONAL COOPERATION AND PUBLIC PARTICIPATION

Since the 1980s and 1990s, with the Border XXI program, a broad effort of binational cooperation was initiated, and this has been reinforced by the environmental agreements that accompanied the North American Free Trade Agreement (NAFTA). The exchange of information and experiences has allowed the challenge of environmental deterioration and improving conditions in the El Paso-Ciudad Juárez region to be faced. However, this cooperation has occurred in the framework of serious structural problems.

In principle, as is recognized by the workgroups, there is little probability of true binational planning. The different positions of Mexico and the United States with regard to international agreements such as the Kyoto Protocol (air) and Helsinki Agreement (water) illustrate the difficulties unique to countries with different degrees of economic growth and large asymmetries.

Further, the goal of real public participation has yet to be reached. Civil associations or non-governmental organizations, in general, have not shared the same experiences as the community and therefore do not necessarily reflect the needs of the community, but rather the agenda of the associations, which have not attained the autonomy necessary to be able to provide options that go beyond the short term.

## CONCLUSIONS

Ciudad Juárez is located in a fragile ecosystem and will experience demographic growth of at least 50% by the year 2020. The fundamental cause of this growth is due to the model of industrialization that is based on comparative advantage and exchange of inexpensive labor for investment of capital. This model has as its driving force its own need for capitalization and expansive growth, which puts pressure on the demand for natural resources and impedes long-term planning and improvement in the quality of life for residents.

The environment responds in a direct manner to the pace of this model and not to sustainable development. While binational cooperation has helped slow the accelerated deterioration, the economic logic of the decisions for the region indicates the tendency toward growing deterioration of natural resources and an intensifying of environmental indicators.

It is necessary to explore new economic formulas for economic development in the city and design new methods of social participation that reverse the current trends for the environment. The terms of the equation need to change in order to give more weight to the requirements of the region's ecosystems and to the need for improving the living standards of the residents of the municipality of Juárez.

Figure 1. Projected Population Growth in the State of Chihuahua and Ciudad Juárez 1990-2020. (4)

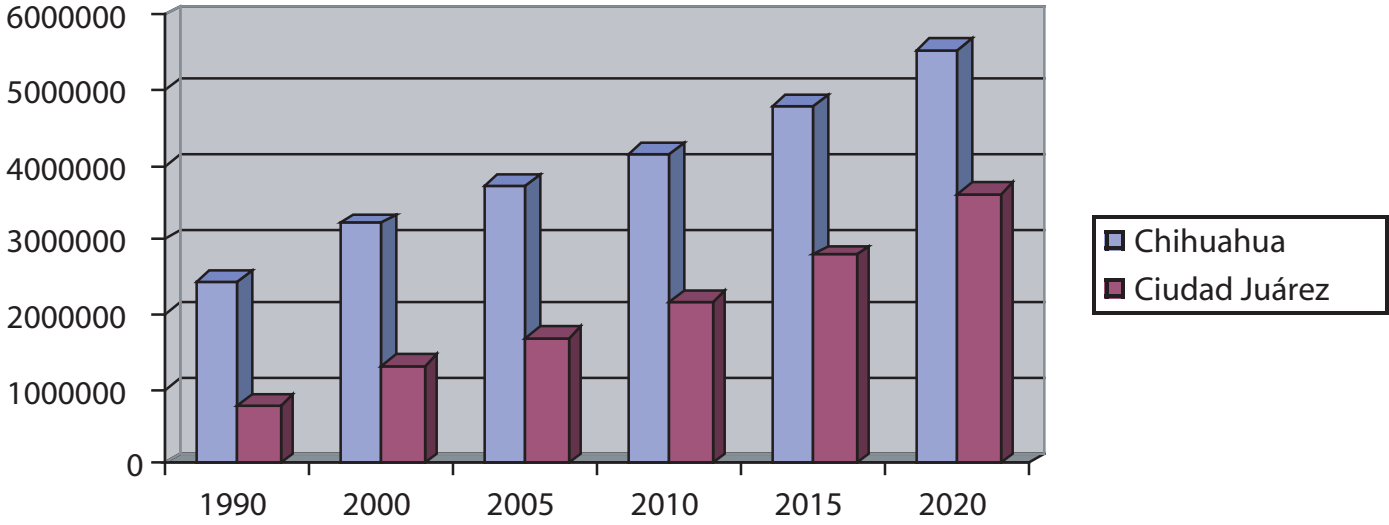


Figure 2. Distribution of the Working Age Population (EAP) in Ciudad Juárez (4)

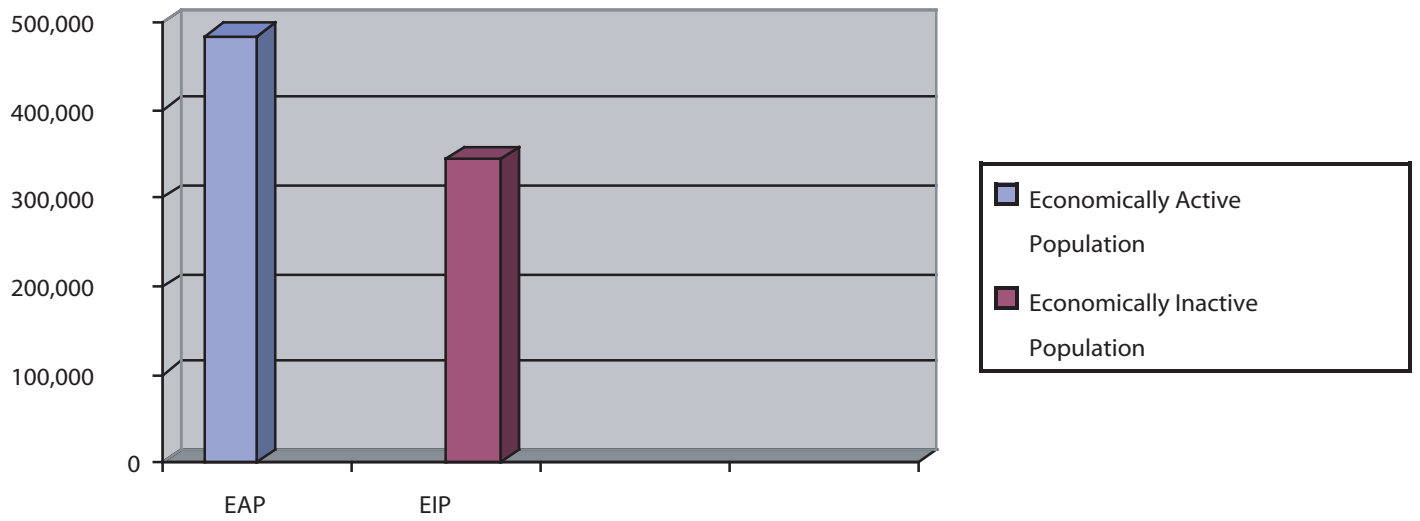


Figure 3. Status of IMSS  
Beneficiaries in Ciudad Juárez (4)

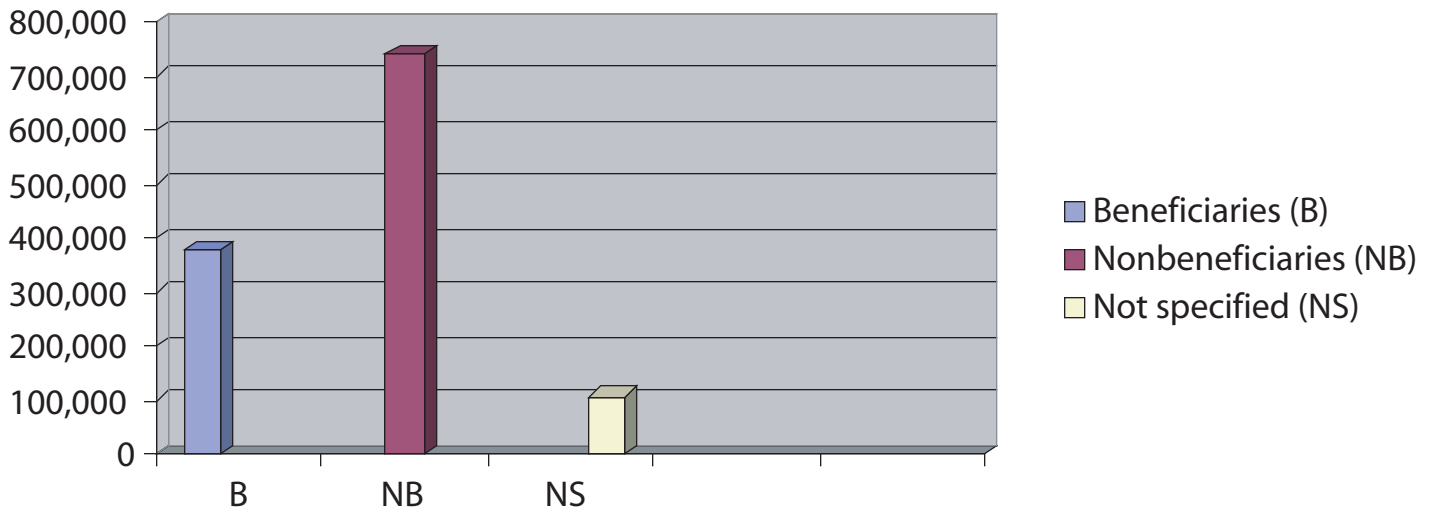


Figure 4. Occupied Households with Piped Water, Sewage, and Electricity Services(3)

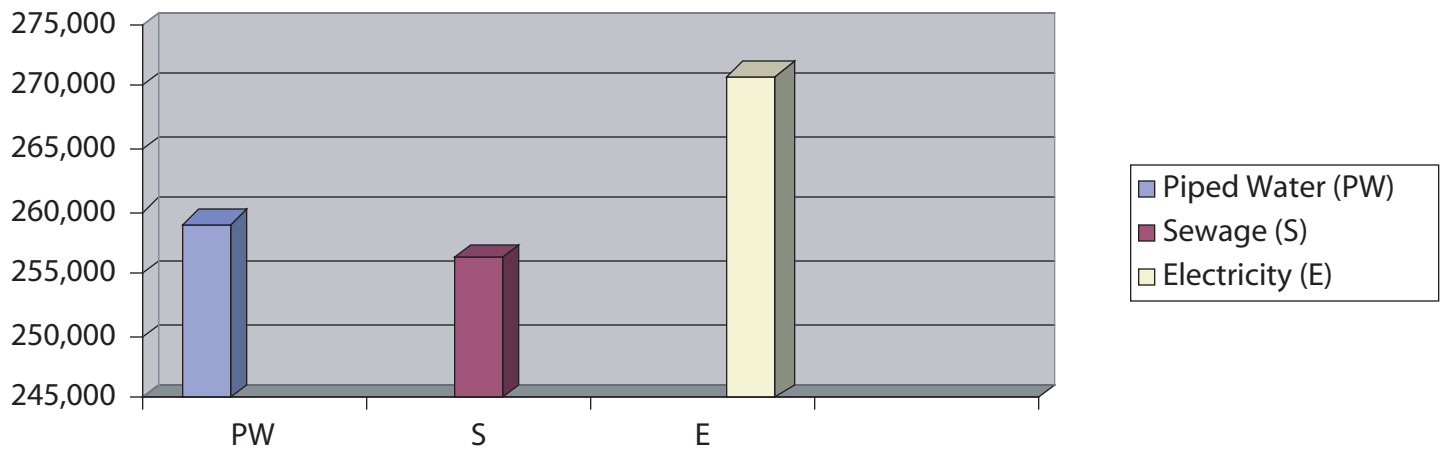


Table 1. Location

Administrative Center	Ciudad Juárez
Surface	4,853.80 km <sup>2</sup> (2'485,380 hectares)
Altitude	1,140m above sea level minimum altitude and 1,820m above sea level (summit of the Juárez mountains)
Latitude	Between the coordinates 31° 07' 38" and 31° 44' 22" north latitude
Longitude	Between the coordinates 106° 06' 57" and 106° 26' 29" west longitude
Borders	
To the north	Texas and New Mexico, U.S.A.
To the east	Texas, U.S.A. and the Municipality of Guadalupe
To the south	Municipalities of Guadalupe, Villa Ahumada, and Praxedis Guerrero
To the west	Municipality of Ascensión

Source: Desarrollo Economico De Ciudad Juárez, A.C.

Table 2. Climatology

Annual Median Temperature	18.0 °C (from 1957 to 2000)
Maximum Extreme Temperature	45.5 °C (June 1994)
Annual Median Precipitation	264.5 mm. (from 1957 to 2000)
Annual High Precipitation	55.7 mm. (from 1957 to 2000)
Annual Low Precipitation	7.8 mm. (from 1957 to 2000)

Source: Desarrollo Economico De Ciudad Juárez, A.C.

Table 3. Population of the Municipality of Juárez

Year	Population	Period	Annual Growth Rate (%)
1950	131,308		
1960	278,995	1950-1960	7.7
1970	424,135	1960-1970	4.5
1980	567,365	1970-1980	2.8
1990	798,499	1980-1990	3.6
1995	1,011,786	1990-1995	4.3
2000	1,218,817	1995-2000	4.5

Source: Desarrollo Economico de Ciudad Juárez, A.C.

Table 4. Composition of Permanent Employment by Activity Sector

Sector	1996	1997	1998	1999	2000
Agriculture	1,768	1,787	1,612	1,503	1,349
Mining	44	64	99	104	81
Manufacturing Industry	206,676	229,530	251,276	240,377	282,762
Construction	4,233	5,201	12,208	12,838	12,816
Electricity	1,706	2,031	2,094	2,098	2,124
Commerce	28,439	31,089	35,050	37,740	42,966
Transportation	5,512	5,378	7,718	9,294	10,036
Services and Other	56,068	59,996	55,641	50,784	72,947
Total	304,446	335,056	365,698	363,908	425,081

Source: Desarrollo Economico De Ciudad Juárez, A.C.

Table 5. Characteristics Of The Maquiladora Export Industry Over Time In Ciudad Juárez

Year	Number of plants	Number of employees (annual average)	Salaries, wages, provisions (millions of U.S. dollars)	Value-added (millions of U.S. dollars)	Imported Inputs (millions of U.S. dollars)
1987	240	96,850	352.36	760,719.00	-----
1988	254	118,112	356.8	1,581,275.00	-----
1989	248	110,999	474	894.2	2,441.90
1990	290	128,829	542.77	967.3	2,624.80
1991	255	123,888	608.39	1,097.90	3,056.70
1992	267	128,901	732.33	1,232.80	3,760.10
1993	254	132,089	810.96	1,253.60	4,470.30
1994	232	140,197	910.16	1,471.05	4,748.00
1995	237	155,421	697.87	1,275.96	5,319.63
1996	264	172,926	825.57	1,476.22	6,641.50
1997	283	190,506	851.9	1,552.42	5,520.30
1998	258	206,623	-----	2,076.98	-----
1999	297	222,866	953.3	2,580.00	10,713.20
2000	308	249,509	706	29,094.00	112,233.00
2001	308	207,067	19,520.00	33,725.00	109,786.00
2002	298	206,077	4,655.00	8,123.00	25,033.00

Source: Desarrollo Economico de Ciudad Juarez A.C.

Table 6. Main Crops in Irrigation District 009 in the Juárez Valley

Crops	Area of Cultivation (In Hectares)
Cotton	8,750
Alfalfa	2,400
Wheat	2,000
Sorghum fodder	500
Sorghum	100
Oats	1,000
Corn fodder	100
Fruit	150
Total	15,000

Source: Salas-Plata J., C. D. Turner and T. Redlinger

Table 7. Water Resources From Irrigation District 009

Source	Volume/Year
Rio Grande	74Mm <sup>3</sup>
Wastewater	65Mm <sup>3</sup> (Varies according to discharges)
Wells	60Mm <sup>3</sup> (Varies according to the budget of Irrigation District 009)
Total	199 million cubic meters

Source: Salas-Plata J., C. D. Turner and T. Redlinger

Table 8. Characteristics of the Water Supply System for Ciudad Juárez

Urban population with water and sewage services	1,298,588
Population served with potable water taps through residential connections	1,180,875
Population served by other means	117,164*
Number of wells	142
Median daily flow volume of potable water	4,612.19 L/s
Service coverage for potable water	90.90%

\*The population that does not have residential connections is provided approximately 400 L/family/week through cistern trucks.

Source: Victoriano Garza A., 2001

Table 9. Main Causes Of Mortality In Ciudad Juárez

Causes of Death	Number of Cases	Percent Total
Miocardial Infarction	14	29.2
Diabetes Mellitus	10	20.8
Chronic Renal Failure	5	10.2
Cancer (various types)	5	10.2
Gastrointestinal Infections	3	6.3
Respiratory Infections	3	6.3
Premature birth	3	6.3
Neonatal Period Heart Conditions	3	6.3
Chronic-Degenerative Diseases	3	6.3
Stillborns	2	4.2
Hepatic Cirrhosis	2	4.2
Cerebro-Vascular Accidents	2	4.2

Source: Infomexus 1999

Table 10. Most Frequent Illnesses (1997)

Illness	General Consult	Specialty Consult
Gastrointestinal Disease	69%	28%
Diabetes	60%	24%
Respiratory Infections	53%	27%
Hypertension	43%	16%
Wounds/Lesions/Fractures	26%	19%
Cardiopathies	15%	n/a
Cephalies / migraines	7%	n/a
Gastrointestinal Problems	n/a	19%
Psychiatric Disorders	n/a	12%
Orthopedic Problems	n/a	9%
Neurological Problems	n/a	7%
Gynecological Problems	16%	n/a

Source: Infomexus 1999