

Challenges of Transboundary Groundwater Management at the U.S.-Mexico Border

Erin M. Ward

**New Mexico Water Resources Research Institute
Las Cruces, New Mexico**

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Road Map

- **Objectives**
- **Background**
 - Population growth, industrial growth, climate change
 - History, protocols, institutions, governance
 - Mexican perspective, institutional comparisons
- **Potential Mechanisms for Cooperation**
- **Conclusions**

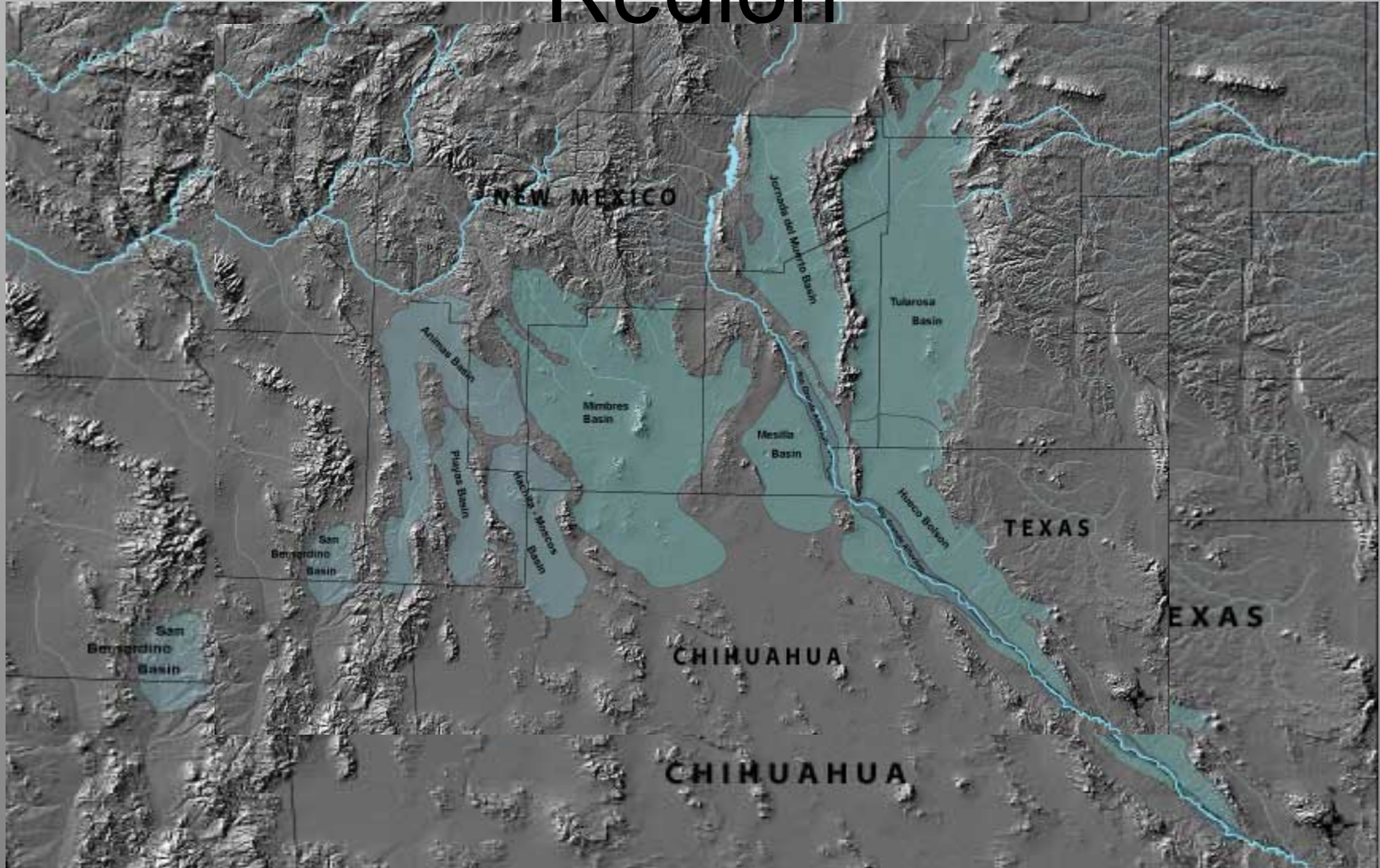
Objectives

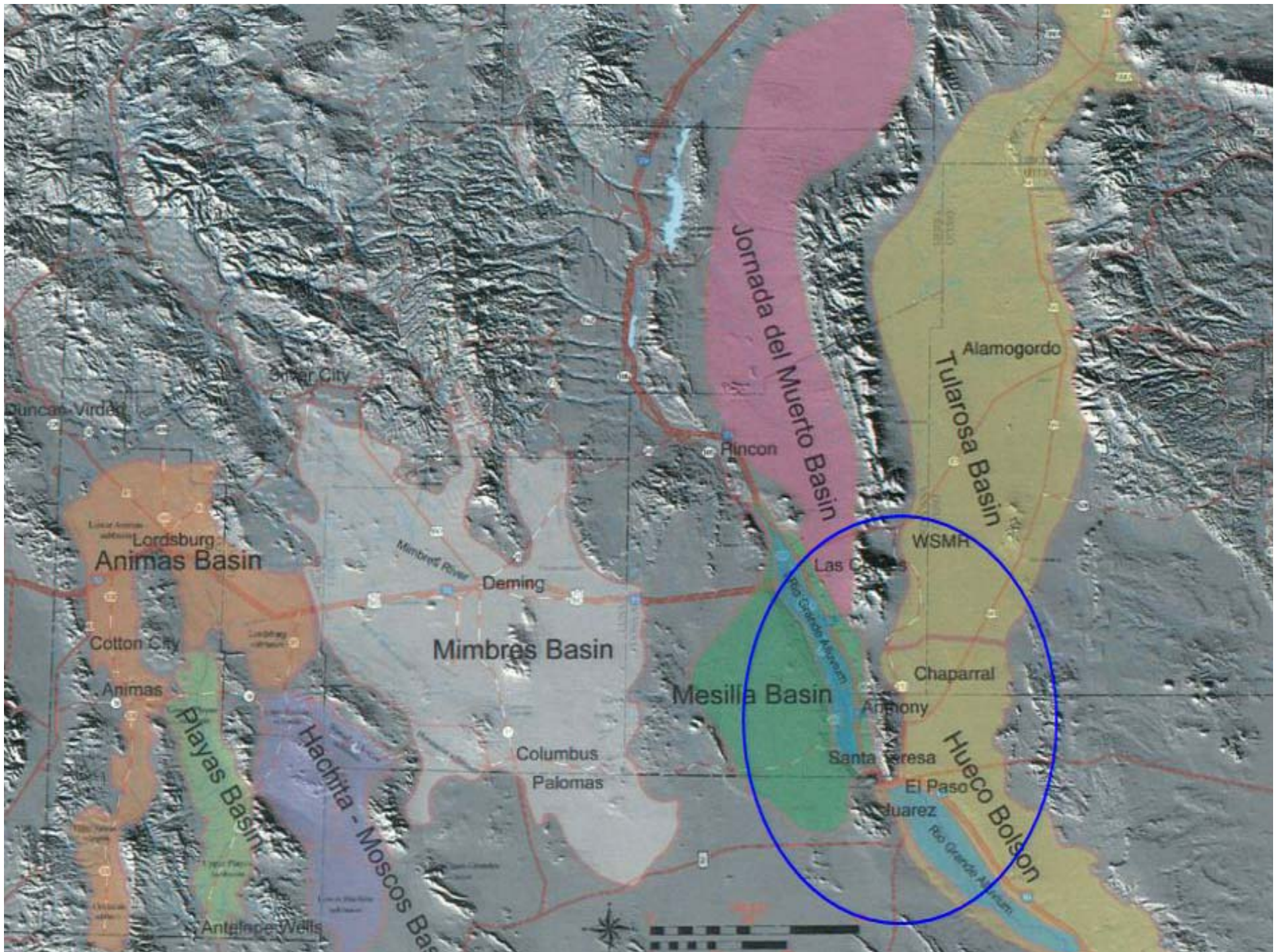
- Describe transboundary groundwater issues in the U.S.-Mexico border region
- Examine potential mechanisms for addressing the issues

Background

- Growing population
- Growing industrial presence
- Evidence of severely falling aquifer levels
- Lack of cooperative governance among competing users
- Potential tragedy of the commons

Transboundary Aquifers in the New Mexico-Chihuahua Border Region





Desert Environment

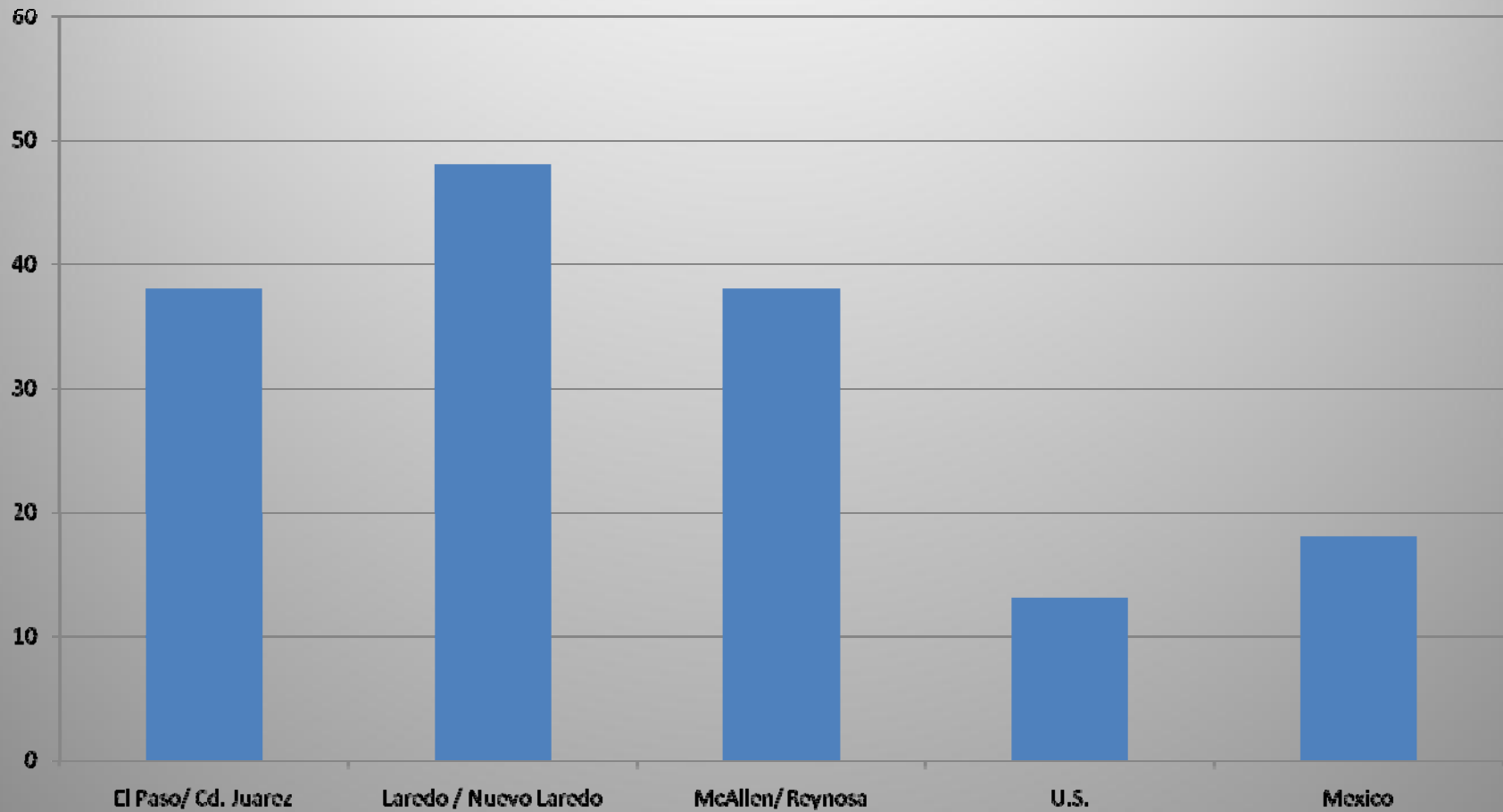
- Large portions of the U.S.-Mexico border fall within Chihuahuan and Sonoran deserts
- Average annual rainfall of 6-11 inches in desert regions; 11-19 downstream of Ojinaga to Amistad; 17-19 between Amistad to Falcon; 16-28 in Lower Rio Grande Valley
- Groundwater is chief source of potable water for 90% of border communities



Population Growth

- Growth from 1990 – 2000
 - El Paso/Cd. Juarez 38%
 - Laredo/Nuevo Laredo 48%
 - McAllen/Reynosa 38%
 - **U.S. nationwide 13%**
 - **Mexico nationwide 18%**
- Age, 2000 Censuses
 - El Paso, 26% under 15 (21% for U.S.)
 - Cd. Juarez, 35% under 15 (34% for Mexico)

% Change in Population, 1990-2000

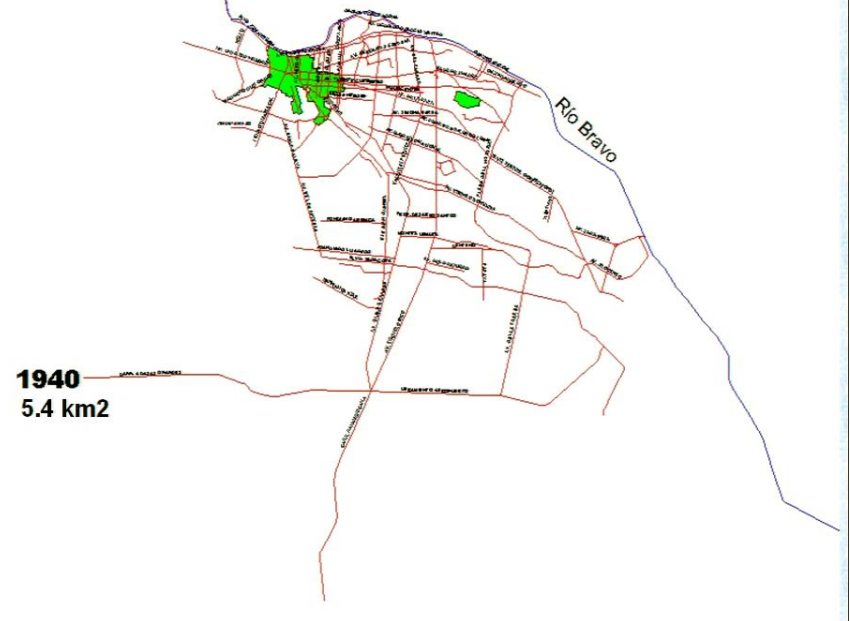


Source: INEGI & U.S. Census Bureau

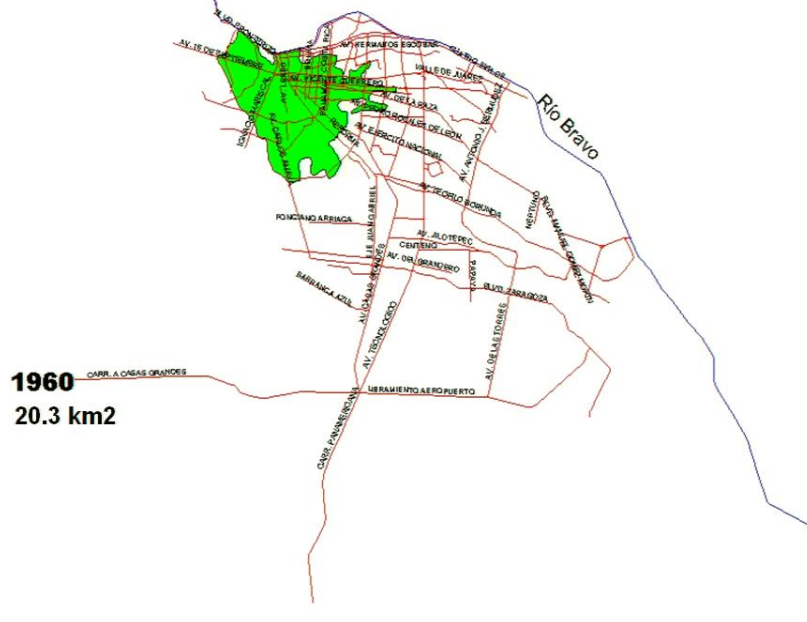
Concentration of Population in the CJ-EP area, has increase vulnerability in the PDN transboundary region



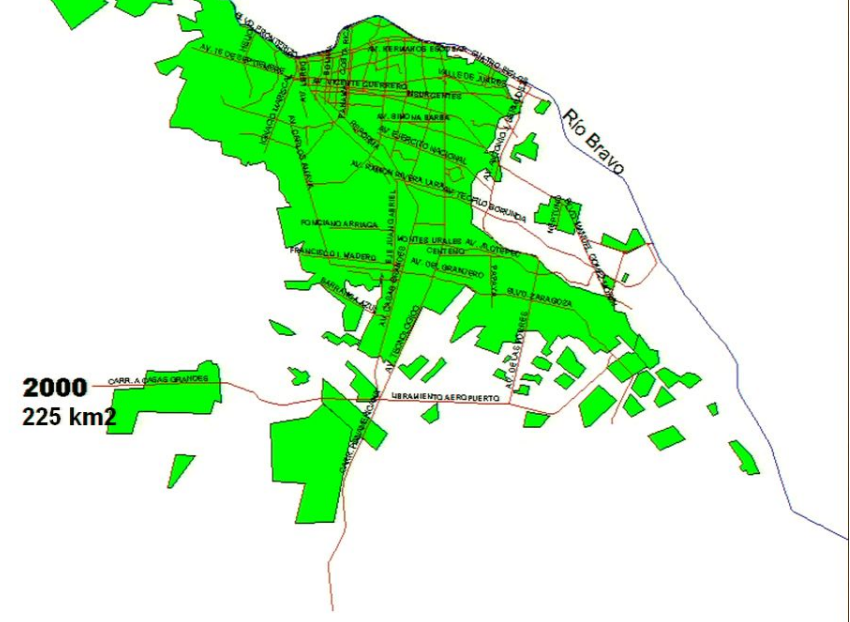
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Industrial Growth

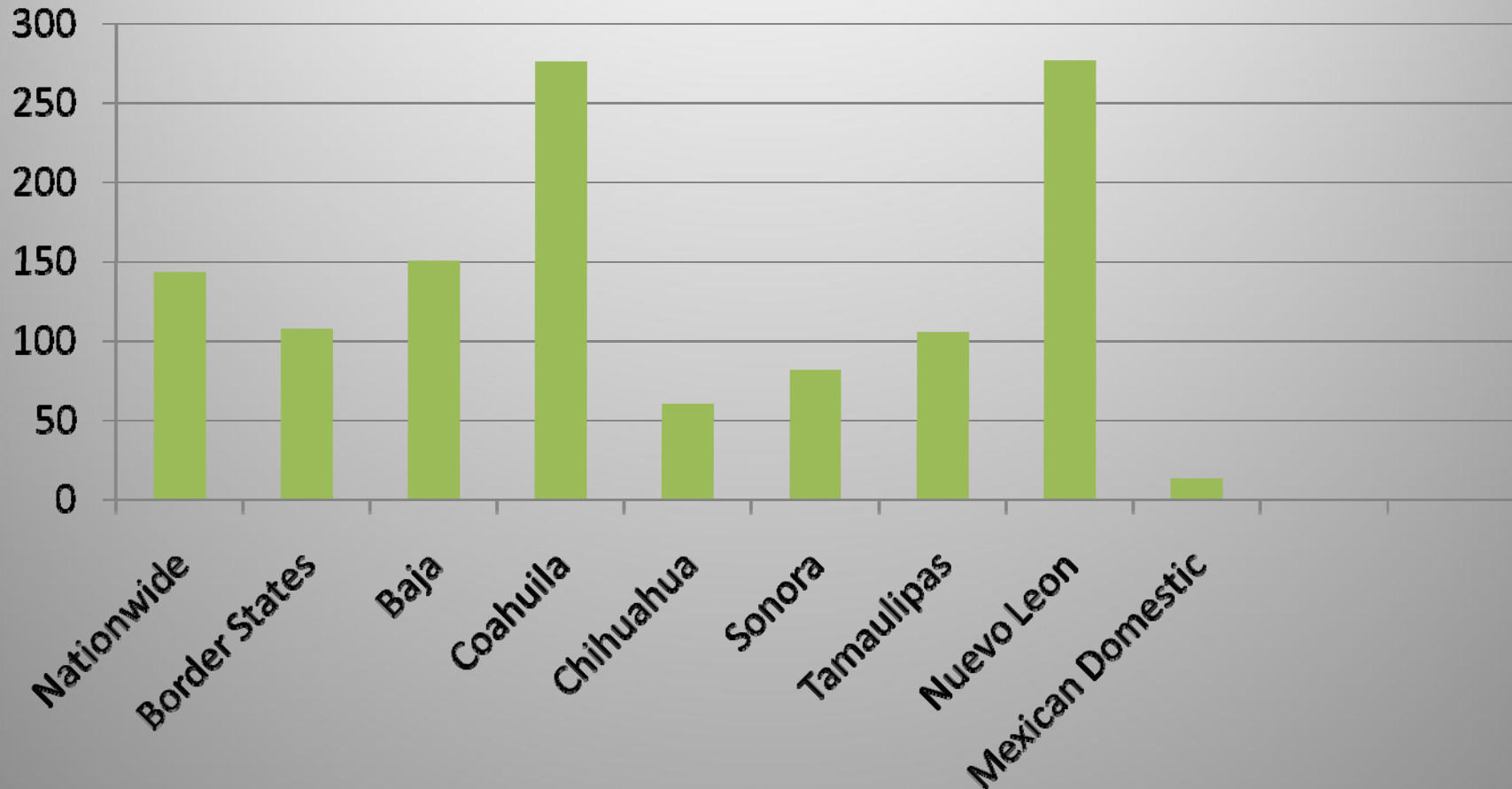
- Maquiladoras
 - 45% of Mexico's exports
 - 25% of Mexico's GDP
 - 17% of Mexico's employment
 - Estimated 3,000 plants in operation along the border, mostly along the border with Texas

Maquilas employed 1,084,911 in 2002

834,216 of those jobs (77%) located in border

Source: INEGI

% Growth in Maquila Employment, 1990-2002



Potential Climate Change Impacts

- Changes in distribution of surface supplies
 - Likely to lead to increased groundwater pumping
 - Likely reduction in groundwater supplies
- Raises the importance of transboundary groundwater cooperation

Historical Overview

- 1906 U.S.-Mexico (60,000 AF to Mexico)
 - 1944 Divided flow below Fort Quitman
- 1938 Rio Grande Compact (allocated waters among U.S. states above Ft Quitman)
- 1948 Pecos River Compact (between New Mexico and Texas)

Water Management

	TEXAS	NEW MEXICO	MEXICO
Groundwater	Common Law	Prior	Mexican federal
Surface Water	International Treaty	Prior Appropriation	Mexican federal
	Rio Grande Compact	International Treaty	

Rio Grande Compact

Water Management Institutions

UNITED STATES	MEXICO
State governments (State Engineer's Office; Water Commissions, etc)	Federal Water Agency (CNA)
International Boundary and Water Commission (IBWC)	Comision Internacional de Limites y Aguas (CILA)
BECC / NADBank / CEC	COCEF / NADBank / CEC
Treaties, Agreements, State Compacts	Treaties, Agreements
Federal agencies (Bureau of Rec, Army Corps, EPA, Park Service, BLM, military services)	CNA (single agency)
Water Authorities, Utilities (public & private), Irrigation Districts	Water Basin Council's (water management) and Water User Associations (irrigation districts)

Mexican Governance

- Mexican Constitution, 27th Article
 - All waters including groundwaters are federal property
 - Right to use granted by the federal government
- Instruments for Allocation
 - Water Registry (title registry)
 - Water Right Titles (not permanent, 5-30 years, can be extended)
 - Water markets

Mexican Perspective

- From the Mexican perspective, are the shared ground waters managed in a sustainable way with the U.S.?
 - No. For historic reasons, groundwater is a sensitive issue with Mexico, its government and people.
 - Groundwater resources are not managed in Mexico according to natural watersheds or aquifer basins, but via historic districts. Many districts fail to reflect the boundaries of watersheds and aquifers.
 - There is ample evidence of over-appropriation of certain groundwater resources in Mexico's northern border region.

Mexican Perspective

- What does the future of groundwater look like from your point of view?
 - New, integrated research is planned to characterize and map groundwater resources.
 - Although official agencies are responsible for the management of groundwater resources, within “closed basins” there is evidence of over-appropriation in the issuance and extension of titles to water rights in certain areas.
 - Mexico will require additional data in order to better understand its water resources at the border. This will require funding.
 - Economic incentives continue to drive water use at the border.

Potential Mechanisms for Transboundary Cooperation

- Formal, Federal Level
 - U.S.-Mexico Goundwater Agreement (Bellagio Treaty, UN Draft Treaty)
- Informal Arrangements
 - e.g. Jordan River “picnic table” water diplomacy
 - Johnston Agreement
- Transboundary water fairs, education, outreach
- Jointly funded research
 - Transboundary Aquifer Assessment Act (TAA)
 - develop common measures for characterizing and mapping transboundary aquifers

Conclusions

- Groundwater supplies are under stress in areas of the U.S.-Mexico border
- Existing institutions fail to promote sustainable use of transboundary groundwaters
- Possible options include formal binational agreements, informal regional practices, community education & outreach activities, jointly funded research