

# Investing in Border Water Quality

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In 1994, in response to environmental concerns raised during NAFTA negotiations, the United States and Mexico established the North American Development Bank (NADBank) and the Border Environmental Cooperative Commission (BECC). The NADBank arranges public and private financing of environmental infrastructure projects within 100 km of the border (Recently passed legislation extends the zone 300 km into the interior of Mexico). To qualify for NADBank funding, the BECC must certify projects based on environmental impacts, technical feasibility, and financial feasibility. BECC priorities are water, wastewater, and municipal solid waste projects. Besides making loans, the NADBank administers the EPA-funded Border Environmental Infrastructure Fund (BEIF), which provides grants for border water and wastewater projects. The NADBank, BECC, and other institutions offer the promise of greater federal financing and technical assistance to help border communities address water pollution and other environmental problems. Despite early growing pains, these new institutions have helped both nations plan and implement new projects in a more coordinated manner. Border communities in Arizona and Sonora have received more than \$100 million in grants and loans for water systems and other environmental improvements through BECC/NADBank programs.

## Border Population Growth and Pollution

In 1980, 4 million people lived within 100 km (62 miles) of the

U.S.-Mexico border. Today, more than 12 million people live within this border zone with 90 percent clustered in 14 pairs of sister cities (see Figure 1). By 2020, the border population is projected to reach 21 million, with 4.2 million living in the San Diego/Tijuana metro area and 3.3 million in the El Paso/Ciudad Juarez area. Some less obvious population centers will include Mexicali/Calexico (1.8 million) and Reynosa/McAllen (1.3 million). Closer to home, projections show Yuma-Somerton/San Luis Río Colorado approaching 400,000, with Nogales, Arizona and Sonora passing a third of a million people by 2020. In all these metro areas, population growth and size will be much greater on Mexico's side of the border.

Rapid industrial and population growth makes it difficult for border cities to provide adequate environmental infrastructure that supplies water, collects and treats wastewater, and disposes of municipal solid waste and hazardous materials. The task is particularly challenging when metro areas cross an international boundary. Municipal water problems literally become matters of international diplomacy. Although border twin cities share common watersheds and air sheds, large income differences between the countries complicate binational planning of water projects and pollution control. U.S. GDP per capita is 9 times that of Mexico. San Diego's per capita municipal budget is 27 times that of Tijuana. U.S. and Mexican cities have quite different capacities to fund water supply and

treatment projects and to regulate pollution.

Thousands of residents on both sides of the border lack access to safe drinking water and sewage treatment. A report of the U.S. General Accounting Office (GAO) found that, in Mexican border municipalities, 1.7 million people lacked access to potable water, 3.2 million lacked wastewater treatment services, and 4 million lacked solid waste disposal services. In U.S. border counties, 200,000 people lacked access to potable water and 1.7 million lacked wastewater treatment services. In the United States, problems are most acute among the more than 400,000 people who live in *colonias*—low income, unincorporated subdivisions of substandard housing that lack basic public services. *Colonias* are primarily in New Mexico and Texas, but small settlements also exist in Arizona and California.

Untreated wastewater is a major trans-border health problem. Raw or partially treated wastewater often enters drinking water sources on both sides of the border. A recent U.S. Environmental Protection Agency (EPA) study of surface water quality found that most of the samples taken from the seven border watersheds did not meet federal standards for fecal coliform and dissolved oxygen. The rate of waterborne diseases hepatitis A and shigellosis in the U.S. border region are three times the U.S. national rate. In Mexican border cities, rates of waterborne disease are even higher.

**Fig. 1 Sister Cities along the U.S.-Mexico Border**



## Border Water Institutions: Some History

The United States and Mexico have a longstanding history of bilateral institutions for water resource negotiations and management. The 1944 Water Treaty that apportioned surface waters of the Colorado and Rio Grande Rivers between the two countries also established the International Boundary and Water Commission (IBWC). The IBWC superseded the International Boundary Commission established even earlier, in 1889. The IBWC is composed of a U.S. and Mexican section, each responsible to its own national government. The Commission is primarily a technical agency, focusing on scientific appraisals and engineering solutions to water management problems. Its authority is specific and narrow, extending only to water management issues that are fundamentally binational. The Commission can address water pollution problems and plan projects through agreements known as "Minutes." IBWC Minutes have set salinity standards for Colorado River water reaching Mexico and authorized construction and expansion of the International Wastewater Treatment Plant serving Nogales, Arizona and Sonora.

The Commission earned a reputation for effectiveness in managing

disputes over surface water supplies, but with rapid population and industrial growth, environmental problems grew in size and scope beyond the Commission's capacities and authority. These included lack of sewage treatment, groundwater overdrafting of border aquifers, industrial wastes, and air pollution. While the IBWC had the capacity to formally coordinate with Mexico, its mandate was too narrow to deal with all the emerging border environmental issues. With the 1970s, came the creation of the EPA and state environmental agencies, along with passage of the Clean Air Act, the Clean Water Act, and Safe Drinking Water Act. New state and federal environmental laws and agencies were broader in scope, but did not have a framework to coordinate with their counterparts in Mexico.

In 1983, the United States and Mexico signed the La Paz Agreement, establishing a framework to discuss environmental issues, share information, and coordinate pollution control within 100 km of the border. The agreement established EPA and Mexico's SEMARNAT (Secretariat of

Environment and Natural Resources) as the lead agencies to coordinate and monitor pollution control efforts as well as to collect and share data. The counties established nine workgroups to address a host of environmental problems. The Border 2012 Program (formerly the Border XXI Program) coordinates and reports on workgroup progress.

## Role of BECC / NADBank

Historically, IBWC responded to border sanitation problems, such as sewage spills moving from Tijuana to San Diego or from Nogales, Sonora to Arizona, after they arose. As a technical/engineering agency, they focused on engineering and structural solutions to address immediate water pollution problems. The short-term solutions, while certainly necessary, do not address problems of market failures and incentive problems that lead to the water pollution crises in the first

place. Firms located on the border have not had to pay the full social costs of their production and release of industrial wastes into water bodies. Further, border communities have had difficulty financing provision of public goods such as drinking water, sewage treatment, and solid waste disposal.

Mexican border cities, especially, have limited capacity to self-finance water infrastructure. It is difficult to attract private financing because of legal, political, and economic risks associated with investing in Mexican utilities. These include foreign exchange risks, uncertainty about the future of the Mexican economy, and uncertainty about the ability to cover costs by charging higher rates to water users. The Mexican tax system presents additional problems by limiting the taxation authority of local governments. Under Mexican law, local taxes go back to the federal government. Communities depend on uncertain, annual appropriations to fund infrastructure. This prevents local governments from issuing bonds against user fees or property taxes.

In the United States, larger cities can finance projects through tax-exempt municipal bonds or obtain loans from the Clean Water State Revolving Fund at below-market rates. Some smaller U.S. communities, however, may have too limited a tax base to qualify for loans or have the credit rating needed to issue municipal bonds.

The United States and Mexico created the NADBank to help border communities with long-term funding of water and solid waste projects. Capitalized by both governments, NADBank can secure financing at lower commercial rates than would otherwise be possible for border communities. The bank also uses its funds to leverage other private loans and grants that local entities may not otherwise be able to secure. In principle, user fees from water service customers would provide the funds to repay loans.

The BECC must first certify projects before they may receive NADBank financing. BECC certification criteria include human health and environment, technical feasibility, financial feasibility and project management, community participation, and sustainable development. BECC also provides technical assistance for local entities developing projects, analyzing environmental and financial aspects of projects and helping to arrange public financing for projects.

## Growing Pains

In its first two years, the BECC failed to secure NADBank funding for any of its certified projects. While there was great debate over the BECC's sustainable development criteria, projects were not meeting NADBank's financial criteria. NADBank identified five

constraints that limited project approval: (1) insufficient community resources for high cost projects, (2) lack of master plans and inadequate proposal preparation, (3) limited financial, administrative, and commercial capabilities of local water agencies, (4) inadequate revenue for the sound operation of existing services and resistance to raising user fees, and (5) lack of private sector involvement in environmental projects.

Financing projects through user fees alone is difficult in poor Mexican communities. To avoid excluding people from basic water and wastewater services, utilities must tie base rates to the earnings of the poorest households in the community. In the United States, an industry benchmark is \$30–\$40 per month per household as an affordable base rate for water and sewer services. The World Bank advises municipalities in developing countries that water and sewer base rates not exceed 5 percent of the poorest 20 percent of the population. By one U.S. Department of Commerce estimate, this rule of thumb would imply a base rate of \$3.25 per household per month in Mexico.

In Mexico, as in other developing countries, public water systems become caught in a "low-level equilibrium trap" that makes it difficult to raise user fees. Systems do not adequately plan for operation and maintenance (O&M) costs. Without O&M, systems deteriorate. As service worsens, people stop paying water bills and increase the level of illegal hook-ups. This starves the system further of money and deterioration of service worsens. This leads to a downward spiral of low fee collection and poor service.

To address these constraints, the EPA and NADBank established the Border Environmental Infrastructure Fund (BEIF). The fund administers grants that may be combined with

### San Luis Rio Colorado, Sonora

**NADB Funding (Total):** \$13.7 million (\$16.7 million)

**Purpose:** Provide wastewater service to 85% of the population and treat 100% of collected wastewater, which is currently discharged into the Colorado River. Reduce health and environmental problems from insufficient wastewater treatment. Efficient water reuse for irrigation.

### San Luis Rio Colorado, Sonora, Mexico

**NADB Funding (Total):** \$1.8 million (\$4 million)

**Purpose:** Construct sanitary landfill, close existing open-air dumpsite, and improve solid waste management. Improved sanitation services will provide 100% collection service for residents. Closing open-air dumpsite will reduce environmental pollution and the health risks.

### Puerto Peñasco, Sonora

**NADB Funding (Total):** \$0.5 million (\$2.2 million)

**Purpose:** Reduce environmental and health risks by constructing new solid waste landfill, purchasing garbage collection and disposal equipment, and closing existing open-air landfill.

### El Sásabe, Sonora

**NADB Funding (Total):** \$0.5 million (\$0.9 million)

**Purpose:** Provide first-time sewer and sanitation services to entire community. Eliminate health hazards from latrines and septic tanks. Proper wastewater disposal will reduce environmental contamination, benefiting Sasabe, Arizona, and the Buenos Aires National Wildlife Refuge.

### Nogales, Sonora, Mexico

**NADB Funding (Total):** \$8.7 million (\$39 million)

**Purpose:** Construct new aqueduct, regulating tanks and waterlines; rehabilitate existing aqueduct, water and sewage lines. Provide uninterrupted service to 100% of the population. Eliminate leaks and reduce effluent going to the binational wastewater treatment plant in Nogales, Arizona, extending its useful life.

### Naco, Sonora

**NADB Funding (Total):** US \$1.1 million (\$2.1 million)

**Purpose:** Improve water quality and wastewater treatment. Protect transboundary watersheds from sewage contamination.

### Agua Prieta, Sonora

**NADB Funding (Total):** \$0.4 million (\$1.9 million)

**Purpose:** Construct new landfill, acquire garbage collection and disposal equipment, and close existing site for municipal solid waste disposal. Reduced smoke and odors will help Douglas, Arizona, comply with U.S. EPA air quality standards.

### Agua Prieta, Sonora

**NADB Funding (Total):** \$4 million (\$17 million)

**Purpose:** Street paving to reduce wind blown dust particles to improve the air quality for people living in Agua Prieta and Douglas, Arizona. Improved traffic flows will reduce carbon monoxide concentrations.

**Fig. 2 Projects along the Arizona-Sonora Financing**

**Gadsden, AZ**  
**NADB Funding (Total):** \$1.5 million (\$5.3 million)  
**Purpose:** Provide first-time wastewater collection and treatment services to entire community to alleviate health and environmental problems from inadequate on-site disposal systems.

**Somerton, AZ**  
**NADB Funding (Total):** \$4.0 million (\$7.9 million)  
**Purpose:** Improve water quality in the Yuma Main Irrigation and the groundwater aquifer. Eliminate odors generated by existing lagoons.

**Somerton, AZ**  
**NADB Funding (Total):** \$1.1 million (\$3.4 million)  
**Purpose:** Water main replacement to reduce malfunctions and health risks. Eliminate clothing discoloration from poor state of the waterlines. Improved water pressure and fire safety.

**Yuma County, AZ**  
**NADB Funding (Total):** \$3.0 million (\$6.2 million)  
**Purpose:** Line 25 miles of canals and replace turnouts to increase water delivery efficiencies, improve quality of Colorado River flows, and reduce maintenance requirements. Estimated water savings from seepage: 7,583 acre-feet/year.

**Nogales, AZ**  
**NADB Funding (Total):** \$59.5 million (\$74.1 million)  
**Purpose:** Replace part of sewer system and upgrade and expand Nogales International Water Treatment Plant to accommodate flows from both cities and some flows from Rio Rico and Peña Blanca. Improved effluent treatment will help preserve riparian habitat and groundwater quality downstream.

**Nogales, AZ**  
**NADB Funding (Total):** To be determined (\$1 million)  
**Purpose:** Replace well contaminating city's potable water supply.

**Patagonia, AZ**  
**NADB Funding (Total):** US \$1.3 million (\$2.3 million)  
**Purpose:** Construct new wastewater treatment facility and rehabilitate wastewater collection lines. Effluent will comply with U.S. ambient water quality norms. Improved sewage collection will reduce health risks from untreated wastewater leaking from lines.

**Bisbee, AZ**  
**NADB Funding (Total):** \$11.3 million (\$30.1 million)  
**Purpose:** Rehabilitate wastewater collection system and construct new wastewater treatment plant to eliminate sewage back-ups and overflows to prevent contamination of surface and ground water.

**Douglas, AZ**  
**NADB Funding (Total):** \$3.7 million (\$8.5 million)  
**Purpose:** Improve delivery and quality of potable water supply. Eliminate untreated sewage discharges from faulty septic systems in 3 *colonias* by connecting them to the sewage system.

## ra Border Approved for NADBANK

loans or loan guarantees. Grants may support municipal infrastructure, drinking water treatment plants, and treated water distribution systems. Communities can use grant funds to allow utilities to phase in user fees over time.

The BEIF succeeded in jump-starting border water projects. By fall of 1999, the NADBANK had secured grants and loans for 20 BECC-certified projects. The goal of developing self-financing projects remained elusive, however. Grants accounted for 96 percent of funds spent in the United States and 88 percent of funds spent in Mexico. A GAO study found that interest rates on loans, though lower than could be obtained in many commercial markets, were still higher than rates obtained through municipal bonds or the Clean Water State Revolving Fund. Larger U.S. cities could finance projects this way more cheaply. Though lower than other commercial rates, smaller U.S. communities and Mexican cities still could not afford interest rates offered by NADBANK.

The GAO also noted that many border communities lacked technical capacity and sufficient planning to develop creditworthy projects. In Mexico, local managers often have limited experience conducting the type of technical and financial analyses needed to develop viable projects. Utility managers and other technical personnel stay at their positions less than two years, on average.

## Program Changes/Expanded Mandate

Border institutions have made a number of changes to increase the technical capacity of border communities to construct and run water systems. The BECC established a Technical Assistance Grants Program, funded primarily by EPA, to help disadvantaged communities prepare

project proposals to meet BECC certification. IBWC Minute 294 established a Facilities Planning Program, also funded by the EPA, to assist border communities in developing projects. NADBANK established a Utilities Management Institute to train public utility professionals. The hope is that improved technical capacity will improve the creditworthiness of water projects.

The NADBANK also changed lending practices. It expanded loan eligibility to air pollution-control projects. It also established the Low Interest Rate Facility (LIRF) that charges borrowers below-market interest rates on loans to support core projects for water, wastewater, and solid waste management. Interest rates are comparable to those obtainable from the U.S. tax-exempt municipal bond market or the State Revolving Fund. Because of these changes, the ratio of loans to outright grants has increased substantially in recent years. EPA grants, however, remain a crucial part of NADBANK's portfolio.

In 2002, in response to drought-induced disputes over Rio Grande water, the NADBANK initiated a Water Conservation Investment Fund (WCIF) that provides grants to finance investments in projects to use and transfer water more efficiently. Each country received \$40 million to encourage investment in water conservation. Two new projects funded by the WCIF will encourage conservation of Colorado River water. The Imperial Irrigation District in California, will receive \$2.5 million and Yuma County Water Users' Association will receive \$3 million to repair and line canals. The projects' goals are to conserve over 10,000 acre-feet of water per year.

## Arizona and Sonora Take Advantage of Funding Opportunities

Figure 2 shows the different projects approved for NADBANK financing (primarily EPA-funded grants) along the Arizona-Sonora Border. NADBANK funding alone accounts for over \$100 million so far. Some of these projects have received additional funding from the U.S. Department of Housing and Urban Development (HUD), USDA Rural Utilities Service, and the State of Arizona's Water Infrastructure Finance Authority of Arizona (WIFA). Because Arizona and Sonora share air and watersheds, projects implemented in Mexico often have spillover benefits to Arizona residents. **AR**

## For More Information

The Border Environmental Cooperative Commission:

<http://www.cocof.org/>

International Boundary and Water Commission:

<http://www.ibwc.state.gov/>

The North American Development Bank:

<http://www.nadbank.org/>

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percent increase in production over 2002. After above average price levels in 2002, Arizona alfalfa prices have continued to decrease throughout 2003 and into the first three months of 2004. Alfalfa prices for the first quarter of 2004 were about 13 percent lower than 2003 first quarter prices and 15 percent lower than 2002 first quarter prices. USDA forecasts 2003–2004 U.S. lemon production to decrease by 0.8 million boxes or 3.1 percent over the previous year. USDA expects Arizona lemon production to be 3.2 million boxes, a 6.7 percent increase over last year and placing some downward pressure on lemon prices. **AR**

**Satheesh Aradhyula's** research shows how agricultural policies affect producers and consumers.

**Russell Tronstad's** research and extension activities focus on marketing, management, and policy issues germane to Arizona's production agriculture.

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<http://www.usda.gov/rus/water/index.htm>

U.S. Environmental Protection Agency. Border 2012:

<http://www.epa.gov/usmexicoborder/>

U.S. Department of Housing and Urban Development

Colonias Quick Facts: <http://www.hud.gov/offices/cpd/communitydevelopment/programs/colonias/>

U.S. General Accounting Office. US-Mexico Border:

Despite Progress, Environmental Infrastructure Challenges Remain: [http://www.sice.oas.org/geo-graph/north/Gao\\_3.pdf](http://www.sice.oas.org/geo-graph/north/Gao_3.pdf)

Water Infrastructure Finance Authority of Arizona (WIFA): <http://www.wifa.state.az.us/>

**George Frisvold** conducts research and outreach on environmental policies and natural resource management issues of importance to Arizona. His program includes ongoing work on agricultural biotechnology, pesticide use and regulation, border environmental management, and the relationship between federal farm programs and resource use.

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