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AIR POLLUTION AT THE U.S.– MEXICO BORDER: STRENGTHENING THE FRAMEWORK FOR BILATERAL COOPERATION

Lauren Eades

INTRODUCTION

The U.S.–Mexico bilateral environmental agenda has prioritized reducing air pollution at the border for more than two decades, yet poor air quality continues to plague the region. Urbanization and cross-border trade are contributing factors, with the high volume of commercial trucks, passenger automobiles, and idling vehicles at border crossings exacerbating air pollution. The U.S.–Mexico border has 43 points of entry (POEs), through which 6 million trucks, 77 million passenger vehicles, and 42 million pedestrians crossed northward alone in 2017 (U.S. Department of Transportation 2018). In addition, pollution from border factories and plants, legal and illegal burning of garbage and agricultural fields, the use of brick kilns for cooking in rural communities, and dust from desert areas all contribute to poor air quality.

It is difficult to collect data that pinpoints where air quality problems are most intense because air quality monitors on both sides of the border are spread thinly throughout the border region, and the averages within

Lauren Eades is a 2018 graduate of the Fletcher School of Law and Diplomacy at Tufts University. She would like to thank JPIA editor Russell Hathaway for his encouragement and support, as well as JPIA editors Colette Ashley, Savitri Arvey, and Alicia Krueger for their thoughtful comments and suggestions. She can be reached at lauren.e.eades@gmail.com.

a city or county may not accurately reflect the pollution concentration in different parts of the region, particularly at the POEs. According to Quintana et al. (2015, 290), air pollution “is monitored by a few stations per region that are purposefully located away from local pollution sources and that reflect large scale air quality as the environmental laws apply to the airshed level concentrations, not local hotspots.” In addition, differences in reporting practices between the United States and Mexico make direct comparisons difficult.

Despite these challenges, evidence indicates that the border region experiences high levels of airborne particulate matter (PM), especially PM_{10} and $PM_{2.5}$ (particulate matter less than 10 and 2.5 micrometers in aerodynamic diameter, respectively). These air pollutants are associated with dusty roads and industry, as well as gases and smoke emanating from vehicles and factories. Ozone (O_3), the major component of smog, is also prevalent in the border region due to the high levels of vehicle exhaust. O_3 is produced when vehicles emit nitrogen oxides (NO_x) and volatile organic compounds which combine with sunlight (Davila Fragoso 2016b; Quintana et al. 2013, 49). These compounds persist in the air as they move away from roadways; in particular, PM_{10} only reaches background concentrations at 580 feet from roadways, and NO_2 at 1,250 feet (Quintana et al. 2013, 12). Perhaps even more concerning, $PM_{2.5}$ does not concentrate around roadways; due to its tiny size, this type of particle floats freely in the air.

Reports demonstrate that cities along the U.S.–Mexico border regularly fail to meet their respective national standards governing air quality. In 2017, according to the U.S. Environmental Protection Agency (EPA), various border cities experienced multiple days with air pollution levels that were unhealthy for sensitive groups. Among them, El Paso, Texas had 22 days with unhealthy air quality; Las Cruces, New Mexico had 27; El Centro, California had 33; and San Diego, California had 55 (EPA 2017). The latest official data on Mexican air quality is from 2015, when Mexicali, Baja California reported levels of PM_{10} , $PM_{2.5}$, and O_3 that exceeded government standards (INECC 2015, xiii). In the same report, Tijuana, Baja California reported levels of PM_{10} that exceeded government standards, but no data was collected for $PM_{2.5}$ or O_3 (INECC 2015, xiii). Ciudad Juárez, Chihuahua was not part of the 2015 study because no data was submitted for the city, but in the 2014 report Juárez had excessive levels of PM_{10} and O_3 (INECC 2014, 6).

The U.S.–Mexico border region has a population of about 15 million people, largely concentrated in 14 pairs of sister cities that constitute binational urban areas (U.S.–Mexico Border Health Commission 2015;

Quintana et al. 2015, 287). Due to the border region's high rates of migration, high levels of poverty, low levels of health insurance, and inequitable health conditions relative to other parts of both countries, air pollution has a disproportionately large impact on border communities. For example, although the overall U.S. uninsured rate is 8.8 percent, in most Texas border counties more than 25 percent of the population lacks health insurance. Other U.S. border states fare better, with most border counties averaging 10 to 15 percent uninsured (Barnett and Berchick 2017, 1; Bowers, Gann, and Upton 2018, 4). Additionally, every U.S. border county has been designated a Health Professional Shortage Area (HPSA) for primary care, meaning that certain income groups, geographic areas, or facilities face shortages in health care providers (HHS 2017). In Mexico, 34.6 percent of border residents were uninsured in 2010, while 40 percent of Mexicans were uninsured nationwide (Lara-Valencia 2013, 43). Higher levels of employment in the border region result in better-than-average health insurance access on the Mexican side, but shortages of health care professionals have historically been more acute in Mexican border communities than in the United States (Lara-Valencia 2013, 43–44).

Related to the limited access to health insurance and health care, air pollution is associated with increased rates of allergies, asthma, cancer, tuberculosis, heart conditions, adverse birth outcomes, and premature deaths in border communities (Quintana et al. 2015, 2; Davila Fragoso 2016a). Elevated levels of air pollution particularly affect sensitive groups, including children, senior citizens, pregnant women, and people with underlying health problems, as well as people living closest to POEs, those who cross POEs on foot, and those who work at POEs.

Even though broader diplomatic relations between the United States and Mexico have been strained under the Trump administration, now is an important time to address air pollution due to the groundswell of support for clean air initiatives at the local and state levels. For example, in San Ysidro, a city in eastern San Diego County, community leaders are partnering with San Diego State University and the University of Washington to install new air pollution monitoring devices (Smith 2017). In Mexicali, an outcry is rising over the sickness and death associated with air pollution (Davila Fragoso 2016a, 2016b). In addition, California and New Mexico were among the 16 states that sued the EPA in the summer of 2017 for delaying the implementation of an air pollution law that would lower ozone levels (Hand 2017). Particularly in the United States, the current presidential administration's actions on climate change policy have motivated communities to tackle environmental problems more actively.

In Mexico, the upcoming change in presidential administration could influence the policy environment. After winning the July 2018 presidential election by the highest margin in more than 30 years, Andrés Manuel López Obrador will take office in December 2018. Although he has not directly addressed border air quality issues, his environmental agenda includes creating sustainable cities and combating climate change. Specifically, his “NaturAMLO” proposal calls for a shift away from highly polluting vehicles and personal vehicle use in cities (2018, 12).

Prior to his election, López Obrador spoke scathingly about President Trump and his policies toward Mexico, but he appears to be adopting a more conciliatory stance as president-elect. The week following his election, López Obrador stated, “We are neighbors, we have economic and commercial relations, links of friendship... Cooperation with the United States is very important to our progress” (McDonnell 2018). The López Obrador administration is expected to have goals broadly aligned with progress at the border, even though air pollution is not a high priority for the incoming administration as compared to corruption and public security concerns.

Over the past few years, community actions have highlighted the roles of various relevant stakeholders in reducing air pollution: in addition to local communities, academia, and state governments, environmental policies also influence the private sector and non-governmental organizations (NGOs). By working creatively with all of these groups, U.S. and Mexican environmental agencies can more effectively combat air pollution and its damaging effects on the health of the border population. This paper analyzes the existing agencies and agreements that govern border air pollution and offers policy recommendations to create more effective bilateral cooperation through coordination between local, state, and federal actors.

ANALYSIS

Complementary institutions govern border air pollution, but they lack resources and some are not well integrated.

This analysis explains the border region’s complex network of institutions that are intended to uphold air quality standards. Although these agencies and programs enhance institutional capacity in the border region by adding to the range of available mechanisms for environmental protection, their funding sources are ad hoc, varied, and sensitive to the political priorities of national, state, and local governments (Coronado and Mumme 2018, 3). As a result, border air quality initiatives are limited in capacity. Furthermore, this situation results in government agencies “lurching from crisis

to crisis” (Stephen Mumme, interview with author, July 3, 2018) in their efforts to protect the environment, lacking a broader strategic vision that would capitalize on the potential contributions of these complementary institutions, agencies, and programs (Sánchez-Rodríguez and Mumme 2013, 153).

The United States–Mexico Agreement on Cooperation for the Protection and Improvement of the Environment in the Border Area (1983), commonly referred to as the La Paz Agreement, is the main framework that underpins bilateral cooperation on shared environmental challenges in the border region. The La Paz Agreement facilitates decentralized collaboration between the U.S. and Mexican environmental agencies that is independent of each country’s foreign ministry (Córdova and de la Parra 2009, 282–3). Accordingly, the EPA and the Secretariat of the Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales*, SEMARNAT) are the implementers of the La Paz Agreement, which provides the mechanism for the governments to work on environmental protection issues without stipulating a specific strategy (Mumme and Collins 2014, 304). The agreement requires national governments to consult with state governments and incorporates the participation of states and cities, intergovernmental organizations, NGOs, U.S. Native American border tribes, and Mexican indigenous communities (Mumme and Collins 2014, 305; EPA and SEMARNAT 2016a, 4). Finally, the agreement can be updated over time, as subsidiary agreements can be added in the form of annexes. Annex IV of the agreement deals specifically with air pollution resulting from copper smelters along the border, while Annex V addresses transnational air pollution in urban areas (EPA 1983).

Additional agencies also contribute to carrying out the La Paz Agreement. Among them, bilateral institutions were established following the signing of the North American Agreement on Environmental Cooperation (NAAEC), the environmental side agreement of the North American Free Trade Agreement (NAFTA). These institutions include the Border Environment Cooperation Commission (BECC) and the North American Development Bank (NADB). A trilateral institution that includes Canada, the Commission for Environmental Cooperation (CEC), was also created at that time. The NADB is a financial institution capitalized equally by the United States and Mexico that provides funding for environmental infrastructure projects in the border region, while the BECC designs and certifies environmental infrastructure projects in the region. In November 2017, the BECC was merged into the North American Development Bank (EPA 2018c). In 2016 the BECC administered \$761,383 USD in EPA

grants for 19 border environmental projects as part of the La Paz Agreement (NADB and BECC 2017, 17). Under the merged NADB, the EPA has approved grants of \$1.42 million USD for 26 projects beginning in 2018 (NADB 2018, 14).

Working in close partnership with SEMARNAT, Mexico's National Institute for Ecology and Climate Change (*Instituto Nacional de Ecología y Cambio Climático*, INECC) operates a National System of Information on Air Quality (*Sistema Nacional de Información de la Calidad de Aire*, SINAICA). This platform gathers and disseminates national air quality monitoring data. SINAICA provides hourly updates for major cities indicating which have acceptable air quality levels, air pollution levels exceeding government standards, or inadequate information (SINAICA 2018). SINAICA has been incorporated into SEMARNAT's implementation of the La Paz Agreement by serving as the instrument that communicates border air quality data to the public (EPA 2012, 18).

Along the same lines, AirNow is the official U.S. platform for air quality data. The border region's air quality data is supplied by the various state-level agencies, including the Texas Commission on Environmental Quality (TCEQ), the New Mexico Environment Department, the Arizona Department of Environmental Quality, the California Air Resources Board, the Imperial County Air Pollution Control District, and the San Diego County Air Pollution Control District.

The U.S.–Mexico Border Information Center on Air Pollution (*Centro de Información sobre Contaminación de Aire*, CICA) is sponsored by the EPA's Clean Air Technology Center, and it provides in-depth technical support to federal, state, and local government agencies, as well as academic institutions that are working to address air pollution in the border region.

Implementation of the La Paz Agreement also relies on the advice of two primary advisory committees. The Good Neighbor Environmental Board (GNEB) is a U.S.-based independent federal advisory board that provides recommendations regarding environmental infrastructure needs in states along the southern U.S. border. Its members include public servants and professionals from the private sector, academia, and the nonprofit sector. The advice of the GNEB is incorporated into EPA and SEMARNAT's border environmental strategy (EPA 2012, 39).

SEMARNAT's Advisory Councils for Sustainable Development (*Consejos Consultivos para el Desarrollo Sustentable*, CCDS) are the Mexican equivalent of the GNEB, and the CCDS advise the EPA and SEMARNAT on their shared border initiatives (EPA 2012, 39). In November 2017, the United Nations Development Program released a report that highlighted

the need for deep reform to make the CCDS truly participatory (UNDP 2017, 9).

Other agencies and institutions also deal with border air quality, but they are not incorporated into the EPA and SEMARNAT's framework. These agencies serve key functions in the context of transborder environmental policies.

- The U.S. Department of State's Office of Environmental Quality and Transboundary Issues (EQT) coordinates the development of U.S. foreign policy on air pollution. This office ensures that trade agreements have environmental commitments, engages with international institutions, and leads the environmental review process for transborder infrastructure projects (U.S. Department of State 2018).
- In Mexico's Ministry of Foreign Affairs (Secretaría de Relaciones Exteriores, SRE), the staff that focus on the environment work in several offices across the General Directorate for Global Issues, which is part of the Secretariat for Multilateral Affairs and Human Rights (SRE 2018).
- The U.S.–Mexico Border Health Commission (BHC) is a binational organization that the U.S. and Mexican governments created by executive agreement in July 2000 to study major public health issues affecting people in the border region. The commission is particularly concerned about air pollution as it relates to elevated incidence of asthma in children and adults (BHC 2015, 12). However, as of 2018 the BHC headquarters in El Paso, Texas has been closed, leaving its future role uncertain (Stephen Mumme, interview with author, July 3, 2018).

Border environmental plans have yielded mixed results.

The Border XXI Program (1995–2000) was the first program under the La Paz Agreement to deal specifically with air quality. Border XXI introduced air-quality assessment programs in each of the seven major urban areas along the border, and it implemented abatement programs in two of them: El Paso-Ciudad Juárez and Mexicali-Imperial Valley (Mumme and Collins 2014, 307). Arguably, this program offered the most ambitious goals under the most centralized model thus far in border environmental collaboration.

The Border 2012 Program (2002–2012) was implemented following the election of more conservative governments in both countries. Border 2012 had a lower federal budget and an emphasis on decentralized action, which translated to less progress. Other circumstances also limited Border

2012, including harsh new national security policies in the United States and rising drug violence in Mexico (Mumme and Collins 2014, 308). However, reducing air pollution was one of the five overarching goals of the program, and some progress was achieved. The program established five air quality monitoring areas and carried out joint monitoring at the El Paso-Ciudad Juárez border (Mumme and Collins 2014, 308). The program also facilitated the adoption of retrofitted emissions controls for diesel-powered trucks and buses. Despite these advances, a lack of interoperable data continues to limit air quality assessment efforts (Mumme and Collins 2014, 308).

The Border 2020 Program (2012–2020) builds on the work that took place under Border 2012, emphasizing bottom-up strategies for setting priorities with the goal of protecting the environment and public health. Border 2020 has five major goals, and Goal 1 is to reduce air pollution. The five key objectives underpinning Goal 1 are summarized below (EPA 2016):

1. Reduce the number of vehicles in the border region that do not comply with emissions standards, and reduce emissions at POEs through anti-idling and other measures.
2. Reduce the emissions of pollutants to ensure national air-quality standards are met in the major binational airsheds.
3. Maintain air-monitoring networks with real-time access to air quality data in all binational airsheds.
4. Complete climate action plans in Mexican border states and build up the capacity to ensure implementation.
5. Reduce emissions through energy-efficient or renewable energy projects.

The 2016 progress report, “State of the Border Region Indicators Interim Report 2016,” does not offer adequate information regarding progress. The only air pollution-relevant indicator that has been reported is the “number of days exceeding air quality standards in border monitoring areas” (EPA and SEMARNAT 2016b, 9). Therefore, progress toward Objective 2 is highlighted, but no other progress has been reported. Other indicators that need to be measured include the percentage of vehicles that do not comply with emissions standards, progress on the implementation of anti-idling measures, the functioning of air monitoring networks, progress on the

completion of climate action plans in Mexico and related capacity, and progress on the implementation of energy-efficient and renewable energy projects.

Furthermore, a detailed breakdown of funding for the Border 2020 program is not available. Neither the EPA Budget in Brief (2017) nor the SEMARNAT Authorized Budget (2017) refer specifically to the program, although general information about funding for projects at the U.S.–Mexico border is included in the EPA Budget in Brief. The funding section of the “Border 2020: U.S.–Mexico Environmental Program” report does not include any dollar or peso amounts and merely reports that the Border 2020 coordinating bodies will evaluate funding needs on an ongoing basis (EPA and SEMARNAT 2012, 39). The report indicates that funding sources include federal funds, investments by state and local governments, private investment, and NADB financing (EPA and SEMARNAT 2012, 39). More details about the expenses of specific projects are shared in the Winter 2014–2015 and Autumn 2016 Highlights Reports: for example, the Autumn 2016 report describes a grant of \$89,750 USD for the Texas A&M Transportation Institute to study the emissions of drayage trucks at the Laredo–Nuevo Laredo border, and a grant of \$28,725 USD to the State of Chihuahua in partnership with the Autonomous University of Ciudad Juárez to conduct a study of particulate matter’s sources in the Paso del Norte region (EPA and SEMARNAT 2016a, 5 and 9). In addition, EPA Region 9 states—California/Baja California and Arizona/Sonora—publish biennial action plans. California/Baja California provided nearly complete information on costs and funding sources for 2017–2018 projects, which totaled about \$785,000 for Goal 1 (EPA 2018b). Arizona/Sonora left most costs “TBD,” while the majority of funding sources were provided (EPA 2018a). However, despite these details, publicly available information does not demonstrate that Border 2020 is on track to achieve its goals in the planned timeframe.

RECOMMENDATIONS AND CONCLUSIONS

More effective U.S.–Mexico bilateral collaboration on air pollution is needed, but complex institutional structures and decentralization have hindered progress. Peripheral challenges also influence the potential for policy change, especially U.S. security concerns at the border. Below are a few policy alternatives that could address these issues.

1. *Monitoring systems must be able to identify air-pollution hot spots.* The existing system, which measures overall pollutant levels in airsheds, does not accurately assess the conditions that affect some border communities. A

much denser network of monitors is needed on both sides of the border. In the absence of more federal funding to expand the network, communities could partner with universities, the private sector, or NGOs to organize these projects.

2. *Joint monitoring on a broader scale must be achieved.* Joint monitoring of air pollution levels has been a goal for almost two decades. In order to fully understand and respond to air pollution hot spots, monitoring systems must be interoperable on both sides of the border, and personnel must be employed to quickly fix monitoring stations that break down. More funding for the effective maintenance of the monitoring system may be needed.
3. *Agencies must collect appropriate data to gauge progress.* As the Border 2020 interim report demonstrates, the EPA and SEMARNAT need to collect more data that tracks progress. In the future, this might mean setting goals that the agencies know they will be able to measure. Some indicators that would assist in measuring progress toward Goal 1 include the change in average idling time at POEs, change in the percentage of POEs that have regular air quality monitoring, and changes in the types of pollutants that are monitored. In addition, the EPA and SEMARNAT should consider the percentage of vehicles crossing the border that do not comply with emissions standards, progress toward anti-idling policies, progress toward Mexican states' climate action plans, and progress toward energy efficient and renewable energy projects in the border region.
4. *Funding for Border 2020 must be more transparent to ensure accountability and appropriateness.* A major challenge in evaluating Border 2020 is the difficulty in accessing information about public spending on the program. Advocates cannot argue for increased EPA and SEMARNAT budgets without a deeper understanding of how the existing budget is being spent. Ultimately, Border 2020 may be in need of a larger budget, but publicly available data does not permit that analysis.
5. *Border wait times must be reduced.* Extended waits at border crossings have long been identified as a major cause of vehicle-based pollution, and current efforts have not curbed the concentrated air pollution at border crossings. The EPA and SEMARNAT should partner with Customs and Border Protection (CBP), which is already working on reducing border wait times through increasing its staffing and implementing trusted traveler programs, including SENTRI, NEXUS, and FAST, as well as Ready Lanes

and Pedestrian Ready Lanes (CBP 2017, 25–26). In its 2017 report, the GNEB also highlighted the need to reduce border-crossing wait times to combat air pollution (GNEB 2017, 44).

6. *Coordination among key institutions must be enhanced.* High-level collaboration between the EPA, SEMARNAT, the State Department, SRE, and a revitalized BHC would improve priority-setting and goal alignment, and greater integration could lead to steadier funding streams by raising the profile of border environmental initiatives. Collaboration between these institutions on border air quality issues is currently very limited, as federal interest in border environmental collaboration has declined in recent years.

In the short term, the EPA and SEMARNAT should prioritize making Border 2020 as effective as possible. One way to do so would be to follow the San Ysidro air quality monitoring example by partnering with academia or other institutions to develop innovative, scalable projects. Such projects would enable the EPA and SEMARNAT to access new funding streams and benefit from local knowledge. Education programs regarding public-private or public-academic partnerships could be organized quickly and carried out within the next year. Such initiatives could be championed by regional EPA and SEMARNAT offices and could have the effect of strengthening public commitment to fighting air pollution in border cities.

In the medium term, the EPA and SEMARNAT should lead the way in streamlining institutional processes and identifying solutions to reduce border wait times in partnership with other border agencies, particularly CBP. This strategy would require buy-in from CBP, which should be feasible given that all three agencies have an interest in reducing border traffic while maintaining security. In particular, CBP aims to cut down wait times by operating as efficiently as possible in order to stimulate the U.S. economy (CBP 2017, 4–5). Working with environmental agencies may also afford reputational benefits to CBP. In addition to expanding the programs already being implemented by CBP, the agencies could incentivize vehicles to reduce their emissions by creating a “fast track” lane specifically for vehicles that meet certain higher emissions standards.

Finally, even though concerns related to budget transparency have been discussed above, the EPA and SEMARNAT should push for more funding to improve binational air pollution monitoring systems. The average cost of an air monitoring station start-up is \$100,000 USD, not including the monitoring equipment (Shina, Brick, and Shields 2015, 35). Equipment for one monitoring station has traditionally cost \$100,000 USD, although much cheaper new technologies are emerging (New Jersey Clean Air Council

2017, 18). Therefore, if existing technology is used, doubling the density of air monitoring stations at the border would cost roughly \$27 million USD. In the United States, champions for this budget increase could come from various levels—ranging from civil society groups and local governments to congressional and Senate leaders. In Mexico, the federal government has historically been more willing to support environmental goals, although it has fewer resources to contribute. The United States could provide a larger portion of funding for binational monitoring systems if Mexico does not have the available resources.

The EPA and SEMARNAT have appropriate goals to improve air quality in the border region, but so far implementation and monitoring have been weak, and a policy intervention may be necessary for improvement. The implementation of these recommendations would enhance environmental justice at the U.S.-Mexico border and contribute to better health outcomes in the medium and long term. More broadly, environmental policymakers can learn from this case that effective data collection, transparency, interagency collaboration, and political will are necessary to achieve environmental goals.

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