WATER AND WASTEWATER IN THE U.S.–MEXICO BORDER REGION

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




USA

MEXICO




GNEB
Environmental Advisors Across Borders

December 2023

The publication number for this report is EPA 219-R-23-001. All GNEB reports may be found at the website www.epa.gov/faca/good-neighbor-environmental-board-gneb-reports-president-united-states.

About the Board

The Good Neighbor Environmental Board (GNEB or Board) was created in 1992 by the Enterprise for the Americas Initiative Act, Public Law 102-532. The purpose of the Board is to "advise the President and the Congress on the need for implementation of environmental and infrastructure projects (including projects that affect agriculture, rural development, and human nutrition) within the states of the United States contiguous to Mexico to improve the quality of life of persons residing on the United States side of the border."

The Board is charged with submitting an annual report to the U.S. President and Congress. Management responsibilities for the Board were delegated to the Administrator of the U.S. Environmental Protection Agency by Executive Order 12916 on May 13, 1994.

GNEB does not carry out border region activities of its own, nor does it have a budget to fund border projects. Rather, its unique role is to serve as a nonpartisan advisor to the U.S. President and Congress and recommend how the federal government can most effectively work with its many partners to improve conditions along the U.S.–Mexico border.

The Board operates under the provisions of the Federal Advisory Committee Act, and membership on the Board is extremely diverse. By statute, GNEB comprises representatives from:

(1) the U.S. government, including a representative from the U.S. Department of Agriculture and representatives from other appropriate agencies;

(2) the governments of the states of Arizona, California, New Mexico and Texas; and

(3) private organizations, including community development, academic, health, environmental and other nongovernmental entities with experience on environmental and infrastructure problems along the southwest border.

The Board also includes representatives from tribal governments with lands in the border region.

The recommendations in this report do not necessarily reflect the official positions of the federal departments and agencies that are represented on the Board, nor does the mention of trade names, commercial products or private companies constitute endorsement. Following historic precedent, the federal departments and agencies represented on the Board have recused themselves from this report.

Suggested short citation:

Ganster, P. et al. 2023. *Water and Wastewater in the U.S.–Mexico Border Region. Twentieth Report of the Good Neighbor Environmental Board to the President and Congress of the United States.* EPA 219-R-23-001. Washington, D.C.: U.S. Environmental Protection Agency.

Suggested full citation:

Ganster, P., I. Coronado, J. McNeece, W. M. Micklin, K. S. Becker, J. K. Nierman, J. L. Palacios, E. Moderow, L. Fleet, J. Rizk, J. M. Heyman, F. Lara, A. Sweedler, R. DeLeon, M. Jordan, J. Collert, C. Helmer, J. Payne, C. Suarez, S. Mumme, P. Aguirre, A. R. Barcenas, K. Collins, E. A. Cruz, M. E. Gonzales-Roses, J. Hinojosa, M. D. Hollis, J. P. King, E. Lee, M. Lopez, J. Maruffo, J. Murrieta-Saldivar, P. L. Vandervoet, M. E. Giner, and T. R. Pohlman. 2023. *Water and Wastewater in the U.S.–Mexico Border Region. Twentieth Report of the Good Neighbor Environmental Board to the President and Congress of the United States.* EPA 219-R-23-001. Washington, D.C.: United States Environmental Protection Agency.

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President Joseph Biden
Vice President Kamala Harris
Speaker Mike Johnson

On behalf of your Good Neighbor Environmental Board (GNEB), I am submitting our 20th Report, *Water and Wastewater in the U.S.–Mexico Border Region*. This report addresses unmet drinking water and wastewater needs—and related issues of stormwater and watershed management—for millions of Americans along the U.S. border with Mexico. GNEB applauds progress that federal agencies and their partners at the tribal and state levels have made in addressing these needs. This momentum has accelerated with significant new infrastructure funding from Congress and a renewed focus by federal agencies on underserved populations throughout the United States and in the border region. However, continued attention by federal agencies is necessary for smaller communities with limited resources and for municipalities on the international boundary that are impacted by transborder sewage flows.

The report has 10 specific recommendations in three areas. First, we recommend that federal agencies increase coordination for services to underserved border and tribal communities that have limited resources and administrative capacity. This includes adjusting funding criteria for communities that cannot repay loans and providing support for ongoing operations and maintenance of installed infrastructure.

Second, we recommend that existing federal funds be approved for green infrastructure for urban and rural stormwater management. Additional reliable and consistent funding for the International Boundary and Water Commission is necessary for unmet capital investment for wastewater infrastructure, levee and dam repairs, and ongoing sediment removal to protect border communities from growing flood risks. Consistent funding at the $100 million level is also essential for the U.S.–Mexico Border Water Infrastructure Program to enable the U.S. Environmental Protection Agency and North American Development Bank to continue their critical wastewater and water work in the region.

Third, we recommend convening a task force of the relevant federal, state, local and international agencies to devise a long-term institutional and international solution for chronic and predictable cross-border flows of contaminated water and sewage. The current reactive approach to these problems often delays solutions a decade or more, amplifying the human health impacts on border communities and increasing capital costs significantly. The task force should also develop binational groundwater management for critical aquifers that underlie the international boundary and provide water for millions of border residents.

Thank you for the opportunity to examine these issues and apply the Board's many years of collective experience in addressing border infrastructure matters.

Sincerely,

Paul Ganster, Ph.D.
Chair, Good Neighbor Environmental Board
Institute for Regional Studies of the Californias
San Diego State University

Overview of the 20th Report

This report addresses unmet drinking water and wastewater needs—as well as related issues of stormwater, watershed and wetlands management—for millions of Americans along the U.S. border with Mexico. This region includes the counties immediately adjacent to the U.S.–Mexico border or located partially within the zone that extends 60 miles (100 kilometers [km]) north of the international boundary. This area is the poorest region of the country, with per capita incomes, health outcomes and education levels well below the national average. Approximately 10 million U.S. residents, mainly Hispanic, live in this region, including approximately 800,000 individuals in *colonias* and rural areas. About 400,000 Native Americans, 300,000 *colonias* and rural residents, and more than a million people in cities adjacent to the international boundary are underserved in terms of water and wastewater infrastructure and services. The intersection of poverty, ethnicity, and lack of basic water and sanitary services has created persistent inequities and an environmental and public health crisis along the southern border.

The Good Neighbor Environmental Board (GNEB) recognizes the progress that federal agencies and their partners at the tribal and state levels have made in addressing unmet water and wastewater infrastructure needs and related watershed and wetlands issues. This momentum has accelerated with significant new infrastructure funding from Congress and a renewed focus by federal agencies on underserved populations throughout the United States and in the border region. However, continued attention by federal agencies is necessary, especially to benefit smaller communities with limited resources and communities on the international boundary that are impacted by transborder sewage flows.

Recommendations of the 20th Report

GNEB provides the following 10 recommendations for general and specific federal actions throughout this report:

1. Continue to expand federal partnerships to make water and wastewater infrastructure funding and other water-related funding accessible to marginalized and underserved border communities as a priority of the administration and federal agencies. Proactive outreach by collaborating federal agencies is essential for reaching rural, peri-urban and tribal communities that have been left behind with previous efforts. Funding must include grants, as well as support for operations and maintenance.

2. Provide targeted technical assistance to aid and expedite underserved border communities, including tribal governments, to take advantage of the resources provided by such federal investments as the Infrastructure Investment and Jobs Act (commonly known as the Bipartisan Infrastructure Law, or BIL), the Inflation Reduction Act (IRA) of 2022 and other sources that include funding for water and wastewater projects and watershed and wetlands management. For example, BIL incorporates a requirement that 49 percent of certain federal funds provided to states through the Drinking Water Revolving Funds and Clean Water Revolving Funds must be distributed as grants or 100 percent principal forgiveness loans. The federal government should work with border communities and border states so that state grants and loans with 100 percent principal forgiveness are directed to underserved communities, many of which are border communities. The administration should also evaluate whether additional grant funds can be made available to poor communities, particularly because BIL funding will extend only through fiscal year (FY) 2026.

3. Develop a grant program to assist border communities with ongoing operations and maintenance of public water systems. The Drinking Water Revolving Funds and the Clean Water Revolving Funds are focused primarily on construction of infrastructure and cannot be used for ongoing operations and maintenance of systems, but these costs are prohibitive for many poor communities. Amend the Safe Drinking Water Act to allow irrigation districts to be eligible for funding similar to public water systems that receive Drinking Water Revolving Fund monies. Many poor communities obtain domestic water through irrigation districts, and the

expansion of eligible entities for funding with respect to the drinking water service they provide will aid in the distribution of funds to rural and underserved populations.

4. Provide guidance to clarify that authorized uses of Clean Water Revolving Funds include measures to manage, reduce, treat or recapture stormwater, as well as development and implementation of certain watershed pilot projects. The administration should clarify that under these provisions, Clean Water Revolving Funds may be used to develop green infrastructure for urban stormwater collection and runoff and watershed restoration.

5. Provide funding to the International Boundary and Water Commission (IBWC) for the levees and flood infrastructure on the border that only IBWC has the jurisdiction and responsibility to repair and maintain.

6. Provide guidance to clarify that authorized uses of BIL funding to state and local governments for levees and dam repair also include other flood infrastructure and ongoing sediment removal.

7. Convene a task force of the relevant federal, state, local and international agencies to devise a long-term institutional solution for chronic and predictable environmental problems, such as cross-border flows of contaminated water and sewage. The charge of the task force should include redefining the roles of agencies and developing long-term funding streams. The North American Development Bank (NADBank) should be central to these discussions, along with IBWC, the U.S. Environmental Protection Agency (EPA) and relevant Mexican agencies. A key goal of this effort should be the ability to plan and prioritize water and wastewater infrastructure and related needs based on science-based transborder analysis. U.S. communities located on the international boundary face ongoing flows of wastewater and stormwater from Mexico that affect quality of life and compromise public health. The current reactive approach to these problems does not work because solutions are often delayed a decade or more, populations are continuing to grow, and the costs are much higher than necessary.

8. Fund the U.S.–Mexico Border Water Infrastructure Program (BWIP) at the $100 million level in the years to come to address the water and wastewater infrastructure deficit of border communities. On an annual basis, Congress appropriates funding to EPA for BWIP, which is designed to fund the development, design and construction of water and wastewater infrastructure projects within the region 62 miles (100 km) north and south of the U.S.–Mexico international boundary. In the mid-1990s, Congress appropriated $100 million on an annual basis from 1995–1997; however, from 2012–2016, Congress appropriated a mere $5 million annually. To date, BWIP has been very successful in channeling more than $700 million for basic water and sanitation infrastructure on both sides of the border. In addition, BWIP has been leveraged at a ratio of 2:1 by mobilizing local and state resources.

9. Provide a funding stream to IBWC for capital and repair projects that are critical for the health and safety of millions of border residents. The large backlog of projects includes the South Bay International Wastewater Treatment Plant upgrade (potentially $910 million for plant expansion and rehabilitation); the Rio Grande Flood Control Project ($946 million for 158 miles [254 km] of levees, of which $70 million is for projects where a high levee failure risk exists); Tijuana River Levee Rehabilitation ($100 million for levee construction and sediment removal); and Amistad Dam Seepage Correction ($80–$276 million). These projects are not eligible for BIL financing. The administration, acting through the U.S. Department of State and the U.S. Section of IBWC, should also negotiate a cost share with Mexico for the pending capital and repair projects. Congress should also approve the President's budget request giving the U.S. Section of IBWC additional authorities to receive funds from federal and non-federal entities all along the U.S.–Mexico border, which is not currently permitted.

10. Direct IBWC and other agencies to initiate and continue as long as necessary discussions with U.S. and Mexican agencies to develop minutes to 1944's *Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande Treaty Between the United States of America and Mexico* (1944 Water Treaty) for governance of each of the critically important transboundary aquifers. Long-term drought, decline of surface-water sources and growing demands for water are putting more pressure on aquifers that underlie the border. Critical transborder aquifers have experienced excessive pumping and deterioration of water quality due to intrusion of saline waters, threatening the water security of millions of border residents. Because U.S. border states control underground water in their jurisdictions and the Mexican federal government controls underground water in its jurisdiction, a comprehensive U.S.–Mexico ground water treaty is likely not achievable. To support this effort, GNEB recommends that the administration direct available resources to continue the U.S.–Mexico Transboundary Aquifer Assessment Program to properly characterize the international aquifers.

1

Border Socioeconomic Context

Responses to regional water challenges must consider the socioeconomic conditions of communities along the U.S. border with Mexico (see **Figure 1** for various demarcations of the U.S–Mexico border region). Except for San Diego County (California) and Pima County (Tucson), Arizona, U.S. residents along the border have fewer financial resources than residents of other U.S. regions. In 2020, 22 of the 23 U.S. counties bordering Mexico had a higher percentage of their population in poverty (i.e., below the federal poverty level) than the national average (U.S. Census Bureau 2021a, 2023). The White House Council on Environmental Quality recently developed the Climate and Economic Justice Screening Tool, which highlights disadvantaged census tracts based on factors that include water and wastewater, revealing that in wealthy areas, such as San Diego County or Pima County, there are many areas that are disadvantaged (Council on Environmental Quality 2023a). Approximately 57 percent of the border county population is Hispanic; this number jumps to 84 percent when the highly urbanized and predominantly non-Hispanic counties of San Diego (74% white) and Pima (84% white) are excluded.[1] Engaging with Hispanic communities requires cultural understanding and, in some cases, communication in the Spanish language. Community engagement with border tribal peoples requires similar approaches. See callout box on "Environmental Justice" for more information on federal and state policies related to environmental justice communities.

Federally recognized tribes and tribal communities along the U.S.–Mexico border (**Figure 2**) are particularly affected by elevated ambient temperatures that exacerbate water supply vulnerability.

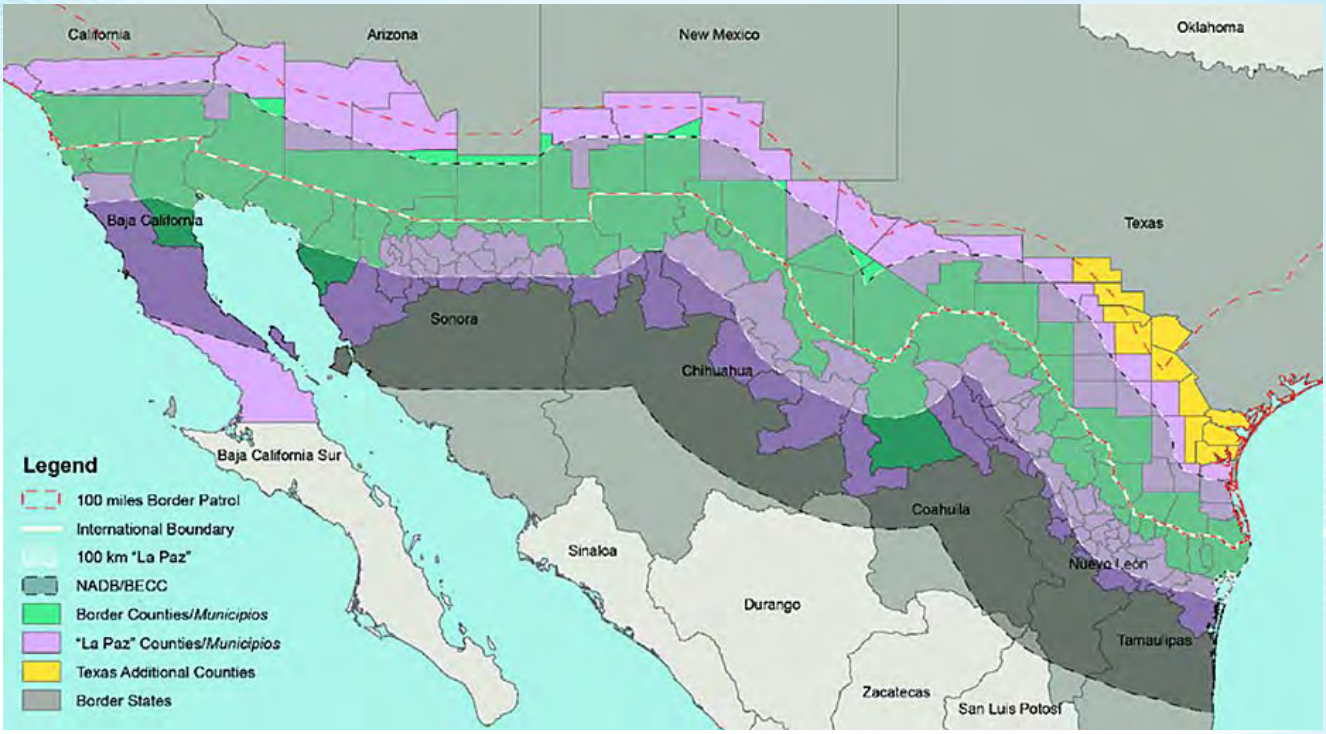


Figure 1. The U.S.–Mexico border region as defined by the La Paz Agreement, North American Development Bank, and border counties and municipalities. Source: Pamela Criz, The Baker Institute. From: Payan, T., and P. Cruz. 2017. *Managing the U.S.–Mexico Border First Requires Defining It.* Baker Institute for Public Policy Issue Brief 4.20.17. Houston, TX: Rice University.

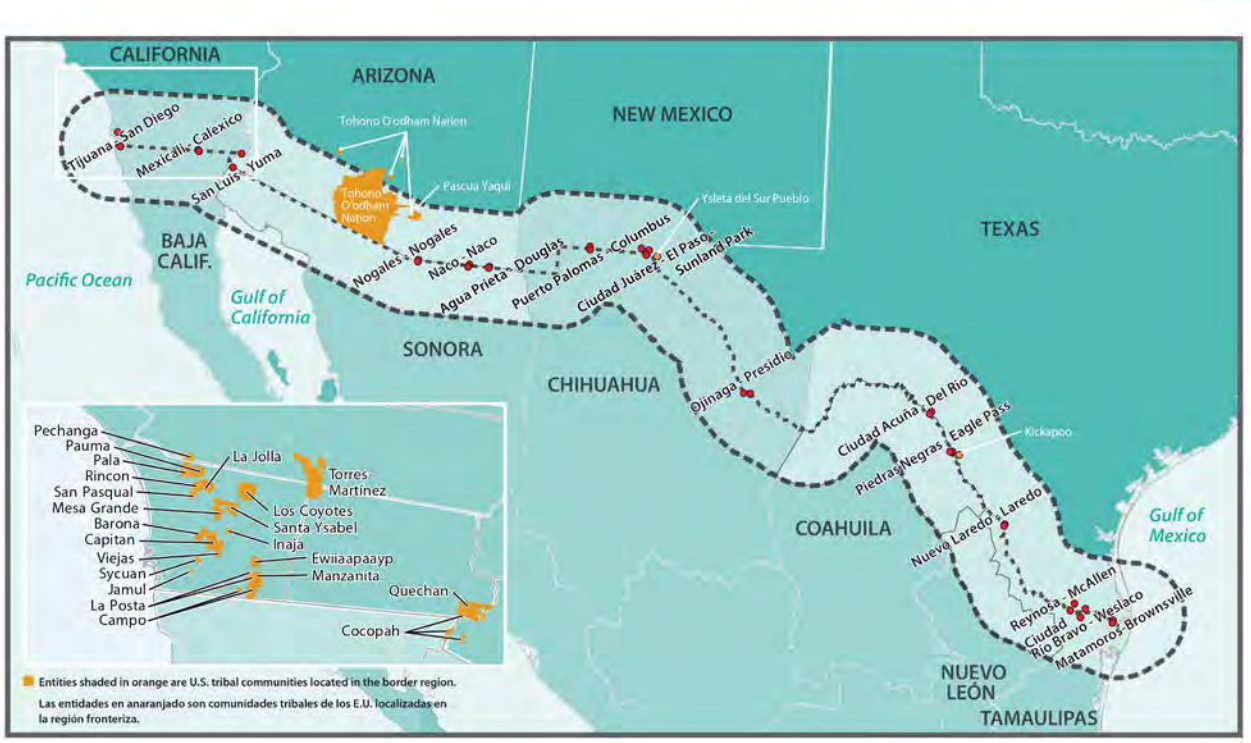


Figure 2. U.S. tribal communities located in the U.S.–Mexico border region. Source: U.S. Environmental Protection Agency Border 2020 Program, website: www.epa.gov/sites/production/files/documents/Border2020-map.pdf.

Environmental Justice

Environmental justice, according to Executive Order 14096 of April 21, 2023, "means the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, tribal affiliation or disability, in agency decision-making and other federal activities that affect human health and the environment so that people: (i) are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards, including those related to climate change, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or systemic barriers and (ii) have equitable access to a healthy, sustainable and resilient environment in which to live, play, work, learn, grow, worship and engage in cultural and subsistence practices."

Executive Order 14096 points out that "communities with environmental justice concerns exist in all areas of the country, including urban and rural areas and areas within the boundaries of tribal nations and U.S. territories. Such communities are found in geographic locations that have a significant proportion of people who have low incomes or are otherwise adversely affected by persistent poverty or inequality. Such communities are also found in places with a significant proportion of people of color, including individuals who are Black, Latino, Indigenous and Native American, Asian American, Native Hawaiian and Pacific Islander. Communities with environmental justice concerns also include geographically dispersed and mobile populations, such as migrant farmworkers."

Federal policies regarding environmental justice date from a Clinton administration executive order (Executive 0rder 12898 of February 11, 1994) and Biden administration executive orders and programs (e.g., Justice40 Initiative; White House Environmental Justice Advisory Council; White House Environmental Justice Interagency Council; Executive Orders 14008, 12898 and 14096) (White House 2023). Many federal funding programs discussed in this GNEB report emphasize goals related to environmental justice.

U.S. border states have distinct policies regarding environmental justice. California state law establishes that environmental justice means "the fair treatment of people of all races, cultures and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations and policies" (Cal. Gov. Code § 65040.12d.(e)(1)). California also has several specific programs and offices tasked with environmental justice issues and identifying disadvantaged communities (California Environmental Protection Agency 2023). New Mexico has formally used the environmental justice concept since 2005 with an executive order (State of New Mexico Office of the Governor 2005) and maintains an office that applies principles, policies and procedures of environmental justice (New Mexico Environment Department 2023). Texas has used the terms "environmental justice" and "environmental equity" to refer to procedural practices consistent with Title VI of the Civil Rights Act of 1964. Arizona's current administration is in the final stage of defining the environmental justice statewide policy and strategy, which aims at the fair treatment and engagement of people regardless of race, color, origin or income.

GNEB, in this report, uses the phrase environmental justice to refer to specific federal and state programs. Otherwise, disadvantaged communities and underserved communities are terms used to describe communities that lack proper water and wastewater infrastructure and services.

They face deteriorating infrastructure and contaminated water and air, as well as the loss of traditional foods and medicines, culturally important animal species, and plant resources through prolonged drought (Cozzetto et al. 2013). Historic land settlement practices that often include isolated dwellings and communities and high rates of poverty—more than double that of the general U.S. population (Sarche and Spicer 2008)—complicate tribal and disadvantaged populations' abilities to respond to these challenges.

Despite the high levels of poverty along the U.S.–Mexico border, the region is critical for the prosperity of the U.S. economy. The Mexican side of the border houses a world-class manufacturing industry, much of it owned by or dependent on U.S. businesses. U.S. border communities are centers for logistics, specialized services and management. Mexico is the second largest trading partner of the United States ($661 billion in 2021), nearly as large as Canada ($665 billion), and most of the bilateral trade moves through border communities on trucks and rail, with significant negative environmental and human impacts (Office of the U.S. Trade Representative 2023, U.S. Census Bureau 2021b). Nearly 5 million U.S. jobs depend on trade with Mexico (Wilson 2017). Some border regions are areas of significant economic

Construction of border wall with hoistable gates across the Tijuana River channel in San Diego in 2023, as described on page 33. **Photo credit:** Paul Ganster

activity and resources, such as the biotechnology cluster in San Diego, California; aerospace and automotive industries in Arizona; petroleum and natural gas industries in Texas; and intensive irrigated agriculture—especially fresh fruits and vegetables—in Imperial County, California, adjacent areas in Arizona, and the Lower Rio Grande Valley.

Although the benefits of U.S.–Mexico trade are spread widely throughout the United States, many of the costs associated with the flourishing bilateral trade are borne by border communities. Particularly relevant to water and wastewater issues is the rapid urbanization of key locations for trade and manufacturing. The growth of urban and peri-urban communities in both the United States and Mexico has outstripped planning and investment in basic infrastructure, including that for water and wastewater. For many decades, the U.S. and Mexican border regions' population growth rates have exceeded those of their respective nations. An important manifestation of the demographic dynamism in the U.S. border is the spread of *colonias*, residential communities without standard urban services and infrastructure. Similar settlements also are characteristic on the Mexico side.

To better serve the *colonia* residents, the National Affordable Housing Act of 1990 (as amended) called for border states to set aside a percentage of their annual state Community Development Block Grant allocations for use in *colonias*. The purpose of these set-aside funds is to help meet the needs of *colonias* residents in relationship to the need for potable water, adequate sewer systems, or decent, safe and sanitary housing (U.S. Department of Housing and Urban Development 2023). The Rural Community Assessment Project in 2015 found that 604 U.S. border–region *colonias* with 134,419 residents lacked potable water or sewer services (Rural Community Assessment Project et al. 2015).

Colonia residents are susceptible to waterborne diseases, such as hepatitis A and shigella dysentery. Those who can afford a large cistern still must pay a water delivery truck; other families resort to purchasing water by the gallon at local retail stores. In the case of a fire in a dwelling in *colonias*, the lack of water has had devastating effects, leading to major losses (Coronado 2019).

Scholars and policymakers have been aware of quality-of-life problems in *colonias* since the 1970s (Lower Rio Grande Valley Policy Research Project 1977). The Federal Reserve Bank of Dallas issued reports in 1996 and 2015 documenting and updating conditions in *colonias* (Federal Reserve Bank of Dallas 1996, 2015). Despite a clear understanding of *colonia* characteristics and problems, as well as federal and state investment for many years, growth of *colonias* without water and wastewater services has continued. That growth has been driven by failure of state and local legislative and governance remedies, lack of investment at all levels, and lack of affordable housing in urban centers where low-income individuals and families often lack the credit history and funds to rent an apartment (Coronado 2019).

The North American Free Trade Agreement (NAFTA, 1994–2020) and the successor United States–Mexico–Canada Agreement (USMCA), currently in effect since 2020, successfully expanded bilateral trade and

investment flows. Unfortunately, most border residents have not benefitted proportionately. Most jobs created in border communities by rapidly expanding trade are low skill and low pay. The trade agreements did not reduce the chronic income inequality either within the U.S. border region, within the Mexican border region, or between the United States and Mexico.

Low-income rural and urban residents of border communities are more vulnerable to climate and other risks than residents of wealthier communities elsewhere in the United States. Poorer residents of U.S. border communities most often live in substandard housing without air conditioning or adequate insulation and are more vulnerable to the effects of climate extremes, especially increasing daytime and nighttime temperatures (Schmidt 2022a). Already-high energy costs for consumers have increased due to extreme weather events and wildfires, along with other difficulties for the electricity grids that serve the border states (Schmidt 2022b). The homes of low-income residents often are in areas prone to flooding and the increasingly severe storm and extreme precipitation events related to climate change. Many rural residents rely on local water sources, such as wells that are less secure because of drought conditions and climate change. Many must purchase their drinking water, often at high prices and subject to inconsistent delivery (Tippin 2021). Even urban dwellers with piped water and sewage but with low incomes characteristic of the border region may be challenged by substantial rate increases levied by utilities implementing necessary new conservation and water processing/production technologies in the face of higher energy costs.

Long-term drought and climate change have had a devastating impact on rural flora and fauna, including riparian areas and wetlands that traditionally provided important foods and materials for rural residents and tribal peoples. These are important not only for the subsistence economy but for continuity of traditional cultural practices. Traditional Native American land management techniques that include dryland farming, cultivation of native plants, use of fire, and watershed management with check dams and other structures offer inexpensive responses to ongoing drought conditions. Federal infrastructure programs should include funding for infrastructure and techniques that are part of the Indigenous knowledge of border tribal peoples.[2]

Almost all border climate and environmental issues are binationally important because most of the U.S. border population lives in sister cities separated from adjacent Mexican urban areas only by the international boundary, forming more than a dozen transboundary metropolitan regions. These range in size from the greater San Diego, California–Tijuana, Baja California area, with 5 million people, to the area of Naco, Arizona–Naco, Sonora, with just over 6,000 people. Each sister-city pair shares an ecosystem with shared environmental issues, such as water quantity and quality. Facing such challenges, however, is made more difficult by crossborder governance issues. For example, ground water, which is of great importance in this arid region, lacks any transboundary governance framework. Adaptations in the region must involve crossborder cooperation, a serious challenge for a poor but important region.

Although U.S. and Mexican border communities share ecosystems and water and pollution issues, funding sources available to address common water-related problems are significantly different on each side of the border. U.S. border communities, except for San Diego and Tucson, are below national averages in terms of income and governmental resources. Mexican border communities, although well off in comparison to the rest of Mexico, have very limited governmental resources compared to their U.S. counterparts.

Local priorities differ as well. For example, Mexican border cities place priority on providing potable water systems to growing populations; sewage services, solid waste management and green areas are a lower priority. This reality means that it is unrealistic to expect Mexican border cities always to agree with U.S. border city priorities, meet U.S. standards for drinking water and sewage treatment, or provide equivalent amounts of funding to address transborder water and wastewater issues. Similarly, underserved U.S. border communities cannot be expected to supply matching funds to attract federal funding for infrastructure projects that address basic water and wastewater needs.

2

Institutional Framework Context for Binational Management of Shared Water Resources

Binational management of shared water resources encompasses many topics, including allocation issues, transportation and treatment of shared water resources, water quality of shared water resources, wastewater treatment that affects shared water resources, water conservation, and development and management of the necessary infrastructure. With respect to such infrastructure, financing, construction, and operations and maintenance are all critical issues. Accordingly, the institutional framework context for binational management of shared water resources corresponds to the treaties, bilateral agreements, other binational arrangements and laws that establish the context for the United States and Mexico to work together on all of these matters. Legal and institutional barriers that inhibit transboundary cooperation to address shared water and wastewater concerns through local and state, as well as federal, initiatives are important factors.

GNEB recommends that the U.S. President convene the relevant federal agencies to develop a plan to expand the resources of NADBank to address the deficiencies in water and wastewater infrastructure in the border region. At the same time, consultations with Mexico are necessary. Congress should expand funding for NADBank to meet these basic human needs for border citizens.

Key elements for management of shared water resources in the border region are a 1906 water convention and 1944 water treaty allocating the waters of the Colorado River and Rio Grande; the 1983

Agreement Between the United States of America and the United Mexican States on Cooperation for the Protection and Improvement of the Environment in the Border Area, known as the 1983 La Paz Agreement; the U.S.–Mexico Border Environmental Program implemented under the 1983 La Paz Agreement and currently being executed as Border 2025; NADBank; and the U.S. and Mexican Sections of IBWC.

The 1906 Convention Between the United States and Mexico: Equitable Distribution of the Waters of the Rio Grande (1906 Water Convention) contains basic provisions for the development and use of Rio Grande waters upstream of Fort Quitman, Texas, by the two countries.[3] The 1906 Water Convention provides for delivery to Mexico by the United States of 60,000 acre-feet of water annually in the El Paso–Juárez Valley. The 1944 Water Treaty describes how Mexico and the United States shall divide the waters of the Rio Grande below Fort Quitman to the Gulf of Mexico and the waters of the Colorado and Tijuana rivers.[4] The 1944 Water Treaty also established IBWC in its modern form.

In 2015, IBWC Minute 320, under the framework of the 1944 Water Treaty, established work groups for the binational Tijuana River Watershed, an important step toward joint management of the international watershed (IBWC 2015). In 2020, IBWC approved Minute 325 to create the Rio Grande Hydrology Work Group with technical experts from both countries to enhance information exchange, develop a binational Rio Grande water availability model, and use the model as a tool to analyze water management scenarios (IBWC 2020). Minute 325 also provides for a Rio Grande Policy Work Group to oversee the Hydrology Work Group and consider water management policies in the basin. IBWC has also adopted minutes regarding the Colorado River to address such matters as salinity, storage of excess Mexican water, efforts to restore the Colorado Delta, and most recently, adjustments to Mexican water deliveries in the new era of reduced flows through the river. All of these efforts are useful steps toward shared management of transborder water issues between Mexico and the United States.

State participation in IBWC-led work groups has proven a successful tool to include local engagement and expertise in the drafting of treaty minutes, the development of binational water studies and research, and enhanced engagement for water delivery negotiations. Due to the difference in federal and state jurisdictions related to water management in the United States and Mexico, in addition to direct binational federal engagement, state-to-federal communication is needed in many instances where Mexico's National Water Commission (Comisión Nacional del Agua; CONAGUA) and U.S. states share responsibilities for water governance.

The 1983 La Paz Agreement[5] establishes that the parties would coordinate efforts to address problems of water pollution, as well as such other concerns as air quality and hazardous materials. The border environmental programs derived from the La Paz Agreement, most recently Border 2025 (in effect from 2021 to 2025), have each included water-related goals. Current specific objectives include improving drinking water and wastewater treatment infrastructure, improving operation and maintenance of drinking water and wastewater infrastructure, promoting beneficial reuse of treated wastewater and conservation of water and energy, implementing projects to prevent and reduce the levels of trash and sediment from entering high-priority binational watersheds, and improving access to transboundary water quality data (USEPA 2021, pp. 16–18). Border 2025 includes a Water Policy Workgroup, co-chaired by senior-level managers at EPA and Mexico's federal environmental agency, the Secretariat of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales; SEMARNAT), and water committees within regional task forces to convene local stakeholders (USEPA 2021, pp. 26–28).

State governments in the United States and Mexico often sign memoranda of cooperation or similar agreements related to environmental issues that include collaboration on transboundary water issues. Although nonbinding, these memoranda provide guidance to the signatory U.S. and Mexican state governments on how to work together to confront shared environmental issues and coordinate their respective efforts. Texas, for example, has active environmental memoranda of cooperation with neighboring Mexican states. These memoranda include specific workplans and outline joint activities to protect water quality. Through the Arizona–Mexico

Commission, the neighboring states of Arizona and Sonora signed a memorandum of understanding in 2017, establishing the implementation of a 5-year Arizona–Sonora Environmental Strategic Plan. Current administrations are working on the second phase of this plan (2023–2027), setting priorities for water, air quality, waste management and wildlife protection that should be the focus for the border region between Arizona and Sonora during the next 5 years of collaboration. Most water quality and all water availability management, however, are under federal jurisdiction in Mexico. This creates an imbalance and additional challenge for collaboration. Local governments also collaborate both formally and informally with regard to water, specifically as it relates to wastewater treatment in sister cities.

Because of the international border, transborder cooperation of government agencies on shared environmental problems, such as wastewater, is poorly coordinated, often ad hoc and always reactive. Economic asymmetries, different national and regional priorities, and different structures of political power and public administration across the border exacerbate barriers to transborder cooperation. As a result, U.S. and Mexican local and state entities usually cannot work directly across the boundary to resolve issues at the local level. GNEB recommends that the U.S. President and Congress work with their Mexican counterparts to develop and institutionalize workable structures and institutions to enable timely transborder cooperation on transborder environmental issues.

3

Border Water Supply and Challenges

The supply of water for many U.S. border communities is insecure on several fronts. Climate change and long-term drought have reduced water deliveries from small streams and rivers, the two major basins of the Colorado River and Rio Grande, and underground aquifers. Differences in U.S. and Mexican federal water management structures and different water and complex regimes in each U.S. state add to the challenges of integrated and efficient management of water in the border region.

In its 17th report, GNEB (2016) addressed climate change in the border region and federal actions to work with communities to implement mitigation and adaptation measures. The Board particularly notes the importance of close cooperation with Mexico for effective measures for regional binational climate-related issues.

The U.S.–Mexico border region has a hot and arid climate, with more precipitation on the eastern end in the Lower Rio Grande Valley and a Mediterranean climate on the Pacific Coast. Climate change projections for the border region are confirmed by significant observable data (Wilder et al. 2013). The likely scenarios are higher daytime and nighttime temperatures, decreased and more variable precipitation, increased evaporation, increased water stress in the Rio Grande and Colorado river systems, less replenishment of ground water resources, more frequent and intense wildfires, and more intense weather events and flooding. The Gulf and Pacific ends of the border will confront increased storm surge driven by more frequent severe storms and sea level rise.

These changing conditions will affect water and wastewater infrastructure, energy production, trade

and transportation, and animal and plant communities that many traditional borderland community members depend on. Changing conditions will also have widespread health effects (e.g., new diseases in the region, more illness and death related to heat). Most impacted by these features of climate change will be the poor urban and rural residents, tribal peoples, and other vulnerable groups in border society. Climate change will disproportionately affect certain groups that lack the capital-intensive infrastructure and other resources to mitigate the effects.

As covered in more depth below, BIL and IRA have substantial funding available for water and wastewater projects, as well as funding for protection and rehabilitation of watersheds and wetlands. Both laws also have a focus on disadvantaged communities. The appendix includes a summary of all the key provisions of BIL and IRA applicable to water and wastewater infrastructure and watershed and wetlands resilience. Border communities are encouraged to explore those provisions to determine whether they might be eligible to receive funding, or else have the federal government make direct investments in water and wastewater infrastructure for the benefit of such communities.

For example, as described in the appendix, BIL includes $5 billion over 5 years that is to be granted for the benefit of disadvantaged or small communities to address the issue of emerging contaminants in drinking water. Under IRA, the U.S. Bureau of Reclamation has $550 million to disburse for up to 100 percent of the cost of planning, design or construction of water projects to provide domestic water supplies to communities or households in "Reclamation States" that do not have reliable access to domestic water supplies. The Reclamation States include the four border states of California, Arizona, New Mexico and Texas.

Within the U.S. Department of Commerce, the National Oceanic and Atmospheric Administration is providing $575 million for the Climate Resilience Regional Challenge, a new competitive grant program that will invest in holistic, collaborative approaches to coastal resilience at regional scales. Funds will support climate resilience and adaptation actions that are appropriate to the plan, place and people and that are supported by National Oceanic and Atmospheric Administration technical assistance. It includes two funding tracks——(1) Regional Collaborative Building and Strategy Development and (2) Implementation of Resilience and Adaptation Actions—and supports eligible uses, such as stormwater management projects and pursuing hybrid green (natural) and gray (structural) projects, including the modifications of public infrastructure to deliver multiple benefits and return significant positive impact for the long term.

Further, as described in the appendix, BIL incorporates a requirement that 49 percent of certain federal funds provided to states over 5 years through the Drinking Water Revolving Funds, Drinking Water Revolving Funds for lead service lines replacement and Clean Water Revolving Funds must be distributed as grants or 100 percent principal forgiveness loans. Disadvantaged communities that would be unable to pay back regular loans should explore seeking funding for needed drinking water infrastructure through their respective states by means of grants or 100 percent principal forgiveness loans that would come within the 49 percent BIL requirement.

In the border region, the availability of water for drinking, municipal needs, agriculture and industry is a fundamental and critical issue. Climate change effects have reduced water availability everywhere in the border region, so competition among users has increased within a complex system of water law and water politics. U.S. federal and state water laws, evolving federal jurisdiction, and conflicts over water access by tribal peoples, traditional Hispanic communities, farmers, urban areas and natural systems create a water apportionment system that is difficult to change. In the sections that follow, GNEB describes some of the relevant issues important for all water users and especially underserved border communities.

3.i. Desalination and water supply for the border region

Desalination offers significant potential for the arid U.S. borderlands. Inland desalination removes most of the dissolved chemicals ("salts") from brackish water, which typically lies below the freshwater in aquifers, whereas ocean desalination removes those salts from ocean water. The challenges of desalination are the enormous infrastructure investment, the energy cost of removing the salts, and the monetary cost of safely

disposing the remaining water with concentrated salt. These solutions will greatly benefit the region if sufficient investment is available and challenges can be overcome. Desalination of water is an excellent target for renewable energy. The process can be completed during the daytime and the resulting clean water accumulated and distributed during off hours.

While desalination represents an important opportunity for public environmental investment, it also increases the cost of providing public water. Poor, disadvantaged communities in the border region cannot afford the higher cost of pure water produced by desalination, so public policies will be necessary to offset costs for these communities.

One aspect of desalination with special promise for the borderlands is small-scale, dispersed desalination (e.g., attached to individual water wells) that can serve small rural communities, including Native American communities, and farmers. For this, the challenge is collecting and disposing of the salty concentrates. This domain deserves investment in research and diffusion of innovation.

A potential source of funding for desalination projects and studies is within the U.S. Department of the Interior, as the U.S. Bureau of Reclamation has $250 million available for these purposes pursuant to BIL for projects in Reclamation States, which includes the four border states, as described in the appendix.

3.ii. The impact of drought on the Colorado River and the states in its watershed

According to the National Integrated Drought Information System (2023), "the Colorado River provides water to more than 40 million people in the United States and Mexico, seven states, 29 federally recognized Indian tribes, and 4 million acres of farmland." Some 10 million users live within the Colorado River Basin, and vast amounts of water are transferred out of the basin to Southern California, the densely populated coastal zone of Baja California, and metropolitan regions, such as Salt Lake City, Utah; Denver, Colorado; Albuquerque, New Mexico; and Cheyenne, Wyoming. The Colorado River is under great stress from long-term drought conditions,

and this will affect water availability for all users, including those in the seven basin states and areas of northwestern Mexico.

Under the complex body of law, agreements and treaties affecting allocation of Colorado River waters, the Upper Basin states of the United States—Colorado, New Mexico, Utah and Wyoming—are entitled to 7.5 million acre-feet (MAF) of water per year, and the Lower Basin states—California, Nevada and Arizona—are also entitled to 7.5 MAF per year. Mexico is entitled to another 1.5 MAF/year, pursuant to the 1944 Water Treaty; this allocation serves users in part of the Mexican state of Sonora and the border region of Baja California. In recent years, however, the flow of the Colorado River has been far below the 16.5 MAF/year sum of these allocations. Since 2000, the average natural flow has been 12.3 MAF/year (Wheeler 2022). To continue meeting demands, storage in the two key reservoirs on the Colorado River—lakes Powell and Mead—has decreased substantially. In July 2023, Lake Powell was at 41 percent capacity (Skinner 2023) and Lake Mead was at 32 percent capacity (Lochhead 2023), compared with 95 percent in 2000 (Podmore 2022).

According to the Congressional Research Service (2023), efforts to date to manage the Colorado River shortfalls include:

- 2007 Interim Guidelines/Coordinated Operations for Lake Powell and Lake Mead requiring staged cutbacks by Lower Basin states depending on the water level of Lake Mead (i.e., cutbacks will be required if the water level declines further).
- 2019 Drought Contingency Plans expiring in 2026, which affect Lower and Upper Basin states, including further staged cutbacks by the Lower Basin states depending on the water level of Lake Mead.
- Minute 323 agreement with Mexico, whereby Mexico also agreed to staged cutbacks in proportion to U.S. cutbacks, also depending on the water level of Lake Mead.

These efforts, however, were not sufficient to stabilize the Colorado River system. On June 14, 2022, the U.S. Bureau of Reclamation called for the Upper and Lower Basin states to conserve an additional 2–4 MAF of water in 2023; this could lead to further reduced deliveries to contractors in the near term (Congressional Research Service 2023). However, no agreement was reached in response to this call.

In April 2023, the U.S. Bureau of Reclamation, through a Supplemental Environmental Impact Statement, raised the possibility that it would unilaterally impose uniform percentage-based delivery reductions on all Lower Basin users for the 2023–2026 period, disregarding the century-old water priority rules known as the "Law of the River." The effect of percentage-based delivery reductions would have been pro rata reductions for California, Arizona and Nevada, whereas the priority rules under the Law of the River would have resulted in Arizona and Nevada suffering most of the reductions (Congressional Research Service 2023).

On May 22, 2023, the three Lower Basin states announced a proposed agreement whereby they would, for the period 2023–2026, conserve a total of 3 MAF beyond the cuts required by the 2007 Interim Guidelines, 2019 Colorado River Basin Drought Contingency Plan and IBWC Minute 323, with a minimum of 1.5 MAF physically conserved by the end of 2024. Under this agreement, up to 2.5 MAF of the cuts would be compensated by the federal government via funds appropriated in IRA and BIL. As described in the appendix, IRA provides for $4 billion to address drought issues in the "Colorado River Basin and other basins experiencing comparable levels of long-term drought," whereas the BIL provides for $300 million to implement the Colorado River Drought Contingency Plan. The Lower Basin states proposal does not include specific information on allocations of curtailments at the state or contractor level or how these cuts would be tied to specific Lake Mead elevations (Colorado River Basin States Representatives of Arizona, California, and Nevada 2023).

In connection with the Lower Basin proposal and a request from all seven Colorado River Basin states for the U.S. Bureau of Reclamation to analyze that proposal (Colorado River Basin States Representatives of Arizona, California, and Nevada 2023), the U.S. Department of the Interior stated that it would temporarily withdraw the April draft Supplemental Environmental Impact Statement so that it could focus on analyzing the effects of the new proposal as to management of drought conditions on the Colorado

River for the period 2023–2026, with a goal of finalizing the document later in 2023 (U.S. Department of the Interior 2023). Then, on June 15, 2023, the U.S. Department of the Interior announced that it had directed the U.S. Bureau of Reclamation to initiate a formal process to develop new operating guidelines that would take effect after 2026 to replace the 2007 Interim Guidelines (U.S. Bureau of Reclamation 2023).

In mid-2022, in the midst of severe drought, there was great fear that without significant, permanent cuts to water use in the Colorado River Basin, "both Lake Powell and Lake Mead may be headed for collapse" (Schwartz 2022). With the benefit of a wet winter, the May 2023 proposed agreement by the Lower Basin states, and the initiation of formal efforts to develop new operating guidelines to take effect after 2026, the U.S. Bureau of Reclamation and the Colorado River Basin states have a reprieve to develop a long-term strategy in response to the historic decline in Colorado River flows.

3.iii. Riparian and water rights[6]

Water rights in surface waters are one element of the border states' access to water. There are two broad categories of water rights in surface waters, excluding rights held by governments: riparian rights and appropriative rights. A riparian water right is a right to use the natural flow of water on or adjacent to riparian land. Riparian land is land that touches a watercourse (e.g., lake, river, stream, creek). A watercourse has a definite natural channel and a bed with banks. California is the sole state among the U.S. border states that still recognizes riparian rights, although the California riparian rights framework runs in parallel with a system of appropriative rights, with some tension between the two.

Appropriative water rights derive from appropriation of surface waters (i.e., diversion of water from a watercourse for beneficial use elsewhere). These rights gain priority under the doctrine of "first in time, first in right." Under this doctrine, the appropriator has a right to use the full volume of water appropriated, and this right "relates back" or has a priority date as of the time when the water is first diverted and put to beneficial use. The appropriator then has a right to use that amount of water, and this right is superior to anyone with a later priority date.

Unlike a riparian right, an appropriative right exists without regard to the relationship between the land and water. An appropriative right is generally based on physical control and beneficial use of the water. These rights are use rights to a specific amount of water, for a specified use, at a specific location with a definite date of priority. An appropriative right depends on continued use of the water and may be lost through non-use. Unlike riparian rights, these rights can generally be sold or transferred, and long-term storage is permissible.

Tribal water rights, a form of appropriated rights, are an important concern in the arid border region. As described in the appendix, BIL provides for $2.5 billion, deposited into a newly created Indian Water Rights Settlement Completion Fund within the U.S. Department of the Treasury, managed by the Bureau of Indian Affairs, to fund settlements of outstanding water claims of tribes, including some in the border region. In addition, significant funding is included in BIL for tribal water and wastewater infrastructure programs, as discussed below.

Tribal water rights are likely to play an important role in the future of the Colorado River. Congress has

approved Indian water rights settlements associated with more than 2.5 MAF of tribal diversion rights on the Colorado River. Only a portion of this water has been developed to date. The extent to which tribes further develop their water rights, or are willing and able to market their water to other users, will have ramifications for water availability in the Colorado River Basin (Congressional Research Service 2023).

3.iv. Water deliveries under international treaties

The 1906 Water Convention and 1944 Water Treaty between Mexico and the United States allocate surface waters of the Rio Grande and Colorado river systems. The annual allocation of 1.5 MAF of Colorado River waters to Mexico has been met successfully for many decades. The current water crisis, however, will see Mexico also sharing in the shortfall of Colorado River water as water production declines. The U.S. and Mexican Sections of IBWC successfully negotiated this arrangement, as documented in Minute 323. The minute provides for U.S. and Mexican reductions in water allocations of the Colorado River during times of extraordinary drought. In 2022, in response to falling water levels in Lake Mead, Mexico's allotment was reduced by 50,000 acre-feet and U.S. users saw a reduction of 333,000 acre-feet (IBWC 2022a). Many of the provisions of Minute 323 will remain in force through the end of 2026, so ongoing attention to these issues is essential (IBWC 2017). Future reductions of water allotments among the Colorado River Basin states and between the United States and Mexico are ongoing challenges for stakeholders.

Water deliveries from Mexico via the Rio Grande under the 1944 Water Treaty, which Texas users depend on, have chronically been irregular and usually less than specified in the treaty. This continues to adversely affect agricultural operations, as well as municipal water deliveries in Texas. Since 1992, Mexico has not met its Rio Grande delivery obligations three times within the 5-year cycles (1997, 2002 and 2015), although these were repaid in the following cycles. Additionally, shortfalls in the average allotments led to last-minute large-scale deliveries as the cycles ended (2007, 2020), impeding proper planning and causing conflicts and uncertainty among users, as well as international tensions. As of August 2023, Mexico's deliveries to the Rio Grande are the lowest in 30 years. Due to the deficit in deliveries, water has only been allocated to Texas irrigators in 6 of the past 20 months, and for the first time since the Rio Grande Water Master Program was established as such in the early 1970s, a negative allocation was applied in July 2022 to safeguard operational reserves.

To improve reliability and ensure treaty compliance, Mexico should recognize the United States as a water user. Mexico should distribute water to the United States as a part of its annual water allocation process, as the United States does with Mexico for the Colorado River. A long-term solution could be developing a water accounting system for the binational basin that is similar in each country to facilitate comparison and understanding by water managers of each nation and joint planning.

Minute 325 in 2020 established the Hydrology Work Group to improve information exchange and develop a binational Rio Grande model as a management tool for the basin (IBWC 2020). The Policy Work Group was also created to oversee these efforts to improve reliability and predictability of Mexico's water deliveries. Funding from BIL and IRA for watershed projects could help improve binational water management of the lower Rio Grande for the benefit of millions of residents in the region.

Additionally, the 1944 Water Treaty allows exceptions for years of extraordinary drought or serious accident to the hydraulic systems on the Mexican tributaries by making up for the pending deliveries in the upcoming cycle; however, this term is not defined. IBWC should define "extraordinary drought" for the Rio Grande

system and establish a process to invoke its use. Renewed efforts are needed to ensure that Mexico complies with Minutes 234 and 309 to eliminate deficits within specified treaty cycles and ensure that water saved by prior irrigation conservation projects in Mexico is allocated to the United States. Long-term supply and demand issues driven by development and climate change and complicated by evolving political issues have created a dynamic situation that will not be easy to resolve.

3.v. Transborder ground water

Ground water is a critical water resource for many border communities, and most aquifers in the region face significant challenges in terms of water quality and water quantity. In the United States, states regulate ground water, and in Mexico, the federal government has jurisdiction. This administrative disparity helps explain why no ground water treaty exists for the management of the aquifers that underlie the international boundary. As the surface water systems of the Colorado River and Rio Grande continue to experience high demand and declining water production, ground water will increasingly supplement border region water supplies. Tension surrounding the use of shared ground water is apparent as the lack of clear guidelines over its management and common omission from binational water conversation collides with a greater demand for this resource (Coronado et al. 2022; Sanchez et al. 2021). Neither of the current legal instruments for binational water management (1906 Water Convention and 1944 Water Treaty) address the use or management of ground water. Although Minute 242 limits U.S. and Mexican pumping within 5 miles of the land boundary at San Luis to 160,000 acre-feet annually, the agreement is specific to that area of the border (IBWC 1973).

Despite U.S. border state ground water regulations, many aquifers have been depleted from excessive pumping for urban and agricultural uses, and many are deteriorating in water quantity and quality. In agricultural areas, aquifer water levels have fallen so much that the overlying land has subsided, causing damage to irrigation and transportation infrastructure. Ground water resources in Mexican border areas are similarly compromised by overuse and lack of natural recharge.

The transboundary ground water resources shared by the two countries are largely uncharacterized due to lack of data, differences in aquifer boundary delineations and methodologies, and the limited cooperation and coordination among federal, state and local agencies within and between these countries to address ground water issues from a binational perspective (Far West Texas Water Planning Group 2021). Of the 28 transboundary aquifers along the U.S.–Mexico border, only half are estimated to have good aquifer potential and good to moderate water quality (Sanchez and Rodriguez 2021). Only the San Pedro transboundary aquifer between Arizona and Sonora has been the subject of a binational scientific report (Callegary et al. 2018).

The Hueco Bolsón/Valle de Juárez and Mesilla/Conejos aquifers provide Ciudad Juárez, Chihuahua, with 100 percent of its municipal and industrial demands. With a growing population that is now estimated to exceed 1.5 million, Ciudad Juárez recognizes the limitations of the Hueco Bolsón to supply future demands (Far West Texas Water Planning Group 2021). With continuous pumping from Ciudad Juárez and El Paso, Texas, both cites have experienced extensive water-level drawdowns and water-quality degradation due to lateral brackish water intrusion into the freshwater zones. Brackish water intrusion from irrigation return flow drains continues to expand laterally and vertically and degrade water quality in the shallow alluvium along the Rio Grande (Far West Texas Water Planning Group 2021).

Ground water can enhance the resiliency of water-resource systems and link water management approaches both at national and transboundary scales. Stronger binational characterization and management of shared aquifers would enhance resiliency of cities and agricultural users on both sides of the border in the context of frequent droughts and surface water shortages (Sanchez and Rodriguez 2022). Further study and acknowledgment of ground and surface water interactions is needed. This will become more relevant as additional pumping due to water stress from long-term drought and excessive pumping continues.

Given the U.S. and Mexican administrative differences in ground water management, developing a treaty for management of binational aquifers for the entire border is probably not feasible (Mumme 2023, pp. 145–147). Instead, GNEB recommends that the U.S. and Mexican Sections of IBWC develop minutes for selected critical shared aquifers along the border, building on the success of Minute 242 in regulating ground water pumping from the binational aquifer in the San Luis Río Colorado area known as Sonora Mesa. Support from the Biden administration and Congress for sharing of ground water data across the border and continued joint U.S. and Mexican aquifer assessment efforts under the Transboundary Aquifer Assessment Program are critical (Tapia-Villaseñor and Megdal 2021). Facilitated by IBWC, with leads by the U.S. Geological Survey and CONAGUA, the Transboundary Aquifer Assessment Program will support binational management decisions that will protect critical shared border aquifers.

3.vi. Water quality

More than 4 million Texans rely on the Rio Grande as their primary source of drinking water, and close to 30 irrigation districts depend on it. Furthermore, municipal water use in the Lower Rio Grande Valley is projected to double during the next 50 years. Surface water is complex to treat; poor water quality adds challenges and expense.

Water quality concerns in the Rio Grande include salinity, nutrients and fecal coliform bacteria throughout the basin. Salinity concentrations are of significant concern on both sides of the border, especially below the Falcon International Reservoir. Several major agricultural drains that flow into the Rio Grande below Falcon Dam contain seasonally high levels of chlorides and sulfates. These drains receive irrigation return flows from an estimated 500 square miles (1,295 square km) of irrigated land, 80 percent of which are in Mexico. With active sources of pollution on both sides of the river and separate U.S. and Mexican institutional frameworks in place to control them, coordinated binational efforts to protect water quality in the Rio Grande are fundamental to realize improvements (Rio Grande Regional Water Planning Group 2020, pp. 3–18).

Salinity concentration is also the major water-quality issue in the Colorado River system and is especially important for irrigated agriculture. Urbanization, population growth, mining, agricultural practices and return flow, and recreation affect the salinity and other chemical concentrations. Both river systems also are beginning to detect more contaminants of emerging concern that can include pharmaceuticals, industrial chemicals, household cleaning products, household and agricultural pesticides, and many others (Water Resources Mission Area 2019). Treating this water for human consumption will be more difficult for small water utilities along the border.

For water bodies with significant potential for pollution, such as the Rio Grande and Colorado River, the Clean Water Act requires entities, such as the Texas Commission on Environmental Quality, to develop a total maximum daily load (TMDL) to determine the maximum amount of a pollutant that a water body can receive from all sources, including point and nonpoint sources, while maintaining water quality standards set for its use (Texas Water Development Board 2022). The Texas Commission on Environmental Quality's TMDL process is not well suited for the Rio Grande, which receives pollutants from both countries. To restore and protect water quality in the Rio Grande, a comprehensive binational plan must be developed to manage current and future sources of pollution entering the river.[7]

Significant surface water–quality issues are also found elsewhere along the border. Nogales, Arizona, downstream of Nogales, Sonora, has persistent and ongoing issues of renegade flows of sewage, industrial contaminants, sediments, trash and other water pollution from Mexico.

Lower Rio Grande Salinity Study

The Lower Rio Grande Water Quality Initiative (LRGWQI) is a binational partnership to restore and protect water quality, improve water quality monitoring, and reduce water pollution below Falcon Dam to the Gulf of Mexico. Among the challenges faced in the region are high salinity concentrations that affect both water quality and uses of the river. Salinity affects farmers by decreasing crop yields and land value, sometimes permanently. Additionally, it increases the cost of water treatment for municipal users.

The binational LRGWQI seeks to identify the sources of salinity and the relative contributions of these sources in the Rio Grande. The scope of work includes analysis of point sources, irrigation return flows, other potential sources of salinity, and their relative contributions using a mass balance model.

Irrigated field in Hidalgo County, south of Pharr, Texas, showing salt deposits from irrigation water on the right side of the image. Photograph courtesy of Frank John Schuster.

The U.S. and Mexico Sections of the International Boundary and Water Commission, U.S. Environmental Protection Agency, the Texas Commission on Environmental Quality, Mexico's National Water Commission (Comisión Nacional del Agua), and the State Water Commission of Tamaulipas meet periodically to define the scope of work and agree on quality assurance requirements. The study will provide a diagnosis for water quality improvement projects that benefit border communities.

The New and Alamar rivers flow from Mexicali through Calexico and the Imperial Valley and into the Salton Sea. Heavily contaminated by raw sewage and industrial waste in Mexicali and agricultural return flows in the Imperial Valley, these rivers have long been a health concern in the Imperial Valley and have a disproportionate impact on the underserved communities that live near the rivers.

The binational Tijuana River and its tributaries transport many contaminants from urban Tijuana into the United States, as well as into the Tijuana River Valley and the protected wetlands of the Tijuana River National Estuarine Research Reserve in San Diego and then out into the Pacific Ocean. The pollutants include renegade sewage, sediments, industrial waste, solid waste and chemical contaminants flushed from urban areas by storms. At the ocean, the contaminated waters mix with the outflow of Tijuana's San Antonio de Los Buenos wastewater treatment plant, transported by northerly coastal currents to contaminate the nearshore marine environment, often making the beaches of Imperial Beach and Coronado, California, unsafe for recreation bathing, a devastating blow the local community and tourism industry.

The pollution crisis from the Tijuana River is not just an inconvenience; it is a public health emergency that is recognized by a continuous "state of local emergency" proclaimed by city council resolutions from the cities of San Diego and Imperial Beach. The County of San Diego has also issued a public health emergency order for the Tijuana River Valley. The extent of pollution in the Tijuana River is well documented, including recent research that attributes 34,000 illnesses in 2017 to water quality pollution along the Imperial Beach coastline (Feddersen et al. 2021). The high levels of coastal water pollution also impact local air quality (Pendergraft et al. 2021). The Tijuana River is the unfortunate case study where researchers are monitoring the airborne transmission pathways for coastal water pollution and documenting concerning levels of industrial chemicals and pathogens from aerosol sea spray generated from wind and ocean waves (Pendergraft et al. 2023). The community members who live and work along the

Tijuana River serve as a poignant case study of the far-reaching effects of pollution on human health and the environment.

3.vii. Watershed protection and management

In its eighth report, GNEB (2005) addressed the border region's water resources. The report's three overarching, principal recommendations spoke to the still-timely needs to—

1. Coordinate and better integrate the many institutions involved in border water resources management.
2. Collect, share and analyze water data to facilitate effective water management.
3. Implement strategic planning for integrated water resources, using a stakeholder-driven watershed approach for immediate concerns, as well as long-term strategies.

GNEB has repeatedly emphasized the importance of watershed approaches in this report, in earlier reports and in other communications. Extending the watershed approach to include transboundary watersheds is important for U.S. border communities and efficient use of the region's water resources, as well as management of stormwater and floods. Management of pollution is also important for binational rivers that receive contaminants from both Mexico and the United States. The Lower Rio Grande/Río Bravo Water Quality Initiative began in 2013 with the goal to improve the water quality of the Rio Grande below Falcon Dam and is a good example of a binational watershed approach (Rio Grande Regional Water Planning Group 2020, pp. 3–18). A joint effort of IBWC, EPA and the Texas Commission on Environmental Quality—along with Mexican partners CONAGUA, the Mexican Section of IBWC and the state government of Tamaulipas—this important initiative for a binational watershed protection plan has lacked targeted funding, and

Natural Infrastructure in Drylands Streams

Nature-based solutions rely on ecosystem services of healthy watersheds to protect people, simplify infrastructure and promote biodiversity. In November 2022, the Biden administration released a roadmap for government agencies on nature-based solutions to address climate change, nature loss and inequity (Council on Environmental Quality, Office of Science and Technology Policy, and Office of Domestic Climate Policy 2022, pp. 16–17). This roadmap showcased the U.S. Geological Survey (USGS) Aridland Water Harvesting Study using natural infrastructure in dryland streams in border watersheds in southern Arizona (Western Geographic Science Center 2018). The structures included gabions, check dams, and beaver dams of earth, wood, debris or rock that can restore the natural functions of dryland fluvial ecosystems.

The U.S. Fish and Wildlife Service, working with the nonprofit Cuenca Los Ojos, installed rock detention structures in the historic binational San Bernardino Cienega wetland habitat on the Arizona–Sonora border in the late 1990s (Norman et al. 2014). Analysis of 30 years of Landsat imagery documented a pronounced decline of vegetation associated with the declining precipitation. At locations where natural infrastructure was installed, however, vegetation was maintained or increased despite the long-term drought conditions. Additionally, increased vegetation at structures was documented up to 5 km (3 miles) downstream and 1 km (0.6 miles) upstream of each structure. Over time, the natural infrastructure is helping to propagate plant growth and extend valuable growing seasons in dryland streams.

In the Coronado National Forest, a private rancher installed more than 2,000 small rock check dams throughout a 769-square-km (297-square-mile) watershed (Norman et al. 2015). USGS monitored and documented the decrease in peak flows with these structures and increased volumes of water being discharged over time that was 28 percent more than in an untreated watershed. The check dam structures create a climate adaptation strategy that reduces flooding and harvests rainfall to augment water supplies, extending seasonal water availability in arid environments. USGS estimated that 210 tons of sediment per year was stored behind this huge series of check dams (Norman and Niraula 2016). Furthermore, the structures are maintaining function even after 30 years after installation.

Nature-based projects in border watersheds are inexpensive to install, provide valuable ecosystem services to local communities, restore functioning of watersheds, and help mitigate effects of climate change (Norman et al. 2022). The systems of check dams reflect traditional Indigenous practices in parts of the border and are also based on applied science and analysis.

Green Infrastructure Solutions for Ambos Nogales

A green/gray infrastructure strategy for the long-term reduction and control of transboundary stormwater flows was planned and piloted for the Ambos Nogales watershed in the Arizona–Sonora border (Lara-Valencia 2022, forthcoming; Schwartz et al. 2023). Every summer, monsoonal rains produce intense stormwater runoffs laden with sanitary sewer overflows, sediments, garbage and other pollutants impacting the lowlands of Nogales, Sonora, and Nogales, Arizona. The runoffs cause flooding, loss of life, health hazards, water quality concerns, damage to urban infrastructure and disruption of daily life on both sides of the border, but mainly in Nogales, Sonora. Stormwater control in the binational watershed is an environmental and health priority for authorities in Arizona and Sonora. Responding to these concerns, researchers from Arizona State University, The University of Arizona, University of Arkansas, the U.S. Geological Survey, El Colegio de la Frontera Norte, and the Instituto Municipal de Investigación y Planeación de Nogales implemented a hydrologic model, land suitability analysis and landscape assessment to find the optimal emplacement and design of a binational green infrastructure network for Ambos Nogales.

The project identified 83 suitable sites in Nogales, Sonora, and 21 in Nogales, Arizona. Public lands used as neighborhood parks, schools and sports facilities represent 52 percent of the potential intervention sites. Hydrological modeling (KINEROS AGWA 3.x) estimated a reduction in runoff (~6%), peak flow (~6%) and, most notably, sediment yield (~11%) in the watershed when the sites are integrated into the proposed binational network. The model's results were consistent with the performance parameters of a 25,000-liter capacity rain garden installed in Secundaria General #3, a middle school identified as a suitable site in Nogales, Sonora.

The project also evaluated the perceived risks and benefits of the monsoons among children and water managers on both sides of the border and explored the value of this knowledge for building flood resilience in Ambos Nogales. This research project adds to the body of evidence supporting green infrastructure as a flexible and practical approach to the various challenges of cross-border water management on the U.S.–Mexico border and the transformation of border cities into healthier and sustainable places.

progress has been slow. However, in the fall of 2023, the group began an important binational salinity study to better understand and apportion salinity inflows to the Lower Rio Grande Valley (see callout box "Lower Rio Grande Salinity Study" for additional details).

Minute 320 in 2015 provided a framework for joint management of the transboundary Tijuana River Watershed. A technical committee, the Binational Core Group, was established to advance specific management actions for the U.S. and Mexican Sections of IBWC. At the same time, a secretariat was established to interface with local stakeholders to develop broad community support for management of the binational watershed. Minute 320, along with binational planning in the Rio Grande and lower Colorado River, represents an important step toward management of natural systems that are bisected by the international boundary. Lack of funding for these binational efforts has delayed significant progress for integrated watershed management, however.

GNEB recommends that federal and state agencies take full advantage of BIL, IRA and other funding sources to facilitate investment in natural infrastructure in border watersheds. Use of natural infrastructure in dryland streams provides techniques for ecosystem restoration in many border watersheds (see callout box "Natural infrastructure in Drylands Streams" for more information). Founded on nature-based solutions and traditional Indigenous knowledge, these inexpensive measures can improve water production, restore wetlands and riparian areas, and mitigate climate change effects. The authorized uses of Clean Water Revolving Funds include measures to develop and implement certain watershed pilot projects.[8] The administration should clarify that under these provisions, Clean Water funds may be used for watershed restoration.

3.viii. Stormwater management

Stormwater runoff is generated from rain events that flow over land or impervious surfaces, such as paved streets, parking lots and building rooftops, and does not soak into the ground. The runoff may collect pollutants like trash, chemicals, oils and soil that can harm rivers, streams, lakes and coastal waters. To protect these resources, stormwater best management practices are used to remove pollutants or prevent pollution at its source. In Texas and California, as well as other border states, stormwater

discharge permits require best management practices to be implemented to reduce or eliminate pollutants in stormwater runoff from certain activities and facilities, specifically industrial facilities, construction sites and municipal separate storm sewer systems.

Although the U.S. side has extensive stormwater management regulations and requires separate systems for sewer and stormwater, Mexico lacks such requirements. None of the northern border cities in Mexico have effective separate stormwater systems. As a result, stormwater flows from Mexico into the Rio Grande or into international treatment plants in Nogales (Arizona) and San Diego. The contaminated cross-border stormwater flows exceed the treatment plant capacity on the U.S. side of the border, polluting watercourses north of the border. The United States should support binational engagement to promote improved stormwater management with Mexican partners, especially in areas of urban runoff into the United States or binational rivers. Stormwater management is an important consideration for watershed management in the border region.

Climate change and climate variability will bring more severe storm events to the border region, potentially increasing flooding events. On the eastern end of the border, the Lower Rio Grande Valley is close to the Gulf of Mexico and prone to annual hurricanes and tropical storms and their related flood events, which will likely become more severe due to climate change effects. One response for border cities is to enhance natural systems through green infrastructure efforts, as in the case of Brownsville, Texas, where its revitalized *resaca* (a type of oxbow lake) system has reduced severe flooding. This stands in strong contrast to neighboring Matamoros, Tamaulipas, where most of the *resacas* had been filled in and paved over, exacerbating flooding (GNEB 2016, p. 32).

On the arid desert western end of the border, severe storm events will also become more frequent. In western border urban and rural areas, green infrastructure has been deployed not only for stormwater control, but for water harvesting and ground water recharge. Urban Tucson, for example, has installed infrastructure to capture stormwater runoff for landscape irrigation and aquifer recharge. Green infrastructure techniques are also employed in rural and natural areas and are a useful technique to improve water production in watersheds and reduce runoff and sedimentation. Rock detention structures, or check dams, in arid landscapes are inexpensive to deploy and have positive benefits for water production, streamflow and aquifer recharge. The techniques reflect some traditional Indigenous practices and are applicable throughout many areas of the arid western border region (Gooden and Pritzlaff 2021; Norman 2022). These examples of green infrastructure provide inexpensive tools for watershed management and management of the border's water

resources. Green infrastructure can also contribute to stormwater management and flood control in some areas of the border, such as Ambos Nogales, as described in callout box "Green Infrastructure Solutions for Ambos Nogales."

BIL provides $11.713 billion over 5 years for the Clean Water State Revolving Funds, which can be used among other things, for measures to "manage, reduce, treat, or recapture stormwater."[9] As noted above, 49 percent of these funds are to be used for grants or 100 percent principal forgiveness loans. With this significant new funding, and potential funding from other sources, border communities can improve their resilience to the impacts of natural hazards and extreme events while creating multiple physical and societal benefits through the application of natural and nature-based infrastructure.

From an increase in the frequency and severity of extreme precipitation events to rising sea levels, a changing climate has profound implications on the way that flood risk is examined. Through the establishment of the Federal Flood Risk Management Standard (FFRMS) under Executive Order 13690, the federal government is taking steps to ensure that all federally funded actions (e.g., buildings, projects) consider both current and future flood risk, so that taxpayer investments are more resilient to the impacts of flooding. FFRMS outlines a set of three possible approaches to establishing new flood elevations and flood hazard areas that consider the effects of climate change and other threats, including a preferred Climate-Informed Science Approach to determine the elevation and flood hazard area that result from using the best-available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding based on climate science. To assist users in defining the future floodplain, and to ensure that BIL and IRA investments are informed by future flood risk, federal science agencies have developed simplified guidance for federal agencies and their non-federal partners and grantees to begin to implement FFRMS. The FFRMS Floodplain Determination Job Aid is a resource to help federal agencies and their non-federal partners (including potential federal financial aid recipients) conduct screening to determine whether a proposed federally funded action will be located within an FFRMS floodplain (Flood Resilience Interagency Working

Group 2023). The Job Aid helps identify the FFRMS floodplain in situations where an agency does not have processes, protocols, procedures or technical guidance for identifying the floodplain using the approaches identified in the FFRMS. This Job Aid will serve until a more sophisticated decision-support tool is developed over the next year to meet longer term user needs, especially because BIL and IRA timelines will run through the next 4 to 5 years.

GNEB recommends that federal agencies facilitate the use of BIL and other funding mechanisms for green infrastructure, both for urban areas such as Tucson and Nogales, but also for appropriate watersheds along the border. Moreover, it is important that green infrastructure be installed on both sides of the international boundary in the same watershed as needed. These efforts will contribute to improved water production of surface and underground sources in watersheds, restoration of riparian areas, enhanced flood control, and improved environmental quality for border residents.

4

Border Water and Wastewater

4.i. Large cities

Large border cities, such as San Diego or El Paso, chronically encounter funding issues and jurisdictional questions for development of wastewater infrastructure to manage crossborder pollution impacts. Since the 1930s, San Diego, Coronado and Imperial Beach have been impacted by sewage from booming urban Tijuana across the border, into the Tijuana River Valley, and then into the nearshore ocean waters. As detailed in Section 3.vi, contaminated waters periodically require closing the beaches. Intense lobbying of the U.S. Congress and Mexico by San Diego stakeholders and others produced binational agreements and funding for the South Bay International Wastewater Treatment Plant (SBIWTP), inaugurated in 1996 and operated by IBWC to treat sewage from Mexico. Rapid urban growth and expansion in the Tijuana region—along with challenges faced by Mexican agencies to provide proper operation and maintenance for the sewage collection system and another treatment plant in Tijuana—have caused the resurgence of coastal contamination problems after two decades. Once again, intense pressure produced funding commitments from the U.S. and Mexican governments as part of USMCA, which replaced NAFTA. Minute 328, signed in July 2022, allocated $474 million in U.S. and Mexican funding for expanding the SBIWTP, rehabilitating collection infrastructure in Mexico, and conducting other projects (IBWC 2022b). IBWC will have oversight of operations and maintenance, which should improve the reliability of the binational system. The expanded plant is projected to be ready by 2027 and would reduce untreated wastewater discharged to the ocean by 80 percent (Sullivan Brennan 2022).

Spills of untreated sewage by the wastewater treatment plant in Anapra, Juárez, into New Mexico and the Rio Grande at El Paso are chronic problems. Both NADBank and EPA have worked to enhance the treatment capabilities of Ciudad Juárez; however, aging infrastructure and expansion of the urban area, combined with financially burdened utilities, makes the problem more challenging.

In the case of Laredo, Texas, and Nuevo Laredo, Tamaulipas, the Nuevo Laredo International Wastewater Treatment Plant built in 1996 has not been sufficient to avoid sewage flows into the binational Rio Grande. Lack of resources for operations and maintenance and rapid urban growth have caused this problem to become commonplace. NADBank signed a commitment agreement to take steps to expedite funding for a comprehensive wastewater collection and treatment project in the city of Nuevo Laredo. The agreement outlined the $81 million investment needed to expand and improve the wastewater system in Nuevo Laredo and was signed by the government of Tamaulipas, the Municipality of Nuevo Laredo, CONAGUA, IBWC and NADBank for the financing and implementation of infrastructure. The investment will replace old and deteriorated sanitary sewer and collection systems, rehabilitate or expand the wastewater treatment plants, and extend the sewer system to areas currently without service.

Other border cities, such as Nogales, Arizona, and Texas border cities along the Rio Grande, face similar difficulties in addressing wastewater issues of a transborder origin not seen in non-border cities within the United States. It is a federal responsibility to assure that there are institutionalized, transparent and proactive methods in place for resolving transborder wastewater issues.

4.ii. Small cities and rural communities

Many residents of small border cities and rural communities are underserved in terms of water and wastewater infrastructure. Many people experience poverty and unemployment, and their communities often lack the financial resources, technical expertise and administrative resources to plan, develop and maintain the infrastructure necessary for these most basic services.

Decentralized wastewater treatment systems play a big role in small communities. A variety of these systems exist, ranging from individual septic systems to cluster systems that serve multiple properties to advanced treatment systems that remove pollutants, such as nutrients and naturally occurring contaminants (e.g., arsenic, fluoride, nitrates). One complicating factor for many water systems in the border region is what is labeled "tap water distrust," when residents are unsure about the quality of tap water and turn to consuming more expensive—and unregulated—bottled water. Although tap water distrust is found in border communities of all incomes, its economic impact is largest among the poor. Residents of Mexican border communities face similar skepticism about tap water quality and likewise devote scarce family resources to purchase bottled water.

In Texas, 84 percent of the 7,053 public water systems serve communities of fewer than 3,300 residents; this prevalence of small public water systems also characterizes the Texas border region. Given a small customer base, the small systems often struggle to operate effectively and maintain infrastructure. Small communities frequently lack financial, managerial and technical resources to comply with complex water regulations and customer expectations. Many are too small or lack the resources to join larger systems for more efficient operations.

Small systems need reasonable and practical mechanisms to consolidate or tie into larger or high-functioning systems. Increased flexibility in existing and new funding sources to include regionalization support—such as feasibility studies, increased outreach and education, legal assistance, funding coordination, and meeting facilitation—would be beneficial. Additionally, small systems are reluctant to incur loans either because they already have considerable debt or they do not have the financial resources for repayment. Diversifying assistance types and the scope of awarded projects to allow for smaller investments would benefit communities in the entire border region, as well as elsewhere in the nation.

Federal appropriations for water and wastewater infrastructure are at an all-time high in 2023, but much of the funding is not tailored to the special

A house with privy in San Elizario, in El Paso County, 1989. Similar houses continue to be installed on vacant agricultural land in many areas of the border. **Photo credit:** Paul Ganster

circumstances of small border communities. Often, grants require matching dollars, have very complex application requirements, have burdensome management and reporting requirements, and/or do not fund salaries and supplies needed for ongoing operation and maintenance.

BIL addresses some of these issues, but not all of them. As described in the appendix, BIL provides $11.713 billion for grants to the Clean Water State Revolving Funds, which can be used to fund "construction, repair, or replacement of decentralized wastewater treatment systems that treat municipal wastewater or domestic sewage."[10] As previously noted, 49 percent of these Clean Water funds are to be used for grants or 100 percent principal forgiveness loans. Small systems should seek funding under this 49 percent requirement. Also, BIL separately provides $1 billion for the Clean Water State Revolving Funds to deal with emerging contaminants, all of which is to be distributed as grants or 100 percent principal forgiveness loans.

Regarding the application process, EPA is now funding various centers that can provide technical assistance to small communities to help them with grant applications, as discussed below, but the fact remains that no funding exists for ongoing operation and maintenance.

Federal requirements, and those of the states, need to be reformed to be more useful in solving the basic wastewater and water needs of poor communities served by small water systems by making funding accessible and addressing existing barriers.

4.iii. *Colonias*

Colonias are rural neighborhoods, located in all U.S. border states, that lack adequate infrastructure or housing. It is estimated that more than 800,000, primarily Latino, residents live in 2,200 *colonias*, which are mostly located in Texas (Rural Community Assistance Partnership et al. 2015). *Colonias* emerged in the 1960s due to the availability of land with little or no down payment that was close to employment opportunities for working-class families (Durst 2017; Federal Reserve Bank of Dallas 1996). Families would self-build incrementally. Thus, open disposal of untreated wastewater and regular consumption of

contaminated water is common in these emerging communities (Soden 2006).

Colonias are scattered along the U.S.–Mexico border as makeshift settlements mostly on private land and established outside the formally sanctioned governance of nearby cities and towns (U.S. Geological Survey 2004). Consequently, *colonias* residents have traditionally struggled to gain access to the public services available in those communities. They typically have high poverty rates, on the order of 40 percent (Federal Reserve Bank of Dallas 2015), making it difficult for residents to pay for such municipal infrastructure as roads, water, wastewater, flood control and street lighting. The *colonias* often are burdened by urgent challenges, including the shortfall of proper water and wastewater infrastructure and services.

Federal programs have targeted *colonias* with grants and loans for capital investment in municipal infrastructure through the U.S. Department of Agriculture (USDA), U.S. Department of Housing and Urban Development, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers and EPA (U.S. Government Accountability Office 2009). More than $1.4 billion has been invested in water and wastewater services during the last 25 years, mostly by EPA and USDA. Additionally, state programs managed by the Texas Water Development Board granted more than $500 million (Giner 2021). This funding was critical, as agencies estimate that more than 80 percent of the cost was funded through grants to make services affordable (Giner and Pavon 2021).

Several federal and state agencies have worked cohesively with a common mission of increasing water and wastewater infrastructure in the hopes of benefiting communities by addressing such issues as poverty, health and housing standards. Institutional capacity varied among the utility providers for the *colonias*, where more rural utilities relied on the federal and state agencies to closely assist them through the application, planning, design and construction process. Most of the funding was approved between 1995 and 2008 (U.S. Government Accountability Office 2009), with much of the Texas *colonia* population connected to service by 2015 (Giner and Pavon 2021).

A recent study documented lessons learned from these investments in Texas. These include the importance of documenting needs and tracking results, the important role of agencies in facilitating funding, the need for legal frameworks designed to avoid further proliferation of *colonias*, and prioritization of funding for environmental benefits. One unintended consequence is oversized infrastructure in areas where expected growth did not occur; much of this infrastructure is aging and in need of repair or replacement. Recommendations of this study include employing a much shorter planning period for design because growth can be unpredictable, creating a small and agile grant program for repair and replacement of equipment, and performing ongoing asset management capacity building. Some of the core infrastructure will be expensive to replace, and water losses from leakage in the systems are high. Assistance is also needed to address issues of drought as ground and surface water levels drop, requiring modification to wells and water intakes. Finally, areas still in need of service are often too isolated and costly to connect to centralized systems. Onsite systems could provide a solution but require a robust local government monitoring program with access to affordable maintenance options. The Rural Community Assistance Partnership et al. (2015) indicates approximately 130,000 residents in 600 *colonias* would benefit from these recommendations, as many have systems in violation of state standards or have inadequately functioning onsite systems.

Continued needs in *colonias* reflect poverty and lack of economic development. These needs include stormwater management, drought-related adaptation, roads, public transportation and adequate housing. Inadequate housing, informal employment, low education attainment, limited access to health care and food deserts continue in these communities, which are among the poorest of the border region. Progress has been made and conditions have improved in the *colonias* because of water and wastewater infrastructure. The groundwork has been laid, and partnerships have formed over time in other areas (Federal Reserve Bank of Dallas 2015). Addressing needs across agencies in these vulnerable communities, rather than by agency silos, is needed to continue progress. GNEB recommends that the administration pursue a holistic approach led by the

federal government to resolve chronic *colonia* water and wastewater infrastructure problems. Federal collaboration might include an interagency task force that includes anchor institutions, such as the U.S. Department of Housing and Urban Development and USDA. This process could mirror EPA's Border 2025 process, in which regional task forces with U.S. members from local stakeholders could help identify needs and design appropriate programs.

4.iv. Tribal communities in the border area

Tribal citizens share many of the challenges of border residents who live in *colonias*, small cities and towns, and isolated rural communities. For historical and cultural reasons, however, tribal lands face additional challenges.

A multi-agency federal tribal Infrastructure Task Force was established in 2007 to develop and coordinate federal activities to deliver water and wastewater infrastructure and solid waste management services to tribal communities (USEPA 2023c). The task force initially included EPA, USDA, Indian Health Service, U.S. Department of Housing and Urban Development, and Bureau of Indian Affairs. In 2022, the partnership was expanded to include the U.S. Bureau of Reclamation and Centers for Disease Control and Prevention. The U.S. Government Accountability Office (2019) recommended that federal agencies establish a central federal information system to better coordinate the flow of information to tribes and allow agencies to better communicate with tribal governments. This suggestion is consistent with many GNEB reports over the years that recommend better coordination of federal and state agencies on border-related programs.

Pond created with the traditional Kumeyaay practices described on page 31 on the Campo Indian Reservation in San Diego County in 2002. **Photo credit:** Paul Ganster

EPA has provided funding for water and wastewater infrastructure to border tribes, but funding has been insufficient to meet the needs. As described in the appendix, BIL provides substantial new funding for tribal water and wastewater programs. Tribes have access to monies for these programs through the Drinking Water State Revolving Funds and Clean Water State Revolving Funds; through special funding mechanisms within the Indian Health Service and Bureau of Indian Affairs; and through the Western Water Infrastructure grants program administered by the U.S. Bureau of Reclamation. Conversely, federal and state pass-through funds usually do not cover operational costs to operate and maintain the infrastructure.

Similar to small communities, tribes should take advantage of grants and 100 percent principal forgiveness loans to avoid matching fund requirements and onerous repayment obligations. They should also rely on the new EPA technical assistance centers to help with the grant application process. One issue unique to tribes is that they often rely on the Indian Health Service to oversee project management, but the Indian Health Service is chronically understaffed, and projects often take 5 years or longer to complete. It may be that the technical assistance centers can provide an alternate source to help tribes prepare applications for funding.

Border tribal lands are especially vulnerable to the effects of climate change and such challenges as flooding, water conservation and storage, water quality, stormwater and drainage, ecosystem health for production of traditional foods and materials, increased wildfires, and increasing temperatures. Therefore, it is important that water and wastewater infrastructure for tribal lands in the border area be adequate for the changing climate conditions. Border tribes are highly dependent on proactive and effective federal programs and intergovernmental cooperation among tribal, federal, state and local governments to address water, stormwater, wastewater and other

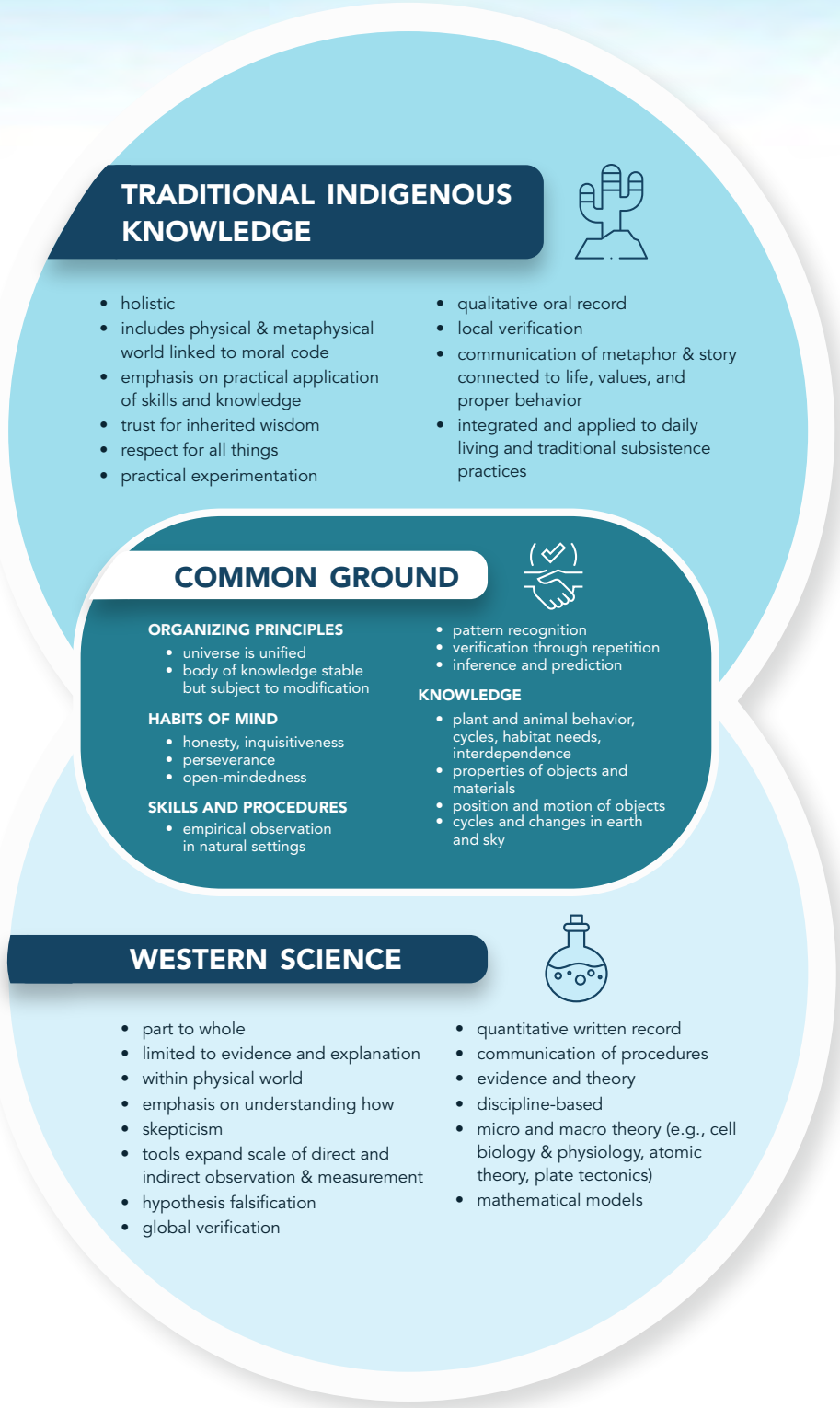


Figure 3. Diagram showing Indigenous and Western science knowledge and their commonalities. Diagram based on Stephens, S. 2001. *Handbook for Culturally Responsive Science Curriculum*. Arlington, VA: National Science Foundation. Website: eric.ed.gov/?id=ed451986.

problems related to climate variability and change. An immediate need for tribes is to receive support for infrastructure vulnerability assessments, guidance from climate change modeling of likely impacts to water supplies and wastewater facilities, and forward-looking measures in utility practices and facilities that are adaptive to climate change impacts.

An important component of infrastructure assessments must be the application of Indigenous knowledge

Diabold Creek detention structures that follow traditional Kumeyaay practices on the Campo Indian Reservation in San Diego County in 2002. **Photo credit:** Paul Ganster

and restoration of Indigenous ecosystems. In November 2022, the White House Office of Science and Technology Policy and Council on Environmental Quality (2022) issued "Guidance for Federal Departments and Agencies on Indigenous Knowledge." Agencies are instructed to apply this guidance as a foundation for meaningful consultation and collaboration with tribal nations and Indigenous peoples on the inclusion of Indigenous knowledge in federal decision-making and research and to consider whether agency-specific policies are appropriate (p. 21). See **Figure 3** to view the importance and key points of Indigenous knowledge and the common ground Indigenous knowledge shares with Western science.

Among the Biden administration's commitments of the federal government to tribal nations (Executive Order 13985 of January 20, 2021; Executive Order 14031 of May 28, 2021; White House 2021b) are assurances that federal agencies will conduct regular, meaningful and robust consultation with tribal officials in the development of federal research, policies and decisions affecting tribal nations consistent with the administration's additional commitment to scientific integrity and knowledge- and evidence-based policymaking (White House 2021a). This is underscored by the Office of Science and Technology Policy and Council on Environmental Quality (2021, 2022) memoranda recognizing the importance of Indigenous knowledge and committing to providing guidance.

An example of Indigenous knowledge and its benefits are in e'Muht Mohay ("love of the land" in the Kumeyaay language) (Connolly Miskwish 2021). The members of the Campo Band of Kumeyaay Indians in the border region of California and Baja California revived their traditional relationship with their land of the Campo Indian Reservation by use of both traditional and culturally inspired rock drop structures as a tool to restore wetlands and stop erosion caused by intensive agricultural and cattle grazing programs ill-suited to the reservation ecosystem. The reservation ground water rose more than 20 feet during the initial 5 years, and the tribe regained more than 600 acre-feet of storage with the aquifer of the central basin. Native flora and fauna returned, and the project site became a primary location for social gatherings and harvesting. The success at Campo with rock drop structures was similar to the positive outcomes of natural infrastructure use for watershed restoration efforts in Arizona described in Section 3.vii of this report.

Indigenous authorities point out that the frameworks underlying Indigenous knowledge and Western scientific systems have fundamental differences, and Indigenous ways of generating and translating knowledge at the Indigenous community level require a methodology for translating Indigenous knowledge to Western models for a mutually beneficial system of interactions among regulators and decision-makers. Western knowledge systems treat data as

abstract, multicomponent, theoretical systems among specialists; Indigenous knowledge proceeds from experience to wisdom (Smylie et al. 2004, p. 141).

Tribal governments have fought to preserve and protect their jurisdiction over the Indigenous biosphere within their aboriginal lands, which is essential to the meaningful and effective application of their Indigenous knowledge. The Office of Science and Technology Policy and Council on Environmental Quality (2021, 2022) memoranda propose platforms for the exercise of Indigenous knowledge through co-management, co-stewardship and collaborative management over federal public lands within tribes' traditional territorial lands. GNEB recognizes the importance of incorporating Indigenous knowledge into programs and, in adherence to federal guidance, the Board recommends the application of Indigenous knowledge to resolve water and wastewater challenges that border tribal communities face.

4.v. Irrigation districts

Irrigation districts are self-governing public corporations set up by state governments to deliver water for agricultural use and increasingly to provide water for municipal and industrial uses. Large and small, they are found along the major water courses of all U.S. border states. Approximately 85 percent of the U.S. water from the Lower Rio Grande system is managed by more than two dozen irrigation districts through networks consisting of earthen canals, concrete-lined canals and pipelines.[11]

Irrigation districts in general are not considered "public water systems" under the Safe Drinking Water Act.[12] If they are not public water systems, they are not subject to certain drinking water regulations.[13] At the same time, they cannot receive Drinking Water State Revolving Fund monies.[14] But many poor communities obtain water through irrigation districts, and the applicable law should be expanded to make such districts eligible for drinking water funding with respect to the drinking water service they provide.

The long-term trend in water demand is an increasing share for municipal users and a smaller share for agricultural and other users. Municipal users who utilize irrigation delivery systems face higher transportation and delivery losses when less water is used for irrigation. Texas irrigation districts face reductions in available water supplies due to shortages related to climate variability, long-term drought, decreased deliveries from Mexico and other factors. Texas irrigation districts need modernization and infrastructure upgrades to improve management and conservation. Funding these improvements is difficult, especially for irrigation districts that serve rural and urban users in low-income areas, as in the Lower Rio Grande Valley, with high poverty rates where its residents lack many basic services. As a result of the uncertainty of surface water delivery and the fact that most farmers do not own Rio Grande water rights, irrigation districts that serve agriculture are limited in their ability to provide collateral for loans for on-farm conservation and improvements.

Border irrigation districts in New Mexico, Arizona and California also provide water for agricultural and municipal uses. Additionally, the Imperial Irrigation District in California supplies electrical power to its region. Small agricultural communities that use canal water for drinking water often encounter difficulties in providing and operating the necessary pretreatment infrastructure.

Effective water conservation or storage improvements in support of irrigation districts would include metering, control automation, gates, installation and repair of canal lining, pipeline installation, district interconnects, new reservoirs and reservoir improvements. It also is necessary to explore investment in direct diversion points for municipal water users to obtain their water from the Rio Grande without using the irrigation district infrastructure, when economically and legally feasible.

4.vi. Dams and levees

IBWC operates flood-control levee systems, storage dams, diversion dams and other water infrastructure along the border. Much of the infrastructure requires repair, but congressional appropriations required for the work have not been sufficient to meet the needs. Moreover, because climate change will bring increased storm intensity and flood risk, new models and flood maps need to be in place to properly adapt the infrastructure to future risk. The Amistad Dam on the Rio Grande urgently needs remedial repairs due to sinkholes in the underlying limestone formation, a problem that has been discussed since the 1990s.

Classified by the U.S. Army Corps of Engineers (2022) as in poor condition with high hazard potential, a failure would put 400,000 downstream U.S. and Mexican residents at risk. Based on their condition, five additional dams along the border have been identified as high priority or conditionally unsafe.

The fence-building activities of U.S. Customs and Border Protection and its contractors have raised concerns about the stability of levees in some areas and erosion in dry watercourses elsewhere. Security infrastructure construction has removed vegetation in a wide swath along the route of the fence on some parts of the lower Rio Grande. In other areas of the Rio Grande, the fence has been built in the flood plain. On the western end of the border, U.S. Customs and Border Protection is moving forward with construction of a 900-foot-long steel structure with 53 hoistable gates that are approximately 30-feet tall across the Tijuana River channel on the U.S. side of the boundary (Schubert and Sanders 2023). Proposed to discourage foot traffic across this portion of the border, the structure presents a significant flood risk should the gates fail during a major storm event. In that case, significant flooding would occur in adjacent urban areas in Mexico and San Diego. The Treaty to Resolve Pending Boundary Differences and Maintain the Rio Grande and Colorado River as the International Boundary requires binational consultations between the U.S. and Mexican Sections of IBWC if any infrastructure is installed in the flood plain that might affect the course of the river.[15] Mexico has been consulted regarding the fence security infrastructure along the Rio Grande and across the Tijuana River but is not always in accord with the proposed construction.

GNEB's (2017) 18th report on environmental quality and border security pointed out the benefits of proactive collaboration of federal security agencies and natural resources management agencies. Inadequate interagency communication and cooperation on installation of security infrastructure along the southern border has resulted in environmental damage that required later, and expensive, remediation. At the same time, unilateral actions by U.S. agencies have not been conducive to maintaining the close binational cooperation necessary for resolving many transborder environmental issues. Many GNEB reports have underlined the need for Mexican cooperation on numerous border environmental concerns.

4.vii. Energy and water services

Energy is required to extract, convey and deliver water of appropriate quality for diverse human uses, and then again to treat wastewaters prior to their return to the environment. Electricity alone can constitute 25 to 40 percent[16] of a wastewater treatment plant's annual operating budget and make up a significant portion of a given municipality's total energy bill. These energy needs are expected to grow over time, driven by population growth and increasingly stringent water quality requirements. Over the years, many examples have been documented that demonstrate significant energy reductions are possible through cost-effective measures (Daw et al. 2012).

Throughout much of the border region, the need for sufficient energy to adequately treat water has burdens not found in other parts of the country. Issues related to aridity of the border region, exaggerated by climate change, make both water and energy resources relatively scarce. For example, energy from hydroelectric plants is limited due to inadequate river flows, and ground water supplies are more and more depleted. Rural areas and tribal communities have insufficient energy generation available to them. Moreover, energy costs in rural areas tend to be higher than in more developed regions. Many border residents in *colonias*, rural areas and tribal areas are underserved in terms of water and wastewater infrastructure, and often they have unreliable, inadequate and costly access to electricity. GNEB's (2019) 19th report pointed out the importance of energy for water and wastewater for these and other communities along the border. GNEB recommends that the funding now available for water and wastewater infrastructure also include the necessary energy investments.

Most of the energy supplied to water-related projects in the border region is in the form of electricity, generated for the most part by fossil fuels. One area that needs to be explored in more detail is the use of renewable energy along the border, especially solar energy (GNEB 2019). The border region has some of the highest solar resources in the country, and onsite solar generation could reduce transmission costs.

5

Water and Wastewater Infrastructure Services: Best Practices and Recommended Improvements for the Border Region

Providing sanitary disposal systems for small and isolated rural communities—including tribal communities with many residents, smaller cities and towns with municipal systems, and cities of different sizes that are part of sister city transborder metropolitan areas—is one of many border wastewater challenges. In the case of sister-city pairs, all Mexican sister cities have grown rapidly and, despite investments in infrastructure, have had a chronic shortfall of sewage collection and treatment capacity that results in renegade flows of untreated wastewater into watercourses that transport contaminated waters into the United States, or in the case of the Rio Grande, into a shared binational river. Failures of infrastructure in Mexico have periodically overwhelmed the treatment capacity, for example, of the binational wastewater treatment plants in San Diego and Nogales (Arizona), contaminating the natural systems, including aquifers and the ocean on the U.S. side. As most urban areas on both sides of the border lack effective stormwater systems to contain the intense storm events characteristic of the region, storms periodically exceed the capacity of wastewater systems as well. Their location on the international border provides challenges that other communities in the United States do not have to contend with, and U.S. border cities require effective transborder cooperation for solutions.

Sister cities are significantly integrated economically, socially, culturally, and by shared public health,

environmental and public safety issues. What happens on one side of the border reverberates on the other. The huge impact of transborder flows of untreated wastewater are well documented in U.S. border communities.[17]

Access to proper collection, management and treatment of domestic wastewater is a basic and essential human health need. If not properly managed, sewage and other substances added to wastewater—including household chemicals and cleaning products and contributions to municipal wastewater collection systems by commercial and industrial sources—introduce a range of pollutants that can harm human health and damage natural resources. In the United States, municipal wastewater is regulated under the Clean Water Act and associated tribal, state and local laws. Regulations are designed to ensure proper collection, (e.g., a system of sewers and pumps, treatment, and monitoring), resulting in treated effluent that meets limits for pathogens, nutrients, metals, chemicals and other pollutants. For many homes and businesses that are not near a municipal wastewater system, proper installation and maintenance of onsite wastewater systems (e.g., septic systems) protect human health and nearby natural resources. Lack of proper collection and treatment of domestic wastewater poses major threats to human health due to pathogen transmission.

Access to safe drinking water is commonly referred to as a basic human right and is recognized formally in Mexico, but not in the United States. However, thousands of U.S. communities, including many urban, rural and tribal communities along the U.S.–Mexico border, lack reliable access to safe drinking water. Clean drinking water prevents disease and infections for all humans, with infants, children and the elderly at particularly high risk when exposed to contaminated water. Investing in infrastructure that increases the security of the drinking water supply and allows equitable access to clean water should be the highest priority for the Biden administration and Congress.

Although facing growing challenges in providing potable water, the larger U.S. border communities have moved to diversify supply and improve water security. El Paso supplements its ground and surface water sources with desalination of brackish ground water, ground water recharge and importation from regional aquifers. San Diego has diversified its supply by directly securing Colorado River water, building a large ocean desalination plant that meets

approximately 10 percent of local demand, increasing local reservoir storage, and investing in a massive project to recycle wastewater for potable uses. The Mexican sister cities of El Paso and San Diego (Ciudad Juárez and Tijuana, respectively), however, remain largely dependent on a single water source, which compromises regional transborder water security. Ciudad Juárez relies primarily on ground water, and Tijuana imports most of its water from the Colorado River via an aqueduct over the coastal range mountains. Tijuana is very susceptible to interruption of supply due to maintenance issues and by seismic activity or other natural disasters, and Ciudad Juárez could face supply interruptions or severe shortages in the case of an extended drought or additional decline of local aquifers. It is not clear that the U.S. communities are prepared to respond to a water emergency in their own extended community on the other side of the international boundary.

Meeting the water and wastewater infrastructure needs of border communities requires close collaboration by many partners and consistent, reliable and targeted resources to fund projects and build local capacity. When strategically directed toward the needs of border communities, investments by Congress and federal agencies have been leveraged at the tribal, state and local levels to build coalitions, plan infrastructure projects, provide critical technical assistance, train local water sector workers, and steer available funding to priority projects.

GNEB recommends that Congress and the administration move away from a case-by-case, reactive approach to water infrastructure investment to a proactive, integrated strategic planning process; proactive planning is needed to address issues before they become serious problems so that border needs can be efficiently addressed. This would facilitate borderwide planning with Mexico to prioritize water and wastewater infrastructure investments in the most cost-effective manner to provide these basic services to border residents. Proactive planning and implementation depend on a reliable funding stream, as well as support and technical assistance to access grant funds and other federal resources, which are particularly important for disadvantaged border communities.

Managing stormwater and implementing water harvesting are increasingly important in the border region as water supplies decline due to climate change and demand related to urbanization and development increases. The desert Southwest region of the border experiences high rainfall intensity and runoff from rainfall. Best management practices for stormwater must consider hydrometeorological factors, soils, vegetation, geology, topography and geomorphology. Four recurring principles stand out in arid and semi-arid areas that influence stormwater management:

1. Stormwater practices should be carefully selected and adapted for arid watersheds.
2. Irrigation with existing potable supplies should be avoided to maintain vegetation for stormwater management.
3. Ground water resources need to be protected from contamination and augmented through recharge practices where feasible.
4. Channel erosion and sediment generation in the watershed should be minimized.[18]

Constructed wetlands are one technology that could help reduce the number and concentration of contaminants in the border region and help communities manage increased stormwater entering wastewater facilities during storm events. Constructed wetlands also help recharge aquifers and provide important wildlife habitat. EPA has published useful information about constructed treatment wetlands, including information for siting, design, construction, operation and maintenance.[19]

An interesting binational example for water quality improvement is the effort Laredo and Nuevo Laredo are spearheading to establish a binational river park that will consist of a 6.3-mile (10.1-km) ecological restoration project to develop a natural corridor of green areas along the Rio Grande. Conservation is imperative for the two Laredos because the river is the sole source of drinking water. A federal investment of $2 million dollars was secured to begin the development of the park (Binational Riverfront Project 2022).

6

Available Financing Programs for Water and Wastewater Infrastructure, Watershed and Wetlands Resilience, and Local Capacity Building in the Border Region

No matter the challenges and opportunities associated with water and wastewater infrastructure and watershed and wetlands resilience in the border region, communities and agencies charged with managing these issues cannot advance their goals without funding. Although recent federal actions provide historic levels of funding for infrastructure, the collective task of using available funds to meet the needs of communities—especially disadvantaged communities—is paramount for border communities and governments. Based on outdated drinking water and wastewater needs assessments and the current realties of inflation and supply chain issues, current levels of federal investment are insufficient to meet all U.S. water infrastructure needs, including along the U.S.–Mexico border. EPA estimates that more than $600 billion is needed for water infrastructure improvements during the next 20 years, including for drinking water, wastewater and stormwater infrastructure (USEPA 2023f). The emerging challenges of stronger and more frequent storms, droughts and floods heighten the urgency to reinvest in water sector infrastructure.

Further, because of lack of tools and personnel with the required skills and knowledge, available funds are often out of reach for many low-income, rural and disadvantaged communities that experience persistent or recurring capacity shortfalls needed to operate systems, plan for future upgrades, secure

debt capacity and pursue funding. The path to resilient water infrastructure in the border region is not as simple as appropriating more funding for projects. Instead, to ensure all residents and businesses along the border have access to reliable drinking water and wastewater services, federal investments must include technical assistance and capacity building tailored to all border communities and the binational context. In addition, federal program funds for the planning, design and construction of projects must be accessible to these communities, many of which are unable to pay back a loan or provide cost-share funding. Federal investment needs to be tailored to tribal communities, rural communities and *colonias*, among others.

The remainder of Section 6 will discuss the funding mechanisms for two critical institutions that deal with border water and wastewater issues, NADBank and IBWC, as well as the funding available for state, tribal and local governments with respect to water and wastewater and wetlands resilience.

6.i. North American Development Bank

NADBank is a binational bank created and capitalized by the U.S. and Mexican governments as part of the NAFTA process. NADBank was established to support the development of infrastructure projects to improve environmental conditions in the border region and has several decades of effective operation on both sides of the border that could be of great advantage to underserved border communities. NADBank also provides technical assistance to help prepare projects for financing and implementation and to train utility operators. As of mid-2023, NADBank has funded 199 water and wastewater infrastructure projects in the border region that significantly reduced the shortfall of water and wastewater services. U.S. congressional appropriations to EPA for the Border Environmental Infrastructure Fund have significantly declined. In addition to BWIP, NADBank also administers its own grant programs, including the Community Assistance Program and its Technical Assistance Program. Despite the challenges, NADBank has made an immense impact through its lending for water and wastewater infrastructure in the border region.

An important question is how to fund water and wastewater infrastructure in border communities that have long been impacted by some negative externalities of border dynamics and are underfunded and underserved in terms of infrastructure. One option is to enhance NADBank's operations to increase technical assistance and financial resources for disadvantaged communities for local needs assessment, development of grant proposals, implementation of projects, and ongoing operation and maintenance. This would likely require additional congressional funding to provide grants. Currently, Congress has appropriated $3 million through the U.S. Department of State for the bank's Community Assistance Program and its Technical Assistance Program. These funds are critical for border communities to fund the construction projects or advance their projects to construction. An increase in this funding would allow NADBank to not only continue these programs but fill the gap needed for border communities.

The binational NADBank is experienced and skilled in managing small and large infrastructure projects on both sides of the U.S.–Mexican border. NADBank also has significant experience in the operations and maintenance of infrastructure that is problematic for many small operators on the U.S. side of the border and in most Mexican communities. NADBank should continue to play an important role in meeting the water and wastewater infrastructure needs of the border region through an enhanced role in borderwide and regional infrastructure planning and providing technical assistance and training, more grants to underserved communities, more loans to larger communities, and ongoing operations and maintenance support as needed for small and large systems.

GNEB recommends that the President convene the relevant federal agencies to develop a plan to expand the resources of NADBank to address the deficiencies in water and wastewater infrastructure in the border region. At the same time, timely and substantive consultations with Mexico are necessary. Finally, Congress should expand funding for NADBank and its partners to meet these basic human needs for border citizens.

Historically, EPA has provided significant funding for drinking water and wastewater infrastructure projects in both the United States and Mexico through

BWIP. Through a joint investment partnership with CONAGUA, the Mexican government provides matching funds for projects located in Mexico. Under the program, EPA funds NADBank to administer the Project Development and Assistance Program, which provides funds for project planning and design, and the Border Environment Infrastructure Fund, which helps to fund construction. In addition, the U.S. and Mexican Sections of IBWC are closely involved in many border water and wastewater infrastructure projects.

6.ii. International Boundary and Water Commission

As noted throughout this report, IBWC has a critical role in numerous border issues related to water and water-related infrastructure. However, the U.S. Section of IBWC faces severe budget challenges in meeting its responsibilities to address those issues.

Apart from its responsibilities regarding implementation of the respective water rights of the United States and Mexico—established in the 1906 Water Convention and in the 1944 Water Treaty—Article 24 of the 1944 Water Treaty states that IBWC also has authority to plan, construct, operate and maintain works "constructed or established in accordance with the provisions of [the 1944 Water Treaty] and other treaties or agreements in force between the two Governments dealing with boundaries and international waters." This set of responsibilities is carried out by means of agreements between the U.S. and Mexican Sections of IBWC in the form of IBWC Minutes.

According to IBWC U.S. Commissioner Maria Elena Giner, "[t]he [U.S. Section of] IBWC's mission is to provide binational solutions to issues that arise during the application of treaties between the United States and Mexico regarding, among other things, water quality and flood control in the border region, including constructing, rehabilitating, operating and maintaining flood control systems, storage dams with hydroelectric power plants, and wastewater treatment plants, as directed by Congress" (Giner 2023). In this regard, the U.S. Section of IBWC's activities include—

- Operation and maintenance of flood control systems consisting of more than 500 miles (805 km) of river and floodway levees, 20,000 acres of floodplains, 700 hydraulic structures, 100 hydrologic gaging stations, and four diversion dams.
- Operation and maintenance of two international storage dams (Falcon and Amistad) and associated hydro-electric power plants.
- Operation and maintenance of two wastewater treatment facilities in the United States at San Diego (i.e., the SBIWTP) and Nogales (Arizona) and participation with Mexico in its operation of a facility in Mexico that discharges into the Rio Grande near Laredo (Giner 2023).

The U.S. Section of IBWC does not currently have the necessary funding to properly carry out these activities. According to information released by the U.S. Section of IBWC, the estimated costs for its strategic priorities and pending projects are enormous (see callout box "U.S. Section of the International Boundary and Water Commission Priorities, Projects and Costs").

IBWC is presently dependent solely on congressional appropriations for its budgetary needs, with one exception: Congress authorized the U.S. Section of IBWC to receive EPA funds for the design and construction of the SBIWTP expansion. Congress did not provide funding to the U.S. Section of IBWC through BIL because that funding was dedicated primarily to state and local funding and not to federal agencies.

Historically, Congress has not appropriated sufficient funds for the U.S. Section of IBWC to fully carry out its responsibilities. This is illustrated through a comparison of the U.S. Department of State budget proposal for U.S. Section of IBWC funding for FY 2024 and the specific funding needs of the SBIWTP. This FY 2024 budget proposal includes $64.8 million for salaries and expenses, consisting of $15.03 million for administration, $6.42 million for engineering, and $43.35 million for operations, including operations, maintenance and repair of all mission facilities and infrastructure across the 2,000-mile (3,219-km) U.S. southern border (U.S. Department of State 2023, pp. 494–496). It also includes $40.0 million for construction (a decrease of $13.0 million below the FY 2023 adjusted enacted level), consisting of $22.9 million for the Water Management Program, $4.6 million for the Water Quality Improvement

U.S. Section of the International Boundary and Water Commission Priorities, Projects and Costs

FACILITIES AND EQUIPMENT:

Equipment replacement in all field offices: $60 million, proposed as a 5-year program.

Facilities renovation: $31 million is needed for 61 facilities.

DEFERRED MAINTENANCE:

Estimated deferred maintenance: $11 million per year.

Extraordinary deferred maintenance: $487 million, mostly related to sediment accumulation.

WATER QUALITY AND WASTEWATER INFRASTRUCTURE

South Bay International Wastewater Treatment Plant: IBWC estimates that the full expansion project (including a 50-million-gallons-per-day plant with a peaking factor up to an additional 25 million gallons per day and anaerobic digesters) and necessary rehabilitation may cost $910 million (+/-30%). The original estimate of expansion was $300 million and is now up to $600 million (+/- 30%), with $300 million unfunded; rehabilitation costs were unexpected.

Nogales International Wastewater Treatment Plant capital improvements: $10–$20 million.

FLOOD CONTROL PROGRAM:

Rio Grande Flood Control Program:

- $946 million is needed for 158 miles of levees.
- High priority: $73 million is needed for 14 miles of levees and levee gap repairs for Federal Emergency Management Agency certification and flood control protection in urbanized areas and where high levee failure risks exist.
- Medium priority: $60 million is needed for 16 miles of levees and levee gaps repairs based on value/benefit, complexity/constraints and risk/safety.

Tijuana River Levee Rehabilitation:

- High priority: $100 million is needed for 4 miles of levee construction to comply with Federal Emergency Management Agency certification and sediment removal; $5 million is needed for operation and maintenance.

OTHER UNFUNDED CRITICAL CAPITAL PROJECTS

Amistad Dam Seepage Correction: $80–$276 million.

American Canal Middle Reach: $155–$170 million.

SOURCES: "Overview Fact Sheet" and "Strategic Priorities and Pending Projects of the U.S. Section of the International Boundary and Water Commission," July 2023 (prepared by GIS Office, Master Planning Division, U.S. Section of IBWC; copy on file with the Good Neighbor Environmental Board; U.S. Section of IBWC press release of September 13, 2023, "Urgent South Bay Wastewater Plant Repairs Needed Following Tropical Storm Hilary; Plant Rehabilitation and Expansion Moving Forward," website: www.epa.gov/system/files/documents/2023-10/press-release-south-bay-wastewater-plant-repairs.pdf; presentation on the South Bay International Wastewater Treatment Plant Expansion Project given by Dr. Maria-Elena Giner, U.S. Commissioner of IBWC, to the San Diego Regional Water Quality Control Board on September 13, 2023.

Program, and $12.5 million for the Resource and Asset Management Program (U.S. Department of State 2023, pp. 499–502).

During a GNEB tour of the SBIWTP in September 2023, the plant manager explained to the members that the funds available for maintenance and repair from the U.S. Section of IBWC were insufficient. He pointed out that the U.S. Section of IBWC needs $4 million per year in ongoing capital projects for maintenance and repair of the SBIWTP but is receiving much less. He also pointed out that the SBIWTP needs about $900 million in total for all approved SBIWTP projects (repairs, rehabilitation and expansion), but the amount allocated is far below that and will cover only repairs. In her testimony to Congress, IBWC

U.S. Commissioner Giner (2023) stated that virtually all of the $40 million construction budget will be used to pay "unexpectedly high costs to rehabilitate the South Bay International Wastewater Treatment Plant." Thus, the proposed $40 million construction budget is almost completely taken up by the costs of repair and rehabilitation of the SBIWTP, and even that expenditure is a small portion of the total $900 million needed for the SBIWTP.

To confront these budget issues, GNEB suggests the following:

- First, Congress should take action to increase the budget of the U.S. Section of IBWC, focusing on the Section's strategic priorities. Among other things, Congress should provide sufficient operations and maintenance funding for the Section's mission facilities and infrastructure to meet current, ongoing needs and also to respond to deferred maintenance requirements.

- Second, the President's budget should request additional authorities for the U.S. Section of IBWC to receive funds from federal and non-federal entities all along the U.S.–Mexico border. According to IBWC U.S. Commissioner Giner (2023), "[t]he new authorities would match the contributed funds authorities already enjoyed by other U.S. infrastructure agencies, and any contributed funds could be used in connection with the South Bay plant expansion or a wide range of activities along the 2,000-mile border with Mexico." Congress should approve this request and then take into account the capabilities and funding needs of the U.S. Section of IBWC when it evaluates the budget requests of other federal agencies that act on water issues that impact the border region.

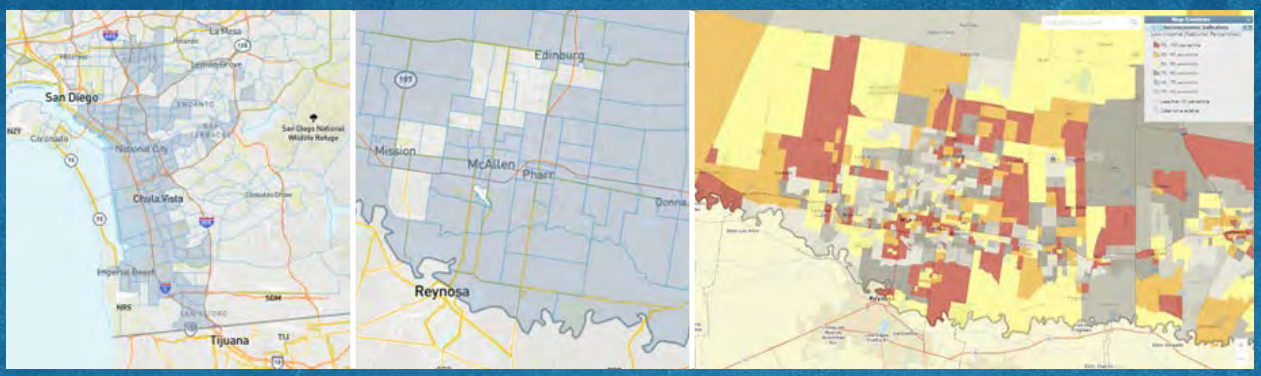
6.iii. Federal funding programs

Many federal funding programs exist to support water and wastewater infrastructure planning, design and construction projects, including the long-standing Clean Water State Revolving Funds, Drinking Water State Revolving Funds and USDA Rural Development funding. The Water Infrastructure Finance and Innovation Act of 2014 established a new funding source that helps municipalities fund significant projects, although the 51 percent local cost-share requirement places these funds out of reach for many, if not most, border communities. Since 1988, the Clean Water State Revolving Funds have provided more than $153 billion to eligible borrowers nationwide across more than 44,000 low-cost loans. Since 1997, states have leveraged $23.6 billion in federal Drinking Water State Revolving Funds to infuse a total of $48.5 billion into drinking water infrastructure.[20] The USDA Rural Development water and waste disposal loan and grant program provides funding to eligible entities, including rural areas and towns with population of 10,000 or less, tribal lands in rural areas, and *colonias*. USDA also has funding

Useful Screening Tools for Border Communities

Two useful screening tools have been developed by federal agencies to better understand underserved communities in the border region and elsewhere. EJScreen, developed by EPA, is a web-based tool that combines environmental, demographic and socioeconomic indicators to analyze geographical areas and produce environmental justice indexes for those areas (USEPA 2023d). The tool is able to display the information as a large-scale map, generate a standard report according to indicators selected for the area, and show comparisons with other areas. EJScreen allows users to evaluate and identify low-income populations, *colonias*, communities of color and Indigenous communities, which allows EPA to track funding reaching those populations through Clean Water State Revolving Funds and Drinking Water State Revolving Funds.

The Climate and Economic Justice Screening Tool (CEJST) highlights disadvantaged census tracts (Council on Environmental Quality 2023b). Its purpose is to help agencies identify disadvantaged communities to direct federal benefits and help agencies measure whether 40 percent of benefits are being received by those communities. Communities are considered disadvantaged if they are in census tracts that meet the thresholds for at least one of the tool's categories of burden: climate change, health, energy, housing, legacy pollution, transportation, water and wastewater, or workforce development. Communities are also considered disadvantaged if they are on land within the boundaries of federally recognized tribes. CEJST is revealing, showing that most of the counties and census tracts within the counties along the border with Mexico are disadvantaged. Moreover, because CEJST provides data at the level of census tracts, it is possible to understand local patterns within the counties. For example, even in wealthy San Diego, the census tracts that extend from the center of the city of San Diego southward to the border are disadvantaged. In neighboring Imperial County, which is primarily classified as disadvantaged, CEJST identifies two census tracts in the city of El Centro that are not disadvantaged; this pattern is repeated across the border. Yuma, Arizona; El Paso, Mission and Edinburg in Hidalgo County, Texas; and Harlingen and Brownsville in Cameron County, Texas, all are primarily disadvantaged but include nondisadvantaged census tracts. CEJST documents the overwhelming number of border communities that are disadvantaged and, among other things, lack adequate water and wastewater infrastructure and services.



Above left: CEJST maps of parts of the city of San Diego and Hidalgo County with disadvantaged areas shaded; above right: Hidalgo County showing low income. Source: CEJST, website: screeningtool.geoplatform.gov/en, accessed July 2023.

programs for rural decentralized water systems, as well as for households in *colonias* to cover the costs of utility hook-up and installation of plumbing and related fixtures. Federal agencies also have developed screening tools to better understand underserved communities (see callout box "Useful Screening Tools for Border Communities").

As mentioned above, the appendix to this report includes a summary of all key provisions of BIL and IRA applicable to water and wastewater infrastructure. BIL provides almost $50 billion in water and wastewater infrastructure funding to be administered by EPA through 2026. The states along the U.S.–Mexico border receive annual allocations from EPA to administer eligible Clean Water State Revolving Fund and Drinking Water State Revolving Fund projects. In addition to these funds, which are primarily available to directly fund infrastructure projects, the states can set aside a portion of the funds to provide technical assistance, support local source water protection planning, and engage in other approved activities that benefit local communities. Importantly, most

of the funding is available only for infrastructure projects and not for the critically needed operations and maintenance activities that many small border communities struggle to fund.

In addition to funding water and wastewater infrastructure through EPA, BIL also provides funding specifically directed to tribal water and wastewater infrastructure needs. This includes $3.5 billion over 5 years through the Indian Health Service and $250 million over 5 years through the Bureau of Indian Affairs. Finally, BIL provides $8.3 billion for Western Water Infrastructure through the U.S. Bureau of Reclamation.

BIL also provides funding for protection of watersheds and coastal wetlands, including estuaries, and related habitats. This includes $1.6 billion over a 5-year period through the National Oceanic and Atmospheric Administration and in excess of $900 million through USDA's Natural Resources Conservation Service for these purposes.

BIL provides critical funding to upgrade and restore water infrastructure and support communities' efforts to prepare for climate change through advanced technology, increased energy and water efficiency measures, and emergency preparedness, among others. In addition, BIL requires federal and state agencies administering the funds to ensure that disadvantaged communities are a priority as project proposals are reviewed and funds awarded to local entities. This federal commitment to equitable access to drinking water and wastewater services is essential in the border region. Nevertheless, some inherent barriers within the federal funding programs continue to place disadvantaged, low-income and rural communities at risk of not benefitting from these funding opportunities.

As explained throughout this report, many border communities lack the technical, financial and/or managerial capacity to plan, operate, maintain and invest in water and wastewater infrastructure. Many border communities do not have the technical and administrative capacity to apply for grant funding, let alone take on debt for a federal infrastructure loan, even if the interest rate is 0 percent. Therefore, although EPA began dispersing BIL funding beginning late FY 2022 and into FY 2023, some communities in the greatest need are unprepared to apply for and receive the funds. These communities need dedicated and sustained support to build capacity at the local level to plan for needed upgrades, hire engineering firms, conduct rate surveys and train grant writers, among other core functions. Communities also must prepare to confront the Build America, Buy America Act requirements of BIL, which are likely to increase burden and costs for local infrastructure projects unless the community can secure a waiver.

Notably, BIL acknowledges the importance of technical assistance, particularly for small and disadvantaged communities. Border states and communities are watching closely as federal agencies make decisions and provide guidance on administration of the increased technical assistance funding available through BIL. For example, EPA and USDA collaborated to launch the Closing America's Wastewater Access Gap Community Initiative (commonly known as Closing the Gap). Closing the Gap is premised on the simple fact that "too many communities in the United States are still living without the basics—including safe and reliable drinking water and wastewater services" (USEPA 2023h). In August 2022, EPA and USDA announced the first phase of the pilot that includes 11 communities nationwide, including Chaparral, New Mexico, an unincorporated *colonia* in Doña Ana County (Edwards 2023). Through this initiative, which EPA and USDA plan to extend to additional communities in future years, the agencies seek to demonstrate that a true partnership approach with local leadership can leverage technical assistance resources to

prepare a traditionally underserved community to obtain infrastructure financing and build wastewater infrastructure to meet the community's needs. In short, this program seeks to prove that the right type of sustained technical assistance can bring centralized wastewater services to a community that has been seeking such investments unsuccessfully for years or decades prior. Importantly, community voices are at the center of the process.

One key source of technical assistance for BIL funding is EPA's free Water Technical Assistance (WaterTA) programs. EPA WaterTA helps communities to identify water challenges; develop plans; build technical, managerial and financial capacity; and develop application materials to access water infrastructure funding for financing a project through State Revolving Funds or other EPA-supported funding opportunities. EPA WaterTA provides these services to address drinking water, wastewater and stormwater challenges. To implement WaterTA, EPA collaborates with states, tribes, territories, community partners and other key stakeholders (USEPA 2023a). Several EPA WaterTA programs and resources are available to local municipalities, tribes, communities and entities eligible for EPA water infrastructure funding programs (USEPA 2023b).

One of the key EPA WaterTA programs for providing technical assistance can be found in EPA's Environmental Finance Centers (EFCs) program.[21] EFCs can help communities across the United States access federal funding for infrastructure projects that improve public health and environmental protection. Currently, EPA has selected 29 EFCs to help carry out this mission; some of these are located in the border region. The University of New Mexico manages a multi-environmental media EFC for EPA Region 6, and Sacramento State University operates a similar EFC for Region 9. The University of New Mexico also manages a Regional Water Infrastructure EFC for EPA Region 6, and a similar EFC for Region 9 is managed by the Rural Community Assistance Corporation.

EFCs are also tasked with ensuring that communities can obtain assistance in receiving BIL funding. To assist states, local, tribal and territorial leaders on how BIL works and how to secure funding, the Biden administration developed a guidebook to the BIL, with a specific section on water and wastewater

infrastructure.[22] Another source of EFC-related information is the Environmental Finance Center Network (website: www.efcnetwork.org). This resource is a university- and nonprofit–based organization providing valuable information. Of particular interest is the Municipal Online Stormwater Training Center (MOST; website: www.efcnetwork.org/most-center-municipal-online-stormwater-training-center), an online resource to help communities address major challenges to their water systems, such as aging infrastructure, flooding and climate change. The virtual platform works to eliminate barriers that small communities face to achieving their water system goals, including accessibility to education and training, budget constraints, and lack of expertise. MOST serves multiple stakeholder groups that have diverse but critical roles in the development and management of municipal water programs. The platform boasts a range of educational resources, including short on-demand courses, an interactive case story map, educational videos and a resource library with manuals, reports, toolkits and more.

Supporting the EFCs is EPA's Water Infrastructure and Resiliency Finance Center (website: www.epa.gov/waterfinancecenter). The center provides "objective financial advice to help communities make informed decisions on funding drinking water, wastewater and stormwater infrastructure projects and access to tools that help utilities make financing decisions that meet their local infrastructure needs" (USEPA 2023e). The Water Infrastructure and Resiliency Finance Center also brings in partners besides the EFCs to help local communities with technical assistance. This includes:

- USDA Rural Development (website: www.rd.usda.gov), which offers loans, grants, loan guarantees

and technical assistance to support essential services in rural areas including water, electric and communications infrastructure.

- National Rural Water Association (website: www.nrwa.org), a national network of nonprofit organizations that, among its other services, provides training and technical assistance on operating, managing, and financing water and wastewater utilities to rural and small communities through 49 affiliated State Rural Water Associations.
- Rural Community Assistance Partnership (website: www.rcap.org), a national network of nonprofit organizations that, among its other services, provides training and technical assistance on financing, managing, and operating water and wastewater systems to rural and small communities through six regional organizations.

Another potential source of technical assistance for border communities is the Environmental Justice Thriving Communities Technical Assistance Centers (EJ TCTACs) Program, established by EPA in partnership with the U.S. Department of Energy.[23] Through this program, approximately $177 million in funding was awarded to grantees to establish 14 regional and three national EJ TCTACs to provide free direct technical assistance, training and capacity-building support to communities and organizations to advance environmental and energy justice priorities (USEPA 2023g). The technical assistance will include assisting with grant proposal writing and preparation; managing federal grants (e.g., accounting, policies, controls); identifying sources of funding for which to apply (e.g., federal, state, local, private); navigating SAM.gov and Grants.gov website registration processes and other portals related to grants; and developing partnerships and coalitions to conduct outreach.[24]

The EJ TCTACs will be focused broadly on environmental and environmental justice priorities and not only water and wastewater issues. Nevertheless, support for water and wastewater grant applications and grant management would be within the scope of the EJ TCTACs. Border communities should take advantage of that help. The regional EJ TCTACs for the border states are—

- South Central Environmental Justice Resource Center, led by New Mexico State University, for EPA Region 6, including Texas and New Mexico and 66 tribal nations.
- San Diego State University's Center for Community Energy and Environmental Justice, led by the San Diego State University Foundation, and Western Environmental Science Technical Assistance Center for Environmental Justice, led by The University of Arizona, for EPA Region 9, including California and Arizona and 148 tribes.[25]

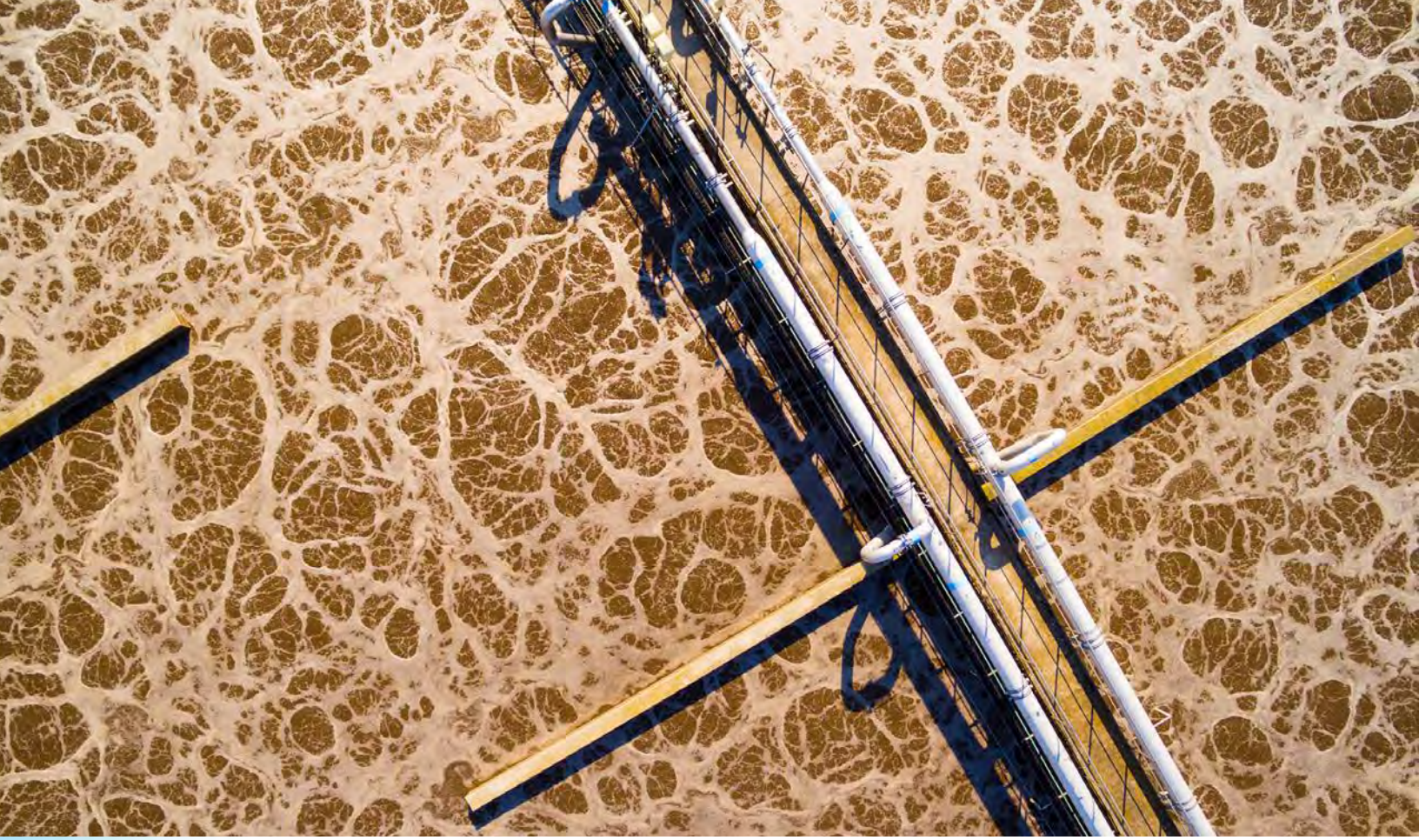
Each of these regional EJ TCTACs serves a huge geographical region. GNEB suggests that EPA and the U.S. Department of Energy ensure that the new centers develop the necessary connections and local presence to adequately assist isolated communities in the border region, including those of the Lower Rio Grande Valley.

As detailed in the appendix, IRA is another important source of funding for water and wastewater issues, although on a smaller scale than BIL. Through the U.S. Bureau of Reclamation, IRA provides $4 billion for drought mitigation in the Reclamation States, which include the four border states, and $550 million for domestic water supply projects in the Reclamation States. IRA also provides substantial funding for the conservation, restoration and protection of coastal and marine habitats, which will include watersheds and wetlands in coastal areas. In this regard, IRA provides $2.6 billion to the National Oceanic and Atmospheric Administrator for investing in coastal communities and climate resilience, which will include making grants for these purposes.

6.iv. State programs

In addition to federal investments, some border states have programs that provide funding for water and wastewater infrastructure, creating more opportunities for communities to leverage various sources of funding to complete critical infrastructure projects. Some of these state programs use federal funds.

In New Mexico, the New Mexico Finance Authority and *Colonias* Infrastructure Board administer the *Colonias* Infrastructure Fund (website: www.nmfinance.com/*colonias*), created in 2011. In



adopting the *Colonias* Infrastructure Act, the New Mexico legislature found that *colonias* lack basic infrastructure, resulting in poor social, health and economic conditions. The purpose of the act is to address those findings by ensuring adequate financial resources for infrastructure development, providing for the planning and development of infrastructure in an efficient and cost-effective manner, and developing infrastructure projects to improve quality of life and encourage economic development for *colonia*-recognized communities. Since 2011, the *Colonias* Infrastructure Fund has supported 263 awards across 12 counties, representing a total investment of more than $144 million in water systems, wastewater systems, solid waste disposal, flood and drainage control, and road and housing infrastructure.

The Texas Water Development Board provides water planning, data collection and dissemination, financial assistance, and technical assistance services. Population growth and the recurrent threat of severe drought add importance to its institutional role. The Texas Water Development Board supports the development of regional and state water and flood plans; provides loans to local governments for water supply projects, water quality projects (including wastewater treatment and nonpoint source pollution control), flood control projects, agricultural water conservation projects, and rural and small community water and wastewater projects, as well as expenses related to administering ground water conservation districts; provides grants and loans for the state's economically distressed areas; and assists with research and data collection on water-related issues.

Texas Commission on Environmental Quality regulatory oversight helps ensure that drinking water produced and distributed by public water systems is safe and aids both operators and consumers. It manages surface water rights and availability, develops and monitors surface water quality standards, and implements pollution control projects. The Texas Commission on Environmental Quality also manages permits and registrations for wastewater and stormwater and has a key role on ground water protection. The commission assists small operators with finding funding options and has a dedicated "at-risk" team to assist troubled and nonfunctioning systems and currently is working with 90 of them. The agency also offers pre-enforcement assistance by identifying systems approaching enforcement criteria and facilitating return-to-compliance activities before

triggering formal enforcement actions. Finally, the Texas Commission on Environmental Quality conducts training and technical assistance for public water systems to implement state and federal regulations.

The Texas Attorney General's office includes a *colonias* prevention division (website: www.texasattorney general.gov/divisions/*colonias*-prevention). It is responsible for the enforcement of laws designed to prevent the formation of new *colonias*. It also maintains a useful database that displays the location of *colonias* in Texas border counties, along with incomplete information on the number of lots, water and wastewater services, paved roads, and other information. **Figure 4,** for example, shows *colonias* mapped in the El Paso region that occupy a substantial area.

In Arizona, the Water Infrastructure Finance Authority administers State Revolving Funds. It operates as a bond bank and can issue water quality bonds for water infrastructure projects. The Water Infrastructure Finance Authority does not charge an application fee, closing costs or origination fees. All loans receive a discounted interest rate, which lowers the borrower's interest costs to between 70–95 percent of the Water Infrastructure Finance Authority's tax-exempt cost of borrowing. The authority has 280 active loans and 40 projects currently in construction. Most recently, the Water Infrastructure Finance Authority accepted applications for water project assistance grants with $3 million in funding available for cities and towns providing water in Navajo and Apache counties, with an additional $2 million available in funding for irrigation districts in Cochise and Graham counties.

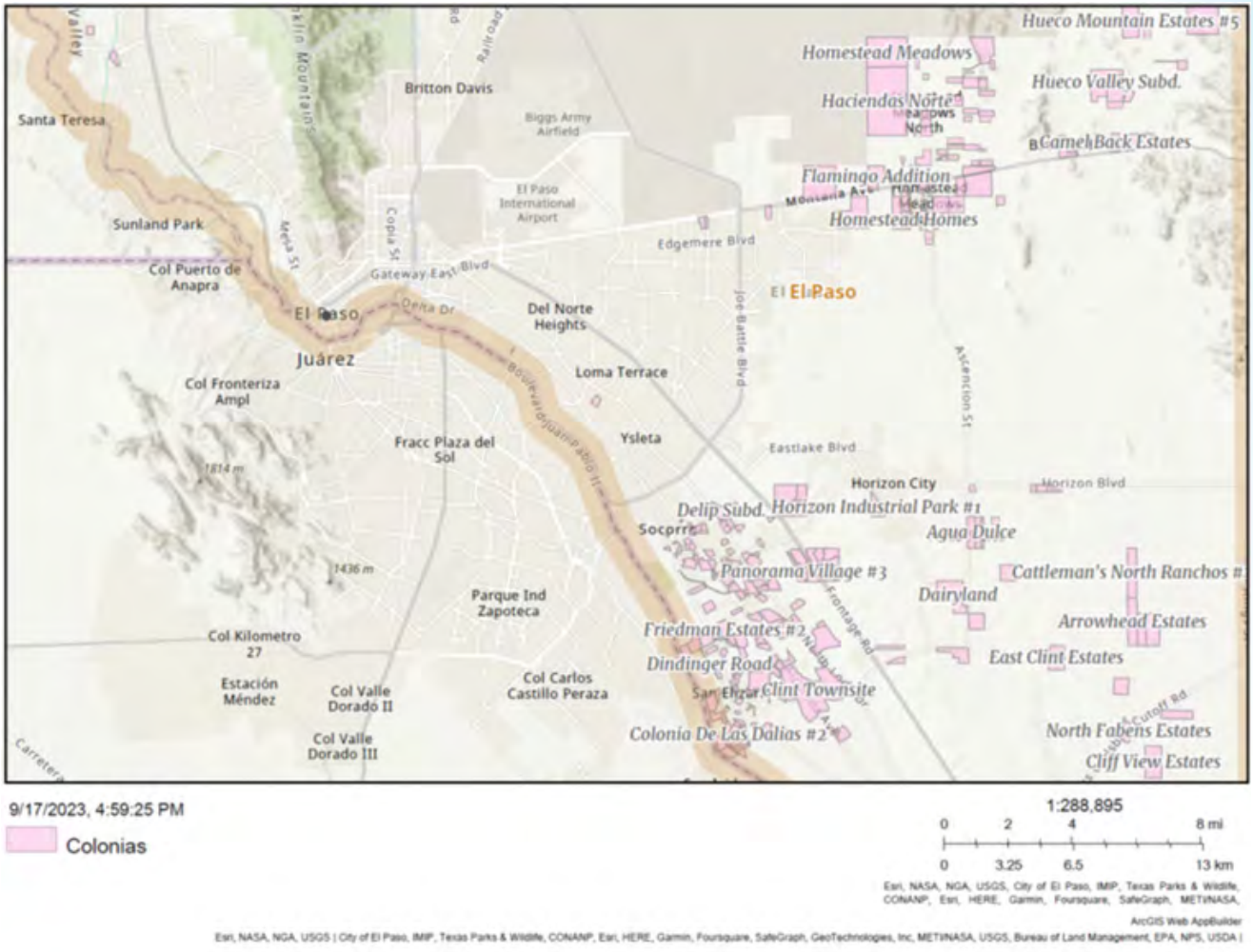


Figure 4. *Colonias* in the El Paso region. Image generated from the website texasoag.maps.arcgis.com/apps/webappviewer/index.html?id=1bc9c4f7b1da47dd8fc535fbd17dc060 on October 4, 2023.

The state of California program offers low-cost financing for a wide variety of water quality projects through its Clean Water State Revolving Funds (website: www.waterboards.ca.gov/water_issues/programs/grants_loans/srf). The Clean Water State Revolving Funds provide low-cost financing to protect California's waters from pollution. Depending on the type of project, eligible applicants include public agencies, 501(c)(3) nonprofit organizations, private entities, and federally recognized tribes or state tribes on the Native American Heritage Commission consult list. Eligible project types include publicly owned treatment works, nonpoint source projects, national estuary program projects, decentralized wastewater treatment systems, stormwater projects, water conservation, watershed projects, energy conservation, water reuse projects, security measures at publicly owned treatment works, and technical assistance.

6.v. Best practices and gaps associated with available funding

Looking to 2024 and beyond, it is an exciting time for greater focused attention and resource allocations to advance water and wastewater infrastructure investments across the border region. The United States is in the first phase of 5 years of historic water infrastructure funding from the federal government, even as border communities and state and tribal governments are coming to terms with a changing climate and forecasts for the region. The opportunities are great, and the urgency is very real.

GNEB's 10 recommendations described in pages 1–3 are broad but doable. In conjunction with the Justice40 Initiative, the federal government is appropriately targeting historically underserved and disadvantaged communities while maximizing flexibility at the state and local levels. The border region is well within the target populations and locations, and best practices to complement the 10 recommendations in this report in the border region include—

- Expanding the focus on the U.S.–Mexico border region, such that EPA and USDA work directly with state, tribal and local leaders in the border region to design a phase of the Closing the Gap initiative that expands opportunities for un- and under-sewered border communities to participate in the initiative and benefit from federal technical assistance resources.
- Continuing the emphasis on equitable distribution of federal infrastructure dollars and institutionalizing practices that make it easier for federal and state funding staff to implement equity principles and make it easier for communities to navigate the system, particularly by implementing more robust outreach to border communities, including tribal nations and non-English speaking populations, prior to and during funding cycles, such as the EJ TCTACs discussed on page 51.
- Increasing recurring funding for technical assistance providers and centers of excellence and expanding the number of skilled staff at federal, tribal, state, local and nongovernmental entities who are available to help communities through the technical and financial aspects of applying for funding for, planning, designing and constructing projects in the border region, via dedicated EJ TCTACs discussed on page 51.
- Investing in water workforce training and recruitment hubs, including emphasis on nontraditional students and workers transitioning to new careers and opportunities.
- Creating economies of scale for technology advancement, supply purchasing, project design and more through investments in border region networks to provide essential services and supplies at lower cost to local communities and small systems.
- Revisiting and revising the Build America, Buy America Act requirements and waiver policies to ensure that these well-intentioned policies never prevent a community in the border region from meeting its infrastructure needs.
- Integrating meaningful incentives into federal funding programs to increase the federal dollars invested into resilient infrastructure that addresses the current and future impacts of climate change.
- Exploring options to manage federal funds to incentivize community collaboration and regionalization efforts at the local level, particularly in small and disadvantaged neighborhoods and communities in the border region.

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Appendix: Sources of Funding Under the Bipartisan Infrastructure Law and Inflation Reduction Act for Water and Wastewater Infrastructure, Watersheds, and Wetlands

Overview of Potential Sources of Funding Under the Bipartisan Infrastructure Law

U.S. Environmental Protection Agency		
Program	*Amount*	*Page*
Drinking Water State Revolving Funds	$11,713,000,000	59
Drinking Water State Revolving Funds—Lead Service Lines Replacement	$15,000,000,000	59
Drinking Water State Revolving Funds—Emerging Contaminants	$4,000,000,000	60
Drinking Water—Disadvantaged or Small Communities, Addressing Emerging Contaminants	$5,000,000,000	60
Clean Water State Revolving Funds	$11,713,000,000	60
Clean Water State Revolving Funds—Emerging Contaminants	$1,000,000,000	61

U.S. Department of Health and Human Services, Indian Health Service		
Program	*Amount*	*Page*
Indian Health Service Sanitation Facilities	$3,500,000,000	61

U.S. Department of the Interior, Bureau of Indian Affairs		
Program	*Amount*	*Page*
Indian Water Rights Settlements	$2,500,000,000	62
Irrigation, Dam Safety, Sanitation and Other Facilities	$250,000,000	62

U.S. Department of the Interior, U.S. Bureau of Reclamation		
Program	*Amount*	*Page*
Water Storage, Groundwater Storage and Conveyance Projects	$1,150,000,000	63
Aging Infrastructure Extraordinary Maintenance	$3,200,000,000	63
Rural Water Projects	$1,000,000,000	64
Water Recycling and Reuse Projects	$1,000,000,000	64
Water Desalination Projects and Studies	$250,000,000	65
Safety of Dams Program	$500,000,000	65
WaterSMART Grants	$400,000,000	65
Colorado River Drought Contingency Plan	$300,000,000	66

U.S. Department of Commerce, National Oceanic and Atmospheric Administration		
Program	*Amount*	*Page*
National Oceans and Coastal Security Fund	$492,000,000	66
Habitat Restoration	$491,000,000	67
Coastal Zone Management	$207,000,000	67
National Estuarine Research Reserve System	$77,000,000	67
Fish Passage	$400,000,000	68

U.S. Department of Agriculture, Natural Resources Conservation Service		
Program	*Amount*	*Page*
Watershed and Flood Prevention Operations	$500,000,000	68
Emergency Watershed Protection Program	$300,000,000	69
Watershed Rehabilitation Program	$118,000,000	69

Overview of Potential Sources of Funding Under the Inflation Reduction Act

U.S. Department of the Interior, U.S. Bureau of Reclamation		
Program	*Amount*	*Page*
Drought Mitigation in the Reclamation States	$4,000,000,000	70
Bureau of Reclamation Domestic Water Supply Projects	$550,000,000	70

U.S. Department of Commerce, National Oceanic and Atmospheric Administration		
Program	*Amount*	*Page*
Investing in Coastal Communities and Climate Resilience	$2,600,000,000	70

Sources of Funding Under the Bipartisan Infrastructure Law by Agency

U.S. Environmental Protection Agency

Program

Drinking Water State Revolving Funds

Intended to help water systems and states achieve the health protection objectives of the Safe Drinking Water Act (SDWA). States are required to give priority for use of these funds to address the most serious risks to human health, ensure compliance with the requirements of the SDWA, and assist systems most in need on a per household basis according to state affordability criteria.

Amount Available, Funding Mechanism, Applicable Law

$11,713,000,000 over fiscal years 2022–2026. BIL §50102; BIL Division J (Appropriations), Title VI, EPA, State and Tribal Assistance Grants; 42 USC §300j-12.

Under BIL, the states shall distribute 49% of these funds as grants or 100% principal forgiveness loans (or any combination thereof).

State to match 20% of the federal amount, for deposit to the State Revolving Fund, except the matching amount is 10% for FY 2022 and 2023.

Recipients

States initially receive funding as "capitalization grants" into the Drinking Water State Revolving Funds, then provide funds to water utilities and/or municipal and other eligible entities. Tribes and territories are also eligible to receive a portion of State Revolving Fund monies.

Funds are distributed to the states according to an allocation formula based on state needs, subject to minimums.

Eligible Uses

Funding for eligible water infrastructure projects, including planning, design, siting, construction, replacing or rehabilitation of water treatment, distribution or storage facilities, or other facilities to comply with national primary drinking water regulations or to protect public health but not including monitoring, operations, and maintenance expenditures.

Program

Drinking Water State Revolving Funds—Lead Service Lines Replacement

Amount Available, Funding Mechanism, Applicable Law

$15,000,000,000 over fiscal years 2022–2026. BIL Division J, Title VI, EPA, State and Tribal Assistance Grants. 42 USC §300j-12.

Under BIL, the states shall distribute 49% of these funds as grants or 100% principal forgiveness loans (or any combination thereof).

No matching or cost share requirement.

Recipients

Same recipients as for Drinking Water State Revolving Funds (since the lead service line replacement money goes through the SDWA revolving funds, subject to the law governing the funds).

Funds are distributed to the states under the same allocation formula as for other SDWA grants to the states.

Eligible Uses

Eligible projects limited to lead service line replacement projects and associated activities directly connected to the identification, planning, design and replacement of lead service lines.

U.S. Environmental Protection Agency

Program

Drinking Water State Revolving Funds—Emerging Contaminants

Amount Available, Funding Mechanism, Applicable Law

$4,000,000,000 over fiscal years 2022–2026. BIL Division J, Title VI, EPA, State and Tribal Assistance Grants. 42 USC §300j-12(a)(2)(G), (t).

Under BIL, the states shall distribute these funds to eligible recipients as grants or 100% principal forgiveness loans (or any combination thereof).

No matching or cost share requirement.

Recipients

Same recipients as for Drinking Water State Revolving Fund (since the emerging contaminants money goes through the SDWA revolving funds, subject to the law governing the funds).

Funds are distributed to the states under the same allocation formula as for other SDWA grants to the states.

Eligible Uses

Funding shall be to address emerging contaminants in drinking water with a focus on perfluoroalkyl and polyfluoroalkyl substances.

Program

Drinking Water—Disadvantaged or Small Communities, Addressing Emerging Contaminants

Amount Available, Funding Mechanism, Applicable Law

$5,000,000,000 over fiscal years 2022–2026 via grants. BIL Division J, Title VI, EPA, State and Tribal Assistance Grants; 42 USC §300j-19a.

No matching or cost share requirement.

Recipients

Funds may be granted to a public water system, to a water system in an area governed by an Indian tribe, or to a state, in each case for the benefit of disadvantaged and small communities. A "disadvantaged community" is one that under state affordability criteria in accordance with the SDWA, (1) is a disadvantaged community or (2) may become one as a result of carrying out a project or activity. A "small community" is one that has a population of 10,000 of fewer individuals and lacks the capacity to incur debt sufficient to finance a project to comply with the SDWA.

Eligible Uses

These funds are to address emerging contaminants. Funds provided to states under these provisions of BIL may be used for projects that address emerging contaminants supporting a disadvantaged or small community.

Program

Clean Water State Revolving Funds

This program under the Federal Water Pollution Control Act provides capitalization grants to states, which will provide a long-term source of state financing for construction of wastewater treatment facilities and implementation of other water quality management activities.

Amount Available, Funding Mechanism, Applicable Law

$11,713,000,000 over fiscal years 2022–2026, via loans and grants. BIL §50210; BIL Division J, Title VI, EPA, State and Tribal Assistance Grants; 33 USC §§ 1381-89.

Under BIL, the states shall distribute 49% of these funds as grants or 100% principal forgiveness loans (or any combination thereof).

State to match 20% of the federal amount, for deposit to the State Revolving Fund, except the matching amount is 10% for FY 2022 and 2023.

U.S. Environmental Protection Agency

Recipients

States initially receive funding as "capitalization grants" into the Clean Water State Revolving Funds, then provide funds to water utilities and/or municipal and other eligible entities through grants, below-market loans, or other credit support. Tribes and territories are also eligible to receive a portion of State Revolving Fund monies or credit support.

Funds are distributed to the states according to an allocation formula based on state needs, subject to minimums.

Eligible Uses

Eligible projects include construction (including planning and design) of wastewater and stormwater treatment facilities and collection systems; nonpoint source pollution management; construction, repair or replacement of decentralized wastewater treatment systems; and other uses associated with the management of wastewater and stormwater.

Program

Clean Water State Revolving Funds—Emerging Contaminants

Amount Available, Funding Mechanism, Applicable Law

$1,000,000,000 over fiscal years 2022–2026. BIL Division J, Title VI, EPA, State and Tribal Assistance Grants. 33 USC §§ 1381-89.

Under BIL, the states shall distribute these funds to eligible recipients as grants or 100% principal forgiveness loans (or any combination thereof).

No matching or cost share requirement.

Recipients

States initially receive funding, then provide funds to water utilities and/or municipal and other eligible entities. Tribes and territories are also eligible to receive a portion of State Revolving Fund monies.

Funds are distributed to the States under the same allocation formula as for other Clean Water grants to the states.

Eligible Uses

Funding shall be for eligible uses under section 603(c) of the Federal Water Pollution Control Act (see eligible projects above under Clean Water State Revolving Funds) that address emerging contaminants.

U.S. Department of Health and Human Services, Indian Health Service

Program

Indian Health Service Sanitation Facilities

The Division of Sanitation Facilities Construction within the Indian Health Service administers a nationwide Sanitation Facilities Construction (SFC) Program that is responsible for the delivery of environmental engineering services and sanitation facilities to American Indians and Alaska Natives.

The SFC Program provides technical and financial assistance to American Indian tribes and Alaska Native villages for cooperative development and construction of safe water, wastewater, and solid waste systems and related support facilities.

Amount Available, Funding Mechanism, Applicable Law

$3,500,000,000 over fiscal years 2022–2026 for the provision of domestic and community sanitation facilities for Indians. BIL Division J (Appropriations), Title VI, Department of Health and Human Services, Indian Health Service; 42 USC § 2004a.

Of the **$3,500,000,000, $2,200,000,000** shall be for projects that exceed the economical unit cost. These "economically infeasible projects" exceed a per unit cost set for each Indian Health Service Area and three different regions within the Indian Health Service Alaska Area.

U.S. Department of Health and Human Services, Indian Health Service

Recipients

To the Indian Health Service to provide domestic and community sanitation facilities for Indians.

On completion of the sanitation facilities, they may be transferred to "any state or territory or subdivision or public authority thereof, or to any Indian tribe, group, band or community or, in the case of domestic appurtenances and fixtures, to any one or more of the occupants of the Indian home served thereby" subject to the terms and conditions established with respect to such transfer.

Eligible Uses

These funds are to be used for the provision of domestic and community sanitation facilities for Indians, as authorized by section 7 of the Act of August 5, 1954, 42 USC 2004a.

That law provides authorization "to construct, improve, extend, or otherwise provide and maintain, by contract or otherwise, essential sanitation facilities, including domestic and community water supplies and facilities, drainage facilities, and sewage- and waste-disposal facilities, together with necessary appurtenances and fixtures, for Indian homes, communities and lands."

U.S. Department of the Interior, Bureau of Indian Affairs

Program

Indian Water Rights Settlements

Amount Available, Funding Mechanism, Applicable Law

$2,500,000,000, to be deposited in a U.S. Treasury fund to be known as the "Indian Water Rights Settlement Completion Fund," to be administered by the Secretary of the Interior, acting through the Bureau of Indian Affairs. BIL, § 70101.

Recipients

The funds will ultimately be used to carry out Indian water rights settlements for the benefit of tribal governments. In many cases, a settlement will include a quantification of Indian water rights and provisions for construction of water infrastructure that increases access to newly quantified resources. Some tribal settlements have also included provisions for environmental protection and restoration.

Eligible Uses

The **$2,500,000,000** shall be used by the Secretary of the Interior for transfers to funds or accounts authorized to receive discretionary appropriations or to satisfy other obligations identified by the Secretary, under an Indian water settlement approved and authorized by an Act of Congress before November 15, 2021.

Program

Irrigation, Dam Safety, Sanitation and Other Facilities

Amount Available, Funding Mechanism, Applicable Law

$250,000,000 over fiscal years 2022–2026, of which (1) not less than **$50,000,000** shall be for addressing irrigation and power systems and (2) **$200,000,000** shall be for safety of dams, water sanitation and other facilities. BIL Division J (Appropriations), Title VI, Department of the Interior, Bureau of Indian Affairs.

Recipients

The Bureau of Indian Affairs.

The Bureau of Indian Affairs' Branch of Irrigation and Power provides administration, policy, oversight and technical assistance to irrigation and power projects that the Bureau of Indian Affairs owns or in which it has an interest.

The Bureau of Indian Affairs' Branch of Safety of Dams administers dam safety activities for dams on Indian lands.

The Bureau of Indian Affairs' Branch of Water Resources, among other things, administer the Bureau's Water Management, Planning and Pre-Development Program.

U.S. Department of the Interior, Bureau of Indian Affairs

Eligible Uses

For construction, repair, improvement and maintenance of irrigation and power systems, safety of dams, water sanitation, and other facilities.

U.S. Department of the Interior, U.S. Bureau of Reclamation

Western Water Infrastructure: A total of **$8,300,000,000** is appropriated for fiscal years 2022–2026 under BIL Division J (Appropriations), Title III, Department of the Interior, Bureau of Reclamation, with specific terms and conditions established in BIL, Division D (Energy), Title IX (Western Water Infrastructure) §§ 40901–40910. These funds are appropriated to the Bureau of Reclamation, including for transfer of funds. The following are elements of the appropriation to the Bureau of Reclamation pertaining to water and wastewater infrastructure and treatment, each of which is appropriated over fiscal years 2022–2026.

Program

Water Storage, Groundwater Storage and Conveyance Projects

Amount Available, Funding Mechanism, Applicable Law

$1,150,000,000 to the Bureau of Reclamation, of which **$100,000,000** shall be made available to provide grants for Small Surface Water and Groundwater Storage Projects. BIL § 40901(1); § 40902 (criteria for Bureau of Reclamation projects); BIL § 40903 (terms for grants for small surface water and ground water storage projects).

For federal projects with state participation, state cost-share is 50%. For non-federal projects, the non-federal share is 75%.

Recipients

Bureau of Reclamation, for direct federal spending. For the $100,000,000 available for grants, eligible recipients include non-federal project sponsors in Reclamation States—which include California, Arizona, New Mexico and Texas—are eligible for such grants.

Eligible Uses

For Bureau of Reclamation spending, projects with existing feasibility study or construction authorization are eligible for funding.

For the grant funds, the small projects are defined as projects that have storage capacity between 2,000 acre-feet and 30,000 acre-feet and increase surface water or ground water storage or convey water, directly or indirectly, to or from surface water or ground water storage. There are several priority factors for grants, including more reliable water supply, increased water management flexibility and reduced environmental impact, regional projects, multistakeholder projects, and multiple benefit projects.

Program

Aging Infrastructure Extraordinary Maintenance

Amount Available, Funding Mechanism, Applicable Law

$3,200,000,000, of which **$100,000,000** shall be for Bureau of Reclamation reserved or transferred works that have suffered a critical failure, and **$100,000,000** shall be for a specific dam in accordance with BIL § 40904(b). BIL § 40901(2).

Recipients

Bureau of Reclamation for funding of eligible uses, subject to repayment by transferred works operators (non-federal parties managing operation and maintenance of Bureau of Reclamation facilities under contract) and reserved works project beneficiaries (districts, power customers, cost share partners benefiting from reserved works [i.e., facilities operated directly by the Bureau of Reclamation]).

U.S. Department of the Interior, U.S. Bureau of Reclamation

Eligible Uses

These funds will be deposited into an aging infrastructure account under 33 USC § 510b and used for major, nonrecurring maintenance, including major rehabilitation and replacement, of transferred works and reserved works. The funding must be subject to a 50-year repayment contract with the transferred works operator or reserved works project beneficiaries.

Program

Rural Water Projects

Amount Available, Funding Mechanism, Applicable Law

$1,000,000,000 for seven rural water projects that have been authorized by an Act of Congress before July 1, 2021, in accordance with the Reclamation Rural Water Supply Act of 2006, 43 USC § 2401 et seq. BIL § 40901(3).

Recipients

Bureau of Reclamation for funding of previously authorized rural water supply projects.

Eligible Uses

For "rural water supply projects" (i.e., projects that are designed to serve a community or group of communities, each of which has a population of not more than 50,000 inhabitants, which may include Indian tribes and tribal organizations, dispersed homesites, or rural areas with domestic, industrial, municipal and residential water).

Program

Water Recycling and Reuse Projects

Amount Available, Funding Mechanism, Applicable Law

$1,000,000,000, of which **$550,000,000** is for water recycling and reuse projects that have either (1) been previously approved or authorized by Congress (which includes numerous projects in the four border states, 43 USC § 390h-4 through 43 USC § 390h-39) or (2) selected for funding under the competitive grant program authorized pursuant to 43 USC § 390h(f)), and **$450,000,000** is for large-scale water recycling and reuse programs, to be distributed through a competitive grant process authorized pursuant to BIL § 40905. BIL § 40901(4)

For the $550,000,000, the non-federal cost share is 50%, which may be lower for funding of feasibility studies in the case of financial hardship to the non-federal participant (the federal share for construction, operation and maintenance cannot be above 25% unless the Bureau of Reclamation determines that the project is not feasible without such federal participation). For the $450,000,000, the non-federal cost share is 75%.

Recipients

For the **$550,000,000**, any non-Federal entity with an eligible project is eligible to receive funding.

For the **$450,000,000**, an eligible participant includes: (a) a state, Indian tribe, municipality, irrigation district, water district, wastewater district or other organization with water or power delivery authority; (b) a state, regional or local authority, the members of which include one or more organizations with water or power delivery authority; or (c) an agency established under state law for the joint exercise of powers or a combination of entities described in subparagraphs (a) and (b).

Eligible Uses

For the **$550,000,000**, an eligible water recycling and reuse project is a project that reclaims and reuses (i) municipal, industrial, domestic or agricultural wastewater or (ii) impaired ground or surface waters.

For the **$450,000,000**, a large water recycling and reuse project must have a total cost in excess of $500,000,000.

All projects must be located in Reclamation States, which includes California, Arizona, New Mexico and Texas.

U.S. Department of the Interior, U.S. Bureau of Reclamation

Program

Water Desalination Projects and Studies

Amount Available, Funding Mechanism, Applicable Law

$250,000,000, for water desalination projects and studies authorized in accordance with the Water Desalination Act of 1996, 42 USC § 10301 note. BIL § 40901(5).

For an eligible desalination project, the state cost-share is 75% of the total cost of the eligible desalination project.

A federal contribution may exceed 25% if the Bureau of Reclamation determines that the project is not feasible without such increased federal contribution. Federal cost-sharing for a research, study or demonstration project or a desalination development project or activity shall not exceed 50% of the total cost of the project or research or study activity. Costs of operation, maintenance, repair and rehabilitation shall be non-federal responsibilities.

Recipients

Any state, department of a state, subdivision of a state or public agency organized pursuant to a state law.

Eligible Uses

Eligible projects include projects for desalination of ocean or brackish water, that are either (a) authorized or approved for construction funding by an Act of Congress before July 1, 2021 or (b) selected for funding under 4(a) of the Water Desalination Act of 1996, 42 USC § 10301 note.

All projects must be located in Reclamation States, which include California, Arizona, New Mexico and Texas.

Program

Safety of Dams Program

Amount Available, Funding Mechanism, Applicable Law

$500,000,000 for the Safety of Dams Program, in accordance with the Reclamation Safety of Dams Act of 1978, 43 § USC 506 et seq. BIL § 40901(6)

Recipients

Bureau of Reclamation, for direct federal spending. **Certain of the amounts spent may be reimbursable to the Bureau of Reclamation by project beneficiaries depending on the reasons for expenditure.**

Eligible Uses

Bureau of Reclamation dams and related facilities.

Program

WaterSMART Grants

Amount Available, Funding Mechanism, Applicable Law

$400,000,000 for WaterSMART grants in accordance with 42 USC§ 10364, of which **$100,000,000** shall be made available for projects that would improve the condition of a natural feature or nature-based feature. BIL § 40901(7).

In general the non-Federal cost share will be 50%, but this may decline to 25% under specified circumstances.

Recipients

Eligible recipients include states, tribes, irrigation districts, water districts, and state, regional or local authorities whose members include one or more organization with water or power delivery authority; other organizations with water or power delivery authority; and nonprofit conservation organizations that are acting in partnership with and with the agreement of an entity previously described.

Eligible Uses

The WaterSMART program authorizes grants for specified water-related purposes, including to conserve water or increase water efficiency; facilitate water markets; enhance water management, including through use of renewable energy; accelerate the adoption and use of advanced water treatment technologies to increase water supply; prevent water-related conflicts; and plan for or address the impacts of drought. 42 USC § 10364.

U.S. Department of the Interior, U.S. Bureau of Reclamation

Program

Colorado River Drought Contingency Plan

The Colorado River Basin Drought Contingency Plan aims to reduce the risk of Lake Mead and Lake Powell reaching critically low elevations. The Drought Contingency Plan requires additional water savings contributions by Lower Basin states, allows for flexibility for water storage and recovery to incentivize conservation, requires the Bureau of Reclamation to implement programs designed to create or conserve additional water in the Lower Basin (subject to available appropriations), and provides for drought response operations and demand management in the Upper Basin.

Amount Available, Funding Mechanism, Applicable Law

$300,000,000 to implement the Drought Contingency Plan, of which of which **$50,000,000** shall be made available for use in accordance with the Drought Contingency Plan for the Upper Colorado River Basin. BIL § 40901(8).

Recipients

The Bureau of Reclamation.

Eligible Uses

These funds shall be used for implementing the Drought Contingency Plan.

Funds made available for use in the Lower Colorado River Basin may be used for projects to (1) to establish or conserve recurring Colorado River water that contributes to supplies in Lake Mead and other Colorado River water reservoirs in the Lower Colorado River Basin or (2) improve the long-term efficiency of operations in the Lower Colorado River Basin.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration

Program

National Oceans and Coastal Security Fund

The National Oceans and Coastal Security Fund is a fund established by the National Oceanic and Atmospheric Administration (NOAA) and the National Fish and Wildlife Foundation. It is administered by the National Fish and Wildlife Foundation. The National Oceans and Coastal Security Fund supports the National Coastal Resilience Fund, a partnership of the National Fish and Wildlife Foundation, NOAA, U.S. Department of Defense, and various private sector companies and non-profits. The National Fish and Wildlife Foundation also administers the National Coastal Resilience Fund.

Amount Available, Funding Mechanism, Applicable Law

$492,000,000, over fiscal years 2022–2026, appropriated to NOAA for National Oceans and Coastal Security Fund grants. 16 USC § 7505(c); BIL, Division J (Appropriations), Title II, Department of Commerce, NOAA, Operations, Research and Facilities (1).

There is a 2-year period of availability for each annual tranche.

These funds will be granted through the National Coastal Resilience Fund, and leveraged with matching private sector contributions, to restore, increase and strengthen natural infrastructure to protect coastal communities while also enhancing habitats for fish and wildlife.

Recipients

Non-profit 501(c) organizations, state and territorial government agencies, local governments, tribal governments and organizations, educational institutions, or commercial (for-profit) organizations

Eligible Uses

The National Coastal Resilience Fund invests in conservation projects that restore or expand natural features, such as coastal marshes and wetlands, dune and beach systems, oyster and coral reefs, forests, coastal rivers and floodplains, and barrier islands that minimize the impacts of storms and other naturally occurring events on nearby communities.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration

Program

Habitat Restoration

Amount Available, Funding Mechanism, Applicable Law

$491,000,000, over fiscal years 2022–2026, appropriated to NOAA. The funds will be administered by NOAA's Office of Habitat Conservation through a competitive grant process. BIL, Division J (Appropriations), Title II, Department of Commerce, NOAA, Operations, Research and Facilities (2).

There is a 2-year period of availability for each annual tranche.

Recipients

Non-profit 501(c) organizations, state and territorial government agencies, local governments, tribal governments and organizations, educational institutions, or commercial (for-profit) organizations.

Eligible Uses

For contracts, grants and cooperative agreements to provide funding and technical assistance for purposes of restoring marine, estuarine, coastal or Great Lakes ecosystem habitat or constructing or protecting ecological features that protect coastal communities from flooding or coastal storms.

Program

Coastal Zone Management

Amount Available, Funding Mechanism, Applicable Law

$207,000,000, over fiscal years 2022–2026, appropriated to NOAA. The funds will be administered by NOAA's Office for Coastal Management through competitive and noncompetitive grants. 16 USC § 1456c; 16 USC § 1456-1; 15 CFR Part 923; BIL, Division J (Appropriations), Title II, Department of Commerce, NOAA, Operations, Research and Facilities (9).

There is a 2-year period of availability for each annual tranche.

Recipients

Coastal and Great Lakes states and territories. The governor of the state will designate a single state agency to receive and administer grants for implementing the management program.

Eligible Uses

To restore and protect coastal ecosystems, including ecosystem conservation, through direct investment by coastal states and territories in ecologically significant habitats. This will include conserving lands that play a critical role in helping communities become more resilient to natural hazards, such as storms, flooding, inundation, erosion, tsunamis, sea level rise and lake level changes.

Program

National Estuarine Research Reserve System

The National Estuarine Research Reserve System consists of estuarine areas of the United States and its territories designated and managed for research and educational purposes, called Reserves.

Amount Available, Funding Mechanism, Applicable Law

$77,000,000 over fiscal years 2022–2026, appropriated to NOAA. 16 USC § 1461; 16 USC § 1456-1; 15 CFR Part 921; BIL, Division J (Appropriations), Title II, Department of Commerce, NOAA, Operations, Research and Facilities (10).

There is a 2-year period of availability for each annual tranche.

Recipients

Coastal and Great Lakes states and territories, for purposes of acquiring lands and waters for a national estuarine reserve and for purposes of operating or managing a national estuarine reserve and constructing appropriate reserve facilities.

Coastal and Great Lakes states and territories and any public or private person for purposes of supporting research and monitoring within a national estuarine reserve that are consistent with research guidelines.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration

Eligible Uses

For habitat restoration projects through the National Estuarine Research Reserve System, including ecosystem conservation.

Program

Fish Passage

Restoring fish passage by removing in-stream barriers and providing technical assistance pursuant to section 117 of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (16 U.S.C. 1891a).

Amount Available, Funding Mechanism, Applicable Law

$400,000,000 over fiscal years 2022–2026, appropriated to NOAA. The funds will be administered by NOAA's Office of Habitat Conservation. 16 USC § 1891c; BIL, Division J (Appropriations), Title II, Department of Commerce, NOAA, Operations, Research and Facilities (14).

There is a 2-year period of availability for each annual tranche.

Recipients

Non-profit 501(c) organizations, state and territorial government agencies, local governments, tribal governments and organizations, educational institutions, or commercial (for-profit) organizations.

Up to 15 percent shall be reserved for Indian tribes or partnerships of Indian tribes in conjunction with an institution of higher education, non-profit or commercial (for profit) organizations, U.S. territories, and state or local governments.

Eligible Uses

To restore fish passage through the removal of dams and other in-stream barriers to restore marine, estuarine, coastal and Great Lakes ecosystem habitat.

U.S. Department of Agriculture, Natural Resources Conservation Service

Program

Watershed And Flood Prevention Operations

Amount Available, Funding Mechanism, Applicable Law

$500,000,000, appropriated to the Department of Agriculture, Natural Resources Conservation Service. 16 USC Chapter 18; 7 CFR Part 622; BIL, Division J (Appropriations), Title I, Department of Agriculture, Natural Resources Conservation Service.

Project sponsors initiate a request for assistance through their local Natural Resources Conservation Service office to develop a preliminary feasibility study. After a feasibility study is conducted, a watershed plan is chosen, reviewed, approved and authorized. Once authorized, project sponsors gain access to the Natural Resources Conservation Service's financial and technical resources to help implement their plan.

Recipients

Local sponsor or legal subdivision of state or tribal government. Eligible sponsors include cities, counties, towns, conservation districts, federally recognized Native American tribes, and tribal organizations.

Eligible Uses

Provides technical and financial assistance for new watershed infrastructure to help plan and implement authorized watershed projects for the purpose of flood prevention, watershed protection, public recreation, public fish and wildlife, agricultural water management, municipal and industrial water supply, and water quality management.

Applies in watershed or subwatershed areas not exceeding 250,000 acres and not including any single structure that provides more than 12,500 acre-feet of floodwater detention capacity and more than 25,000 acre-feet of total capacity.

Each project must contain benefits directly related to agriculture, including rural communities, that account for at least 20% of the total benefits of the project.

U.S. Department of Agriculture, Natural Resources Conservation Service

Program

Emergency Watershed Protection Program

Amount Available, Funding Mechanism, Applicable Law

$300,000,000, appropriated to the Natural Resources Conservation Service. 16 USC §§ 2203; 7 CFR Part 624; BIL, Division J (Appropriations), Title I, Department of Agriculture, Natural Resources Conservation Service.

The Natural Resources Conservation Service may bear up to 75% of the eligible construction cost of emergency measures (90% percent within identified limited-resource areas). The remaining costs must come from local sources and can be in the form of cash or in-kind services.

Recipients

Local sponsors representing owners, managers, and users of public, private or tribal lands are eligible for emergency watershed protection assistance if their watershed area has been damaged by a natural disaster.

Eligible Uses

The program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms and other natural disasters that impair a watershed.

Threats that the Emergency Watershed Protection Program addresses include, but are not limited to, debris-clogged waterways, unstable streambanks, severe erosion jeopardizing public infrastructure, windborne debris removal, and damaged upland sites stripped of protective vegetation by fire or drought. The program can include purchasing floodplain easements.

Program

Watershed Rehabilitation Program

Provides planning, design and construction for U.S. Department of Agriculture assisted dams to extend their service life and meet current safety requirements

Amount Available, Funding Mechanism, Applicable Law

$118,000,000, appropriated to the Natural Resources Conservation Service. 16 USC §§ 2203; 7 CFR Part 624; BIL, Division J (Appropriations), Title I, Department of Agriculture, Natural Resources Conservation Service. 16 USC § 1012; BIL, Division J (Appropriations), Title I, Department of Agriculture, Natural Resources Conservation Service.

Amounts to be granted by the Natural Resources Conservation Service shall be equal to 65% the total rehabilitation costs but not to exceed 100% of actual construction costs incurred in the rehabilitation.

Recipients

Local sponsor or legal subdivision of state or tribal government. Eligible sponsors include cities, counties, towns, conservation districts, federally recognized Native American tribes, and tribal organizations.

Eligible Uses

Rehabilitate high hazard watershed dams previously installed under the following four authorities: PL 83-566, PL 78-534, DoA Resource Conservation and Development Program, pilot watershed program. See 16 USC § 1012(a)(2).

Rehabilitation may include: (a) protecting the integrity of the dam or prolonging its useful life beyond the original evaluated life expectancy, (b) correcting damage to the dam from a catastrophic event, (c) correcting the deterioration of structural components that are deteriorating at an abnormal rate, (d) upgrading the dam to meet changed land use conditions in the watershed served by the dam or changed safety criteria applicable to the dam, or (e) decommissioning the dam, if requested by the local organization.

Sources of Funding Under the Inflation Reduction Act by Agency

U.S. Department of Agriculture, Natural Resources Conservation Service

Program

Drought Mitigation in the Reclamation States

Amount Available, Funding Mechanism, Applicable Law

$4,000,000,000, appropriated to the Secretary of the Interior, acting through the Bureau of Reclamation, for fiscal year 2022, to remain available through September 30, 2026. IRA § 50233.

Recipients

The Reclamation States consist of 17 states west of the Mississippi and certain U.S. territories. 43 U.S.C. 391. The Reclamation States include California, Arizona, New Mexico and Texas.

Eligible Uses

For grants, contracts or financial assistance agreements, to or with public entities and Indian tribes, to carry out the following activities to mitigate the impacts of drought in the Reclamation States, with priority given to the Colorado River Basin and other basins experiencing comparable levels of long-term drought, to be implemented in compliance with applicable environmental law: (1) compensation for a temporary or multiyear voluntary reduction in diversion of water or consumptive water use, (2) voluntary system conservation projects that achieve verifiable reductions in use of or demand for water supplies or provide environmental benefits in the Lower Basin or Upper Basin of the Colorado River, and (3) ecosystem and habitat restoration projects to address issues directly caused by drought in a river basin or inland water body.

Program

Bureau of Reclamation Domestic Water Supply Projects

Amount Available, Funding Mechanism, Applicable Law

$550,000,000, appropriated to the Secretary of the Interior, acting through the Bureau of Reclamation, for fiscal year 2022, to remain available through September 30, 2031. IRA § 50231.

Recipients

Disadvantaged communities, identified according to criteria adopted by the Bureau of Reclamation, in a Reclamation State, which includes California, Arizona, New Mexico and Texas.

Eligible Uses

For grants, contracts or financial assistance agreements for disadvantaged communities for up to 100% of the cost of the planning, design or construction of water projects, the primary purpose of which is to provide domestic water supplies to communities or households that do not have reliable access to domestic water supplies in a Reclamation State.

U.S. Department of Commerce, National Oceanic and Atmospheric Administration

Program

Investing in Coastal Communities and Climate Resilience

Amount Available, Funding Mechanism, Applicable Law

$2,600,000,000, appropriated to NOAA, to remain available until September 30, 2026. IRA, § 40001.

These funds will be administered by NOAA's Office of Habitat Conservation.

Recipients

Coastal states, the District of Columbia, tribal governments, nonprofit organizations, local governments and institutions of higher education.

Eligible Uses

For the conservation, restoration, and protection of coastal and marine habitats, resources, and Pacific salmon and other marine fisheries, to enable coastal communities to prepare for extreme storms and other changing climate conditions; for projects that support natural resources that sustain coastal and marine resource–dependent communities, marine fishery and marine mammal stock assessments; and for related administrative expenses.

Glossary of Acronyms and Abbreviations

BIL	Bipartisan Infrastructure Law (formally the Infrastructure Investment and Jobs Act)
BWIP	U.S.–Mexico Border Water Infrastructure Program
CONAGUA	Comisión Nacional del Agua (Mexico's National Water Commission)
EFC	(EPA) Environmental Finance Centers
EJ TCTACs	Environmental Justice Thriving Communities Technical Assistance Centers
EPA	U.S. Environmental Protection Agency
FFRMS	Federal Flood Risk Management Standard
FY	fiscal year
GNEB	Good Neighbor Environmental Board
IBWC	International Boundary and Water Commission
IRA	Inflation Reduction Act of 2022
MAF	million acre-feet
MOST	Municipal Online Stormwater Training Center
NADBank	North American Development Bank
NAFTA	North American Free Trade Agreement
NOAA	National Oceanic and Atmospheric Administration
SBIWTP	South Bay International Wastewater Treatment Plant
TMDL	total maximum daily load
USDA	U.S. Department of Agriculture
USMCA	United States–Mexico–Canada Agreement
WaterTA	(EPA) water technical assistance

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Acknowledgments

This report was researched and written by members of the Good Neighbor Environmental Board (GNEB). The text was coordinated by Board Chair Paul Ganster and Vice Chair Irasema Coronado. The Board members spent countless hours drafting, reviewing and providing input on several iterations of the report before approving the final document.

This report is a collective effort of the Board members and their professional colleagues, as well as other border experts, but we wish to acknowledge those who were especially important in completing the report.

John McNeece, Senior Fellow for Energy & Trade at the University of California, San Diego's Center for U.S.–Mexican Studies, contributed significant text on water rights and infrastructure budget needs for the International Boundary and Water Commission, led the creation of the appendix that details funding opportunities for border governments and tribes, and commented on funding issues throughout the report.

William M. Micklin, Chief Executive Officer of the Leaning Rock Ewiiaapaayp Band of Kumeyaay Indians, provided key contributions on border tribal communities and traditional Indigenous knowledge.

Kathryn S. Becker, Acting Deputy General Counsel and Tribal Liaison at the New Mexico Environment Department, contributed her expertise to many report sections, organized and strengthened the recommendations of the document, and helped create the appendix.

The Texas Commission on Environmental Quality Chairman Jon Niermann and staff members Jose Luis Palacios, Eddie Moderow, Laurie Fleet and Jim Rizk developed important sections relating to the Rio Grande, irrigation districts and water deliveries from Mexico and provided specific input for other parts of the report.

Josiah M. Heyman, Director of the Center for Inter-American and Border Studies at the University of Texas at El Paso, crafted the socioeconomic discussion and section on desalination.

Joaquin Marruffo of the Arizona Department of Environmental Quality, Laura Norman of the U.S. Geological Survey, and Francisco Lara-Valencia of Arizona State University created callout boxes on green infrastructure in Ambos Nogales and southern Arizona dryland streams.

Kimberly Collins, California State University, San Bernardino, contributed text on funding opportunities and technical assistance centers.

Alan Sweedler, Clean Energy Alliance in San Diego, provided analysis of energy and water services.

Rafael DeLeon and Marta Jordan of the U.S. Environmental Protection Agency (EPA) provided helpful discussion of environmental justice, funding sources, traditional Indigenous knowledge and tools such as EJScreen.

Jay Collert, Director of Environmental Compliance, Office of the Chief Readiness Support Officer, and Teresa R. Pohlman, Executive Director of Sustainability and Environmental Programs, both of the U.S. Department of Homeland Security, provided updates on relevant data throughout the report.

Chris Helmer, Environmental & Natural Resources Director of the City of Imperial Beach, California, updated effects on the local community of the Tijuana sewage crisis.

Jeff Payne, Director of the Office of Coastal Management at the National Oceanic and Atmospheric Administration, updated the material on the Federal Flood Risk Management Standard and information on funding for projects to increase resiliency.

Carlos Suarez, State Conservationist of the U.S. Department of Agriculture's National Resources Conservation Service in Davis, California, added invaluable information about funding opportunities for water and wastewater infrastructure within the U.S. Department of Agriculture's programs.

North American Development Bank officials—Salvador López, Chief Environmental Officer, and Jesse J. Hereford, Head of Strategic Partnerships & Stakeholder Engagement—kindly updated data on border environmental infrastructure activities of the bank.

Steve Mumme, Colorado State University, suggested helpful additions and corrections to the text of the report.

Morgan Rogers, Area Operations Manager, San Diego Field Office of the International Boundary and Water Commission, provided a tour and briefing at the South Bay International Wastewater Treatment Plant in San Diego, enabling Board members to clearly understand the complex crossborder wastewater issues.

Jeff Crooks, Research Director, and Chris Peregrin, Reserve Manager, Tijuana River National Estuarine Research Reserve, briefed Board members on impacts of the crossborder sewage flows on a valuable and threatened ecosystem.

Jeremy Bauer, Deputy Director of the Tribal, Intergovernmental and Policy Division in EPA Region 9, briefed the Board meeting of September 21, 2023, about the establishment of Environmental Justice Thriving Communities Technical Assistance Centers. At the same meeting, Alhelí Baños-Keener, Acting Manager of the Mexico Border Branch in EPA Region 9, detailed the border work of Region 9, including the Border 2025 grants.

At the April 27, 2023, GNEB Board meeting, Kimberly Tenggardjaja, Deputy Director for Nature Conservation at the Council for Environmental Quality, provided feedback on GNEB's December 2022 Advice Letter and then discussed the Council's priorities.

At the April 27, 2023, GNEB Board meeting, Zachary Lowenstein, EPA Office of Water, provided an overview of the Closing America's Wastewater Access Gap Community Initiative, a joint effort of EPA and the U.S. Department of Agriculture to help disadvantaged communities with technical assistance to facilitate access to federal funding opportunities.

We also wish to recognize the professionalism of Lynne Agoston, Margaret Christoph, Eric Doty, Stephen Grenis, Kristen LeBaron and Alicia Rosov of The Scientific Consulting Group, Inc., who undertook copyediting and graphic design of this report.

Finally, we are grateful to Eugene Green, the Designated Federal Officer for GNEB, and his colleagues at EPA in Washington, D.C., for overcoming the significant challenges of pivoting to virtual meetings because of the pandemic and then beginning the transition back to face-to-face GNEB meetings and also for their coordination and support of this report.

Our most sincere thanks to all our colleagues who have contributed to the work of GNEB.

Paul Ganster, San Diego State University, GNEB Chair

Irasema Coronado, Arizona State University, GNEB Vice-Chair

Endnotes

1 Calculated using data and information from the website www.census.gov/quickfacts.

2 For examples of Indigenous knowledge in the border region, see the website www.nps.gov/subjects/tek/southwest.htm.

3 The text of the 1906 Water Convention may be found at the website www.ibwc.gov/Files/1906Conv.pdf.

4 The text of the 1944 Water Treaty may be found at the website www.ibwc.gov/Files/1944Treaty.pdf.

5 The full text of the La Paz Agreement may be found at the website www.epa.gov/sites/default/files/2015-09/documents/lapazagreement.pdf.

6 The discussion in this section is based on the Energy & Environmental Research Center's analysis of water appropriation systems, which can be found at the website www.undeerc.org/Water/Decision-Support/Water-Law/pdf/Water-Appr-Systems.pdf.

7 This recommendation of the Texas Commission on Environmental Quality is from the commission's internal summary of the Lower Rio Grande/Río Bravo Water Quality Initiative.

8 33 USC § 1383(c)(7); 33 USC § 1274.

9 33 USC § 1383(c)(5).

10 33 USC § 1373(c)(4).

11 Additional information regarding the Lower Rio Grande system can be found at the website www.ibwc.gov/Mission_Operations/Lower_RG_Flood_Control.html.

12 42 USC § 300f(4).

13 42 USC § 300f(1),(2).

14 42 USC § 300j-12.

15 The full text of the 1970 treaty may be found at the website www.ibwc.gov/Files/1970_Treaty.pdf. The relevant sections are Article IV, B. (1) and (2).

16 See the website www.epa.gov/sustainable-water-infrastructure for additional information.

17 For one well-documented example, see the Minute 320 Binational Technical Team Water Quality Workgroup's 2017 *Report of Transboundary Bypass Flows into the Tijuana River* at the website docslib.org/doc/7578188/report-of-transboundary-bypass-flows-into-the-tijuana-river.

18 For an in-depth view of this topic, please see "Best Management Practices for Stormwater Management in the Desert Southwest" by Gautum et al. at the website onlinelibrary.wiley.com/doi/full/10.1111/j.1936-704X.2010.00390.x.

19 These resources can be found at the website www.epa.gov/wetlands/constructed-wetlands.

20 See the website www.epa.gov/dwsrf for additional information.

21 For additional information, see the website www.epa.gov/waterfinancecenter/efcn.

22 For a complete explanation of BIL and water projects, see the website www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf#page=226.

23 For more information on the EJ TCTACs, see the website www.epa.gov/environmentaljustice/environmental-justice-thriving-communities-technical-assistance-centers.

24 For more information, see the "EJ TCTAC Selection Fact Sheet," which can be found at the website www.epa.gov/environmentaljustice/environmental-justice-thriving-communities-technical-assistance-centers.

25 For more information, see the website www.epa.gov/system/files/documents/2023-09/2022-23-environmental-justice-thriving-communities-technical-assistance-centers-program-ej-tctac.pdf.