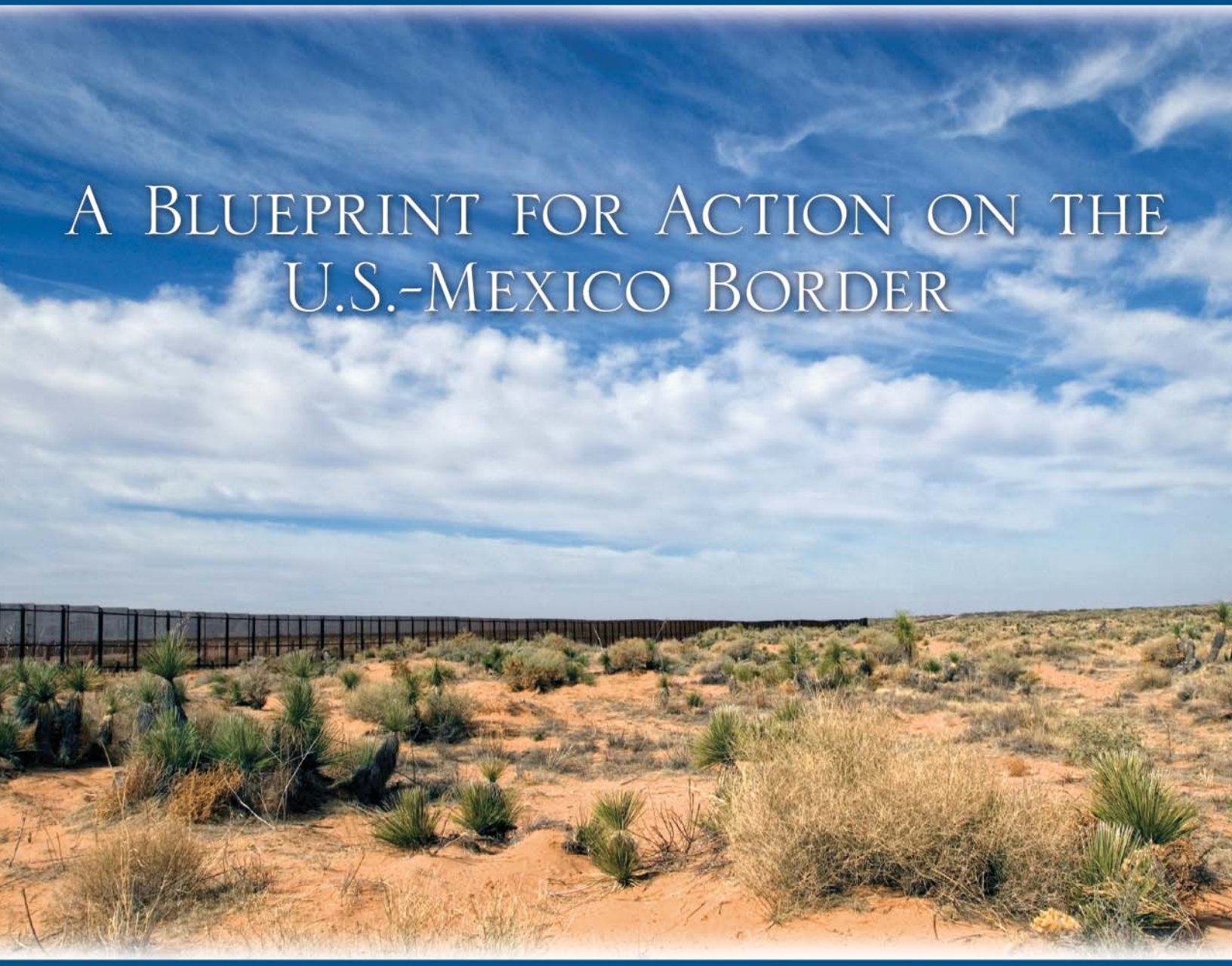
A Blueprint for Action on the U.S.-Mexico Border



Thirteenth Report of the
Good Neighbor Environmental Board to the
President and Congress of the United States

June 2010

GNEB
Environmental Advisors Across Borders

English and Spanish versions available

This report was published in English and Spanish. The original text was written in English and translated thereafter; any disputed meaning should refer back to the English version.

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About the Board

The Good Neighbor Environmental Board is an independent U.S. Presidential advisory committee that was created in 1992 under the Enterprise for the Americas Initiative Act, Public Law 102-532. It operates under the Federal Advisory Committee Act (FACA), and its mission is to advise the President and Congress of the United States on "good neighbor" environmental and infrastructure practices along the U.S. border with Mexico. The Board does not carry out border-region environmental activities of its own, nor does it have a budget to fund border projects. Rather, its unique role is to step back as an expert, nonpartisan advisor to the President and Congress and recommend how the federal government can most effectively work with its many partners to improve the environment along the U.S.-Mexico border. Under Presidential Executive Order 12916, its administrative activities were assigned to the U.S. Environmental Protection Agency (EPA) and are carried out by the EPA Office of Cooperative Environmental Management (OCEM).

Membership on the Board is extremely diverse. It includes senior officials from a number of U.S. Federal Government agencies and from each of the four U.S. border states—Arizona, California, New Mexico, and Texas. It also includes representatives from the tribal, local government, nonprofit, ranching and grazing, business, and academic sectors. In addition, the Board maintains dialogue with its counterpart Mexican environmental agency advisory groups and the Consejos Consultivos para el Desarrollo Sustenable (CCDS)—referred to as Consejos—to help ensure that it remains informed about issues on the Mexico side of the border.

The Board meets twice each calendar year in various U.S. border communities and once in Washington, DC. Its advice is submitted to the U.S. President and Congress in the form of annual reports that contain recommendations for action. These recommendations are submitted after consensus is reached across the entire membership. They are shaped by the combined expertise of the Board members, by the Board's ongoing dialogue with its Consejo counterpart groups, and by the speakers and concerned citizens from both sides of the border who attend its meetings in border communities. The Board also occasionally issues Comment Letters during the year to provide input on timely topics. One of the most frequently recurring themes in its advice is that support for cross-border cooperation is essential if sustained progress is to be made on environmental issues along the U.S.-Mexico border.

All meetings of the Good Neighbor Environmental Board are open to the public. For more information, see the Board Web Site, http://www.epa.gov/ocem/gneb, or contact EPA OCEM at 202-564-2294.

Notice: This report was written to fulfill the mission of the Good Neighbor Environmental Board (the Board); a public advisory committee authorized under Section 6 of the Enterprise for the Americas Initiative Act, 7 USC, Section 5404. It is the Board's Thirteenth Report to the President and Congress of the United States. EPA manages the operations of the Board. This report, however, has not been reviewed for approval by EPA and, hence, the report's contents and recommendations do not necessarily represent the views and policies of EPA, nor of other agencies in the Executive Branch of the Federal Government, nor does mention of trade names or commercial products constitute a recommendation for use.

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(English version) http://www.epa.gov/ocem/gneb/gneb13threport/English-GNEB-13th-Report.pdf
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GOOD NEIGHBOR ENVIRONMENTAL BOARD

Presidential advisory committee on environmental and infrastructure issues along the U.S. border with Mexico

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June 17, 2010

President Barack Obama
Vice President Joseph Biden
Speaker Nancy Pelosi

On behalf of the Good Neighbor Environmental Board, your independent advisory committee on environment and infrastructure along the U.S. border with Mexico, I am submitting to you our thirteenth report: *A Blueprint for Action on the U.S.-Mexico Border*.

The thirteenth report responds to our charge to develop recommendations on a very wide range of issues taking into account the challenges of the border and the opportunities that are unique to this region. In this report we put forward a total of 63 recommendations in eight separate chapters: 1) climate impacts, adaptation, and mitigation, 2) air quality, 3) renewable energy, 4) water, 5) solid and hazardous waste, 6) emergency response and planning, 7) habitat and biodiversity conservation, and 8) institutional mechanisms.

The Board, in the development of this report, and following a tradition that has been maintained since its inception, has been driven by its desire to work through consensus in constructing all its recommendations. The recommendations are intended to be clear and actionable and to identify the main parties and issues at stake. In all cases, the Board was careful not to request additional funding as the first recourse, but to address underlying challenges first, and only call for funding when it felt it was truly unavoidable.

The federal government plays a unique role strengthening and building partnerships throughout the border and harnessing the power of multiple local and state stakeholders, federal agencies, and Mexican sister agencies. This report makes a strong case for why this is a special region with environmental problems unparalleled in the rest of the nation, driven by rapid population growth, the impacts of trade flows, and striking inequalities in public services and income.

We appreciate the opportunity to serve you and provide these recommendations, and hope that this report is of use to you and other U.S. government officials as we continue to think about how best we can achieve a healthier environment and a better quality of life for all of our citizens.

Very truly yours,

Paul Ganster

Paul Ganster, Chair
Good Neighbor Environmental Board

A Blueprint for Action on the U.S.-Mexico Border

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Introduction and Context

The 13th report of the Good Neighbor Environmental Board (GNEB) describes the principal chronic environmental issues that plague the border region today. The report also identifies specific immediate and medium-term actions that the federal government and other key partners in the region can take to address these problems. Although there certainly is a need for more funding to address the environmental problems of this underserved region of the United States, there is much that federal agencies can do to better implement existing programs and better use current resources. They can provide the leadership required to eliminate domestic and international barriers to facilitate efforts of state and local government, border communities, and the private sector. Federal participation is key to working effectively across the border with Mexico, and absolutely necessary for developing and applying solutions to environmental problems that spill across the border and cause problems for U.S. and Mexican communities.

The 13th report highlights important environmental problems and solutions in the areas of climate change, air quality, water quantity and quality, energy, habitat and biodiversity conservation, solid and hazardous waste, emergency response, environmental health, security along the border, and institutional mechanisms for addressing border environmental problems. Most of the topics are treated as stand-alone chapters. Some topics are integrated in a number of places in different chapters, as is the case with security, and with environmental health, which is treated in the water, air, and waste chapters.

Western end of the border fence at low tide; beyond the international boundary is Tijuana's bull ring in the Playas de Tijuana neighborhood. ©Jeff Foott

The 13th report does not prioritize the border environmental problems according to their severity nor according to proposed recommendations. Instead, the Board provides its perspective of what the important border environmental problems are, and actions that the federal government can take to address those problems. This report aims to reflect the concerns of border communities. Many nongovernmental, state and local governmental, and tribal Board members live and work in border communities; federal members of the GNEB also are experts on these border issues. The Board typically meets three times annually, twice in border communities, and hears first-hand from local residents about the challenges that they face in the management of border environmental issues.

Context

There are a number of defining features and characteristics of the border region that make it fundamentally different from other regions within the United States. The U.S. border region is defined by rapid economic and population growth, rapid urbanization, spillover effects from Mexico, asymmetries with Mexican communities across the border, international commerce and trade flows, high rates of poverty, and a distinct ethnic identity. These features all present challenges that regions located within the interior of the United States often do not have to overcome, especially when they occur simultaneously and in the same place.

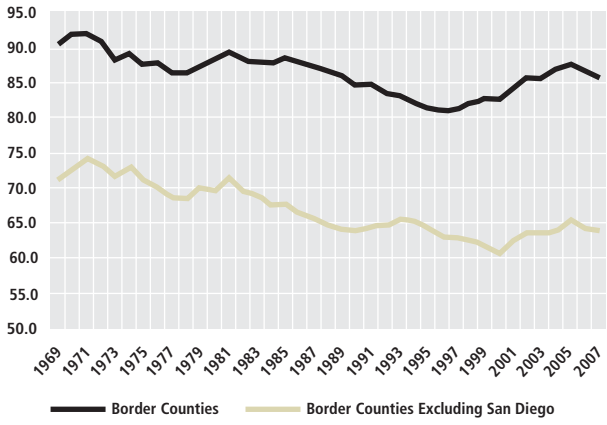
Population and urbanization

Since the 1940s, the population of the U.S. and Mexican border states has grown more rapidly than the national averages and the populations of the counties and municipalities along the border have grown faster than the states in which they are located. Driven by migration, especially of young people, the populations of Mexican municipalities have grown at a faster rate than their U.S. counterparts. These trends make the border region the most demographically dynamic region of the United States and of Mexico. By 2000[1], some 12.4 million people lived in the border counties and municipalities, and by 2010 that figure had reached 14.4 million, concentrated largely in binational metropolitan sister cities. By 2020, the border population is projected to reach 19.5 million.

Urban growth often outpaces the ability of government to provide adequate infrastructure in these border cities, especially on the Mexican side of the boundary where much of the urbanization has been unplanned. In burgeoning cities such as Ciudad Juárez, Nuevo Laredo, Nogales, and Tijuana, lands were settled and houses were constructed, but water and sewerage infrastructure installation occurred years afterward. In areas of the U.S. border region, principally in Texas and New Mexico, but also in Arizona and California, *colonias*—residential communities in rural areas of counties lacking basic services such as water, sewage, electricity, and often paved roads—developed without standard infrastructure. Thus, on both sides of the border, large numbers of residents do not have safe potable water piped into their homes and lack proper sewage collection and treatment services. Hundreds of thousands of U.S. border residents do not have the same levels of water and sewage services as their fellow citizens elsewhere in the United States. By 2000, the deficit in environmental infrastructure in U.S. and Mexican border communities ranged from $5.8 to $10.4 billion, and by 2010 the deficit was more than $1 billion for water and wastewater projects in U.S. and Mexican border communities.

One of the major difficulties for making environmental progress on the U.S.-Mexico border is that although the border region of the United States is one of the poorest areas of that nation (see graph below), Mexico's border region is one of the wealthiest regions of Mexico, along with Mexico City, Guadalajara, and Monterrey. This fact has made it politically difficult for Mexican federal authorities to spend funds on border environmental infrastructure when there are more pressing needs elsewhere in the country.

Border Per Capita Income as Percent of U.S. Per Capita Income



Source: James Peach, New Mexico State University

Economic and trade expansion: North American Free Trade Agreement (NAFTA)

When NAFTA was being negotiated and debated in Congress in the early 1990s, many border residents had hopes that the trade agreement would address environmental problems of

their communities and also bring economic development, including well-paying jobs. NAFTA produced a large increase in trade and investment across the border with Mexico, but did not create prosperity in U.S. border communities. Although NAFTA stimulated commerce and created many jobs along the border, those jobs tended to be low-skill and low-paying, while border communities lost higher paying assembly and manufacturing jobs that moved into Mexico and elsewhere offshore. At the same time, the increased vehicular crossings saturated the border infrastructure and overwhelmed communities along the major trade corridors with increases in air pollution, producing health as well as safety concerns. Although regions throughout the United States benefited from the growth of NAFTA-related trade and investment, border communities absorbed a disproportionate share of the environmental costs related to congestion.

Poverty and ethnicity

A 2006 report by the U.S./Mexico Border Counties Coalition, *At the Cross Roads: US/Mexico Border Counties in Transition*, provides useful analysis for understanding key features of the U.S. border region. The report points out that if the 24 U.S. counties along the border were aggregated as the 51st state, they would rank 40th in per capita income, 5th in unemployment, 2nd in tuberculosis, 7th in adult diabetes, 50th in insurance coverage for children and adults, and 50th in high school completion—all characteristic of regions of poverty.

Hispanics constitute the largest ethnic group in the border region, are the largest minority group in the United States, and are a majority of the population in 18 of the 24 counties along the international border with Mexico. By 2008, 88 percent of the population of the border counties, excluding San Diego and Pima counties, was Hispanic.[1] The percentage of Hispanics in the U.S. border population is increasing due to continuing migration from Mexico and the high birth rate of border Hispanic populations (see adjacent table).

Adding to the cultural and economic complexity, there are 26 U.S. federally recognized Native American Tribes in the border region that range in size from 9 to 28,000 members. Some of these tribes share extensive family and cultural ties to indigenous peoples in the border region of Mexico.

The border region, then, is a region where poverty and ethnicity coincide. It also is a region where the population is harmed by the health effects of deteriorated environmental conditions.

Estimated Population of U.S. Counties Adjacent to the Border, and Hispanic Percentage (July 2008)

State/County	Total	Hispanics	Percentage Represented by Hispanics
Arizona			
Cochise	129,006	40,860	31.7
Pima	1,012,018	335,257	33.1
Santa Cruz	42,923	34,428	80.2
Yuma	194,322	108,108	55.6
Sub-total	**1,378,269**	**518,653**	**37.6**
California			
Imperial	163,972	125,864	76.8
San Diego	3,001,072	926,926	30.9
Sub-total	**3,165,044**	**1,052,790**	**33.3**
New Mexico			
Doña Ana	201,603	131,014	65.0
Hidalgo	4,910	2,865	58.4
Luna	27,227	16,252	59.7
Sub-total	**233,740**	**150,131**	**64.2**
Texas			
Brewster	9,331	3,994	42.8
Cameron	392,736	338,953	86.3
Dimmit	9,758	8,187	83.9
El Paso	742,062	606,810	81.8
Hidalgo	726,604	651,063	89.6
Hudspeth	3,137	2,366	75.4
Jeff Davis	2,275	822	36.1
Kinney	3,233	1,644	50.9
Maverick	52,279	49,449	94.6
Presidio	7,467	6,219	83.3
Starr	62,249	60,596	97.3
Terrell	924	473	51.2
Val Verde	48,053	37,613	78.3
Webb	236,941	224,088	94.6
Zapata	13,847	12,233	88.3
Sub-total	**2,310,896**	**2,004,510**	**86.7**
Total	**7,087,949**	**3,726,084**	**52.6**
Total minus San Diego	**4,086,877**	**2,799,158**	**68.5**
Total minus San Diego and Pima	**3,074,859**	**2,463,901**	**88.0**

Source: U.S. Census Bureau FactFinder, http://factfinder.census.gov/servlet/DTGeoSearchByListServlet?ds_name=PEP_2008_EST&_lang=en&_ts=286892460001

The Janos grasslands, Chihuahua, Mexico. ©Krista Schlyer

Landscape and climate

The natural environment and climate of the border region provide a number of challenges for environmental quality and sustainability of communities. The border is mostly arid, and major populations such as San Diego and El Paso depend on scarce groundwater and surface water that is insufficient to meet current demands for urban and agricultural uses and ecosystem services. To meet these needs for potable water, border communities are forced to transport water over long distances or implement desalination of saline groundwater, both costly solutions. Climate predictions point to higher average temperatures and declining snowpack in the Colorado and Rio Grande systems; as a result, water resources are projected to decrease in the future (see Chapters 1 and 7).

Border location

Its location along the international boundary adjacent to a newly industrialized country with low per capita income and striking income inequalities provides the border region with challenges that other regions within the United States do not share. With populations doubling every 10 to 15 years, Mexican border cities tend to prioritize water supply for the population over other needs such as sewage treatment, hazardous and solid waste disposal, water for conservation, road paving, and motor vehicle emissions control systems. Although environmental spillover effects are inevitable in the densely settled sister-city pairs along the border, the level of development in Mexico means that U.S. border cities need to spend more to address these issues on their side of the border.

The ports of entry also have significant economic as well as environmental impacts on U.S. border communities because of the enormous quantities of freight that move through the trade corridors with Mexico, and the long crossing wait times for commercial and non-commercial vehicles. In 2007, these wait times for personal and commercial crossing from Tijuana to San Diego alone cost the U.S. and Mexican economies an estimated $7.2 billion in foregone gross output and more than 62,000 jobs.[2] If compiled, the figure for losses produced by long wait times along the entire border with Mexico would be very large,

in excess of $10 billion per year. These are costs absorbed by border communities that benefit communities throughout the United States.

The Board addressed key border security environmental issues in its 10th and 11th annual reports. Many of the subjects raised in the 10th report, *Environmental Protection and Border Security on the U.S.-Mexico Border*, as well as those discussed in detail in the 11th report, *Natural Disasters and the Environment Along the U.S.-Mexico Border*, are addressed in other sections of this report, notably in the emergency preparedness and hazardous waste sections.

The international boundary adds complexities and costs for U.S. border communities in their attempts to address regional environmental issues. Organizing a proper emergency response system is greatly complicated by the international boundary, as is dealing with regional air pollution issues when part of the airshed is located in Mexico. Conservation, water quality protection, aquifer management, watershed management, and solid and hazardous waste are other examples of environmental issues that ultimately only have binational or international solutions.

Conclusions

The governments of the United States and Mexico have responded to the challenge of border environmental issues with a number of measures that include the 1944 international water treaty, the 1983 La Paz Agreement, the border environmental program of Border 2012, and the creation of the binational institutions of the North American Development Bank (NADB) and the Border Environment Cooperation Commission (BECC). Although these efforts to address border environmental problems have had positive results, they have been inadequate to meet the needs of dynamic border communities with growing environmental problems.

In 2009, the Board issued two separate letters of advice: the first on May 19, which addressed a wide variety of border issues, and a second letter on December 2, which addressed the environmental effects of the border fence. Both letters, and the reply to the Board from the Council on Environmental Quality (CEQ), are found in the Appendices. A response to the December 2 letter from the Department of Homeland Security (DHS) is available on the GNEB Web Site (http://www.epa.gov/ocem/gneb/pdf/2009_1224_gordon_letter_gneb_chair.pdf).

The GNEB in this 13th report recommends that all relevant federal agencies improve coordination and commitment to address the wide suite of environmental problems and opportunities present on the border, and facilitate cross-border efforts of the border communities whenever possible. At the same time, strategic funding increments are necessary, particularly to address the chronic environmental infrastructure deficit that still exists throughout the border and affects these communities. ■

References:

1. Peach J, Williams J. Population and Economic Dynamics on the U.S.-Mexican Border: Past, Present, and Future. In: Ganster P, ed. The U.S.-Mexican Border Environment: A Road Map to a Sustainable 2020. San Diego: SCERP and SDSU Press, 2000.
2. San Diego Association of Governments. Economic Impacts of Wait Times in the San Diego-Baja California Border Region: 2007 Update. (www.sandag.org)

The saguaro cactus is a treasured symbol of the American Southwest. Saguaros live up to several hundreds of years, and can take 75 years to grow a single arm. Numerous bird species, including gila woodpeckers and elf owls, use saguaros for their nests. ©Chris Linder

CHAPTER 1

Climate Impacts, Adaptation, and Mitigation

Recommendations

1) Encourage the U.S. and Mexican governments to strengthen their collaboration under the U.S.-Mexico Bilateral Framework on Clean Energy and Climate Change.

2) Encourage the U.S. Environmental Protection Agency (EPA), its equivalent in Mexico (Secretaría de Medio Ambiente y Recursos Naturales [SEMARNAT]), and other U.S. and Mexican federal agencies, as appropriate, to clarify the roles of binational institutions with regard to border climate change actions and urge enhanced coordination among these entities.

3) Continue to implement a state-by-state comprehensive planning template for climate mitigation and adaptation throughout participating border states with support from EPA, SEMARNAT, Mexico's National Institute of Ecology (INE), BECC, and other potential partners including private foundations. Comprehensive planning templates include climate impact analyses, inventories and forecasts of greenhouse gases (GHGs), and climate action plans for adaptation and mitigation.

4) Develop consistent protocols across political boundaries for verification of reductions through voluntary early actions based on the inventories and forecasts of GHGs currently being developed by border states, which will provide a baseline against which future reductions can be measured.

5) Ensure widespread participation of local, state, and regional stakeholders and experts in all climate action-planning exercises, and foster binational connections whenever possible.

6) Encourage academia and public agencies to partner across disciplines and geographic borders to address the growing need for climate studies. Identify windows of opportunity for binational collaboration on climate change research building on ongoing activities.

A ranch windmill for pumping water from a well in the Janos grasslands, Chihuahua, Mexico. ©Krista Schlyer

7) Implement education and outreach campaigns for local and state decision makers and the public that address projected climate impacts and energy and water conservation measures; ensure binational coordination of efforts and funding on the part of governments, nongovernmental organizations (NGOs), and academia.

8) Establish cooperative partnerships and encourage state and federal agencies on both sides of the border to build local and state capacity for addressing climate impact analyses, adaptation, and mitigation.

9) Encourage consideration of co-benefits when seeking GHG reductions that include conventional "criteria" pollutant reductions under the Clean Air Act.

Much work has been conducted on the effects of climate change and its impacts on coastal and semi-arid regions. The recommendations set forth in this chapter build on efforts now under way in the region on climate impacts, adaptation, mitigation, and policy development. Climate change policy on the border presents many challenges and opportunities. A strategic approach for the border requires capitalizing on opportunities, viewing the region holistically, and developing mutually beneficial policies for both nations, with the potential to serve as a model for North American transboundary collaboration. It should be noted that the recommendations for actions also would bring improvement to air quality and benefits to human health in the border region.

Climate Impacts in the Border Region

The U.S.-Mexico border region is generally arid, and drought is a recurring aspect of natural climate variability for the region. Predicted effects of climate change include increased warming and drying of the southwestern United States and northwestern Mexico, exacerbating competition for the region's finite water resources. Even slight warming means less snow through a decreasing snow/rain ratio, elevated snow lines, and earlier spring melt. The western border region, especially north of the border where most water is consumed, gets the vast majority of its fresh water delivered from melting snow in the Rocky Mountains and Sierra Nevada. The gradual loss of this reservoir, which is already observed and projected to accelerate, is a looming threat to sustainability and growth in this traditionally water-limited region.[1]

This warming and drying trend would coincide with significant population growth, new economic development, and the need to upgrade and enhance water infrastructure to meet regional water demands. Climate change also is predicted to expand the atmospheric circulation pattern that influences subtropical climate.

Climate models project the jet stream shifting poleward. The jet stream drives the position of winter storm tracks that determine which areas receive precipitation. The poleward storm track shift and related subtropical circulation expansion will interact to cause the world's subtropical deserts to expand. The storm track shift is due to the uneven warming of the globe whereby the Arctic warms more than the tropics. This is a second

Vehicle barrier at the border of Sonora, Mexico, and Arizona. ©Krista Schlyer

order projection (in terms of impacts and certainty), however, for the region's water resources compared to warming.

The southwestern United States and northwestern Mexico lie within this area of expanding desertification. In the immediate border area, warmer temperatures will lead to increased evapotranspiration of crops and urban landscaping, increasing water demand. In urban areas, increasing temperatures in the region's desert cities could affect patterns of future population growth and land development. In summer, minimum temperatures are increasing more than maximum temperatures, and heat waves are expected to intensify and become more humid, which will pose a greater risk for agriculture, human health, animals, and ecosystems, and will create additional demands on the energy sector.[2]

Drought Conditions

The border region's water resources consist primarily of two international rivers, the Colorado and the Rio Grande, in addition to several transboundary aquifers. Climate change likely will lead to increased water demand (due to warmer temperatures), reduced snowpack (because of earlier snowmelt runoff with more rain relative to snow), increased runoff in the winter and decreased runoff in the summer (when demand is highest), warmer water temperatures, more frequent flash flooding, and more frequent and longer-lasting severe droughts.[3]

One Texas climate model, for example, predicts that a 2 degree Celsius temperature increase, and a 5 percent decrease in precipitation will produce a 25 percent decrease in runoff under normal conditions, or a 75 percent decrease under extreme drought conditions.[4] Increased transport of or exposure to pollutants such as sediments, salts, nutrients, and pathogens also are possible outcomes of expected hydroclimatic changes. Sensitive aquatic species likely would be the first to be affected. Invasive species have the potential to transform entire ecosystems. Additionally, wildfires are predicted to increase.

The border region's aridity and geographic vulnerability to climate change impacts underscore the need for climate change adaptation tools and collaboration to address water supply reliability, drought preparedness, and improved water conservation practices. A key strategy for addressing these critical issues has been high-level binational engagement on transboundary water management for the Colorado and Rio Grande rivers (see Chapter 4).

Co-Benefits of GHG Emission Reductions

Because many of the same sources that emit GHGs are major sources of air pollution, GHG emission reductions also will reduce particulate pollution, smog, and toxins in the air, which will directly benefit human health in the border region. A recent National Academy of Sciences report estimated that fossil fuel-based energy production and use is responsible for $120 billion annually in health and environmental costs.[5] The National Institutes of Health (NIH) estimate that the cost savings realized from improving health will offset the cost of addressing climate change and, therefore, should be considered as part of all policy discussions related to climate change. As NIH notes, "recognition that mitigation strategies can have substantial benefits for both health and climate protection offers the possibility of policy choices that are potentially both more cost effective and socially attractive than are those that address these priorities independently."[6]

Inventories, Forecasts, and Climate Action Plans

In 2008, the Border 2012 Air Policy Forum added to its objectives building border GHG information capacity using consistent methodologies and expanding existing voluntary cost-effective programs for reducing GHGs. EPA, SEMARNAT, INE, BECC, state and local governments, and the Center for Climate Strategies (CCS) have been working together to ensure that these inventories and forecasts are developed using consistent methodologies on both sides of the border. To date, all 10 border states have completed GHG inventories. Major sources analyzed include power generation, energy use for industrial processes, transportation, and agricultural processes.

All border states also have completed or are working on forecasts of future GHG emissions, which provide the baseline data for the development of climate action plans. California, Arizona, and New Mexico have plans with set targets, all of which include reduction goals for GHGs. Examples of strategies include methane reductions from landfills and agricultural waste, energy efficiency programs for stationary and mobile sources, and renewable energy. Although Texas is working in-house to complete GHG emission forecasts, it has serious concerns about the potential effects that federal GHG legislation, especially cap and trade, could have on a state economy that produces 40 percent of U.S. petrochemical products.

The Mexican border states also have moved forward with development of their action plans. Baja California, Sonora, and Nuevo León have started planning processes. CCS is partnering with each of these six states (California, Arizona, New Mexico, Baja California, Sonora, and Nuevo León) to develop comprehensive climate action plans. The Border 2012 Program is providing funding support for the next phase of mitigation planning in Baja California, Sonora, and Coahuila,

The Tijuana Estuary in San Diego, California. ©Roy Toft

but additional funding resources are needed to complete this process.

INE is providing technical assistance and policy guidance to all Mexican states. The United States and Mexico are conducting a pilot effort in policy option development with the six Mexican border states. The pilot process includes stakeholder engagement, detailed quantification, and capacity building, all of which will enable domestic and cross-border policy development. Mexico's National Science and Technology Council (CONACYT) also is providing funding through academic institutions to conduct much of the underlying research needed to inform the work required by climate action plans for adaptation and mitigation.

Additional Relevant Bilateral and Trilateral Forums for Addressing Climate Change

The Energy and Climate Partnership of the Americas (ECPA) is a product of the 2009 Summit of the Americas, at which President Obama invited all Western Hemisphere countries to deepen cooperation on energy and climate change. The partnership's aim is to help countries learn from each other as they transition to a clean energy economy, thereby strengthening security and prosperity and protecting the environment. Partnership elements include energy efficiency, renewable energy, cleaner fossil fuels, infrastructure, and addressing energy poverty (i.e., the lack of access to clean, affordable, and reliable energy). Mexico has been active in this forum, especially in the area of energy efficiency.

Presidents Obama and Calderón agreed upon the U.S.-Mexico Bilateral Framework on Clean Energy and Climate Change in April 2009. The first bilateral Framework meeting occurred in January 2010, with officials from the White House, the departments of State, Energy, Treasury, and Commerce, EPA, and counterparts from the government of Mexico. Key Framework objectives include cooperation on capacity building, renewable energy generation, energy efficiency, and exploring the potential for future carbon markets.

The Commission for Environmental Cooperation (CEC), the trilateral entity established in the environmental side agreement to NAFTA, consists of the three environmental ministers or leaders of environmental agencies from the United States,

Mexico, and Canada. During the CEC's June 2009 Council session, the leaders agreed to make climate change one of their priorities from 2010 to 2015. In early February, officials from the three countries' environmental agencies met to begin fleshing out parameters of the "Transitioning to a Low-Carbon Economy" program for these 5 years. Recommendations will be presented to the CEC Council for approval at its June 2010 meeting.

GHG Emissions Reporting and Trading

The U.S. Congress is deliberating various legislative proposals for reducing GHGs. A final climate change bill could include a market-based carbon-trading program. Until such legislation is adopted, the implementing agencies cannot regulate a carbon market. In discussions with its neighbors to the north and south, the United States has emphasized the importance of each country having the necessary infrastructure in place before establishing cross-border trading regimes.

EPA, however, has promulgated some GHG regulations and is working on others authorized under the Clean Air Act, pursuant to the 2007 Supreme Court decision that found that GHGs are air pollutants covered by the Clean Air Act. Having determined that GHG emissions do endanger Americans' health and welfare, EPA recently issued a final regulation requiring fossil fuel and industrial GHG suppliers, motor vehicle and engine manufacturers, and facilities that emit 25,000 metric tons or more of CO_2 equivalent per year to report GHG emissions data to EPA annually, beginning January 1, 2011. This new program will cover approximately 85 percent of the Nation's GHG emissions and apply to roughly 10,000 facilities. EPA also completed an updated renewable fuels standard rule and published a light-duty vehicle emissions standard rule on April 1, 2010.

Absent Congressional action, some states and independent organizations such as the Climate Registry (TCR), the Climate Action Reserve (CAR), and the Western Climate Initiative (WCI) have developed GHG reporting and carbon-trading programs. Membership varies by program and includes some U.S. states, provinces in Canada, and states in Mexico.

The Registry, or TCR, is a nonprofit collaboration among North American states, provinces, territories, and native sovereign nations that set consistent and transparent standards to calculate, verify, and publicly report GHG emissions into a single registry throughout North America. The Registry supports both voluntary and mandatory reporting programs and provides comprehensive, accurate data to reduce GHG emissions. Leading corporations, government agencies and nonprofit organizations in North America participate as members. Jurisdictions, including states, territories, provinces, and native sovereign nations, sit on the Board of Directors. Members are organizations that voluntarily measure, verify, and publicly report their GHG emissions with the Registry. The Registry extends into all six northern Mexican border states. California, Arizona, and New Mexico also are board members. Two of the Registry's main strategies are to encourage voluntary early actions to increase energy efficiency and decrease GHG emissions, and to encourage the use of its accounting infrastructure, which can support a wide variety of voluntary, regulatory, and market-based programs that reduce GHG emissions.

TCR's sister organization is CAR—the re-named California Climate Action Registry (CCAR). CCAR was a registry for GHG emission inventories, but as CAR it now focuses on developing standardized GHG reduction project protocols and a system that registers and tracks GHG offsets through a publicly accessible database. The CAR has developed many protocols for use in California and the United States and more recently has adapted two of these protocols for use in Mexico, namely a livestock project reporting protocol and a landfill project reporting protocol. The forestry project reporting protocol will be the next to be developed.

The WCI is a collaboration of independent jurisdictions working together to identify, evaluate, and implement policies to tackle climate change at a regional level. The WCI also is working on complementary policies that support the cap-and-trade program, and provide additional opportunities to address climate change and achieve related co-benefits of increased energy efficiency, increased renewable energy generation, improved air quality, reduced water pollution, job growth, and increased provincial, state, and local revenue.

The centerpiece of the WCI strategy is a regional cap-and-trade program. When fully implemented in 2015, this program will cover nearly 90 percent of the GHG emissions in WCI states and provinces. WCI analyses indicate that the region can mitigate the costs of emissions reduction and realize a cost savings through increased efficiencies and reduced fuel consumption. These savings come in addition to the benefits for the region from a cleaner environment and from investment and innovation that spurs growth in new green technologies. WCI administrators hope that Mexico will become a partner in this regional program. Currently all six northern Mexican border states have been incorporated as observers, and are in the process of becoming full members. ■

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Page 8, sidebar. A wildflower growing in silt from a recent flood of the Rio Grande/Río Bravo. ©Krista Schlyer

CHAPTER 2

Air Quality

Recommendations

1) Advance regional airshed management efforts along the U.S.-Mexico border, borrowing lessons from the El Paso-Ciudad Juárez-Doña Ana County Joint Advisory Committee.

2) Encourage new legal mechanisms for achieving cost-effective emission reductions in binational airsheds, such as cross-border offsets and trading.

3) Coordinate with state and local agencies and Mexican counterparts to upgrade and maintain existing air quality monitoring equipment and expand binational air quality monitoring networks to reflect the growing footprint of border sister cities; include rural areas where particulate matter (PM) and other contaminants have reached critical levels; explore application of innovative, alternative monitoring techniques (e.g., passive monitors, interpreting satellite imagery, etc.) in the border region.

4) Promote best management practices (BMPs) for air pollution abatement from U.S. agricultural sources—in particular dust associated with unpaved farm roads, tilling, and field burning. Working through the Border 2012 Air Policy Forum and other task forces, EPA should collaborate with Mexican agencies to disseminate this information to Mexican agricultural producers.

5) Implement measures that reduce vehicle idling times at ports of entry, such as more efficient frequent traveler programs (i.e., SENTRI and FAST programs), fully staffed entry lanes to reduce wait times, expanded electrification programs, and other measures to reduce idling times of commercial vehicles. Fully fund the DHS, Department of Transportation, and EPA to implement these activities.

6) Continue working with Mexico through the Border 2012 Air Policy Forum to urge PEMEX (Petróleos Mexicanos) to move forward on its mandated transition to ultra-low sulfur diesel (ULSD) as required by Mexican standard NOM-086 in 2006, thus allowing for introduction of clean diesel trucks as set forth in NOM-044 in October 2006.

7) Encourage the U.S. BECC/NADB board members (Treasury, EPA, and State) to work with their Mexican counterparts to make grant funds available for binational air quality projects that have a documented environmental benefit and lack sufficient funding (e.g., vehicle inspection/maintenance, pre-1994 diesel engine replacement, road paving).

Air quality problems in the border region pose a significant public health threat to border residents, mainly from high levels of ozone and particulate matter. The border region faces unique and persistent challenges in meeting air quality goals that are related to the location along the international boundary and the poverty of the region. The long-term goal for the region should be to develop air quality management authorities and tools needed to meet standards and maintain air quality in binational air basins.

Air pollution health effects include increased respiratory symptoms, aggravated asthma, development of chronic bronchitis, and premature death in people with heart or lung disease. All of these effects are exacerbated by the low-income conditions, substandard housing, and lack of access to health care experienced by many border residents. A recent study of the Texas-Mexico border found that "border children are hospitalized at a 36% greater rate than off-border children."[1]

Binational airsheds such as the Paso del Norte, comprised of El Paso (Texas), Doña Ana County (New Mexico), and Cuidad Juárez (Chihuahua), or the Mexicali (Baja California) and Imperial Valley (California) airshed are not meeting some U.S. and Mexican health-based air quality standards. Air

quality problems in the border region are caused by a variety of sources, and relative contributions of emission sources vary by locale. Generally, vehicle emissions and industrial and commercial activities are the largest contributors to ozone air pollution. Particulate matter (PM_{10}) air pollution sources include open burning (i.e., trash, residential heating, and brick kilns); unpaved roads; and windblown dust from construction sites, agricultural practices, and cleared land. Fine particulate matter ($PM_{2.5}$) is produced by power plants, industry, and vehicle emissions. Long-range transport of air pollutants also affects the border region beyond local and state jurisdiction of the impacted areas. Finally, major trade corridors create hotspots for localized air pollution as a result of large numbers of diesel trucks and poorly tuned automobiles idling as they wait to cross border checkpoints for customs and immigration.

Nonetheless, some progress has been made to improve air quality in the border region. El Paso now meets both the former 1-hour and current 8-hour ozone standards. The EPA promulgated the more stringent 8-hour standard in 1997, following an exhaustive review of health studies showing that lower concentrations of ozone over a longer time period more accurately correspond with respiratory impacts from ozone exposure. Air quality managers point to U.S. and Mexican federal vehicle emission standards, recovery of volatile organic compounds (VOCs) at gas stations, and transportation control measures (i.e., traffic light synchronization and truck stop electrification) as successful measures in achieving EPA's ozone standard. El Paso now is in compliance with EPA's carbon monoxide (CO) standards as a result of implementing measures such as winter-time oxygenated fuels in both El Paso and Ciudad Juárez and vehicle inspection and maintenance requirements. The United States has implemented national heavy-duty diesel emissions standards and ULSD fuel requirements.

Mexico has been unable to make significant progress in implementing its new heavy-duty diesel emissions standards, because of the lack of ULSD in areas other than the border and the three largest cities. Although ULSD is purportedly available throughout the border region, any new truck traveling outside

A roadside fire on Highway 2 in Sonora, Mexico. ©Krista Schlyer

of the 100 km border area in Mexico would be unable to find ULSD and risk damage to the emissions control equipment. Full implementation of the new emissions standards is necessary, along with widespread availability of ULSD fuel, to help reduce $PM_{2.5}$ pollution at ports of entry, in border communities, and along major transportation corridors.

Despite these successes, much work remains. Approximately 5.5 million people on the U.S. side of the border are exposed to health-threatening levels of PM and ozone (see table below). EPA has taken action to tighten National Ambient Air Quality Standards (NAAQS). In January 2010, EPA proposed lowering the current 8-hour ozone standard from the current level of 85 parts per billion (ppb) to somewhere between 60 to 70 ppb. Depending on how the rule is finalized, additional border communities in the United States (and their binational air basins), including some remote areas such as Brewster County (population 9,500, home of Big Bend National Park) will become "non-attainment" areas for the new standard with corresponding recognition that more border residents live with unhealthy air. Strong cooperation between the United States and Mexico along with new, innovative mechanisms for achieving emission reductions within binational air basins will be critical for meeting tougher standards.

Except for the Paso del Norte region, the U.S. and Mexican governments have not officially recognized binational airsheds in other parts of the border. These areas, therefore, have yet to engage in formal joint air quality planning and management efforts. One of the primary challenges is that border air quality monitoring networks have not expanded to match the growing footprints of binational sister cities, making it difficult to accurately gauge the extent of air pollution in newly developed urban areas. Similarly, some border tribes and rural areas do not have permanent air quality monitoring networks despite evidence that air pollution may pose a health concern in some unmonitored areas. Also, the monitoring equipment in Mexican border cities is aging and will need to be replaced to maintain availability of consistent binational airshed data for sound policy making.

As a result of heightened security measures and increased traffic from passenger and commercial vehicles, idling of waiting vehicles at ports of entry is a significant emissions source. BMPs also are needed for agricultural sources to reduce activities that can lead to increased PM_{10} concentrations in non-attainment areas. Finally, in many border areas, air quality improvements are hindered by inadequate resources and a lack of robust and fully enforceable air pollution control measures in Mexico.

Binational Airshed Management

Binational airsheds can be defined by one of four characteristics: topography, meteorology, atmospheric chemistry, or health effects. The international border does not present a barrier to airflow and therefore, depending on local meteorological conditions and wind patterns, emissions on either side of the border can, and usually do, affect air quality in the entire basin. The La Paz Agreement of 1983 recognizes that sources in both nations contribute to this problem, and seeks solutions in a binational forum as a part of joint air management programs undertaken by U.S. and Mexican environmental authorities. These include coordinated operation of air quality monitoring stations in sister cities throughout the border region.

The Paso del Norte air basin provides a useful model for how to best address transboundary air quality. Formally established as an Appendix to the La Paz Agreement in 1996,

U.S. Border Counties Classified as Non-Attainment Status* for U.S. National Ambient Air Quality Standards for Ozone, PM_{10} and $PM_{2.5}$

County	8-hour Ozone	PM_{10}	$PM_{2.5}$	2008 Population**
El Paso, TX	-	√	-	742,000
Doña Ana, NM	-	√	-	202,000
Cochise, AZ	-	√	-	129,000
Santa Cruz, AZ	-	√	√	43,000
Pima, AZ	-	√	-	1,000,000
Yuma, AZ	-	√	-	194,000
Imperial, CA	√	√	√	164,000
San Diego, CA	√	-	-	3,000,000

*Non-attainment area information available at www.epa.gov/ozonedesignations/
**2008 county population estimates from U.S. Census at www.census.gov

Unpaved road through the Animas Valley, New Mexico. ©Krista Schlyer

the Joint Advisory Committee (JAC) for the Improvement of Air Quality in the Paso del Norte Air Basin is a locally based, multi-stakeholder group that works cooperatively to develop air quality improvement projects within the entire air basin. Through the "One Basin Resolution," the JAC affirmed that achieving desired air quality goals required the municipalities on either side of the border to address the air basin as a single entity for planning and management purposes. Under this cooperative framework, stakeholders identified the most cost-effective projects for reducing air pollution regardless of the side of the border on which they are implemented. This model has led to launching several very successful binational air quality projects, such as traffic control measures in Juárez to mitigate vehicle congestion, designated commuter lanes at two international bridges, and distribution of seasonally appropriate gasoline in Ciudad Juárez to reduce CO and ozone.

Aside from the Paso del Norte region, no other sister cities have formally designated binational air basins to facilitate cross-border air quality planning and management. Designation of binational air sheds and formation of stakeholder groups with shared responsibility and accountability along other parts of the border could significantly improve U.S.-Mexico cooperative efforts in border critical, or non-attainment areas, such as the Tijuana/San Diego metropolitan area and the Mexicali/Imperial County region.

Cross-Border Offsets and Trading

Differing regulatory structures and standards between the United States and Mexico; lack of joint binational air quality planning, management, and enforcement; and limited financial resources seriously hinder the ability to achieve U.S. air quality standards in binational air basins. With emerging evidence that even low concentrations of air pollutants such as ozone cause adverse health effects, border communities must find new ways to achieve additional emission reductions to protect public health.

EPA and SEMARNAT, along with stakeholders in binational air basins, need to identify and implement new, innovative

emission reduction strategies to meet air quality standards. As EPA's successful sulfur dioxide (SO_2) cap-and-trade program has shown, emissions trading schemes can achieve emission reductions at a lower cost relative to traditional command-and-control regulatory programs. In the 1990s, the program achieved 100 percent compliance, reducing SO_2 emissions 52 percent from 1990 levels at 20 to 30 percent of the projected cost.[2] At the federal level, the United States would require amendments to the Clean Air Act to allow for strategies consisting of cross-border trading and emission offsets. Border states, however, could enact policies to allow for transboundary emissions trading at the state level.

Emission sources in U.S. non-attainment areas are regulated under EPA rules and through delegated state programs. Requiring additional emission reductions from these U.S. sources to meet tighter standards in binational air basins may be costly. Some of the same sources, however, are not regulated or not regulated as strictly on the Mexican side of the border, and provide great potential to achieve emission reductions at a relatively low cost.

The United States and Mexico should work together to resolve legal, regulatory, and enforcement barriers to implementing a cross-border trading or offset program. Lessons can be taken from programs that implement international carbon trading, such as the Kyoto Protocol Clean Development Mechanism.

Although lacking federal authority until statutory changes are made to the Clean Air Act, transboundary emissions trading for the U.S.-Mexico border has been demonstrated in one case highlighted in the 12th GNEB annual report. El Paso Electric (EPE) replaced high-polluting brick kilns located in Ciudad Juárez with new cleaner burning kilns through a time-limited pilot project completed under Texas state law. EPE received emission reduction credits for its older power plants that otherwise would have required significant and costly overhauls. Social factors in Ciudad Juárez, however, limited the success of this project and demonstrated that attempts to reduce pollution must take into consideration the quality of life of workers and their dependents and gain the support of those who will be directly affected by the new technology. Although some of the brick kilns continue to operate, verification is needed on a continual basis to ensure that permanent emissions reductions are achieved by the new kilns.

Binational Monitoring Networks

Population growth has led to the expansion of the urban footprint of all border sister cities. Significant numbers of unpaved roads as a result of this rapid growth account for increases in PM, especially in Mexico. Unfortunately, the geographic coverage of existing binational air quality monitoring networks has not kept pace with this growth. For example, the population of El Paso-Juárez has quadrupled in the past 40 years. With expansion of Fort Bliss to the north and continued economic growth, the population of this binational region is expected to double to approximately 4 million people by 2045.[3] Currently, no ambient monitoring systems are deployed to measure air quality impacts in the communities along growth corridors.

Similarly, the new Valle de las Palmas 13,000 hectare planned community being built on the east side of Tijuana will accommodate 1 million new residents when completed. Evaluation of existing binational monitoring networks should be conducted and more monitoring sites established to ensure that the monitoring networks fully reflect population exposure to air pollutants. This assessment has begun for the northern Baja California air monitoring network.

Additionally, some rural areas and tribes along the U.S. border without permanent air monitoring have requested support for air quality monitoring networks. Rural areas, such as Columbus, New Mexico, and Palomas, Chihuahua, experience severe particulate air quality problems from unpaved roads and disturbed land areas. Citizens there have requested that environmental authorities provide information on population exposure to PM. Ports of entry also need permanent air quality monitoring to provide a better understanding of the nature and extent of emissions from vehicle idling on ambient pollutant concentrations.

Nationwide, demand for air monitoring resources is increasing to meet priorities (e.g., new lead standard and

Traditional brick kiln burning scrap materials near homes and businesses in Ciudad Juárez, Mexico. ©Paul Ganster

community air toxics), and maintaining systems and retaining trained employees remains a challenge. Innovative, alternative monitoring techniques (e.g., passive monitors, interpreting satellite imagery, etc.) may prove suitable for expansion in the border region provided that such techniques can meet data quality objectives. Accordingly, there is a need to collaborate to provide technical assistance for addressing monitoring concerns along the border.

Agricultural Sources

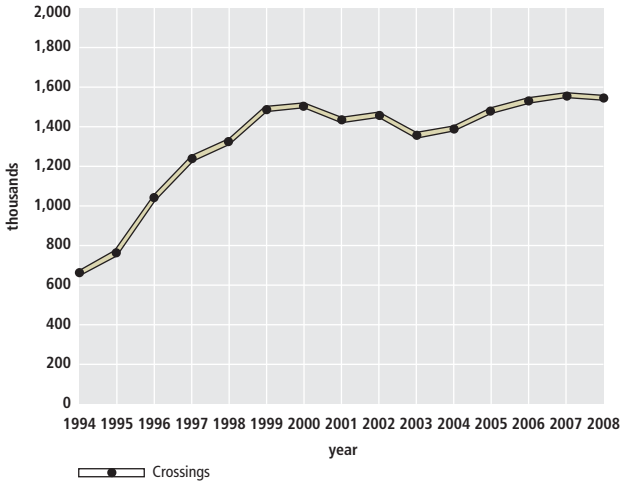
Agricultural activities generate PM from farm road dust, windblown dust from fields, agricultural burning, animal waste, fertilizer production (ammonia), and farm vehicle combustion (sulfur oxides [SOx], nitrogen oxides [NOx], CO, and VOCs). The U.S. Federal Government should take a more active role in emphasizing the need to apply BMPs to agricultural air pollution sources.

The State of Arizona's "Guide to Agricultural PM_{10} Best Management Practices, Agriculture Improving Air Quality, Governor's Agricultural Best Management Practices," Second Edition, 2008, provides BMPs that may be applicable across the border region. Practices include simple measures such as reducing vehicle speed and treating unpaved roads with dust suppressant to more intricate measures such as installing windbreaks to disrupt wind flow and abstaining from soil preparation activity when the measured wind speed at 6 feet in height is more than 25 mph. From a regulatory perspective, agricultural sources may be controversial and difficult to regulate; however, they should be viewed as an opportunity to provide substantial cost-effective improvements in air quality in the border region. Other states besides Arizona also have rules to limit agricultural PM, such as Texas' outdoor burning rules.

Ports of Entry

One large source of emissions in binational air sheds is the long line of idling cars and trucks waiting to cross the border. The GNEB addressed the relationship between transportation and air quality in its Ninth Report. Many of the more than 14 million residents of the U.S.-Mexico border region cross the border routinely to visit family, commute to work or school, or shop. Passenger vehicle crossings are expected to continue to increase given projected economic and population growth. Similarly, international trade corridors between the United States and Mexico have experienced increased commercial truck traffic that also contributes to air pollutant emissions. For example, Laredo, Texas, which is located on the I-35 Mexico-U.S.-Canada trade corridor, experienced an increase in trucks entering from Mexico from 668,000 in 1994 pre-NAFTA to 1,555,000 in 2008, resulting in increased pollution (see graph below for truck crossing data at Laredo, Texas).

Northbound Truck Crossings at Laredo, TX: 1994–2008



Source: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, based on data from U.S. Department of Homeland Security, Customs and Border Protection, Operations Management Database, 1994–2008.

Currently, efficient security measures such as the Secure Electronic Network for Travelers Rapid Inspection (SENTRI) and Free and Secure Trade (FAST) programs reduce wait times for commuters or other program participants. Maximizing staff at the entry lanes would reduce wait times at the ports of entry. Strategies such as batching vehicles to cross the border would help to reduce emissions from idling vehicles. Commercial trucks waiting to cross at ports of entry also contribute to air quality problems by idling engines to run heat, air conditioning, and refrigeration units. Improving electrification efforts at port of entry facilities to reduce pollution from idling heavy-duty vehicles can be accomplished by providing exterior power sources to the tractors.

To implement these types of efforts, funding sources must be made available in the border region. Although grant funds available to states through the Diesel Emissions Reduction Act are applicable for such projects, the process is quite cumbersome and lacks any consideration of limitations and binational complications that exist in the border region.

Diesel Vehicle Emissions and Fuel Standards

Fuel characteristics are a critical determinant of heavy-duty vehicle emissions. Widespread use of ULSD fuel will allow meeting more stringent diesel emissions standards. The Border Governors Conference has encouraged the use of ULSD fuel in

the border region, and the Mexican Petroleum company PEMEX produces this fuel and makes it available in the border region. EPA and the State Department should emphasize this project and collaborate with Mexico to expedite the transition to more stringent diesel emissions standards, as well as the widespread use of ULSD fuel throughout the country.

Availability of Funds for Binational Projects

Some of the most cost-effective opportunities to reduce emissions are on the Mexican side of the border, but because of a lack of funding and enforceable air quality management programs, there is insufficient capacity to ensure full implementation.

In its Fifth Report, the Board explored the idea of establishing a Border Air Quality Fund to finance cost-effective emission reductions in binational air basins. The Board continues to recognize the need for grant funding for important air quality projects; a separate fund, however, may not be necessary to achieve this objective. The Board encourages the BECC and NADB to make these grant funds available through existing programs.

As formal binational airshed groups like the JAC are established along the border according to recommendation #1, these groups should have a role in directing grant funds to priority projects. These binational, multi-stakeholder committees would be accountable for air quality improvements on both sides of the border and have the most knowledge of how to implement emission reduction projects. A project review committee of the binational airshed groups could work with the BECC-NADB to review and approve funding applications.[4]

Examples of cost-effective air pollution control strategies in need of grant funding include vehicle inspection and maintenance, road paving, and diesel engine replacement. Vehicle emission inspections in Juárez have been implemented on an intermittent basis for years in the face of limited funds and changing priorities of new administrations. Yet, this is an important program for identifying high-emitting vehicles and those requiring tune-ups or other engine fixes. A program that incentivizes engine tune-ups or fixes for low-income residents in Juárez would encourage drivers not to avoid inspections for fear of prohibitively expensive repair requirements.

Similarly, grant funds could support the buy-out of high-emitting diesel vehicles and replacement with cleaner diesel engines, as in the Texas Commission on Environmental Quality's (TCEQ) Texas Emissions Reductions Program. This could hasten turnover of the heavy-duty diesel vehicle fleet to one that, on average, meets tighter emission standards.

Unpaved roads represent a significant contribution to high PM concentrations in the border region. Road paving for most unpaved roads in border communities falls to local governments as federal and state transportation programs have volume requirements that make these roads ineligible for funding. Lack of resources, however, can hinder road paving at the local level. Although the NADB has financed the paving of unpaved roads in several urban areas, poor rural communities often cannot afford financing to implement road paving projects. Grant funds could support the local capital contributions for road paving projects. ■

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Page 14, sidebar. The historic steel mill at Parque Fundidora in Monterrey in the border state of Nuevo León. ©Egomezta/Dreamstime.com

*Kit fox pups (*Vulpes macrotis*) in the Janos grasslands in Chihuahua, Mexico ©Krista Schlyer*

CHAPTER 3

Renewable Energy

Recommendations

1) Coordinate U.S. federal agency activities to stimulate increased energy efficiency and the production of renewable energy in the border region aimed at limiting growth of air pollution, including GHGs, and the creation of green jobs.

2) Enhance binational coordination of U.S. and Mexican federal governments to facilitate cross-border energy cooperation to promote greater efficiency, conservation, and development of renewable energy resources. These efforts should include: (1) harmonization of environmental regulations and permitting processes for siting energy production and transmission facilities; (2) assessment of transboundary environmental issues; and (3) an assessment of potential renewable energy resources on both sides of the border.

3) Promote and implement energy efficiency standards for residential and commercial buildings and for industry in border cities and communities.

4) Develop federal requirements and promote incentives for residential and commercial solar water heating.

5) Develop best practices for energy conservation and alternative energy production in border states.

6) Identify and assess opportunities for achieving efficiencies in the water-energy nexus in border states.

Worker inspecting a photovoltaic installation.
©Pedro Castellano/iStockphoto

To predict and plan for the future of the border region, it is useful to think of energy in the context of air quality, economic development, human health, and climate change, because these are interdependent variables that affect quality of life on both sides of the border. Historically, unsustainable patterns of energy production and consumption have resulted in deterioration of the border environment. The current production and consumption patterns of energy are major contributors to air contamination in the border region. Renewable and non-polluting energy sources are becoming more feasible as systems for production, conversion, and transmission are more efficient and reliable and less costly. This trend presents enormous opportunity for the border region because of its abundant supply of renewable resources, including solar, geothermal (in Baja California), and wind. The transition away from fossil fuels, however, will require significant investment and strategic planning on the part of both nations.

The existing energy sector in the border region mirrors the pattern of global energy consumption, with heavy dependence on fossil fuels (88%) and only a small percentage of energy generation from renewable sources (2%).[1] Because many areas of the border do not use locally or regionally available sources of energy, the region is vulnerable to supply interruptions and price volatility. Although there are supplies of petroleum and natural gas in the New Mexico and Texas-Tamaulipas border zones, elsewhere energy supplies are imported from outside the region almost exclusively. The California-Baja California border region, for example, imports natural gas from Texas and Canada through pipelines and from Indonesia and Australia by ship in liquefied form to a deliquification plant near Ensenada.

It then is transmitted to California and Baja California by pipeline. In addition to the energy security risks associated with importation of oil and gas, importation requires large expenditures and takes money and jobs out of the region.

A compounding factor in the border energy picture is the amount of electrical energy lost through transmission networks. In Mexico, transmission losses of 13 percent are not uncommon, compared to losses of approximately 7 to 8 percent in the United States. These losses translate directly into greater power generation required as well as higher electricity costs, adding to the air pollution burden and extra generation of GHGs.

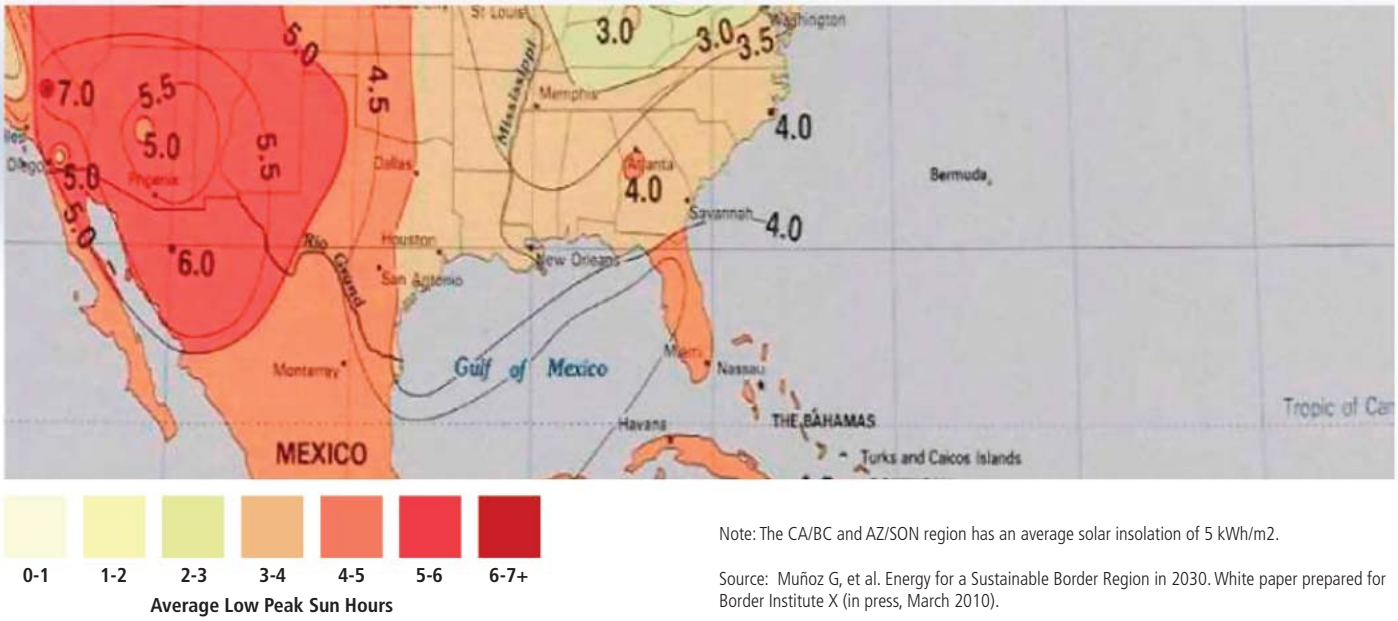
Existing legal barriers, different national priorities, and current economic and other social asymmetries across the border make binational cooperation on border energy matters a challenge. For example, in Mexico, the energy sector is largely government controlled. PEMEX controls oil and gas production, refining, and distribution, and the Comisión Federal de Electricidad (CFE) controls electricity production and transmission. The U.S. energy sector, however, is highly decentralized and distributed between public and private ownership. Although privately owned energy operations are emerging in Mexico, the majority of Mexican energy production is still federally controlled, which makes local and regional projects more difficult to approve and start. Energy use also is different in Mexico and the United States. Per capita energy consumption (measured in kg of oil equivalent) in the United States is almost five times that of Mexico, and GHG emissions are twice as great.[2] The current lower use of energy per capita in Mexico presents an opportunity to implement efficiency programs and renewable energy projects as Mexico increases its demand for electricity. Similarly, the United States should promote energy conservation and transition to alternative energy.

Alternative energy resource maps demonstrate significant potential for the development of solar, wind, and geothermal energy in areas on or near the border region (see Figures 1 and 2, page 24). Renewable sources currently being used in the California-Baja California border region include geothermal energy in the Mexicali and Imperial valleys. Although current practices of geothermal energy generation near Mexicali have some negative environmental impacts because of the lack of reinjection of geothermal fluids and volatile gases, new geothermal development in the region should address the feasibility of reinjection of spent geothermal fluids to significantly reduce the environmental impacts of hot water, dissolved gases, and toxic chemicals.

Researchers and practitioners recently have discussed the creation of a unified "energyshed" management scheme to oversee regional energy development with a focus on resource optimization and economic feasibility as a way to overcome some of the asymmetries and barriers to cross-border cooperation. The energyshed concept would include a binational energy advisory board charged with developing binational siting regulations and guidelines for large-scale energy projects and planning regional energy infrastructure. In addition, the energyshed concept would require binational consultation on energy projects and a transboundary environmental impact assessment process for each project with potential for environmental impact across the border. The energyshed could help to facilitate an eventual binational carbon trading forum, recognizing that legislative action to create a domestic trading system would have to be taken first, and as long as both countries conducted other important climate work, such as measuring, reporting, and verification activities (including emissions inventories and/or continuous monitoring of GHG emissions). A successful

InterGen thermoelectric plant in Mexicali that produces electricity for Southern California and Baja California. Using natural gas as fuel, its siting in the out-of-compliance Mexicali-Imperial Valley airshed was controversial. ©Paul Ganster

Figure 1: Border Region Solar Potential

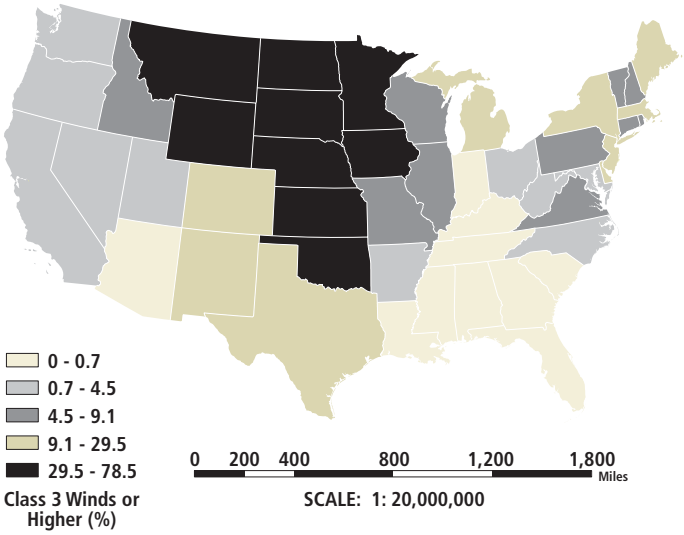


Note: The CA/BC and AZ/SON region has an average solar insolation of 5 kWh/m2.

Source: Muñoz G, et al. Energy for a Sustainable Border Region in 2030. White paper prepared for Border Institute X (in press, March 2010).

framework could serve as the foundation for defining a North American renewable energy market. In terms of a trinational carbon trading regime, it also could incentivize all three North American countries to build cleaner plants and sell credits on the open market except in regions that choose not to enter into a carbon trading program.

Figure 2: Percent of Land with Class-3 Winds in the United States



Note: California/Baja California and Texas/Tamaulipas regions have wind resources classified as good to excellent.

Source: National Renewable Energy Laboratory, Department of Energy, from Muñoz G, et al. Energy for a Sustainable Border Region in 2030. White paper prepared for Border Institute X (in press, March 2010).

Moving in the Right Direction: A Trilateral Energy Forum

Canadian Prime Minister Stephen Harper, Mexican President Felipe Calderón, and U.S. President Barack Obama signed a Declaration on Climate Change and Clean Energy during the North American Leaders Summit in August 2009. The annual summit provides an opportunity for the leaders of Canada, Mexico, and the United States to discuss key bilateral, North American, and global issues. They reaffirmed their political commitment to work toward the competitiveness and sustainable growth of North America by seeking a greater reliance on clean energy technologies and secure energy supplies. The key areas for clean energy collaboration include: (1) technical and scientific cooperation to establish a 21st century smart grid for North America; (2) regional cooperation on carbon capture and storage; (3) pursuit of a harmonized framework to align energy efficiency standards in the three countries in support of improved energy efficiency and environmental objectives; and (4) implementing the North American SynchroPhasor Initiative (NASPI) to create a synchronized data measurement infrastructure for the North American electric power system.[3] The U.S. border region with Mexico provides an ideal place to begin to implement these trilateral goals of harmonization and cooperation. In addition, President Obama and President Calderón announced the Bilateral Framework on Clean Energy and Climate Change in April 2009. At their kick-off meeting in January 2010, the two governments discussed cooperation on renewable energy generation.

Energy and water are inextricably linked. Electricity costs of pumping, distribution, and treatment of water supplies can account for as much as 80 percent of the total cost of these activities,[4] and water is used in the production of energy from both fossil fuels and renewables. Identification and assessment of opportunities to achieve efficiencies in the water-energy nexus should be explored. For example, given that the border region's water supplies are increasingly stressed, dry cooling rather than wet cooling should be used to substantially reduce water consumption from power generation. Implementation of water conservation measures can help to reduce energy use from pumping, as well as extend the life of water supplies.

The demand for energy in the border region will continue to grow to support an expanding population and increasing economic activities. Although U.S. per capita energy consumption is starting to decrease, much can be done to reduce energy demand through greater efficiency and conservation. Absent significant investment in renewable resource development, binational cooperation on smart grid installation, and regulatory coordination on air quality standards, the demand for fossil fuels in the border region will continue to grow. ■

Geothermal pipeline being vented. ©Mayumi Terao/iStockphoto

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1. Muñoz G, et al. Energy for a Sustainable Border Region in 2030. White paper prepared for Border Institute X (in press, March 2010).
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4. National Renewable Energy Laboratory, http://www.nrel.gov/analysis/workshops/water_connect_workshop.html

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Page 22, sidebar. The Campo Kumeyaay Nation wind farm. ©Paul Ganster

CHAPTER 4 WATER

Recommendations

1) Ensure sufficient support for the BECC, the NADB, and other federal programs that fund water and wastewater infrastructure projects to guarantee coverage of potable water and wastewater services in U.S. border communities to match the level of service in non-border communities.

2) Ensure success of the Transboundary Aquifer Assessment Program (TAAP) to scientifically characterize aquifers that underlie the international boundary and encourage other efforts to improve data gathering and accessibility for border water resources, such as harmonization of standards. Support efforts to publish annual statistics on groundwater use near the border in binational aquifers, including the number of new wells. Convene binational teams of experts to identify data collection gaps and develop solutions.

3) Extend the binational stakeholder model of the Colorado River to other watersheds and rivers along the border to preempt conflicts. Include major stakeholders from both countries (local, state, and federal agencies, as well as NGOs, academia, and border residents) and distribute lessons learned through the Border 2012 program.

4) Review treaties to ensure compliance; improve water planning, management, and availability of water resources; prevent future conflict; and improve water security.

5) Take steps to resolve long-standing tribal water issues, including providing access to water conveyance systems for tribes within a reasonable framework of compensation and management, and ensuring that federal agencies with border water responsibility translate Executive Order 13175 into meaningful, accountable actions.

6) Support binational coordination of coastal waters monitoring efforts in the Pacific and Gulf of Mexico, and the assessment and mitigation of impacts of nonpoint source pollution within a watershed framework.

Center pivot irrigation on former grasslands, Janos, Chihuahua, near the New Mexico border. ©Krista Schlyer

Stream flowing through the San Luis Mountains in Mexico near the Arizona-New Mexico border. ©Krista Schlyer

In the border region, water resources management by the United States and Mexico is intrinsically linked. The two nations share rivers and groundwater and have signed treaties to manage shared surface water resources. Binational water management begins with the International Boundary and Water Commission (IBWC), which applies boundary and water treaties and demarcates the boundary between the United States and Mexico. The 1944 Water Treaty created the modern-day IBWC and provides for distribution of the waters of the Tijuana, Colorado, and Rio Grande rivers between the two countries, as well as giving the IBWC a role in border sanitation. Other key actors include: U.S. states, which have delegated authority for water quality standards and issue water rights; EPA, which reviews state water quality standards and provides funding for water and wastewater infrastructure; the Department of the Interior (DOI), whose agencies such as the Bureau of Reclamation and the U.S. Geological Survey (USGS) operate reservoirs and gauging stations; Mexico's National Water Commission (Comisión Nacional del Agua—CONAGUA), which manages water resources in Mexico; Mexican state water agencies, responsible for water infrastructure construction and maintenance; and municipalities on both sides of the border (and states in Mexico), which operate wastewater treatment plants.

Fundamental water management differences exist between the United States and Mexico. In Mexico, water is a national resource. In addition, interstate watershed councils in Mexico, created by the federal government, perform planning activities and resolve differences. In the United States, states have control over their own waters, both surface and groundwater. Interstate compacts in the United States, including the Colorado River, Rio Grande, and Pecos River compacts, allocate water among the states that are parties to the compacts. Local irrigation districts in both the United States and Mexico provide water for agriculture and municipal needs and have been major players in binational water issues.

Lake Morena in San Diego County at 10 percent capacity due to drought. ©Paul Ganster

Water Quality

GNEB identified two issues for immediate priority in its May 19, 2009, advice letter: (1) provision of fresh water for human populations and for ecosystem protection, and (2) contamination of ground and surface sources of water. Water quality in the border region, both for surface and groundwater, varies widely, but often is generalized as bad or poor. The region still is characterized by cross-border flows of inadequately treated wastewater, affecting streams, lakes, reservoirs, wetlands, and the near-shore marine environment. Wastewater treatment has improved over the past 15 years due in part to projects certified by the BECC and financed by EPA through the Border Environment Infrastructure Fund (BEIF) of the NADB and other state and federal agencies on both sides of the border. Nevertheless, surface water quality still is a concern in many areas.

Transboundary flows present a unique challenge to U.S. border communities. For example, in the 12th Report, the GNEB highlighted as a success story the constructed wetlands created using low-cost technology on the New River, which runs northward from Mexicali, Baja California, through Imperial Valley, California, before draining into the Salton Sea. The New River once was considered one of the most polluted rivers in North America, and still does not satisfy California's surface water quality standards. The New River and the Rio Grande are subject to Total Maximum Daily Loads (TMDLs)—the amount of a pollutant that can be discharged to a water body and still allow it to be used for activities such as contact recreation—for bacteria. The fact that several wastewater treatment plants along the Rio Grande in Mexico recently have been completed or are under construction is helpful.

With the completion of wastewater treatment plants in Mexico, partially funded by the United States through BEIF, surface water quality in the New River has improved significantly, with dissolved oxygen concentrations achieving EPA's standard for all but the summer months. California's surface water quality standards for bacteria still are not met, however, and selenium, a naturally occurring heavy metal from agricultural return flows, continues to bioaccumulate in plants and the food chain in the New River wetlands.

Agricultural return flows are a main cause of elevated salinity levels that affect both U.S. and Mexican water users. The Rio Grande and Colorado rivers also experience salinity problems, which require monitoring by farmers to ensure that the water is suitable for crop production.

Infrastructure Needs

Although the BECC and NADB are to be commended for diversifying and working in new sectors such as energy efficiency, great needs for water and wastewater services still exist in the border region, with conditions in many areas reminiscent of much of the United States a half-century ago. As of December 10, 2009, the BECC had certified 78 water and wastewater projects. BEIF grants contributed $553 million since 1997, with the leveraging of two additional dollars for every grant dollar.

The Fiscal Year (FY) 2010 EPA budget for border water and wastewater funding is $17 million, down from a previous level of $100 million in 2001. Unfortunately for border residents, the budget for FY 2011 is only $10 million, although BECC received more than $1.1 billion in project cost requests for the 2009-2010 FY cycle—more than 65 times the amount budgeted. Despite this documented need for basic water and wastewater services, grant funding still is not at previous levels, leaving many border communities with fewer water and wastewater services than the rest of the country.

Another infrastructure concern is the need for improved levees along the Rio Grande, as was noted in GNEB's 11th Report. During major flooding in 2006 in the El Paso region, levees were nearly overtopped. Levee failure would cause enormous damage in the Lower Rio Grande Valley, especially in the event of a hurricane. Congress, led by members of the Texas and New Mexico delegations, included $220 million in the American Recovery and Reinvestment Act of 2009 for crucial levee improvements along the Rio Grande. The U.S. Section of the IBWC (USIBWC) is overseeing the improvements, which are especially needed in southern New Mexico and the

Texas counties of El Paso and Hidalgo. The USIBWC previously undertook rehabilitation of Rio Grande levees in Cameron County. Separate appropriations are funding improvements to Rio Grande levees at Presidio, Texas, which were damaged during a flood in 2008.

Conservation and Reuse

As noted previously in the report, much of the border region is arid, with the highest amount of precipitation in the Brownsville-Matamoros area at 28 inches per year. At the other extreme, Imperial Valley receives less than 3 inches per year (Nogales, Arizona, 19; San Diego, 12; and El Paso, 8 inches per year). Border communities and agriculture depend on groundwater as well as surface water, which is sometimes delivered by canals and pipelines from hundreds of miles away, as is the case for San Diego and its sister city, Tijuana.

Agricultural operations on fields recently converted from natural grasslands, Chihuahua, Mexico. ©Krista Schlyer

Although most water in the border region is used for agricultural purposes, conservation by both municipal and agricultural users is necessary. Municipalities all along the border have implemented conservation and reuse efforts. Las Cruces, San Diego, and El Paso have notable conservation programs. Las Cruces, for example, reduced daily per capita consumption by approximately 10 percent between 2005 and 2008, from 143 to 128 gallons. Twenty-five agricultural conservation projects, from Texas to California—all in the United States except for a significant project in Chihuahua—have been certified and financed through the BECC-NADB. These agricultural water conservation projects, which include canal lining, replacement of canals with pipelines, and other measures, save an estimated 370,000 acre-feet of water per year. In addition, the State of California invested $84 million in a canal-lining project for the Coachella Valley Water District. Some 36 miles of parallel canal were lined to save 50,000 acre-feet of Colorado River water. The San Diego County Water Authority also contributed to the project, which totaled $110 million, in exchange for some of the water saved by the canal lining.

The link between water conservation and energy is a critical one. Visitors from water-scarce lands, such as Israel, often are surprised that water-intensive crops like pecans and alfalfa are grown in the border region, much of which is arid. It is difficult to legislate agricultural water use, however, in an area that many believe can be addressed by the market if the true cost of water were charged to the consumers.

One of the major issues in cities, and particularly in Mexican border municipalities, is that there are great losses in the water distribution system, up to 40 percent by some estimates. These losses not only mean loss of water that could be reaching municipal users and higher city water utility costs, but also the additional energy required to pump this lost water costs the utility and users money. In Monclova, in the border state of Coahuila, there was an estimated 44 percent energy savings in pumping systems from reducing water losses and energy use. Although there are U.S. state laws on water conservation, reducing water and energy losses is up to respective utilities or agricultural users.

Water Treaties

The 1944 Water Treaty was created at a time when the annual supply of water from the Colorado River was estimated at 17.4 to more than 20 million acre-feet. The recent long-term drought in the Colorado River Basin has forced states to make internal agreements to reduce water allocations. The 1944

Water Treaty allows Mexico (on the Rio Grande) or the United States (on the Colorado River) to reduce its deliveries due to "extraordinary drought," a term not defined in the treaty. The United States delivers its 1.5 million acre-feet of water annually to Mexico from the Colorado. On the Rio Grande, a deficit in the deliveries from Mexico in the late 1990s-early 2000s was an irritant in the bilateral relationship for several years, especially as Texas irrigators who relied on the water had to do without. Diplomatic resolution of this "water debt," which at one point reached 1.5 million acre-feet, was a success story in the bilateral relationship.

Another treaty, the Convention of 1906, provides for the United States to deliver to Mexico 60,000 acre-feet per year of Rio Grande water in the region of El Paso, Texas-Ciudad Juárez, Chihuahua, for agricultural use only. Because of the increasing salinity of the Hueco Bolsón groundwater in Ciudad Juárez, the state water management agency in Chihuahua has developed a plan to find additional sources of water for municipal use. The plan includes requesting that the 60,000 acre-feet under the 1906 Convention be converted to municipal use. The plan also includes drilling wells in Chihuahua's portion of the Mesilla Bolsón, which lies principally in New Mexico and Chihuahua, with the construction of a pipeline to Ciudad Juárez. Under the 1906 Convention, Mexico relinquished its right to all waters in the Rio Grande downstream to Fort Quitman, Texas, after receiving its 60,000 acre-feet. Changing from agricultural to municipal use may require concurrence of the U.S. Federal Government.

The lining of the All-American Canal along the U.S.-Mexico border in Imperial County, California, produced controversy because this U.S. water conservation project will reduce seepage into the aquifer adjacent to an area where Mexico has a significant amount of groundwater use. Mexican stakeholders protested the canal lining vigorously because of the implications for agriculture from the loss of this water.

Although conflict arises periodically, cooperative measures are ongoing. For example, through Minute 314 of the IBWC, signed in 2008, allowance has been made to convey a portion of Mexico's Colorado River allotment to Tijuana, Baja California, on an emergency basis through the Southern California

Wastewater treatment plant in El Paso, Texas. ©Krista Schlyer

aqueduct system, with all conveyance costs paid by Mexico. Water has been supplied on an emergency basis to Mexico in this region sporadically since the 1970s during periods when Mexico's conveyance system was inadequate or because of outages on the Mexican side.

Tribal Water Issues

Tribal water issues continue to gain attention from local, state, and federal governments after many years of hard work by tribal officials. Water problems that tribes have endured include loss of water rights, drainage of wetlands, pumping of water from aquifers shared by tribes, and loss of highly valued species. The concerns extend into Mexico as well. For instance, Mexican indigenous communities that depended on the Colorado River delta have had to change fishing and hunting habits due to the disappearance of entire habitats and species because of the dramatic decreases in flows reaching the Gulf of California.

The GNEB commends President Obama's November 5, 2009, Executive Memorandum directing all federal agencies to comply with Executive Order 13175, which requires collaboration and consultation with tribal officials in the development of federal policies with tribal implications. Plans must be developed after consulting with tribes, with annual progress reports submitted on the status of each action included in every plan. At the state and local level, tribal communities should be included in the long-term planning processes for regional water management, and tribal needs should be incorporated in plans and updates. At the state level, the California Water Plan's most recent update for the first time made great efforts to include tribal input in the plan development; this is a positive action.

Watershed Research and Management Efforts

In its Eighth Report, the GNEB reviewed the institutions that manage border water resources in the U.S. and Mexico, identified data gaps, and made recommendations intended to improve water resources management along the border. The report specifically encouraged binational sharing of information about water quality and transboundary aquifers and noted that knowledge about groundwater resources in the border region lags far behind that on surface waters. It further noted that a coordinated program for transboundary aquifer analysis was essentially nonexistent.

Coordination on shared aquifers is difficult because groundwater is controlled by state governments in the United States and the federal government in Mexico. Lacking data about their shared aquifers, water managers face particular challenges in developing effective policies to manage groundwater resources that, in some cases, are being drawn down by water users on both sides of the border. They often are faced with the "blank map" syndrome in which a transboundary aquifer is mapped by an entity in the United States but, because the U.S. researcher lacks access to Mexican data, the portion of the aquifer south of the border shows up completely blank on the map (the same problem occurs north of the border for the Mexican researcher). With the exception of an international agreement restricting groundwater pumping along the Arizona-Sonora border near San Luis, Arizona (IBWC Minute No. 242), there are no U.S.-Mexico agreements regulating groundwater.

The federal U.S.-Mexico Transboundary Aquifer Assessment Act became law in December 2006, and was drafted to exclude California because of concerns about the All-American Canal dispute. The legislation directed the Secretary of the Interior to establish a program in cooperation with the U.S. border states, the water resources research institutes of each state, the IBWC, and other entities in the United States and Mexico to characterize, map, and model priority transboundary aquifers in Texas, New Mexico, and Arizona. Under the Act, the USGS will work with these entities to conduct joint scientific investigations, share and archive data, and produce scientific documents for distribution. The Act authorized federal appropriations up to $50 million over 10 years. In FY 2010, $1 million was appropriated.

In 2009, the IBWC signed a Joint Report of the Principal Engineers to implement the Act. IBWC will provide the framework for exchanging data, facilitate agreement on the aquifers that will be evaluated jointly, establish and coordinate binational technical committees for each transboundary aquifer, and serve as a repository for binational project reports developed under the program. Both the Act and the Joint Report have provisions that could allow some U.S. funding to be used for research in Mexico.

An effort initially spearheaded by EPA has led to development of the Binational Water Quality Data Warehouse (http://apps.ibwc.state.gov/BNQW/en/homeqwdata.asp), a virtual warehouse where various entities can make border region water quality data available online. The Data Warehouse contains validated, quality-assured data that will be maintained by the IBWC. Cooperating agencies are the City of Brownsville, Texas, CONAGUA, EPA Regions 6 and 9, the IBWC, TCEQ, the Texas Water Development Board, and the USGS. Data from Mexico are limited at this time, with more monitoring events planned for the future. Although establishment of the Data Warehouse

is an important development regarding water quality data in the border region, data gaps remain and ongoing differences in data gathering protocols make it difficult to develop a fully integrated binational water quality database. In its May 19, 2009, advice letter, the GNEB encouraged improved water resources research, planning, and management and also offered support for the new transboundary aquifer assessment effort.

The Board's May 2009 letter also recommended increased support for binational coordination of coastal waters monitoring efforts in the border region. In the Texas-Tamaulipas area in particular, coastal monitoring lags. The TCEQ, for example, has only two monitoring stations near the mouth of the Rio Grande. In the California-Baja California coastal area, a well-developed water quality monitoring program provides data regularly. Eighty-nine sites are monitored in summer and 64 in winter in the San Diego region by the County of San Diego, other local governments, and wastewater treatment facility operators. The IBWC also is developing new methods using land- and water-based monitoring techniques to better track pollution point sources. These new techniques will use underwater vehicles and high-frequency radar to track water current movements and water quality parameters.

The Board recommended addressing the continued impacts of nonpoint source pollution in watersheds in its May 2009 letter. California has made a start by funding watershed planning efforts and establishing TMDL limits and regulations. Mexico and the United States, however, have minimal coordination across the border for water planning and nonpoint source control in binational basins. Nonpoint source pollution is difficult to measure, yet still a major concern, especially in arid regions where little but often intense rainfall produces tremendous amounts of runoff.

In summary, although progress has been made related to water data in the border region, the GNEB's recommendation of 5 years ago to enhance data collection efforts remains valid in 2010.

Water Planning

The GNEB in its Eighth Report listed improved planning as one of its key recommendations on managing scarce water resources in the border region more efficiently and effectively. The Board's May 2009 letter reiterated this need. The Eighth Report cited piecemeal implementation of watershed projects as a barrier to efficient management and recommended enhanced binational watershed planning.

Recent developments in the Colorado River Basin only serve to highlight the relevance of these recommendations. In 2007, the Secretary of the Interior approved new guidelines for managing water in the lower Colorado River Basin (Arizona, Nevada, and California) in light of ongoing drought and projected future shortages. In the event of extraordinary drought, Mexico also could face reductions in Colorado River water deliveries from the United States. Faced with these and other challenges, Interior Secretary Dirk Kempthorne and Mexico's Ambassador to the United States, Arturo Sarukhan, in August 2007, issued a joint statement calling for IBWC to expedite discussions to further Colorado River cooperation between the two countries on the water needs of both countries, water conservation and augmentation, environmental priorities, and opportunities for more efficient water deliveries to Mexico.

Since then, the IBWC has convened in the Colorado River Joint Cooperative Process a binational group of stakeholders representing the nine U.S. and Mexican states in the basin, water users, environmental organizations, federal agencies, and others, to explore potential joint cooperative actions. This Binational Core Group hopes to develop a framework for long-term projects to enhance supply, delay or minimize shortages, and meet ecosystem needs. This effort to develop a long-term, comprehensive, binational plan for the basin represents a significant challenge that, if successful, could benefit millions of people in both countries. The outcome of this process could help to inform other transboundary watershed planning efforts that already are under way, or that could be undertaken in the future.

As the U.S.-Mexico border region faces population growth and increased potential for water shortages, the need for improved planning remains. Although positive efforts are moving forward, innovative planning strategies should continue to be a priority and receive support from the federal government. ■

Photo Credits:

Page 26, sidebar. The Rio Grande/Río Bravo where it becomes the international border between El Paso and Ciudad Juárez. ©Krista Schlyer

A guitar player at the fence between Tijuana and San Diego. ©Krista Schlyer

CHAPTER 5

Solid and Hazardous Waste

Recommendations

1) Increase the number of local, state, and/or federal hazmat certified inspectors at ports of entry that accept waste, and develop the necessary memoranda of understanding to ensure real-time coordination between state and federal inspectors.

2) Increase the effectiveness of border hazardous waste inspection and enforcement programs identifying potential violators, increasing safety, and making better use of available resources. Establish specific times for hazmat vehicle transit across appropriate ports of entry.

3) Improve the tracking of hazardous waste by strengthening the CEC's Waste Tracking Project to expedite movement of legal materials across borders, stop illegal shipments that could threaten human health and the environment, and improve enforcement capacity. Implement the electronic manifest (e-Manifest) system proposed by EPA to enable hazardous waste shipment data to be transmitted electronically in real time and in a format that is compatible with Mexico's tracking system. Continue to test and implement the Radio Frequency Identification (RFID) program so that it complements the e-Manifest.

4) Support efforts to create and maintain safe storage facilities for hazardous waste to accommodate increased demand.

5) Encourage binational dialogue to address the problem of indefinite storage of hazardous waste in Mexico, including remediation work at existing hazardous waste sites of concern. Encourage Mexican authorities to reform hazardous waste laws and regulations so that finite and enforceable time limits are established for storage at generating, storage, recycling, transporter, and treatment facilities.

6) Provide more information via seminars, workshops, and other mechanisms to the maquiladora industry on hazardous waste handling and disposal rules to clarify documentation and processing requirements, and to enhance compliance with national and binational agreements.

7) Work with U.S. states in cooperation with the government of Mexico to improve control of the flow of used and scrap tires and other used goods, including appliances and vehicles, to Mexican border cities.

8) Provide federal resources for upgrading states' solid waste management infrastructure, including: recycling centers that process scrap tires, facilities such as crumb rubber processing plants that produce material that can be used in paving roads and highways throughout the border states (as is already being done in Arizona, Texas, and California) or as a substitute for gravel in playgrounds, and facilities that utilize tires as fuel replacement in cement kilns or to produce electrical energy.

9) Provide federal government support to tribes, private landowners, rural communities, state parks and protected areas, and federal land management agencies to address solid waste issues associated with undocumented crossings. New partnerships should be developed for the timely retrieval of undocumented migrant belongings left behind when individuals are apprehended by Border Patrol personnel.

10) Facilitate the development and operation of binational markets in recyclables.

11) Coordinate with U.S. state and Mexican agencies to develop a banned pesticide inventory and a sustainable mechanism to collect unwanted agricultural pesticides from the border region. Determine if pesticides are being unlawfully brought across the border (in both directions), and, if so, identify the source(s) of this activity and develop possible solutions. Identify the highest risk agricultural pesticides being used in the border region, and encourage the transition to reduced-risk pesticides through outreach and demonstration.

The tracking, management, and treatment of both hazardous and non-hazardous waste in the U.S.-Mexico border region is governed by numerous laws and statutes of each individual country and by binational agreements such as the La Paz Agreement, Annex III, which establishes the importance of cooperation between the United States and Mexico on hazardous waste and substances in the border region. Efforts to control and manage waste are particularly challenging in this region because of significant differences in wealth, resource availability, and level of infrastructure between the two countries. Waste, by definition, is a concept with fuzzy boundaries—something only becomes characterized as a waste product in the United States when it is no longer wanted by someone—and efforts to increase recycling and reuse can further complicate the issue. Thus, waste that is intended for recycling is differentiated from that headed to a landfill. In Mexico, for example, the importation of waste is governed by different rules depending on whether it is being imported for the first time or not and whether it is being imported for recycling or co-processing (SEMARNAT-07-029-A, B, and C). Likewise, once waste is defined as such, it then is classified based on its origin (e.g., municipal or industrial) and its potential for causing harm (e.g., hazardous or non-hazardous). The various waste categories are linked; however, in the United States, before a material can be classified as a hazardous waste, it must first be classified as a solid waste as defined under the Resource Conservation and Recovery Act.

Waste disposal occurs in locations along the U.S.-Mexico border in: (1) controlled and sanitary landfills, those with at least partial inspection, supervision, and application of necessary measures to comply with the established regulations; (2) uncontrolled dumps, where different types of wastes are disposed and mixed without any control; and (3) open dumps, where waste is disposed and accumulated illegally without any technical control in places such as deserted lots and ravines. Waste that falls in the latter category is readily moved about during periods of heavy rainfall so that waste deposited in one community or area can and does end up in another, at times crossing the international boundary. Only in controlled dumps is waste separated according to whether it is hazardous or not.

The New Cornelia Mine in Ajo, Arizona, is one of the largest mines in world with a 1.5 mile wide open pit; 7.4 billion cubic feet of tailings from the mine also are cited as one of the largest dams in the world. The mine closed in 1985 after a long labor dispute.
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In 2003, the most recent year for which data are available from SEDESOL/INEGI, 56 percent of Mexico's municipal solid waste went to sanitary landfills, 11 percent went to uncontrolled dumps, and 33 percent went to open dumps.[1]

Rapid industrialization and the associated population increase have strained the waste management systems in the border region of both countries. This chapter highlights specific waste management issues and the need for improved hazardous waste, solid waste, and scrap tire management infrastructure. Some of the specific waste issues include the tracking of transboundary shipments of hazardous waste and the need for increased development of new hazardous waste disposal sites; health and environmental risks posed by inactive, contaminated sites; the need for the collection and disposal of accumulated banned and unwanted pesticides; and the large accumulation of scrap tires in the border region. Persistent efforts by local, state, and national government agencies, citizen groups, and business and industry have led to significant improvements in border waste management, but there is still much to be done. This chapter considers waste management and tracking and uncontrolled waste disposal.

Waste Management and Tracking

Waste management can be costly, and many border communities receive more waste than would be expected based on the size of their populations. Many small border communities are located along major trade corridors that have experienced increased flows of heavy duty vehicles, passenger vehicles, and people. This flow, which benefits businesses and consumers throughout the United States, increases the burden on these communities to provide services such as solid waste disposal, but does not generate revenues to offset those costs. In spite of significant efforts by institutions such as the BECC and NADB, the area's waste collection and disposal infrastructure continues to be unable to keep pace with the rapidly growing border population's needs. According to the Mexican government, the amount of solid waste shipped back to the United States from Mexico increased from 33,187 tons in 1995 to 79,184 tons in 2000, a 140 percent increase.[2] At the same time, small border communities often cannot support local landfills because they do not generate enough solid waste on a regular basis to make it cost effective for solid waste management companies. For example, an industry standard cited by Pima County, Arizona, is that a solid waste landfill cannot operate in a cost-effective manner at less than 500 tons of solid waste per day. As a result, border counties in Arizona locate collection bins throughout the county and solid waste deposited in these bins must be transported over large distances to regional landfills and/or transfer stations. This is very costly to the counties, which operate these facilities at a loss.

Recycling programs in many border counties have not been able to remain self-sustaining; as a result, for example, there are no established recycling programs in many Arizona border communities. It has been suggested that linking recycling programs in border sister cities might generate materials in quantities large enough to be economically sustainable. Facilitating binational markets in recyclables would provide economic development opportunities that also would address an important border environmental problem.

Hazardous waste poses additional problems. The consequences of inadequate waste inspections and management can be severe. For example, in 2004, EPA settled with three hazardous waste firms, one in Tijuana, Mexico, and two in San Diego, after two loads of hazardous waste from these firms burst into flames after being brought into the United States from Mexico, one at the Otay Mesa port of entry and the other on the open road in Riverside County.

In the United States, responsibility for managing hazardous waste is shared by multiple government agencies at varying levels. EPA is the federal lead for hazardous waste management, with other federal, state, and local agencies playing critical roles. The U.S. Department of Transportation (DOT) regulates the safe and secure transportation of hazardous materials and wastes in interstate, intrastate, and foreign commerce, and U.S. Customs and Border Protection (CBP), a component of DHS in conjunction with other federal authorities, enforces compliance with U.S. trade regulations. At the state level, various agencies have delegated authority from EPA to manage transboundary

Scrap tires used as foundations for informal housing, Los Laureles Canyon, Tijuana. ©Paul Ganster

movement of hazardous waste when waste is being transported through, or being sent to, their state for final treatment or disposal. In some U.S. border communities, local government agencies also have a direct role, as in the case of San Diego County, where trucks are inspected at ports of entry. On the Mexican side of the border SEMARNAT has primary oversight for managing hazardous materials and, like EPA, is supported by a number of federal and state agencies with specific roles.

Properly disposing of hazardous waste is essential if border communities are to remain safe, and if industry is to continue to be in compliance with U.S. and Mexican law. Under Mexico's General Law of Ecological Equilibrium and Protection of the Environment (*Ley General de Equilibrio Ecológico y Protección al Ambiente—LGEEPA*), all hazardous waste generated by *maquiladoras* as a result of in-bond temporary importation procedures for raw materials or components must be returned to the country of origin of those imported production inputs. Between 1998 and 2002, an average of 81,400 tons per year of hazardous waste was returned to the United States by border *maquiladoras*, including asbestos, cyanides, heavy metals, and solvents.[2,3] Given efforts to increase reporting and improve waste management, this volume is likely to be much greater today. The amount of waste generated is much higher than that being returned, leading to concerns about what is happening to the remaining waste. For example, between 2000 and 2003, five *maquiladoras* in Nogales, Sonora, generated 78,000 tons of hazardous waste, approximately 98 percent of all the hazardous waste reported during this period; the largest contributor of waste was the medical equipment industry, followed by the electric, metal, and electronic industries.[4] Although *maquiladora* managers continue to work toward responsible environmental management practices, the requirements for waste characterization and final disposition are numerous and complicated.

Significant growth rates, coupled with inadequate infrastructure for storing hazardous waste, represent a real threat to the border environment and public health. Despite the requirement that waste be returned to the country of origin, current Mexican law allows generators of hazardous waste to store waste indefinitely onsite, meaning that facilities in Mexico may be *de facto* hazardous waste storage facilities, creating increased risk to public health and safety. In addition, Mexican long-haul trucks currently drive to warehouses just inside their border where they unload their cargo. There, short-distance transportation trucks, called drayage trucks, carry the goods across the border to U.S. warehouses where they are stored until U.S. trucks retrieve them to take them to their final destination. Often, the same warehouses are used to store U.S. goods going to Mexico. Statistics on exactly how many storage facilities exist along the border are insufficient. What is known is that a portion of the goods being stored are hazardous materials, including hazardous waste. Also known is that, in some cases, these materials may be stored for significant amounts of time. Although DOT and the Occupational Safety and Health Administration have strict rules about storage and training, warehouses may not be designed for the storage of such materials and the employees are not always adequately trained to handle them.

The need to return hazardous waste to the United States generates considerable demand for inspection and enforcement services. Hazardous waste can be imported through eight ports in Texas, six ports in Arizona, two ports in California, and none in New Mexico. Trained personnel must be on hand when hazardous waste shipments arrive at the port of entry; when inspection personnel and current hazmat technologies are available to screen vehicles and conduct inspections, potential problems in waste transport can be addressed immediately and potential safety problems can be avoided. Because hazardous waste shipments must be tracked at the ports of entry, EPA has proposed an e-Manifest system compatible with any similar system in Mexico to enable hazardous waste shipment data to be transmitted electronically and instantly.

The four U.S. border states—California, Arizona, New Mexico, and Texas—have differing procedures at their ports of entry, leading to hazardous waste transporters traveling greater distances to take advantage of more favorable policies at particular ports. The optimal scenario regarding hazardous waste cargo is an efficient and timely transport route from origin to final destination. California, for example, has enacted stringent environmental regulations at ports of entry, reportedly causing some shippers to divert their trucks importing hazardous waste to the San Luis, Arizona, border crossing. Only California has local and state inspectors working alongside federal CBP inspectors at ports of entry; in Arizona, New Mexico, and Texas, CBP hazardous materials inspectors work independently, although they can call upon state agencies for support.

The interaction among regulatory agencies located in the border region is of prime importance. This is especially true at the ports of entry where hazardous wastes are imported into, or exported out of, the United States. For compliance assurance with U.S. hazardous waste regulations, the coordination between CBP, EPA, and the environmental agencies in the

border states is crucial. After the events of September 11, 2001, changes were made in the reliance of CBP inspectors on state and local officials to help with inspections. Although New Mexico does not allow importation of hazardous waste, Arizona and Texas would like to be able to have their state inspectors work alongside the federal officers. TCEQ and Arizona Department of Environmental Quality (ADEQ) investigators no longer have access to their respective ports of entry, apparently because newly required Memoranda of Understanding are not in place. Arizona and Texas state inspectors have the training and safety equipment to inspect and sample shipments that they believe warrant inspection, even after the technology-based inspections of the federal officers. If state investigators or emergency responders cannot assist CBP in inspecting transboundary shipments of hazardous waste, even if on an infrequent basis, environmental risks to border communities are multiplied.

Tracking hazardous waste beyond the ports of entry, ensuring the same cradle-to-grave tracking of wastes available in other parts of the United States (from point of origin to the receiving facility), requires additional infrastructure. Currently, there is no system to provide real-time tracking for hazardous waste in the binational border zone. Regulators and first responders of both nations often are forced to deal with border zone incidents with incomplete information.

In the past, EPA has collaborated with CBP and local, county, and state partners to conduct commodity flow surveys that provide a snapshot of the types of hazardous materials that cross the border at a given port of entry. One tracking mechanism available to federal agencies with responsibilities in this area is the domestic requirement for submissions of hazardous waste manifests so that when utilized and shared among relevant agencies, deficiencies can be addressed before cargo continues into the U.S. interior. EPA's export notice and consent regulations and procedures also provide information, although waste transported for recycling is exempted. Another source of tracking information is provided by DOT's Bureau of Transportation Statistics, which maintains databases on traffic flow of people and goods across national borders.

HAZTRAKS, a database developed by EPA to track hazardous waste entering the United States, was discontinued in 2003; therefore, comprehensive, up-to-date statistics are not easily accessible. Specific statistics, however, provide insight. During a recent 12-month period, approximately 11,900 tons—about 70 percent of all hazardous waste entering the United States from Mexico—came through the Otay Mesa port of entry, ultimately going to 12 states for final disposal, including Minnesota, Pennsylvania, and South Carolina. Other data show that in 2005, of the hazardous waste imported to Texas facilities from Mexico, more than 50 percent, or 5,700 tons, was refinery waste. Much of the rest was hazardous waste because it was flammable or contained heavy metals or spent solvents.

Several efforts to improve cross-border waste tracking are under way. The CEC has undertaken a study of transboundary hazardous waste tracking in North America. The three objectives for the CEC Waste Tracking Project are: (1) expedite movement of legal materials across borders; (2) stop illegal shipments that could threaten human health and the environment; and (3) improve enforcement capacity. The project also will include information exchange; training for customs officials and other law enforcement officials, including border and port inspectors; and capacity building within legal and judicial systems. EPA is piloting the RFID to complement e-Manifest, which does not track hazardous waste beyond the border. The two RFID technologies evaluated by EPA performed well during field testing and achieved high tag read rates. The field testing reports are available on EPA's Environmental Technology Verification Program Web Site (http://www.epa.gov/etv) for other potential RFID users to reference, and EPA plans to conduct outreach to inform industry, regulators, and other interested parties of the field testing results. Although there are no plans for EPA to regulate RFID tracking at present, these technologies have proved to be an effective tool to address cradle-to-grave accountability for transborder shipments.

Agricultural waste and pesticides create a particular challenge. The border area of Arizona-Sonora and California-Baja California is a highly productive agricultural area where numerous crops such as melons, broccoli, lettuce, and onions are grown. Agricultural officials on both sides of the border have identified a need to collect and dispose of unwanted pesticides that have accumulated on farms and in sheds, or that have been abandoned or are no longer usable. In coordination with agricultural and environmental agencies in Mexico and the United States, EPA conducted two pilot pesticide collection projects at the U.S.-Mexico border. The first project was conducted in Yuma, Arizona, and San Luis Río Colorado, Sonora. Approximately 75,000 lbs of waste pesticides were collected during two events in the summer of 2006. This included the banned pesticides DDT, Endrin, and Toxaphene, which are all listed as Persistent Organic Pollutants (POPs). POPs are problematic because of their toxicity, potential to bioaccumulate in the food chain, stability and resistance

Local volunteers clean up after a storm washed debris into the Tijuana Estuary. ©Ben McCue/WiLDCOAST

to natural breakdown, and propensity for long-range air and water transport. Additionally, 35,000 lbs of methyl parathion were collected during the San Luis event. The second project was conducted in Imperial County, California, and Mexicali, Baja California. Approximately 45,000 lbs of waste pesticides were collected and properly disposed during this event. The majority of the waste was transported to an incinerator in the United States. The dioxin-containing materials that could not be disposed in the United States were transported to Canada for proper disposal. A third event in Yuma-San Luis is planned for 2010.

Despite the success of these efforts, unwanted pesticides, including those that are banned, remain throughout agricultural regions along the border. Coordination among U.S. federal and state and Mexican agencies is needed to develop a banned pesticide inventory and a sustainable mechanism to collect and properly dispose of unwanted agricultural pesticides. Information about the transport of pesticides in both directions across the border also is needed, especially where pesticides are being exported illegally. Even in areas where current practices are legal, long-term solutions include the reduction or elimination of the highest risk pesticides and will require a transition to reduced-risk pesticides through inventory changes, outreach, and demonstration.

Uncontrolled Waste

Despite efforts to control waste, insufficient management of both hazardous and non-hazardous solid waste is a significant problem for most U.S.-Mexico border communities, particularly smaller, more rural communities. Systems for collection and disposal of waste frequently are inadequate, and generally lack alternative waste management strategies such as recycling. As a result, waste accumulates in streets, empty lots, washes, and elsewhere in the region. In addition, many border specialists and citizens are concerned that large volumes of untreated industrial waste might be dumped into municipal sewer systems, landfills, local watercourses, or secluded areas within or near cities. Solvents used in the electronics industry and heavy metals associated with metal finishing and other operations are of special concern.

The flow of used goods from U.S. border communities to businesses and consumers in Mexican border communities and beyond also is significant. The flow includes clothing, electrical appliances, used vehicles, scrap vehicles, used computers and other electronic items, used building materials, furniture, and used tires. Although this relieves the U.S. border communities of the need to dispose of large quantities of used goods as solid waste, the goods have a limited life and accumulate as solid waste in Mexican border communities. Scrap tires provide an especially vivid and visible example of this problem. By 2007, some 6.4 million scrap tires had accumulated in large and small piles, especially in Mexican border communities. These piles present environmental and public health threats to both Mexican and U.S. border residents, contribute to urban and rural blight, and create breeding grounds for mosquitoes and other disease vectors. An investigation of an outbreak of dengue fever in Brownsville, Texas, and Matamoros, Tamaulipas, in late 2005 revealed the highest prevalence of human anti-dengue antibodies in the continental United States in the past 50 years, and the first case of classic dengue hemorrhagic fever acquired in the continental United States. The investigation identified discarded tires as the single largest breeding site for the dengue transmitting mosquitoes *Aedes aegypti* and *Aedes albopictus* in both Brownsville and Matamoros.[5]

Scrap tire pile fires are extremely difficult to extinguish, contaminate soils and watercourses, and produce dangerous emissions that affect both sides of the border. Scrap collectors often burn tires to retrieve scrap metal, releasing toxic fumes into the air. Tires are burned as fuel in brick kilns and adjacent to agricultural fields to protect sensitive crops during periods when freezing temperatures are expected. Emissions from these burning practices generate dense smoke that can be seen for miles and result in harmful levels of particulates and other contaminants that affect surrounding communities. In Tijuana and some other Mexican border communities, millions of scrap tires have been used by homeowners for construction

of foundations, retaining walls, and staircases. These structures often fail and the tires are washed across the border by winter storms, creating significant and expensive clean-up problems.

U.S. and Mexican federal, state, and local authorities, within the framework of Border 2012, have worked closely together to clean up many of the scrap tire piles. The challenge is to better control the unauthorized flow of used tires to Mexico and to develop uses and markets for scrap tires (such as for road paving and other civil engineering applications). Scrap tires create a binational environmental problem that only will be solved by the active participation of the U.S. and Mexican federal governments through means such as the U.S.-Mexico Scrap Tire Management Initiative under the Border 2012 Program.

Trash and other waste left by undocumented migrants and drug smugglers in the process of crossing into the United States remains a particularly vexing problem all along the border—on private, local, state, federal, and tribal lands. In trying to survive while crossing harsh landscapes, individuals tend to leave behind everything they do not need, including empty water and food receptacles, along the route. At pick-up locations where they obtain transportation to urban areas, crossers usually jettison everything except the clothes they are wearing to more easily blend into the urban landscape. The resulting trash, along with vehicles and bicycles abandoned by migrants and smugglers, litter the landscape. Federal land managers working in places such as the Cleveland National Forest in California and the Cabeza Prieta National Wildlife Refuge in Arizona, as well as private managers on ranches such as the Diamond A Ranch (formerly the Gray Ranch) in New Mexico, have reported significant problems with trash. Tribes along the border, such as the Tohono O'odham Nation, the Cocopah Indian Tribe, the Quechan Indian Tribe, and the Campo Band of the Kumeyaay Nation share these problems. On the Tohono O'odham Nation, for example, it is estimated that several hundred undocumented migrants dump more than a ton of trash on the reservation every day. The Tohono O'odham Nation successfully completed a pilot waste removal project in 2005, but undocumented migration through the area continues, and no one agency or organization is clearly responsible for removing the solid waste left behind.

One effort to gather data necessary for developing an effective program for managing waste left behind by undocumented migrants began with the 2007-2008 Undocumented Migrant (UDM) Waste pilot project funded by BECC and carried out by ADEQ. The project identified two major constraints to UDM Program development: (1) the scarcity of UDM waste assessment, and (2) the lack of tools to facilitate collaborative information management and outreach for UDM waste cleanup. To address these gaps, ADEQ partnered with the University of Arizona to develop a Web-based UDM Waste Center—an interactive Web site that will provide background information, a mapping feature, and an assessment methodology. These tools (e.g., pre-cleanup checklist, guidance manual, field form and instruction sheet, and supply checklist) have been designed to increase the cost effectiveness of UDM waste cleanups along the Arizona-Sonora border. Field reports, including photographs, will be uploaded and linked to the corresponding area on a map. To make this project a success, ADEQ is working closely with state, federal, and tribal agencies along the border in Arizona, including the Borderlands Management Task Force, which includes local government agencies that deal with border issues in Arizona and the Tohono O'odham and Pascua Yaqui Nations. ■

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Page 34, sidebar. Undocumented migrant waste cleanup. ©Arizona Department of Environmental Quality

*A common merganser (*Mergus merganser*) on the San Pedro River in Sonora, Mexico. ©Roy Toft*

CHAPTER 6

Emergency Response and Planning

Recommendations

1) Ensure that robust emergency response capabilities exist and are supported adequately along the border. Efforts to train Mexican first responders and provide needed emergency response equipment are a priority. Frequent joint training exercises on both sides of the border must be conducted regularly to ensure emergency preparedness.

2) Resolve liability issues for cross-border emergency responders by resolving reciprocity between U.S. and Mexican insurance companies as well as issues related to workers' compensation, bargaining, and sovereign immunity.

3) Develop effective procedures to expedite the entry and exit of emergency responders during incidents along the U.S.-Mexico border and work with the Mexican government to ensure its involvement. In addition, plan for evacuations across the border because at any time, thousands of U.S. border city residents are working or visiting across the border.

4) Strengthen communication systems along the border to ensure that federal-federal agreements on such issues are implemented at the state and local levels where possible. Radio and cellular telephone communications between Protección Civil and U.S. federal, state, municipal, and tribal emergency responders should be tested and updated regularly.

5) Fully implement the Agreement between the United States and Mexico on Emergency Management Cooperation in Cases of Natural Disasters and Accidents signed by Secretary Rice and Secretary Espinosa on October 23, 2008.

6) Adapt the National Response Framework (NRF) Support Annex on International Coordination to enable rapid response to natural disasters in the border region. Although the NRF mentions the U.S.-Mexico Marine Joint Contingency Plan (Marine JCP), it does not address the Joint United States-Mexico Contingency Plan for Preparedness and Response to Environmental Emergencies Caused by Releases, Spills, Fires, or Explosions of Hazardous Substances in the Inland Border Area.

7) Build capacity so that the necessary technology and experienced decision makers, including new players at all levels, are available in the field during a response. Hurricane Katrina and the Southern California wildfires of 2007 proved that responders at all levels must have the capacity to respond quickly and effectively.

8) Clarify and expand Sister City Agreements. Encourage sister city communities to expand both the substantive and geographic scope of their agreements. Substantive scope could be expanded to include pollution, natural events, or other incidents as found in the NRF.

9) Strengthen both informal and cross-agency binational collaboration. Continue to work with the DHS and its Mexican counterparts (e.g., Aduanas) to enhance capabilities for rapid, cross-border emergency response mobilization.

Two men in protective gear cleaning up after chemical accident. ©Andreas Prott/iStockphoto

Forest fire at night. ©Wesley Tolhurst/iStockphoto

The U.S.-Mexico border region provides a complex example of what can occur when vulnerable populations on both sides of the border are faced with an emergency of significant proportions. Extreme weather events such as hurricanes, floods, tornadoes, wildfires, earthquakes, and mudslides do not respect national boundaries. In addition, the transportation, storage, and widespread manufacturing use of hazardous materials through and in the vicinity of border ports of entry pose significant hazards from accidental releases and/or acts of terrorism. (The issues of emergency preparedness and border security were explored at length in GNEB's 10th and 11th reports to the President and Congress.[1,2])

Vulnerability to emergencies along the border presents a wide range of logistical issues. Unlike non-border communities, border communities must attempt to coordinate emergency response with their neighbors across the border, often through informal channels. A local emergency incident in the border region can quickly become an international incident. Scarcity of resources at the municipal level in many border communities also is a major problem.

Since September 11, 2001, border security in the United States has added additional layers of complexity to national policy decisions, including those that affect the border region's vulnerability to hazardous material emergencies and natural disasters. For example, maintaining a tightly controlled border for enhanced security may hinder the ability to cross the border quickly to provide assistance in the event of a chemical emergency or a natural disaster. Residents on both sides of the border are all too aware of the need to respond effectively in real time. Many of these communities also have invested in international cooperation through sister-city agreements and informal venues.

On the government-to-government level, some institutional frameworks already are in place to address cross-border response to hazardous materials emergencies and natural disasters. Some of these institutional frameworks have yet to

be implemented, however, and therefore remain untested. Others have never been fully implemented and therefore have not always enabled the rapid and targeted responses that are needed when a chemical emergency or a natural disaster strikes the same geographical region on both sides of the border.

Hazardous Materials

Border communities through which hazardous materials are transported may be at risk at any time. A hazardous materials incident can begin at the point of manufacturing, during transportation, or at ports of entry. Recognizing that hazardous materials contingencies or emergencies primarily affect local communities, and that 90 percent of the population in the inland border area resides in 15 sister-city pairs, future planning efforts are required to respond to an event of considerable magnitude that involves one or more hazardous chemical substances.

Cross-border emergency preparedness dates from Annex II of the La Paz Agreement, which established the binational Joint Response Team (JRT) and the development of the U.S.-Mexico Joint Contingency Plan for Preparedness for and Response to Environmental Emergencies in the Inland Border Area (JCP). The JRT is co-chaired by EPA, the General Coordinator for Protección Civil, Secretaría de Gobernación (SEGOB), and the Federal Attorney General for Environmental Protection (Procuraduría Federal de Protección al Ambiente, [PROFEPA]). The JRT includes federal, state, and local representatives of both countries and U.S. tribal representatives responsible for emergency prevention, preparedness, and response in the border area.

The JCP was created to establish cooperative measures for the JRT, including emergency response notifications, planning, exercises, and training, and to prepare for and respond to oil and hazardous materials incidents along the inland border. It has provided the basis for 15 Sister City Binational Emergency Response Plans developed during the past few years. During 2006, the JCP was revised through the Border 2012 Emergency Preparedness and Response Border-Wide Workgroup (BWWG) to: (1) incorporate an updated binational notification system; (2) reflect recent reorganizations in both countries; (3) address

Tijuana River Valley flood in a winter storm, December 2008. ©John Gibbins/The San Diego Union Tribune

local border communities, including tribal governments; and (4) incorporate SEGOB, Dirección General de Protección Civil, as the third co-chair for the U.S.-Mexico BWWG.

Although both environmental and security officials focus on the safe transportation of hazardous materials at ports of entry and beyond and also plan for emergency response in the event of a release, they do not always have the opportunity to leverage their efforts. In addition, groups such as tribes and surrounding communities may not be included fully in strategic planning, communications, or resource allocation decisions. Ports of entry lack staff to inspect all shipments of hazardous materials, including hazardous waste, and some local emergency responders have inadequate training. Environmental agencies also lack hazardous materials tracking data as well as more general chemical storage data. Although CBP prescreens shipments before they leave 32 foreign ports, it does not do so at land ports in Mexico. Additionally, emergency responders are not able to cross the border easily to respond to incidents because of insurance, liability, national sovereignty, and command issues, and customs and border procedures often delay response times. In addition, safety concerns due to the increasing violence in Mexico may have prevented some emergency response actions, or even attendance at exercises in Mexico, by U.S. emergency responders.

Natural Disasters

Hurricanes, floods, tornadoes, earthquakes, mud-slides, and wildfires pose a risk to those living along the U.S.-Mexico border. Although floods, even in desert areas, may pose the most widespread threat, other events can inflict as much damage. Earthquake risk is especially strong in California as a result of the high tectonic activity, but earthquakes also have occurred in Texas. Texas is at risk for tornadoes, but tornadoes have struck other parts of the border region as well. Wildfires occur along the entire border.

Recent history has clearly demonstrated the border region's continued vulnerability to natural hazards. In October 2007, for instance, wildfires raged through Southern California, destroying 2,000 homes and causing more than $2 billion in damage. Flooding also has continued to beset the region, with recent examples in Arizona/Sonora and Texas/Chihuahua. In August 2007, intense local storms sent a wall of water through the Nogales Wash, an arroyo now lined as a concrete drainage channel that flows from Nogales, Sonora, through the heart of its sister city of Nogales, Arizona. The aging channel suffered extensive damage in the United States. A 116-foot long segment of the floor of the wash was swept away, and a massive void was detected behind the west wall of the channel. Perhaps of greatest concern was that the damage exposed an international sewer line under the floor of the wash, creating a significant risk that the line would rupture and potentially flood parts of central Nogales, Arizona, with wastewater or contaminate the Santa Cruz River further downstream. The April 4, 2010, magnitude 7.2 earthquake south of Mexicali damaged irrigation canals in Baja California and also was felt in California and Phoenix.

The U.S.-Mexico border region provides a unique and often challenging set of circumstances when compared to domestic-only or international-only contexts. Declaring and managing natural disasters in the border region can be especially complicated. Domestic and international incidents each trigger a different set of responses, including whether the incidents ultimately are declared disasters by either the U.S. or Mexican federal governments. Gaps in response actions can take place at the federal level when agencies, which typically respond exclusively to domestic or international incidents, suddenly are faced with addressing different impacts. For example, U.S. agencies that normally only respond to domestic disasters suddenly may face international concerns as a result of an incident just across the border in Mexico. Likewise, U.S. federal agencies that normally provide international assistance to foreign disasters may suddenly have to examine domestic implications of an event that occurs on the Mexican side of the border. ■

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Page 42, sidebar. Two firemen charge a residential structural fire with a broad spray of water from hose. © TheImageArea/iStockphoto

CHAPTER 7

Habitat and Biodiversity Conservation

Recommendations

1) Encourage, foster, and implement partnerships among agencies on both sides of the border that have responsibilities to manage public lands, critical habitats, and wildlife, particularly in natural protected areas adjacent to one another such as sister parks. Widespread support for international cooperation is essential to the success of these partnerships and equally benefits natural resources, habitats, and wildlife on both sides of the border.

2) Develop and implement wildlife conservation strategies that are adaptive to climate change with collaboration from researchers and managers from both countries. Wildlife, their habitats, and species of special concern will be impacted by a changing climate and availability of resources such as water. The ranges of many species are expected to shift northward across the border; border fencing and associated infrastructure may impede some species' range shifts. Boundaries of protected habitats and species' ranges may need to be adjusted.

3) Encourage, foster, and implement partnerships on a landscape scale, and connectivity models such as those used by the National Park Service's (NPS) Seamless Network of Protected Areas and emerging Landscape Conservation Cooperatives. Engage the Western Governors' Association's strategies for wildlife corridor development, and include Mexican border states in this dialogue. Use these partnerships as a mechanism for coordinated action to reduce stressors, prevent the spread of and assist in removal of invasive species, and support adaptive range shifts of species in response to climate change.

4) Incorporate an ecosystem and biodiversity conservation component into the Border 2012 Program providing a venue of collaboration with Mexican and U.S. partners and a framework for creating synergies with the water and environmental education work groups.

5) Invite Mexican officials from SEMARNAT to participate as ex-officio members in DOI's Field Coordinating Committee for the U.S.-Mexico border. The wide representation of U.S. land management federal agencies on this committee may make this the most appropriate and effective mechanism to coordinate with the committee's Mexican counterparts.

6) Facilitate international allocation of funds for both project activities and international travel, allowing agency staff to implement binational projects, and encourage cross-border travel, translation services, and field cooperation in an effort to promote international cooperation in adjacent protected areas. Lead times required for travel authorization frequently also are a real barrier for collaboration and should be shortened.

7) Promote coordination and cooperation with existing and planned tribal communities on tribal lands and adjacent areas to avoid incompatibility with proposed tribal plans, land use, lifeways, and culture. Encourage efforts that develop synergies with tribal habitat management programs.

8) Expedite development of the DHS-funded USGS monitoring protocol that is being developed for the environmental impacts of the border fence and associated infrastructure for sections of the Arizona fence, and ensure implementation of this program for the entire length of the fence. Ensure that this program adopts an ecosystem approach—including consideration of impacts on wildlife, habitat, and species of concern—and provides the scientific data and analysis needed to evaluate these effects over the lifetime of the fence and associated infrastructure. Make the monitoring protocol readily available to the academic and natural resource management communities, and ensure that it is peer-reviewed and made available to the public for comment. Allocate adequate funding for monitoring, assessment, and reporting of environmental effects as a permanent line item in the DOI federal budget. Encourage long-term shared use of monitoring data among state and federal land management agencies.

9) Mitigation goals for border fence effects should be clearly defined, adequately funded, and linked to specific effects. At present, much of the public has no understanding of the mitigation plans for the border fence, how and when they will be implemented, or what the budget for these actions will be.

The border region encompasses the ecoregions of eastern dry temperate forests, North American deserts, Mediterranean California, temperate sierras, the southernmost part of the Great Plains, and some southern semi-arid highlands. The landscape varies from mountains and grasslands to canyons and deserts. It encompasses several United Nations Biosphere Reserves, National Parks, National Monuments, National Wildlife Refuges, National Estuarine Research Reserves, Natural Protected Areas, National Forests, military reservations, state lands, and other public lands, much of it wilderness. The borderlands also are host to a multitude of endangered species on both sides of the border.

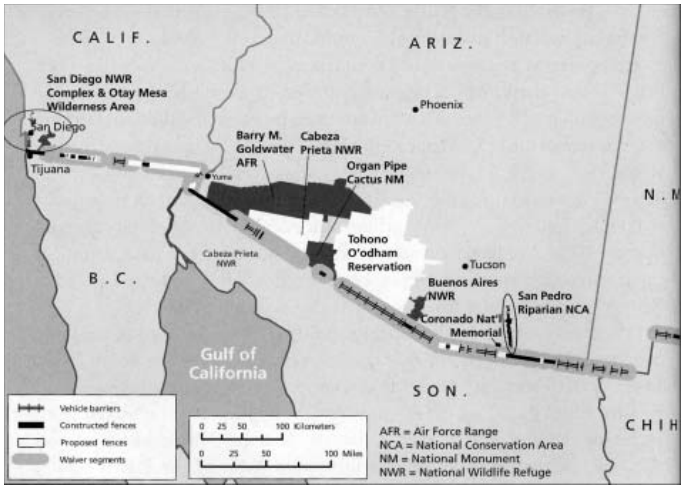
Climate, Habitat Adaptations, and Invasive Species

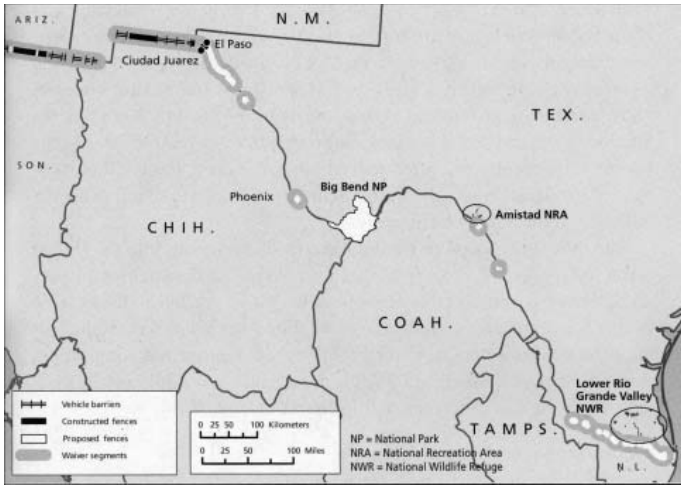
The Intergovernmental Panel on Climate Change (IPCC) predicts that average annual temperature in the U.S.-Mexico borderlands, in addition to much of western North America and Central America, likely will increase by about 1.5°C by 2030 to more than 2.5°C by 2100.[1] In combination with this warming trend, annual precipitation is projected to decrease across the region.[1] The IPCC models predict a 10 to 15 percent reduction in winter rains by 2050.[1] Summer precipitation, created by the northward movement of tropical maritime air masses over the Gulf of Mexico and Gulf of California, likely will remain static or increase slightly due to higher ocean temperatures.[1] Winter snowpack in the headwaters of the Colorado and Rio Grande rivers will be reduced, leading to decreased spring runoff.[2]

In response, current vegetation associations may change. Research suggests a north and east expansion of the Sonoran Desert. Certain subtropical species, no longer inhibited by freezing temperatures, may colonize more northern latitudes.[3] The exotic species buffelgrass (*Pennisetum cilare)* will continue to transform large portions of the Sonoran Desert into a grassland savannah.[4] As temperatures rise, the grass likely will spread upward in elevation, impacting the plant diversity and establishing different vegetation associations than those previously present.[5] The continuation of severe drought conditions, coupled with invasive species, is expected to increase the frequency and severity of wildland fires.[6]

On a local level, San Diego County's Multiple Species Conservation Program (MSCP) is a comprehensive habitat conservation planning program designed to preserve a network

Two javalinas traveling along the border fence in the San Pedro River corridor of southeastern Arizona. ©Krista Schlyer





Western (L) and Eastern (R) portion of the U.S. border, barriers, and waiver segments as of December 2008. Data on segments compiled by Matt Clark. Source: Conservation of Shared Environments: Learning from the United States and Mexico by Laura López-Hoffman, et al. ©2010 The Arizona Board of Regents. Reprinted by permission of the University of Arizona Press.

of habitat and open space to protect biodiversity. San Diego County contains more than 200 plant and animal species that are federally and/or state listed as endangered, threatened, or rare; proposed or candidates for listing; or otherwise considered sensitive. The MSCP Plan was developed cooperatively by local government and public land managers in partnership with the wildlife agencies, property owners, developers, and environmental groups. The plan is designed to preserve native vegetation and meet the habitat needs of multiple species. The MSCP protects the habitat for more than 1,000 native and non-native plant species and more than 380 species of fish, amphibians, reptiles, birds, and mammals. The shifting ranges of flora and fauna predicted from the effects of climate change, however, will require significant adjustments to this carefully crafted habitat conservation effort.

*This jaguar (*Panthera onca*) was photographed in January 2010, 30 miles south of the U.S.-Mexico border in Sonora as part of a private lands conservation partnership. Wildlife corridors that connect sensitive species' breeding grounds in Mexico with healthy habitat in the southwestern United States are critical for their recovery. ©2010 Sky Island Alliance/Rancho El Aribabi.*

From a larger continental perspective, there may be shifts in the timing of life-cycle events (phenology) between migrating wildlife species and the plants on which they depend. For example, the monarch butterfly (*Danaus plexippus)* uses well-defined habitat niches with specific host plants during winter and summer migrations—if the habitat niches shift northward as predicted, the migrating butterflies might not overlap with their habitats and host plants.[7] Likewise, the seasonal arrival times of migratory songbirds are influenced by temperature and large-scale shifts in sea-surface temperature and atmospheric circulation patterns, such as the El Niño Southern Oscillation.[8] If the dates of songbird migrations no longer coincide with the growth or blooming of the plant food sources that they depend on, songbird populations might decline.[9]

Wildlife Protection and Conservation

The United States and Mexico share more than 100 plant and animal species listed under the Endangered Species Act. In many cases, Mexican stocks are the last refuge available for re-establishment of species to their historic ranges in the United States. Because of the shared concern for the status, distribution, and recovery of these species and their habitats, the U.S. Fish and Wildlife Service (FWS) and SEMARNAT have identified capacity building as a top priority in the borderlands. The FWS Wildlife Without Borders grants program was created to facilitate training through three strategic initiatives. The Managing for Excellence initiative supports training for Mexican government officials, typically nature reserve managers and wardens at the federal, state, and municipal levels. Stewards of the Land trains land owners, local communities, and indigenous

Species at risk	Mexican border states						U.S. border states			
	BCN	SON	CHIH	COAH	NL	TAMPS	CA	AZ	NM	TX
—Both Eastern and Western Ecosystems—										
Mexican wolf *(Canis lupus baileyi)*		b	c	c				a	a	c
Jaguar *(Panthera onca)*		a	a		a	a		c	c	c
Northern Aplomado Falcon *(Falco femoralis septentrionalis)*			a			a		a	a	a
—Primarily Eastern Ecosystems—										
Jaguarundi *(Herpailurus yaguarondi)*						a				a
Kemp's ridley sea turtle *(Lepidochelys kempii)*						a				a
Maroon-fronted Parrot *(Rhynchopsitta terrisi)*						a				a
Mexican long-nosed bat *(Leptonycteris nivalis)*				a	a	a		a	a	a
Mexican prairie dog *(Cynomys mexicanus)*				a	a					
Ocelot *(Leopardus pardalis)*						a				a
—Primarily Western Ecosystems—										
Black-footed ferret *(Mustela nigripes)*			a						a	
Black-tailed prairie dog *(Cynomys ludovicianus)*			a					a	a	a
Imperial Woodpecker *(Campephilus imperialis)*		c	c					c	c	
Mexican grizzly bear *(Ursus arctos nelsoni)*		c	c					c	c	
Mexican Spotted Owl *(Strix occidentalis lucida)*		a	a					a	a	
Pronghorn antelope *(Antilocapra americana peninsula; A. a. sonoriensis; A. a. mexicana)*	a	a	a					a	a	a
Thick-billed Parrot *(Rhynchopsitta pachyrhyncha)*		a	a					a	a	
Vaquita porpoise *(Phocoena sinus)*	a	a					a	a		

Distribution of selected species at risk in transboundary ecosystems, coded by level of biological concern: (a) species present; (b) species absent, but habitat present; and (c) species extirpated, and former habitat degraded. Source: Conservation of Shared Environments: Learning from the United States and Mexico by Laura López-Hoffman, et al. ©2010 The Arizona Board of Regents. Reprinted by permission of the University of Arizona Press.

peoples. Voices for Nature supports environmental education and outreach to raise public awareness among teachers, journalists, and the private sector.

A good example of a success in this area was the training of 50 officers from the six Mexican border states in partnership with the Arizona Department of Game and Fish and the Texas Parks and Wildlife Department. The program led to the decentralization of wildlife functions in Mexico and creation of the first natural resource state agency in the state of Nuevo León, and greatly facilitated collaboration between both countries. The Border Governors Conference issued an award to the President of Mexico for supporting this project. This program is now being replicated in other border states.

Another successful cross-border initiative is the FWS' environmental education program in the San Diego-northern Baja California region. This area is an internationally recognized biodiversity hotspot, containing more threatened and endangered species than any other county in the continental United States. Threats include declines in quality and quantity of surface and groundwater, increased runoff from winter storms with accelerated erosion and flood dangers, air pollution, and destruction of natural habitats.

FWS supports a project to protect the Tijuana River Watershed, a 1,750 square-mile basin that lies along the international boundary (one-third of its area is in the United States and two-thirds in Mexico). Training in watershed management as well as support for community-based restoration projects is provided for teachers and communities in Tijuana, Tecate, Mexicali, and Ensenada. More than 1,000 teachers have benefited from this training, and training modules have been incorporated into the Baja California state curricula. Also in Baja California, FWS supports an outreach and monitoring program to restore the California condor *(Gymnogyps californianus)*—which once numbered in the thousands from British Colombia to

*Pronghorn antelope (*Antilocapra americana*) in the grasslands of Texas near the Big Bend of the Rio Grande. ©Krista Schlyer*

Baja California—to parts of its historic ranges in northern Baja California, linking this native population to California's reintroduced populations. This rare species reached near extinction by the 1980s. In 1991, condors bred in captivity in one of the most expensive conservation projects ever undertaken were reintroduced into the wild. As of February 2010, there were 348 condors known to be living, including 187 in the wild. This FWS binational program has made important strides; condors released in Baja California already have flown within kilometers of the international border, potentially connecting the U.S. and Mexican wild populations.

Habitat Management Along the Border

Mexico and the United States have well-developed policies regarding protected natural areas, particularly in national parks and other officially designated natural sites. The federal governments of the United States and Mexico have conducted several binational initiatives. From 1944 through 2000, many agreements were signed that addressed the common environmental and cultural issues faced by the two countries. The September 11, 2001, tragedy impacted the advancement of partnerships and collaboration on the U.S.-Mexico border region in the area of public lands management and natural resource protection because of the singular focus on security.

Binational Partnerships

Although border collaboration has slowed in the past few years, there are several recent examples of new efforts in collaborative binational partnerships.

White Sands National Monument (New Mexico) and Cuatrociénegas Protected Area (Coahuila) entered into a sister-park agreement in 2008 to enhance the understanding and management of their respective management units. Ongoing research, partially funded by the NPS and conducted through Mexican universities, will enhance understanding of Chihuahuan desert ecosystems and the area's cultural and natural resources. The proximity of both areas has led to staff internship exchanges and bilingual brochures for both areas.

Big Bend National Park (Texas), Maderas del Carmen (Coahuila), Cañón de Santa Elena (Chihuahua), and Ocampo Flora and Fauna Protected Areas (Coahuila), jointly have begun to explore the possibility of creating a binational park on the Rio Grande at Big Bend National Park. In a spirit of friendship and collaboration, the two countries hope to exchange

knowledge, technology, and management techniques and create sustainable eco-tourism opportunities and jobs for the benefit of thousands of visitors on both sides of the border.

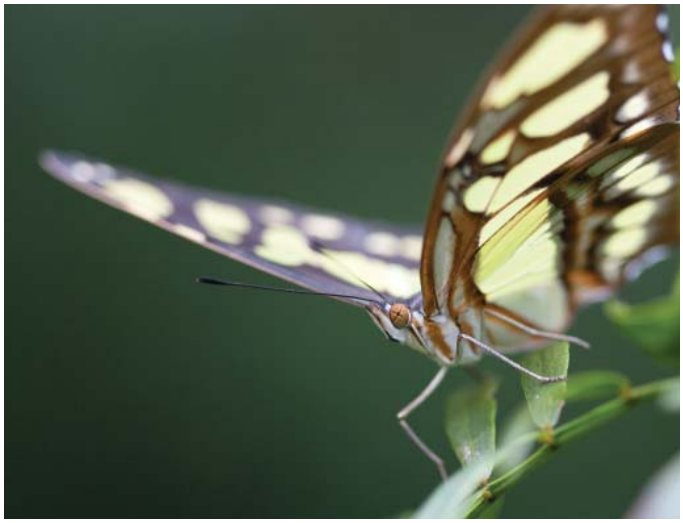
Organ Pipe Cactus National Monument (Arizona), and the Reserva de la Biósfera El Pinacate y Gran Desierto de Altar (Sonora), are sister parks within the Sonoran desert ecosystem. These two areas also are part of the Greater Sonoran Desert Protected Ecosystem, a 3 million hectare (7.4 million acre) binational area that also includes the Tohono O'odham Nation, the Barry M. Goldwater Air Force Range, and several Bureau of Land Management (BLM) Areas of Critical Environmental Concern, including the Cabeza Prieta National Wildlife Refuge.

Las Californias Binational Conservation Initiative is a region located along the U.S.-Mexico border where California and Baja California meet. This is a place of unique natural and cultural resource richness, home to ecosystems and species that are found nowhere else. The area also is home to 5 million people on both sides of the border. Four nonprofit conservation organizations, the Conservation Biology Institute, The Nature Conservancy, Pronatura, and Terra Peninsular, have come together to create a science-based vision for conservation of this unique habitat. To date, approximately 3,500 acres in San Diego County have been conserved, including a recent purchase by The Nature Conservancy totaling 1,100 acres just south of Anza-Borrego Desert State Park. This is a first step in an effort to create transboundary linkages that would connect Palomar Mountain, Cuyamaca Rancho, and Anza-Borrego Desert State Parks with Parque Nacional Constitución de 1857, a protected area located in the Sierra Juárez in northern Baja California. Conservation of these 3,500 acres bolsters the efforts of other conservation partners such as the BLM, California State Parks, Otay-Sweetwater National Wildlife Refuge, and the East County Multiple Species Conservation Program.

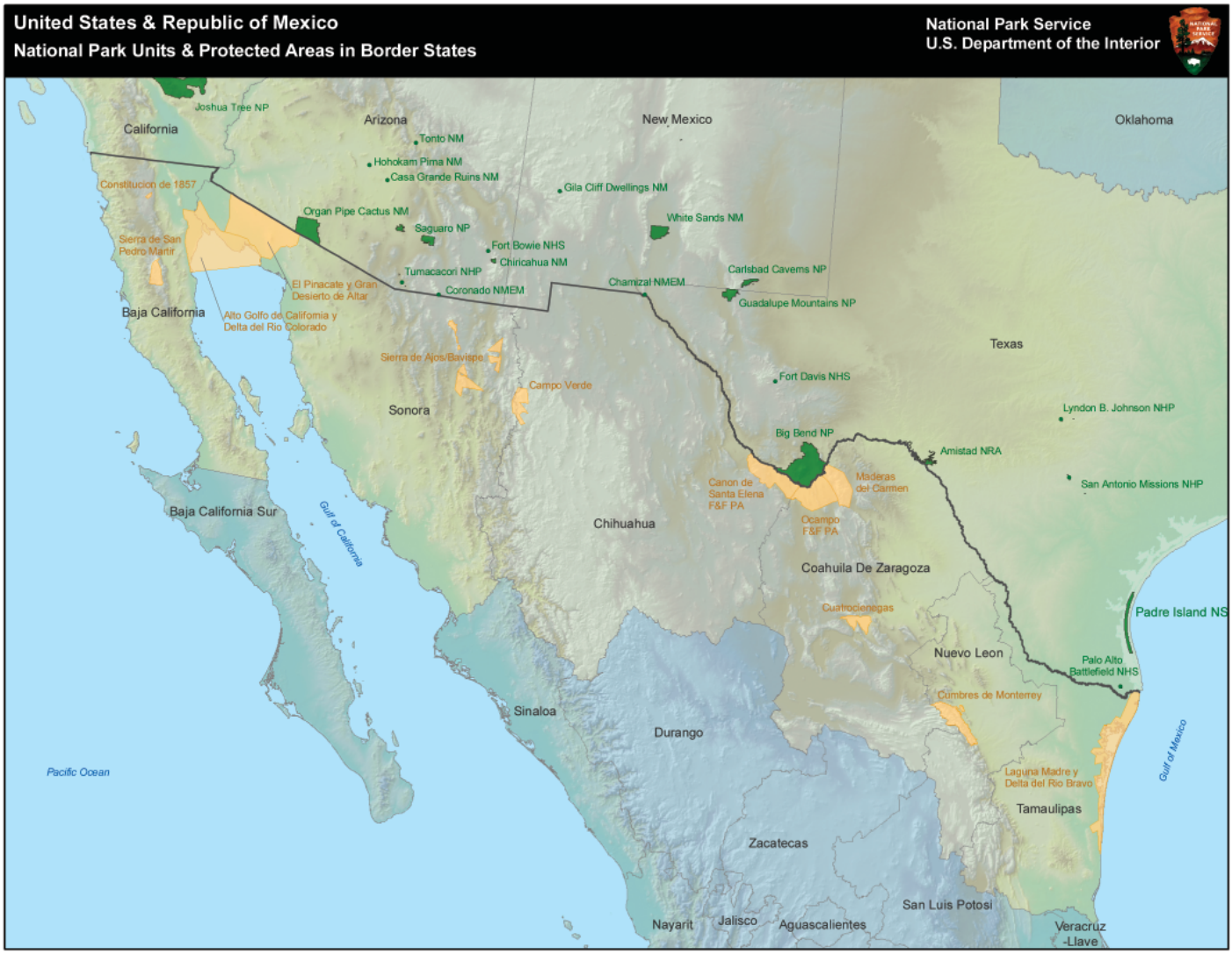
The United States does not have a unified policy for natural protected areas and consequently there is no systematic approach to protected areas. Responsibility for the management of protected areas falls mainly under a number of bureaus within the DOI and the U.S. Department of Agriculture (USDA). These agencies manage areas under their mandates according to each area's unique qualities and attributes. Through its bureaus, the DOI manages nearly 10 million acres of land, including natural, cultural, and historic resources within 60 miles of the border. NPS, FWS, and BLM are the bureaus primarily responsible for protected areas. Other bureaus within the DOI that also provide services and have responsibilities within the border region are the Minerals Management Service, USGS, and the Bureau of Indian Affairs. These agencies manage 30 percent of the total land and resources that border Mexico and tribal nations manage another 7 percent. Although each of these bureaus falls under the umbrella of DOI, the responsibilities, administration and management styles, land-use priorities, and cultures differ dramatically.

Other federal agencies with land management responsibilities in the border region are the Department of State, the IBWC, USDA through the Forest Service, Department of Defense (DoD) (including its Army Corps of Engineers), and the National Oceanic and Atmospheric Administration through the Estuarine Reserves Division. All of these agencies either control land or are involved in habitat and resource management initiatives along the border.

On August 11, 1994, the DOI bureaus listed above signed an Environmental Charter that recognized the need for a "comprehensive, integrated inter-bureau approach to working cooperatively with Mexican counterparts in the shared responsibility for monitoring, preserving, and managing the U.S.-Mexican shared border ecosystem." Before this charter was created, many bureaus already had been working with Mexico on specific projects. The charter marked the first time that DOI bureaus worked together. The goal expressed in this charter is to work more efficiently while addressing border environmental issues with Mexico. The first article of the charter formally established the DOI U.S.-Mexico Border Environmental Issues Field Coordinating Committee, which oversees 10 inter-bureau issue teams. Each team includes representatives from the specific bureaus with interests in the designated issue areas. Each team addresses a specific problem area or topic



*A malachite butterfly (*Siproeta stelenes*) in the Santa Ana National Wildlife Refuge, South Texas. ©Krista Schlyer*



National Park Units and Protected Areas in border states. ©National Park Service

that can range from environmental education to the research and management of shared water resources. One of the teams has as its defined priority U.S.-Mexican "sister areas," and is specifically charged to collaborate with Mexican counterparts in the design and management of protected areas along the border (see map above).

The absence of a national comprehensive ecosystem management planning mechanism or umbrella agency has created some obstacles in the coordination of land-use planning with Mexico across U.S. state lines; across public, private, and NGO land holdings; and with indigenous nations in the area, such as the Tohono O'odham and Cocopah in the Sonoran Desert. Conversely, if all protected areas were managed as parks, wildlife refuges, or national forests, the unique qualities might not be addressed adequately.

International travel and funding of binational activities have been curtailed in recent months, impacting agencies' ability to work cooperatively across the border. Reasons cited for the restrictions in travel vary from security measures related to drug trafficking to administratively imposed cost-saving measures. One concern voiced by agency representatives is the "red tape" that is required simply to cross the border for a routine meeting with a partner agency in Mexico. Other concerns include the ability to reimburse professional speakers for their expenses when they are asked to make presentations at conferences. Again, the paperwork involved can be unwieldy.

Tribal Land Management

Tribal issues also are of critical importance, because tribal governments are the primary managers of tribal trust land and

natural and cultural resources that are located both on and off tribal reservations. All federal agencies and departments must consult with tribes on a government-to-government basis before they can take any action that affects tribal members, lands, or other resources. In addition, tribal communities often have unique perspectives of land management, utilization of resources, and adaptation that can help to develop viable alternatives and to maximize the long-term benefit of proposed mitigations.

Border Fence and Associated Infrastructure

The GNEB wrote a letter of advice on the border fence on December 2, 2009, (see appendices, page 67) to the Administration that details a series of recommendations and provides background on the environmental effects of the border fence. Some additional comments and recommendations on this issue have arisen since the letter was issued and are addressed in this chapter. These issues are mainly: monitoring of the long-term effects on adjacent habitat and species of concern, mitigation of these effects through direct action and off-site activities, and scientific research.

The recent construction of the international border fence between Mexico and the United States in many cases has further suppressed the burgeoning collaboration and cooperation among U.S. agencies, tribal nations, stakeholders, and Mexican partners. Recent research conducted by Mexican and U.S. scientists documents examples of impacts caused by the construction of the border fence. Among these impacts are changes to soil characteristics from machinery, soil erosion, and fragmentation of populations causing concerns with genetic exchange and depopulation, particularly in the face of climate change and the expected adaptations and migrations.

On December 8, 2009, Arizona Congresswoman Gabrielle Giffords sponsored a meeting of conservation organizations with DOI and DHS managers and scientists in Tucson. This meeting was a precursor to the USGS development of a border impact monitoring strategy for the DHS. This strategy and the proposal for implementation were due to DHS in March 2010.

GNEB at its March 11-12, 2010, meeting in Rio Rico, Arizona, heard presentations from DHS, DOI, and USGS on the progress toward development of the monitoring protocol and the mitigation projects. Timing for development, funding, and implementation of the monitoring and mitigation strategies has yet to be finalized. GNEB has requested that this information be made available to the public as soon as practicable in an effort to keep local stakeholders apprised of the progress under way. ■

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Photo Credits:

*Page 46, sidebar. Sandhill cranes (*Grus canadensis*) on a field in southern New Mexico, approximately 5 miles from the Mexican border. ©Krista Schlyer*

CHAPTER 8

Institutional Mechanisms

Recommendations

1) Border institutions including EPA, SEMARNAT, BECC, and NADB should re-evaluate the roles and responsibilities of funding institutions and programs along the border, with the goal of identifying and clarifying priorities, improving coordination, establishing partnerships, and achieving results throughout the region.

2) Care should be taken to ensure that small communities and tribes are provided resources and training to access Border 2012 funding under criteria balanced to accommodate and encourage their participation.

3) Cost estimates of the water and wastewater infrastructure needed to bring the border to parity with the rest of the United States are coarse; more specific regional and binational data are needed in urban areas and tribal lands to prioritize needs. EPA and BECC should establish metrics to measure accurately the level of investment still needed in these areas.

4) Innovative ideas for financing binational transportation infrastructure are being advanced by the Federal Highway Administration (FHWA); future research should examine applications of similar approaches to the border environmental infrastructure. Border institutions, particularly the NADB, should explore the feasibility of developing innovative financing alternatives for the border environmental infrastructure, particularly in areas with unmet needs.

5) The expanded use of EPA's Environmental Finance Centers (EFC) Network resources along the border could be beneficial for analyzing the feasibility of lease concessionaire agreements for meeting infrastructure needs and pollution prevention strategies for private industry, or for developing green business plans for communities. A comprehensive analysis of financial innovations along the border could provide alternatives to address environmental needs not being met by existing local, state, and federal financing mechanisms.

6) The transboundary environmental impact assessment (TEIA) process should be revisited with the goal of determining the feasibility of this mechanism to address transnational impacts, and encourage transborder cooperation on environmental infrastructure projects. Direct the CEC to make a concerted effort to explore such an agreement.

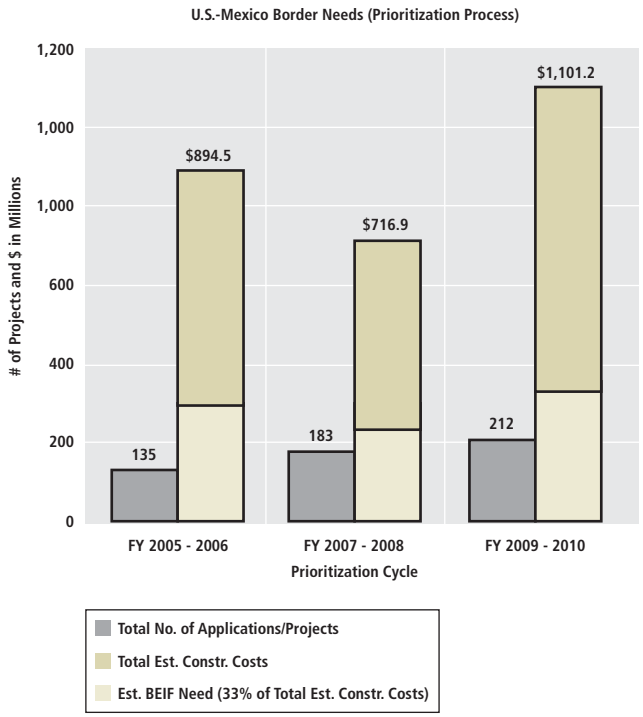
In examining the state of the border environment in 2010, the large deficit in border environmental infrastructure that would allow the border region to be on par with other parts of the United States becomes evident. This deficit is based on a major environmental infrastructure funding shortfall that affects federal as well as local, state, and regional programs. Some of the problems in the border environmental infrastructure could be addressed by a concerted federal effort to better coordinate federal border environmental programs, prioritize investment and expenditures, enhance collaboration, and reduce barriers that frustrate federal, state, and local efforts to resolve border environmental issues. Advancing such an agenda requires development of alternative institutional mechanisms. Along with these efforts, new and innovative funding mechanisms must be devised to meet the investment shortfall in the border environmental infrastructure. This chapter provides an update of unmet border infrastructure needs and also develops specific recommendations in these areas. The TEIA also is regarded as an institutional mechanism that should be reconsidered for the border region.

Updated Estimate of Unmet Border Infrastructure Needs

Unmet needs for environmental infrastructure in the border region have negative impacts on the human health and quality

of life of U.S. border communities. An important question is what level of funding would be needed to bring the border area to the same level of services enjoyed by residents in the rest of the United States, which is an overarching theme of this report. As discussed in Chapter 4 of this report, the gap between need and available funds for border water infrastructure has increased greatly in the past several years, a trend likely to continue (see Figures 1 and 2). Restoring the BEIF to past levels is a priority; because this may not happen in the near future, a discussion of alternate funding mechanisms is very much in order.

Figure 1. Unmet water and wastewater treatment needs in the borderlands (EPA 2010).

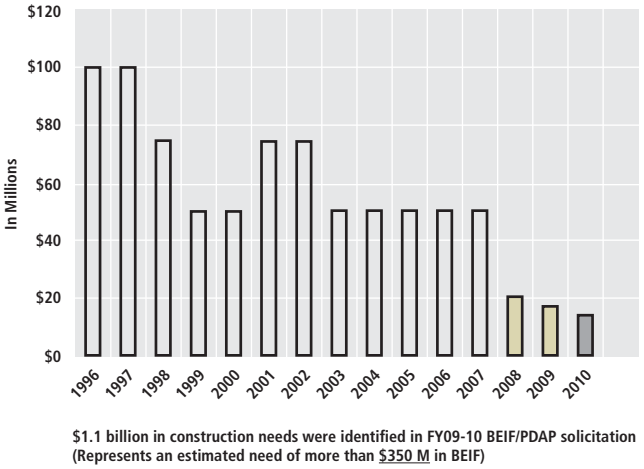


Source: EPA, 2010

Alternate Funding Mechanisms

Municipal bonds: U.S. political subdivisions, including cities and counties, can issue bonds to raise revenue for needed infrastructure projects, but Mexican *municipios* have limited or nonexistent ability to issue bonds. Given this asymmetry in bonding ability, the GNEB recommends exploring some form of binational border bonding mechanism. U.S. cities and counties could cooperate with Mexican *municipios* to generate binational infrastructure bonds that would then be sold in an international bond market through a guarantor such as the NADB. A binational bond market would require harmonization between both nations of legal and regulatory frameworks, rating requirements, trading platforms and conventions,

Figure 2. Provision of Border Environmental Infrastructure Funds, 1996 – present (EPA 2010).



Actual U.S.-Mexico Border Water Infrastructure Program appropriations through Fiscal Year 2009. Fiscal Year 2010 funding level represents the President's budget request.
Source: EPA, 2010

clearing and settlement procedures, accounting and auditing standards, tax treatment of revenues generated, and foreign exchange regulations.[1]

Innovative financing mechanisms for border transportation infrastructure: The Joint Working Committee (JWC) on Binational Transportation Planning is a binational transportation planning group developed and supported by the U.S. FHWA and its Mexican counterpart, the Secretariat of Communication and Transport. During the past several years, the JWC has developed innovative financing mechanisms for border transportation infrastructure, with this experience providing valuable insight for cultivating similar tools for border environmental infrastructure development. (For details, see the FHWA Web Site on Innovative Program Delivery at http://www.fhwa.dot.gov/ipd/index.htm.) The JWC has developed, researched, or implemented the following financing approaches:

- In **public-private partnerships,** public agencies engage in formal relationships with private sector firms, which increase private sector participation in the planning, design, and financing of needed infrastructure projects. Partnerships range from "design and build efforts" in which the private firm designs and builds projects to "design, build, finance, and operate" approaches in which the private firm involved raises funds needed to develop the facilities, then conducts all the work needed to construct and operate them.
- When large projects would consume available funds, municipalities have developed alternative **project finance**

U.S.-Mexico border at the eastern edge of the Otay Mesa-Mesa de Otay area of San Diego and Tijuana. ©Roy Toft

tools, such as bonds or loans, and linked these financing tools with new revenue streams, such as user or impact fees. This approach provides needed capital up front and an ongoing revenue stream to pay off incurred debt.

- The Transportation Infrastructure Finance and Innovation Act (TIFIA) program provides **direct federal investment for infrastructure development** through loan guarantees, direct loans, and various lines of credit otherwise unavailable to municipalities or transportation planning agencies. TIFIA has similarities to the Project Development Assistance Program (PDAP) and BEIF administered by the BECC and NADB, although funds cannot be spent in Mexico. Sections of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA LU), a federal transportation planning act, do allow U.S. funds to be used in Canada or Mexico to construct port of entry facilities provided that the facilities are constructed according to U.S. standards and are maintained over the useful life of the project.[2] The FHWA experience in this area reinforces the utility of the BEIF and PDAP to finance binational infrastructure programs that would exceed the funding ability of municipal governments in the United States and Mexico.

Lease concessionaire arrangements in Mexico: Like the public-private partnerships noted above, this provision allows private sector companies to build infrastructure projects and operate them. Concession arrangements, however, formally transfer the responsibility of specific project administration from the government to a private sector party. In the border region, this tool has been used extensively to build and operate large-scale toll road facilities and prisons with elevated development costs. The San Luis II Port of Entry on Arizona border with Sonora, currently under construction, employed a similar arrangement. In this case, NADB funds were loaned to a private concessionaire in Mexico to create a more efficient border crossing facility, which would reduce idling of vehicles waiting at the port of entry and improve human health. In addition, the third border crossing and toll road proposed for the Otay Mesa port of entry in the San Diego/Tijuana area is exploring similar concepts. Variations of lease concessionaire arrangements have been used for the operation and maintenance of water and wastewater treatment plants in Cuernavaca, Mexico, by U.S.

Filter Corporation. Similar arrangements in the border region are a possibility for planning, designing, and building water and wastewater infrastructure.

EPA EFCs: The EFCs promote innovative environmental financing techniques and provide state and local governments and small businesses with training, advice, and technical assistance on financing alternatives. The present EFC network includes centers throughout the United States. Centers are located in New Mexico and California and could provide assistance on border region projects. The EFCs provide a variety of education and training activities, including short courses on environmental finance for state and local officials. In addition, EFCs develop and publish case studies of innovative financing techniques and serve as clearinghouses for regional and state information on environmental financing and program management. The EFCs also provide technical assistance and analyses to state and local governments and the private sector on managing and financing environmental infrastructure. For example, the New Mexico EFC continues to develop financing strategies for the long-term viability of environmental infrastructure on the U.S.-Mexico border. Dominican University's EFC in California helps small businesses by advancing the environmental goods and services industry and promoting pollution prevention. Among its primary products is the development of public-private partnership models for financing environmental services, and emphasizing the participation of small- and medium-sized businesses, both ideas that have potential usefulness for advancing the border environmental infrastructure.

Other Mechanisms for Binational Cooperation

The Border Liaison Mechanism is a formal binational vehicle for cooperation that includes participation by representatives of the U.S. and Mexican foreign ministries, generally by local consuls general. The Border Liaison Mechanism provides a multi-level consultative mechanism on projects of regional importance (i.e., ports, public safety, and automobile thefts), and allows a wide range of participation in which local recommendations are sent back to the respective foreign ministries, which then make decisions on relevant issues. Authority to implement these decisions is delegated back to the consuls general and the local agency staff.

The JAC is another model of binational environmental cooperation, also mentioned in Chapter 2 of this report. Established in 1996 as a locally driven binational advisory group charged with developing ideas to improve air quality in the Paso del Norte region, the JAC shares these ideas with the Air Work Group established under the 1983 La Paz Agreement. The JAC—comprised of academics; federal, state, and local government officials; private citizens; and members of NGOs—represents an effort to address environmental problems in a binational context. Of particular interest is that the JAC has focused much effort on how to use limited financial resources most efficiently and maximize the benefit for the region's residents.

Finally, the TEIA process is a key mechanism once again being seriously discussed to advance binational environmental cooperation. TEIA was introduced in the North American Agreement on Environmental Cooperation (NAAEC), the trilateral environmental side agreement to NAFTA, with the intention to evaluate, mitigate, and notify the neighboring country of environmental impacts. It should be mentioned that most projects in Mexico are federal in nature, but in the United States, states have jurisdiction over many types of projects (i.e., municipal landfills, hazardous waste landfills, air permits, etc.). As Article 10(7) of the NAAEC states:

"Recognizing the significant bilateral nature of many transboundary environmental issues, the Council (of the CEC) shall, with a view to agreement between the Parties pursuant to this Article within three years of obligations, consider and develop recommendations with respect to:

(a) assessing the environmental impact of proposed projects subject to decisions by a competent government authority and likely to cause significant adverse transboundary effects, including a full evaluation of comments provided by other Parties and persons of other Parties;

(b) notification, provision of relevant information and consultation between Parties with respect to such projects; and

(c) mitigation of the potential adverse effects of such projects."

A TEIA agreement has never been developed, and in the 2009 Joint Declaration of the Border Governors Conference, the 10 U.S.-Mexico border states renewed a call for a TEIA process noting that many projects continue to be developed, such as the border wall, that have significant impacts on the neighboring country.

One example of binational cooperation is the NADB and BECC, which have a mandate to provide environmental infrastructure along the border, and have certified and financed more than $1 billion and provided hundreds of thousands of dollars in grants to communities to support environmental

infrastructure projects. These institutions have in place a successful process to evaluate the environmental impact of projects that serves as a model of binational cooperation.

Other models of binational cooperation consistent with both the TEIA concept and the work of BECC and NADB include: (1) the facilities planning program advanced under IBWC Minute 294, whereby the IBWC, using funds from EPA, established binational technical teams to assist border communities in developing wastewater infrastructure project plans for consideration by BECC-NADB; and (2) the framework for U.S.-Mexico cooperation established in accordance with IBWC Minute 306, related to the preservation of the riparian and estuarine ecology of the Colorado River Delta and the river's international boundary segment. Based on previous work advanced by border state environmental agencies, the TEIA concept or other mechanisms would have to recognize the rights of state, local, and tribal authorities, and coordinate proposed activities with them. ■

References:

1. Espinosa S. Financing Border Environmental Infrastructure: Where Are We? Where Do We Go From Here? 2010 SCERP Border Institute, Rio Rico, Arizona, March 2010.
2. U.S. Congress. *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users* (SAFETEA-LU), Section 1303: Coordinated Border Infrastructure Program, 2005.

Photo Credits:

Page 54, sidebar. People from Tijuana and San Diego greet each other through the border fence. ©Krista Schlyer

Appendices

Prickly pear cactus with fruit in the Organ Pipe Cactus National Monument, Arizona. ©Krista Schlyer

GNEB
Environmental Advisors Across Borders

GOOD NEIGHBOR ENVIRONMENTAL BOARD

Presidential advisory committee on environmental and infrastructure issues along the U.S. border with Mexico

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May 19, 2009

President Barack Obama
The White House
1600 Pennsylvania Avenue, NW
Washington, D.C. 20006

Dear Mr. President:

As your federal advisory committee for environmental and infrastructure issues along the U.S. border with Mexico, we write regarding priorities that need to be addressed to preserve and improve the quality of life for the 15 million inhabitants of this complex multicultural region. We are highlighting issues for immediate priority action as well as longer term concerns. While many of these issues have been discussed in Good Neighbor Environmental Board (GNEB or Board) reports, the rapid population growth of the region has outstripped even the excellent binational, U.S. federal, state, and local efforts that have been made to resolve them.

GNEB has identified the following issues for immediate priority action:

- Provision of fresh water for human populations and for ecosystem protection;
- Contamination of ground and surface sources of water; and
- Contamination of air basins, especially along transportation corridors, at ports of entry, in binational border urban areas, and in some rural areas.

GNEB has also identified important border environmental priorities that require concerted action in the near future. These include:

- Inadequate solid and hazardous waste disposal in border communities;
- Barriers for providing security, emergency response, and natural disaster planning and coordination for U.S. border communities due to their border location;
- Insufficient habitat and natural resource protection and conservation;
- Greenhouse gas production and climate variability;
- Health impacts on border communities resulting from environmental quality issues; and
- Inadequate cooperation and collaboration across U.S. agencies at all levels and across the border to address multimedia and binational problems.

Some of these issues are addressed by existing binational programs such as Border 2012, the Border Environmental Infrastructure Fund (BEIF), and the Border Environment Cooperation Commission-North American Development Bank (BECC-NADB) infrastructure efforts, but the needs have outgrown available funding. Others require new, pragmatic initiatives to improve coordination among U.S. agencies and across the international boundary to take advantage of synergies. Stakeholder participation at all levels in developing solutions is critical.

The following paragraphs provide details on both the border environmental priorities and their context as well as proactive responses that GNEB recommends.

The Border Context

The North American Free Trade Agreement brought economic expansion but not prosperity to the border region. It increased trade flows, congestion, and environmental impacts, and also stimulated significant population growth. By 2000, border cities and counties had 12.4 million people and by 2010 and 2020, the border population is projected to reach 17.1 million and 24.1 million, respectively. If the U.S. border counties comprised the 51st state, they would rank 1st in federal crimes, 13th in total population, 2nd in incidence of tuberculosis, 3rd in hepatitis (a waterborne disease) related deaths, 5th in unemployment, 40th in per capita income, and 51st in the number of health care professionals per capita. Much of the border population is concentrated in binational metropolitan areas such as El Paso-Ciudad Juárez or San Diego-Tijuana, but significant pockets of rural poverty also exist. These include colonias, informal settlements mainly in Texas and New Mexico that lack the most basic infrastructure, and the lands of 26 federally recognized tribes. Addressing environmental problems in the border is complicated not only by the poverty of the region and rapid growth, but also by the transborder nature of many key environmental problems, including air and water quality and hazardous materials management. The U.S. border region is characterized by environmental problems unlike those in any other part of the nation.

Border Environmental Programs

The 1983 La Paz Agreement between the United States and Mexico produced a number of joint efforts to address border environmental issues. Border 2012 is the current effort, and it has successfully mobilized local stakeholders, identified specific goals, and resolved some problems, yet the program has been limited by declining resources. The binational agencies BECC and NADB have made progress improving environmental infrastructure, and the International Boundary and Water Commission has facilitated border infrastructure projects and has also addressed the flood control issue. The Department of Interior has transborder conservation programs with its Mexican counterpart as do other Federal land management agencies. The departments of Agriculture, Health and Human Services, Homeland Security, State, Transportation, and Housing and Urban Development all have specific programs designed to help manage the border environment.

Immediate Priority Border Environmental Issues

Ensuring water supply for human uses and for ecological services is a challenge to the border region. Surface waters are over allocated, and groundwater in some areas is being depleted at an alarming rate. Climate variability will put increasing pressure on border water resources. Contamination of water supplies is a widespread problem, with surface and ground waters affected by anthropogenic pollution. Aquifers are also contaminated by concentrations of naturally occurring materials and intrusion of saline waters from over extraction. In many cases, water resources are shared by the United States and Mexico, making border cooperation critical to providing a sustainable water supply to border communities. Actions to help address these issues include:

- Work to advance the transboundary aquifer assessment effort led by USGS and Mexican agencies; and
- Promote binational water resource research, planning, and management.

Wastewater treatment lacks full coverage in the border region, with conditions in many areas reminiscent of much of the United States a half-century ago. The present EPA budget for border water and wastewater funding is $10 million, while the BECC has received more than $1.2 billion in project requests for FY 09/10. The region is still characterized by crossborder flows of inadequately treated wastewater, affecting streams, lakes, reservoirs, wetlands, and the near shore marine environment. Actions to help address these issues include:

- Continue BECC-NADB efforts to build needed infrastructure;
- Advance regional and binational watershed research and management efforts, including addressing the continued impacts of non-point source pollution in watersheds; and
- Increase support for binational coordination of coastal waters monitoring efforts in the border region.

Air quality problems are ubiquitous in the border region. Regional airsheds such as those of El Paso-Ciudad Juárez-Doña Ana County, NM, and Mexicali-Imperial Valley are out of compliance with U.S. and Mexican federal standards. Vehicle emissions, open burning of agriculture and urban wastes, and unpaved roads all contribute to the problems. The major trade corridors are hotspots for localized air pollution, and ambient air monitoring at ports of entry often shows alarming levels of contaminants, reaching dangerous levels for both those working at the facilities and those waiting to cross the border. Actions to help address these issues include:

- Promote more efficient security measures such as the SENTRI and FAST programs and fully staff entry lanes to reduce wait times at ports of entry;
- Improve electrification efforts at ports of entry facilities to reduce pollution from idling heavy duty vehicles;
- Advance regional airshed management efforts, borrowing lessons from the El Paso-Ciudad Juárez-Doña Ana County Joint Advisory Committee;
- Take action in border communities to control anthropogenic sources of PM10, PM2.5, and ozone; and

- Direct EPA to work with Mexico to expedite its transition to more stringent diesel emissions standards and ultra low sulfur diesel fuel.

Additional Border Environmental Priorities That Need More Attention In The Near Future

Solid waste disposal challenges all border communities as they struggle to find adequate landfill space and develop recycling programs to divert waste to productive end uses. Mexican border communities also receive a large flow of used goods from U.S. communities, including used tires, used and scrap vehicles, used building materials, and used small and large appliances. While this enables U.S. communities to avoid providing for ultimate disposal of these materials, it leads to rapid accumulation of worn out goods in Mexican communities. Some of this trash finds its way back to the United States during floods. Actions to help address these issues include:

- Continue construction of sanitary landfills in border communities that lack them;
- Develop binational reuse and recycling programs and markets;
- Advance binational management of used materials transfers from the U.S. to Mexico; and
- Promote more opportunities to address priority waste streams such as e-waste, used vehicle and cooking oils, and lead acid batteries.

Hazardous waste movement across the border and within the border region is not clearly documented and managed, increasing the vulnerability of border communities to spills and unintended releases. Actions to help address these issues include:

- Implement proper tracking of hazardous materials (HAZMAT) in the border region;
- Promote consistency of import/export HAZMAT management procedures at all border Ports of Entry; and
- Increase the capacity for the development of self-sustaining collection programs for surplus and obsolete pesticides along the border.

Border security, including illegal cross-border entries and related law enforcement and security efforts, has generated a large environmental footprint in the border region in recent decades, especially since September 11, 2001. The challenge is how to control movement across the border and still provide proper environmental protection and emergency response and not unduly disrupt the border economy and the lives of residents. Actions to help address these issues include:

- Promote enhanced coordination between federal, state, and local agencies to reduce environmental impacts of security activities; and
- Promote work with local stakeholders to reduce these impacts.

Emergency response and natural disaster planning capabilities are not well articulated in communities that span the border. Although there are emergency response agreements in place, customs, visa, insurance, and other issues constitute a barrier at the international border by

preventing the ready transit of emergency responders and their equipment. This restricts the ability of border citizens to receive the same emergency response protections that communities entirely within the United States enjoy. Actions to help address these issues include:

- Remove bureaucratic barriers to cross border emergency response;
- Support regular binational emergency response exercises, both tabletop and field exercises; and
- Further elaborate and operationalize the new binational agreement for joint response to natural disasters affecting both countries.

Habitat and natural resource protection and conservation issues are particularly difficult in the border region. Rapid urbanization, the heavy footprint of law enforcement and security activities, and the international boundary have had enormous impacts on habitat through connectivity problems, fragmentation, and destruction. The border, and particularly physical barriers such as the border fence or highways, challenge connection and integrated management of protected areas across the international boundary. Actions to help address these issues include:

- Support coordination and integrated management of binational protected areas; and
- Explore transboundary environmental impact assessment in sensitive areas.

Greenhouse gas production and climate variability is an emerging concern in the border region, and should be addressed with all deliberate speed. Coordination across the border with Mexican authorities is important, not only in terms of data generation and sharing, but also in terms of shared and coordinated measures to reduce emissions. There is a growing need for all potentially impacted communities to anticipate and respond to the challenges posed by a changing environment. Actions to help address these issues include:

- Promote binational development of electricity generation with renewable energy sources in the border states;
- Work to develop binational markets for alternate energy supplies and for trading pollution credits;
- Build capacity in the border region for inventorying greenhouse gasses; and
- Work to support the US-Mexico Bilateral Framework on Clean Energy and Climate Change, announced by presidents Obama and Calderón in April 2009.

Environmental health is an issue central to the priorities listed here. Vulnerable populations, especially children, and environmental quality are folded into all of these environmental priorities. Environmental problems such as air and water pollution and lack of sewage collection and treatment affect the health of border populations. Actions to help address these issues include:

- Strengthen linkages between environmental quality and environmental health efforts.

Approaches And Solutions

In order for the environmental priorities of the border to be addressed in a timely fashion to support the long term environmental sustainability of the region, the Board recommends that the federal government move forward on a number of fronts in an integrated and coordinated fashion. Key components of this effort are increased coordination and facilitation of border environmental initiatives among U.S. agencies and across the border, with the inclusion of local input very early in the process. Another component is to ensure that the total mix of federal funding devoted to border environmental priorities is adequate. Bullets in the previous section of this letter suggest specific action items.

Create a Border Environmental Coordinator within the Office of Environmental Quality to ensure that border environmental issues are given appropriate priority to provide border communities with the same levels of services as the rest of the nation. Federal border environmental decision making is fragmented, and border communities often feel they are given short shrift. There is an important role for the administration in ensuring that the relevant federal and other agencies adequately address the international and domestic complexities of border environmental issues.

Improved cooperation across the border to address binational problems is needed to support local, state, and federal efforts at transborder problem solving. Institutions such as the Border Liaison Mechanism, the Border 2012 Program, Binational Task Forces, the US/Mexico Joint Working Group, and the Joint Advisory Committee have functioned very well in local border regions and deserve strong support. A serious institutional gap is the lack of a transborder environmental impact assessment process between Mexico and the United States, and this needs to be addressed as a high priority.

Strengthened community engagement and capacity building to develop policy options and solutions for border environmental problems are priorities for involving local border stakeholders in policy outcomes and for fostering and maintaining long-term crossborder cooperation and collaboration. The Border 2012 Program Regional Work Groups, comprised of local community members, have done an admirable job of mobilizing and empowering stakeholders from both sides of the borders. Supporting the Border 2012 Program process should be a priority as should funding implementation of policy initiatives developed by Regional Work Groups.

Infrastructure funding for the border has been dramatically reduced in recent years and there is a backlog of environmental infrastructure projects needed to meet the expanded demand caused by rapid population growth. The current needs of border communities for water and wastewater infrastructure is more than one billion dollars. A key element is the Border Environmental Infrastructure Fund (BEIF), which provides grant funds that enable BECC-NADB to provide affordable loans and grants to border communities for needed infrastructure. We recognize stimulus funds from the American Recovery and Reinvestment Act of 2009 will be used to ameliorate U.S. border community needs and help projects move forward.

Sustained applied research and outreach funding through Border 2012 and additional grants to universities, nongovernmental organizations, and tribal entities will provide solutions to key issues and increase human capacity in the border region.

The Board will elaborate on the topics and themes raised in this advice letter in its 13th Annual Report, slated for release in early 2010.

Respectfully,

Paul Ganster

Paul Ganster

cc: The Honorable Joe Biden
The Vice President of the United States

The Honorable Nancy Sutley
Chair, Council on Environmental Quality

The Honorable Lisa P. Jackson
Administrator, Environmental Protection Agency

GOOD NEIGHBOR ENVIRONMENTAL BOARD

Presidential advisory committee on environmental and infrastructure issues along the U.S. border with Mexico

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December 2, 2009

President Barack Obama
The White House
1600 Pennsylvania Avenue, NW
Washington, D.C. 20006

Dear Mr. President:

The Good Neighbor Environmental Board (GNEB), your advisory committee on environmental issues along the U.S.-Mexico border, is pleased to provide its recommendations regarding the environmental effects of the construction and maintenance of the U.S.-Mexico border fence and associated infrastructure. GNEB has members who reside in border communities from San Diego to Brownsville, work on environmental issues on both sides of the border, and are well acquainted with circumstances regarding the fence.

GNEB discussed issues associated with the construction of the border fence in its 2006 and 2007 annual reports (9th and 10th) to the President and Congress. We acknowledged the importance of security at the nation's borders and noted the need for better control of the movement of people and vehicles across the border in order to protect cultural sites and ecosystems from the effects of both unauthorized transit and law enforcement activities. We also recommended that a mix of technology and personnel be deployed along rural border areas to protect habitat connectivity and fragile species.

While we recognize that the Department of Homeland Security (DHS) was mandated by Congress to rapidly build the border fence, and that the border fence has had some positive outcomes and is appropriate in targeted areas, the construction has caused negative impacts to natural and cultural resources, as is described below in the background section. While we commend the recent decision by Secretary of Homeland Security Janet Napolitano to place a moratorium on further fence construction, we offer the following recommendations regarding border fence infrastructure projects:

1) ***Require that all border security infrastructure projects fully comply with the National Environmental Policy Act (NEPA) as well as all other laws including environmental, historic, and archeological preservation laws.***

2) ***Work with Congress to amend the REAL ID Act of 2005 to remove the provisions allowing the Secretary of Homeland Security to waive legal requirements.***

3) ***Fully incorporate adequate environmental review, public participation, and scientific analysis into the design and implementation of all border security infrastructure projects.***

4) ***Facilitate review by the International Boundary and Water Commission (IBWC) of projects that may cause deflection or obstruction of the normal flow of rivers or their flood flows, ensuring continued compliance with the 1970 Boundary Treaty between the U.S. and Mexico and other international agreements.***

5) ***Systematically monitor the entire fence and supporting infrastructure for effects resulting from its construction and develop actions to modify, redesign, or mitigate the negative outcomes realized or anticipated by the existing construction.***

6) ***Provide sufficient annual funding via the DHS budget for monitoring, research, and mitigation of the environmental impacts of the border fence.***

7) ***Obtain adequate local stakeholder input for all fence construction, mitigation, and maintenance as well as for associated infrastructure projects, including access roads.***

8) ***In sensitive rural areas that are important wildlife corridors, use barriers and technology that prevent vehicular traffic, control pedestrian incursion, and allow wildlife movement.***

9) ***Aggressively explore the use of information and remote sensing technologies that will enhance border security while reducing the physical footprint of interdiction activities along the border.***

10) ***Ensure adequate funding to DHS/Customs and Border Protection for ongoing training for border security personnel about the local natural environment and significant natural and cultural resources.***

11) ***Identify and implement best management practices to prevent and mitigate the erosion resulting from fence construction and associated infrastructure.***

12) ***Charge the National Academy of Sciences to conduct a study on the binational environmental effects of the border fence and associated infrastructure.***

Background

In the 1990s, large numbers of undocumented immigrants crossing the land boundary and a growing concern with international drug trafficking produced a series of programs to enhance border enforcement through infrastructure construction and added personnel. These included Hold the Line (El Paso 1993), Gatekeeper (San Diego 1994), Safeguard (southern Arizona 1995), and Rio Grande (South Texas 1997). Increasing violence related to human smuggling and drug trafficking and the terrorist attacks of September 11, 2001, saw the U.S. border with Mexico emerge as a critical component in the defense against terrorism. The push to harden the border through construction of fences, barriers, access roads, and other components as well as adding large numbers of law enforcement personnel often brought security agencies into conflict with federal, state, and local land managers whose core mission was to preserve the land and its ecosystems. Many stakeholder groups, including several border communities, accustomed to active participation in land-use planning and environmental policy formulation, opposed the large infrastructure projects.

Much of the stakeholders' concern centered on the waiver provisions contained in the REAL ID Act passed by Congress in 2005. These provisions allow the Secretary of Homeland Security to waive all legal requirements, including environmental and conservation laws, deemed necessary to ensure expeditious construction of the border fence. The provisions were in response to frustration with the delays in construction of a 14-mile, triple-layered fence along the border near San Diego. The construction, mandated by Congress in 1996, impacted the Border Field State Park and the Tijuana River Estuary. Following passage of the Act, former Secretary Michael Chertoff used the waiver provisions to allow the completion of the fence. After authorization in 2006 of the construction of 700 miles of fencing, in 2007 former Secretary Chertoff invoked the waiver provisions to allow construction in the San Pedro Riparian National Conservation Area and the Barry M. Goldwater Air Force Range in Arizona. In 2008, he again invoked the same provisions to waive compliance with 35 laws for the completion of approximately 500 miles of border fence. Each time a waiver was exercised, the environmental review process was at a different stage. In some cases the NEPA process was almost finished; in others, it was at an earlier stage and the environmental process that continued was not labeled NEPA. Links to public comments submitted in the environmental processes, responses to those comments, and other environmental documents are all publicly available at. http://www.cbp.gov/xp/cgov/border_security/ti/ti_docs/sector. By mid-2009, about 670 miles of the border fence had been constructed with construction proceeding at various points along the 1,951-mile long border. Only some 30 miles remain to be installed.

Another consideration is compliance with the 1970 Boundary Treaty between the U.S. and Mexico. Under the Treaty, the IBWC is charged with maintaining the Rio Grande and the Colorado River as the international boundary. To carry out this responsibility, the treaty specifies that the Commission shall prohibit construction of works that would obstruct or deflect the normal or flood flows of those rivers. To ensure treaty compliance, the DHS in recent years has provided the U.S. Section with fence plans prior to construction so that border fencing can be erected in a manner that is compatible with the missions of both agencies.

There have been both positive and negative outcomes from the installation of border fence and associated infrastructure, which we outline below.

Vehicle barriers and pedestrian fences, along with increased personnel on the ground, have significantly reduced unauthorized vehicle and foot traffic in some areas with sensitive habitat, species, or cultural resources. Examples of areas that have benefited from reduced traffic include the Tijuana Estuary and its nesting areas of endangered bird species; the Cleveland National Forest of Southern California; and areas along the Arizona-Sonora border such as Organ Pipe Cactus National Monument, the Tohono O'odham Nation, the Cabeza Prieta National Wildlife Refuge, the Buenos Aires National Wildlife Refuge, and the Coronado National Forest.

The fence and associated infrastructure were installed in some areas in ways that minimized environmental effects and in a manner that is compatible with local perceptions and practices. In the Animas Valley, in the Bootheel of New Mexico, the Normandy-type vehicle barriers installed may have enabled migration of critical species such as antelope and the jaguar. In this case, through the efforts of the Malpai Borderlands Group and local ranchers working with DHS and the fence contractors, the fence was erected with minimal permanent damage to the environment. The width of access roads was minimized, staging and work areas were reclaimed, and the old border barbed wire fencing was removed.

At other locations along the border, fence design, construction, and maintenance activities negatively impact natural resources. Negative impacts include the loss of critical habitat, fragmentation of wildlife corridors, and destruction of wilderness areas. For example, in San Diego County, construction of the border fence subsumed 53 acres of the Border Field State Park, contributing to the loss of rare coastal wildlife habitat. Otay Mountain in Southern California is a federally protected wilderness and is an important ecosystem that is home to sensitive plant and animal species. It now contains access roads and the fence in areas that previously contained only natural vegetation on steep mountain slopes. A "temporary" Normandy-style vehicle barrier across the San Pedro River and approximately two miles of fence within the San Pedro Riparian National Conservation Area have fragmented critical wildlife corridors for jaguars, black bear, coatimundi, and many other species, and blocked numerous desert washes feeding the San Pedro River and floodplain. The San Pedro River is the last free-flowing river in Arizona. For Southmost Preserve, located near Brownsville, the proposed fence would be on a strip of land running through the reserve, stranding some 700 acres of the reserve between the fence and Mexico. In addition to groves of rare Sabal Palms, the preserve provides habitat for Texas' highly imperiled wildcats, the ocelot and jaguarundi. In the Lower Rio Grande region, parts of the fence cut across pristine and restored habitat that is home to endangered species of flora and fauna and has a very rich biodiversity. Driving on thousands of miles of unpaved access roads constructed along the border fence has also contributed to particulate matter air quality problems throughout the border region.

Construction activities also resulted in damage to cultural resources and sacred sites. For example, in southern Arizona construction workers disturbed Native American burials in Tohono O'odham ancestral lands, including burials in the San Pedro Riparian National Conservation

Area. Tecate Peak, a sacred cultural site of the Kumeyaay of Southern California and northern Baja California, was damaged by access road and fence construction across formerly pristine vegetation. In some areas, such as the Coronado National Forest, fence construction has damaged, and access roads have increased traffic to, archaeological sites.

Poorly designed fencing has not provided migratory routes and instead has led to an increase in dangerous confrontations. The gaps in the border fence do not always accommodate the migration of wildlife, while some locations do provide a funnel for larger, more aggressive groups of human migrants and drug traffickers, placing law enforcement agents in more dangerous confrontational situations.

Fencing was associated with some hydrological problems such as erosion or blocking of watercourses. U.S. and Mexican stakeholders have alleged that the U.S. border fencing has obstructed stormwater flow and caused flooding at Nogales, Sonora; Sonoyta, Sonora; and Palomas, Chihuahua. In 2008, a storm at Lukeville, Arizona, and Sonoyta, Sonora, caused flooding on both sides of the border after debris blocked openings in the pedestrian fence in Organ Pipe Cactus National Monument. Floodwaters that normally flow from north to south flowed to the east along the fence and into the Mexican Port of Entry.

Federal, state, and local government agencies have expressed concerns regarding the potential for increased flooding and sediment loading into the Tijuana River Estuary that have not been addressed. Some of them, including California State Parks, the California State Coastal Conservancy, the California Regional Water Quality Control Board, the City and County of San Diego, and State Senator Denise Ducheny have submitted written comments to DHS expressing concern over the environmental impacts related to fence construction on the Tijuana River National Estuarine Research Reserve. These comments included concerns regarding a comprehensive description of DHS's sediment-control plan. We are also not aware of what type of monitoring is being implemented to determine the plan's efficacy. Furthermore, the hydrologic studies prepared during the design phase of the project have not been made available for public review, making it impossible to determine what the project's impact will be on downstream erosion and flooding. These issues are the subject of ongoing litigation.

In addition to the negative impacts of the fence infrastructure, invoking the waiver of environmental and cultural and archeological preservation laws has produced a strong reaction in many border communities. Border residents have become accustomed to active participation in environmental and land-use review processes in their communities and in playing a part in the decisions that are important for quality of life where they live and work. Invoking the waiver for border fence construction has alienated local stakeholders in the border region, stakeholders who are normally important participants in policy formulation. Despite the efforts of DHS to reach out to border communities, waiving environmental and other laws, in particular NEPA, has had the effect of creating a negative perception in the region. There is a strong and widely held perception in the border region that the public's participation in the consultation process associated with building the fence has been inadequate.

GNEB is confident that addressing concerns raised by local stakeholders through well-tested methods of community outreach, public participation, and other established environmental review processes will restore confidence in border communities regarding the role of the federal government in protecting the environment.

Sincerely yours,

Paul Ganster

Paul Ganster, Chair
Good Neighbor Environmental Board

Attachment (1)

Note: Federal agency members of GNEB recuse themselves from this advice letter.

cc: The Honorable Joe Biden
The Vice President of the United States

The Honorable Janet Napolitano
Secretary, Department of Homeland Security

The Honorable Ken Salazar
Secretary, Department of Interior

The Honorable Nancy Sutley
Chair, Council on Environmental Quality

The Honorable Lisa P. Jackson
Administrator, Environmental Protection Agency

ATTACHMENT 1

Photo 1

Photo 2

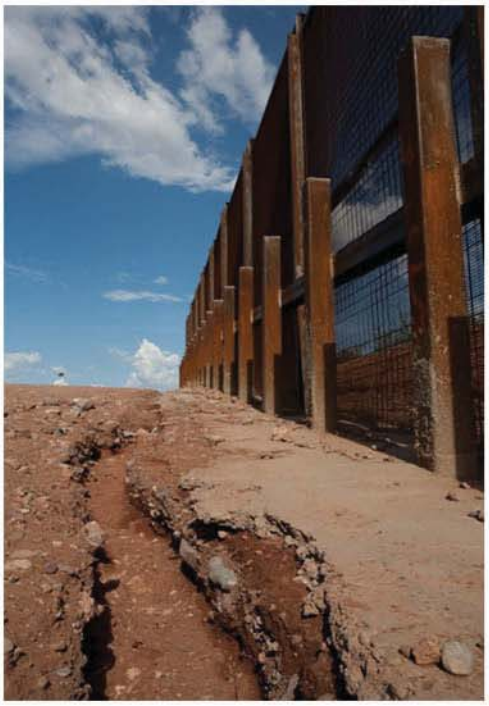

Photo 1: Construction of access roads for border wall machinery. Otay Mountain Wilderness. January 2009.

Photo 2: Border fence adjacent to San Pedro River corridor, Arizona, six months after construction. July 2008.

Photo 3: Construction of access road and border fence at Smuggler's Gulch near the Tijuana estuary. January 2009.

Photo 3

Photo 4

Photo 5

Photos 4 and 5: Border fence on the south slope of Tecate Peak, sacred mountain of the Kumeyaay people. California. March 2009

Photo 6

Photo 6: Mule deer approaching the border wall in the San Pedro region of southeastern Arizona. 2008.

Photo 7 (Before)

Photo 8 (After)

Photos 7 and 8: Historical site near the Arizona-Sonora border before and after construction of the border wall. An adobe structure visible in photo 7 taken October 2006 has nearly disappeared in photo 8, taken December 2007.

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C. 20503

April 21, 2010

Dr. Paul Ganster
Chair
Good Neighbor Environmental Board
5500 Campanile Drive
San Diego CA 92182-4403

Dear Chairman Ganster,

Thank you for your December 2, 2009 letter regarding the environmental impacts of the U.S.-Mexico Border fence. We sincerely appreciate the Good Neighbor Environmental Board's ("the Board") attention to this issue, which is a priority for the Administration. We have shared your letter with the Department of Homeland Security (DHS), the Department of Interior (DOI), the U.S. Forest Service (USFS), the Environmental Protection Agency (EPA), the U.S. Department of State (State Department), and the National Oceanic and Atmospheric Administration (NOAA) ("appropriate Federal departments and agencies") and have coordinated this response with them. We wanted to ensure a comprehensive response, hence our delay in sending you this letter.

Our Nation's environmental laws form the bedrock of our environmental policy. The National Environmental Policy Act (NEPA), overseen by CEQ, helps ensure that potential environmental impacts of any Federal action are identified through robust analysis and public participation and that, where necessary, they are mitigated.

As your recent correspondence accurately states, the approximately 700 miles of border security infrastructure mandated by the REAL ID Act of 2005 is nearly complete, and construction of the fence resulted in both positive and negative environmental impacts. In order to meet Congressional deadlines for fence construction, segments of this border security infrastructure were constructed consistent with a waiver of Federal environmental and other laws exercised by DHS on April 1, 2008. Both before and after the waiver was exercised, DHS prepared environmental documentation related to fence construction, including Environmental Stewardship Plans and associated documents.

CEQ and appropriate Federal departments and agencies appreciate your recommendations of bringing border security infrastructure activities in full compliance with NEPA and our Nation's environmental laws. As you know, we are reviewing the current environmental impacts of border security infrastructure and looking for opportunities for minimizing these impacts. As part of this process, we look forward to identifying opportunities for ensuring that border security infrastructure and associated maintenance and repair meet national environmental goals.

The other major topics mentioned in your letter, including stakeholder engagement and public participation, monitoring of fence infrastructure, implementing best management practices, and funding issues are addressed below.

Stakeholder Engagement and Public Participation

CEQ and appropriate Federal departments and agencies agree with the Board that public participation is important in border security infrastructure projects. CEQ, with DOI, USFS, EPA, State Department, and NOAA, will continue to work with DHS to improve public review, analysis and participation in the design and implementation of select border security infrastructure projects. DHS has agreed to provide CEQ and these departments and agencies with a description of its stakeholder engagement process to foster ongoing coordination. DHS plans to obtain input from non-Federal stakeholders, including State, local and Tribal authorities and the interested public. DHS will share this information with the Board and will post it on the Customs Border Protection (CBP) website and disseminate it through other appropriate mechanisms.

In January of this year, DHS officials toured the westernmost portion of the fence with the California Coastal Conservancy and provided updates on their work to the Tijuana River Valley Recovery team in December 2009 and January 2010. This exchange of information was very well received by the stakeholders.

Monitoring of Fence Infrastructure; Implementing Best Management Practices

DHS has executed an Interagency Agreement with U.S. Geological Service to develop a monitoring protocol to determine the environmental effects of border security activities. This agreement is an important step in monitoring the impacts of the fence and its supporting infrastructure. DHS will continue to work with affected Federal land resource agencies to address possible negative consequences as they are identified.

EPA has encouraged DHS to continue its recent efforts to enhance the erosion control measures in the westernmost 3.5 mile section of the fence, including correcting deficiencies that were discovered during the December 2009 storm events. These efforts were successful in minimizing sediment runoff from the new slopes in this part of the fence. EPA supports establishing clear communication channels between DHS and the resource managers on the ground to promote continued progress.

The Coronado National Forest, U.S. Forest Service, Arizona Game and Fish (AZG&F), the Bureau of Land Management (BLM), and DHS exchanged information on how to make the vehicular barrier more wildlife friendly in the Douglas area of the Coronado National Forest. Safford BLM has agreed to fund removal of the remaining border barbed wire fence. In addition, AZG&F offered to survey and remove portions of a rod running on the top of vertical rails that have impeded wildlife movement.

In response to the Board's recommendation pertaining to facilitating review by the International Boundary and Water Commission, the State Department encourages and welcomes recent steps by DHS to coordinate with the Commission on border fence construction, particularly in flood-prone areas.

Funding Issues

As you know, DHS/CBP and DOI signed a Memorandum of Agreement (MOA) in January 2009 regarding environmental stewardship measures related to the construction of border security infrastructure. To implement the MOA, CBP agreed to fund up to $50 million to address the adverse effects of infrastructure construction and maintenance on DOI-managed natural and cultural resources. DHS and DOI are working together to release the funds so mitigation measures can occur.

The Board urged adequate funding to DHS/CBP for training border security personnel about environmental, natural and cultural resource issues. DHS already has infrastructure in place to provide some of this training. The Environmental and Cultural Stewardship Training (ECST) Task Force, operated under the Director of the Border Patrol Planning Branch, is one example. It delivers environmental and cultural awareness training to Border Patrol agents whose patrol activities include Federal lands. The ECST's mission was established within a Memorandum of Understanding entitled "Cooperative National Security and Counterterrorism Efforts on Federal Lands along the United States' Borders," signed in March 2006 by the Secretaries of DHS, DOI, and the U.S. Department of Agriculture.

Another of the Board's recommendations relates to charging the National Academy of Sciences (NAS) to conduct a study on the bi-national environmental effects of the border fence and associated infrastructure. CEQ and appropriate Federal departments and agencies appreciate the Board's advice and recommend the Board discuss this issue with NAS.

The Board's letter includes a set of important, immediate and longer term priorities for President Obama and his Administration to address along the U.S.-Mexico Border. CEQ and appropriate Federal departments and agencies share the Board's concerns and will continue to work together.

Thank you again for your attention to this issue and for the Board's ongoing work along the border. I look forward to receiving the Board's 13th Report and to working with you in the future.

Sincerely,

Nancy H. Sutley
Chair

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Glossary of Acronyms

ADEQ	Arizona Department of Environmental Quality
BECC	Border Environment Cooperation Commission
BEIF	Border Environment Infrastructure Fund
BLM	Bureau of Land Management
BMPs	best management practices
BWWG	Border 2012 Emergency Preparedness and Response Border-Wide Workgroup
CAR	Climate Action Reserve
CBP	U.S. Customs and Border Protection
CCS	Center for Climate Strategies
CEC	Commission for Environmental Cooperation
CFE	Comisión Federal de Electricidad (Federal Electricity Commission)
CO	carbon monoxide
CONACYT	Mexico's National Science and Technology Council
CONAGUA	Comisión Nacional del Agua (Mexico's National Water Commission)
DHS	U.S. Department of Homeland Security
DoD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
ECPA	Energy and Climate Partnership of the Americas
EFCs	Environmental Finance Centers
EPA	U.S. Environmental Protection Agency
EPE	El Paso Electric
FAST	Free and Secure Trade
FHWA	Federal Highway Administration
FWS	U.S. Fish and Wildlife Service
FY	Fiscal Year
GHGs	greenhouse gases
GNEB	Good Neighbor Environmental Board
IBWC	International Boundary and Water Commission
INE	Mexico's National Institute of Ecology
IPCC	Intergovernmental Panel on Climate Change
JAC	Joint Advisory Committee
JCP	Joint Contigency Plan for Preparedness for and Response to Environmental Emergencies in the Inland Border Area
JRT	Joint Response Team
JWC	Joint Working Committee on Binational Transportation Planning
MSCP	Multiple Species Conservation Program
NAAEC	North American Agreement on Environmental Cooperation
NAAQS	National Ambient Air Quality Standards
NADB	North American Development Bank
NAFTA	North American Free Trade Agreement
NASPI	North American SynchroPhasor Initiative
NGOs	nongovernmental organizations
NOx	nitrogen oxides
NPS	National Park Service
NRF	National Response Framework
PDAP	Project Development Assistance Program
PEMEX	Petróleos Mexicanos (Mexican Petroleum)
PM	particulate matter
$PM_{2.5}$	fine particulate matter
POPs	persistent organic pollutants
RFID	radio frequency identification
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SEGOB	Secretaría de Gobernación (Secretary of Government)
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales (Secretary of Natural Resources and Environment)
SENTRI	Secure Electronic Network for Travelers Rapid Inspection
SO_2	sulfur dioxide
SOx	sulfur oxides
TAAP	Transboundary Aquifer Assessment Program
TCEQ	Texas Commission on Environmental Quality
TCR	The Climate Registry
TEIA	transboundary environmental impact assessment
TIFIA	Transportation Infrastructure Finance and Innovation Act
TMDLs	total maximum daily loads
UDM	undocumented migrant
ULSD	ultra-low sulfur diesel
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
VOCs	volatile organic compounds
WCI	Western Climate Initiative

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