CSIS MEXICO PROJECT

U.S.-MEXICO TRANSBOUNDARY WATER MANAGEMENT

THE CASE OF THE RIO GRANDE/ RIO BRAVO

Recommendations for Policymakers for the Medium and Long Term

A Report of the U.S.-Mexico Binational Council

Center for Strategic and International Studies (CSIS)
Instituto Tecnológico Autónomo de México (ITAM)
University of Texas at Austin

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Preface

The members of the U.S.-Mexico Binational Council are pleased to present this menu of policy ideas for President George W. Bush and President Vicente Fox and the Congresses of Mexico and the United States. The council opted not to pursue consensus from the outset, recognizing that boldness often is sacrificed in the pursuit of consensus. Thus, the ideas in this report do not necessarily enjoy the support of all the council members and cannot be attributed to any individual member. Rather, the council has chosen to present a broad range of policy options, leaving the task of developing consensus to the two new governments. Although not every member of the council agreed with every idea in the report, all concurred that these proposals deserve consideration.

The recommendations contained in this report are the product of a six-month deliberative effort sponsored by the Center for Strategic and International Studies (CSIS) and the University of Texas at Austin in the United States and by the Autonomous Technological Institute of Mexico (ITAM) in Mexico. A working group meeting was held, during which specialists, scholars, policy practitioners, and stakeholders from both countries met to share their expertise and ideas. Recommendations generated in the working session were then presented to the members of the council for evaluation, approval, and additional substantive input. This report does not pretend to be exhaustive; the council intends to continue to contribute to the policy debate in the years to come. It is the council's hope that its members will serve as permanent, informal goodwill ambassadors and points of communication between our two nations.

A preliminary draft of this report was provided to the U.S. Department of State and to Mexico's Foreign Relations Secretariat (SRE) in preparation for the cabinet-level U.S.-Mexico Binational Commission meeting held in Mexico City on November 25–26, 2002. The council strove to provide both administrations the opportunity to move forward on some of the recommendations outlined in the report.

Acknowledgments

This report is the result of collaboration by a host of individuals and institutions. In particular, the cosponsoring institutions of the U.S.-Mexico Binational Council are grateful to the members of the U.S.-Mexico Binational Council for their substantive contributions in putting together this report and, above all, for the strength of their commitment and dedication to U.S.-Mexico relations.

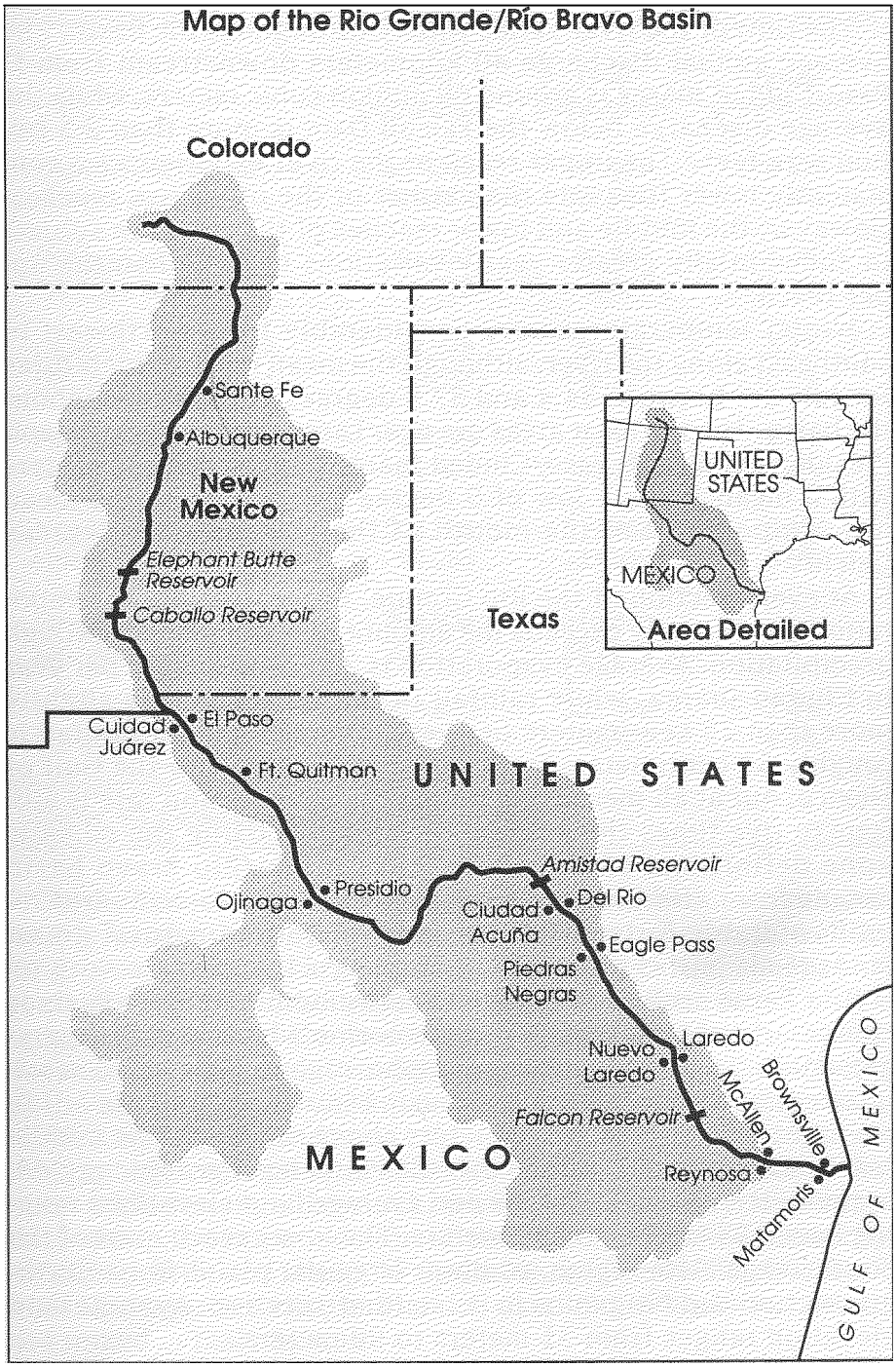
We also would like to thank the many experts, policymakers, and stakeholders from the United States and Mexico who participated in the working group meeting in June 2002 in Austin, Texas, and generously shared their time and thinking on the issue of binational water management. In this capacity, we would like to thank especially: William Nitze, president of the Gemstar Group and CSIS adjunct fellow; Mary Kelly, at the time with the Texas Center for Policy Studies and now senior attorney and program director for U.S.-Mexico Border Initiatives at Environmental Defense; Jose Enrique Castillo Ibarra, regional manager for the Rio Bravo at the Comisión Nacional del Agua (CNA), and Carlos Rubenstein, the Rio Grande water master. Their invaluable expertise greatly contributed to the final product.

Our thanks goes also to David Eaton, the Bess Harris Jones Centennial Professor of Natural Resource Policy Studies at the Lyndon B. Johnson School of Public Affairs at the University of Texas at Austin, for graciously allowing and arranging for our working group meeting to follow his two-day interactive exercise on transboundary water issues. Arranging these two complementary events, back to back, enabled us to convene a greater number of key players from both sides of the border. The Lower Colorado River Authority was kind in allowing us to convene at their scenic Riverside Conference Center facility in Bastrop, Texas.

Diane Tate, research assistant at the LBJ School of Public Affairs at the University of Texas was extremely helpful in assuming a role as our liaison between Washington, D.C., and Texas, and as a knowledgeable reviewer of initial drafts of this report.

The drafting of the report has truly been a shared effort undertaken by CSIS Mexico Project director Armand Peschard-Sverdrup and research assistant Meghan Bishop. We also would like to thank the Mexico Project summer 2002 intern, Kate Fitzpatrick, for her efforts in organizing the working group meeting, for ensuring the complete recording of the roundtable discussion, and transcribing it into the text that forms the backbone of this report. Lastly, we would like to thank Bita Lanys for her expert editing and countless stylistic suggestions that greatly improved the readability of the recommendations within.

Most importantly, we are grateful for the continued financial support of the Smith Richardson Foundation, which has made the work of the U.S.-Mexico Binational Council possible.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Introduction

Although the highly publicized water dispute between the United States and Mexico has focused attention in both nations on the issue, the need to address comprehensively the problem of water scarcity and water quality is not one that is limited to the U.S.-Mexico border region. In fact, water scarcity is increasing around the world and approaching crisis conditions in many regions. It is a phenomenon that is impacting the lives of a growing number of the world's people. According to the United Nations, 31 countries in the world are currently facing water stress and scarcity.[1] Over 1 billion people have no access to clean drinking water, and almost 3 billion people have no access to sanitation services. It is estimated that today 166 million people in 18 countries suffer from water scarcity, while another 270 million in 11 additional countries are considered "water stressed."[2] By the year 2025, the world's population will have increased *by* more than 2.6 billion, but as many as two-thirds of those people will be living in conditions of serious water shortage, and one-third will be living with absolute water scarcity.[3] By 2025, the affected populations will increase to about 3 billion people, or about 40 percent of the world's population, most of them in the poorest countries. As a result of this daunting diagnosis, there is now a consensus that the severity of the problem requires a strategic approach that emphasizes equitable and sustainable management of water resources.[4]

As multilateral and bilateral development agencies grapple with this complex and mounting challenge, the overriding consensus is that modern water resources management should be based on three fundamental principles, known as the Dublin Principles, forged during the Rio Earth Summit in 1993.

1. The *ecological principle* argues that independent management of water by different water-using sectors is not appropriate, that the river basin must become the unit of analysis, that land and water need to be managed together, and that much greater attention needs to be paid to the environment.
2. The *institutional principle* argues that water resources management is best done when all stakeholders participate, including the state, the private sector, and civil society, and that resource management should respect the principle of subsidiary, with actions taken at the lowest appropriate level. Furthermore, particular attention should be paid to women as central players in the provision, management, and safeguarding of water.

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[1] *United Nations Comprehensive Assessment of the Freshwater Resources of the World, Report of the Secretary General* (New York: UN Commission on Sustainable Development, February 4, 1997).
[2] Ibid.
[3] Ibid.
[4] George Keith Pitman, *Bridging Troubled Waters: Assessing the World Bank Water Resources Strategy* (Washington, D.C.: World Bank, 2002), p. xvii.

3. The *instrument principle* argues that water is a scarce resource, and that greater use needs to be made of incentives and economic principles in improving allocation and enhancing quality.[5]

There also is an acknowledgement that any action taken to address these freshwater crises must be both comprehensive and country specific. In other words, there are no cookie-cutter blueprints for institutional reforms and water-sector management.

Water management along a shared border becomes further complicated by the transboundary challenge, and the U.S.-Mexico border region in particular presents its own set of institutional, economic, environmental, infrastructure, and health challenges. The development of Mexico's northern region has been driven by its proximity to the U.S. market and has not been developed as part of an overall strategy that takes into account the regional disparities and environmental limitations of the semiarid border region. Likewise, the U.S. southwest has experienced a development and population boom that also stresses the region's natural resources. The urban centers on the U.S. side of the border have prompted the growth of a shadow set of industrial, commercial, and urban boroughs on the Mexican side. Although the mirroring of cities has contributed to increased economic integration between the two countries, the twin cities possess uneven resource management capacities—including those for water.

The recent drought, the under delivery of water from Mexico to the United States, and subsequent water disputes in the border region have underscored the importance of developing a binational strategy for medium- and long-term water management. Water shortages will continue to plague both sides of the border as the demand for this vital natural resource exceeds its scarce supply. Water is the most limited natural resource on the planet, and its scarcity along *both sides* of this border has been exacerbated by:

- *Semiarid climate.* The climate leaves the states along the border highly vulnerable to drought, particularly along the Rio Grande region, and consequently adversely impacts the hydrological cycle—the process through which water circulates from the atmosphere to the earth and back.
- *Rapid population growth.* Population growth along the border region, with an estimated 11.8 million people currently living on the border, is expected to surge to 19.4 million people by 2020.[6] The population growth/urbanization has resulted in a considerable increase in the per capita consumption of water.
- *Extensive industrialization.* Since the inception of the Border Industrialization Program (BIP), or maquiladora, in 1965, the growth of

[5] World Bank, "Water Resources Sector Strategy: Strategic Directions for World Bank Engagement," Draft for Discussion, March 25, 2002, at <http://lnweb18.worldbank.org/essd/essdext.nsf/18DocByUnid/E662F395F2630BDA85256BAB006C125B/$FILE/WRSSDraftSection01.pdf>.

[6] U.S. Environmental Protection Agency (EPA), "Border 2012: U.S.-Mexico Environmental Program," (draft), EPA-160-D-02-001 (Washington: D.C.: EPA, September 23, 2002), p. 5.

industry along the border has continued to place stress on municipal infrastructure responsible for both water supply and water quality. The implementation of the North American Free Trade Agreement (NAFTA), which has resulted in the doubling of maquiladora industry, has exacerbated this problem.[7]

- *Unchecked pollution.* The pollution of surface or underground (unconfined aquifers) water sources by those factories, industrial farms, and cities that create the runoff of wastewater, sewage, and toxic chemicals (e.g., pesticides, fertilizers, and herbicides).
- *Salinity problems.* Despite Minute 242, agreed upon in 1973, which established the quality standard for Colorado River water delivered to Mexico, the salinity of that water continues to exceed the standard during certain months of the year.[8]
- *Aquifer depletion.* Because supplies of surface water are declining and thus unable to meet the mounting demand along the border, municipalities have had to resort to using groundwater. In some cases, municipalities have been forced to draw aquifer overdrafts—when groundwater is extracted at a higher rate than the rate of replenishment.
- *Global environmental phenomena.* Although not border specific, the council is also mindful of the adverse effect of global phenomena such as the loss of the world's wetlands, climate changes (i.e., global warming), and deforestation.

Water management is one of the most complicated issues in the bilateral U.S.-Mexico agenda for it entails multilevel governance, involving all levels of government—federal, state, and local—on both sides of the border. It also pits agricultural growers against municipalities, as they compete for limited water resources. Public attention to the water crisis has recently been focused on the issue of the water debt addressed below, but it now needs to be refocused on water management problems on both sides of the border.

In particular, both countries need to encourage more efficient use of water in all sectors through institutional reform, more effective enforcement, greater use of market-based incentives, and increased public investment. Efficient water use coupled with conservation will help provide water to future generations of Mexicans and Americans in the region.

An analysis of U.S.-Mexico transboundary water management encompasses the Colorado River in the western area of the border, and the Rio Grande/Rio Bravo in the eastern part—each with its own distinct set of water management

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[7] The number of plants operating in Mexico jumped from 1,700 in 1990 to 3,800 in 2001. Ibid., p. 11

[8] Maria Rosa García-Acevedo, "The Confluence of Water, Patterns of Settlement, and Constructions of the Border in the Imperial and Mexicali Valleys (1900–1999)," in *Reflections on Water: New Approaches to Transboundary Conflicts and Cooperations*, eds. Joachim Blatter and Helen Ingram (Cambridge, Mass.: MIT Press, 2001).

questions. Acknowledging the disparate nature of the issues associated with each river and the overwhelming tangle of issues that would arise by treating both simultaneously, the U.S.-Mexico Binational Council decided to focus this report exclusively on the Rio Grande/Rio Bravo. This decision was made, in large part, because of the heightening of political tensions between stakeholders on both sides of the Rio Grande/Rio Bravo. Moreover, the council felt that it could better contribute to a constructive dialogue on the issue as it relates to the Rio Grande/Rio Bravo, while acknowledging additional attention should be paid to the problems facing the western U.S. and Mexican states. To that end, the U.S.-Mexico Binational Council has produced this report in the hopes of offering constructive recommendations to the stakeholders both in the United States and Mexico.

Binational Legal Framework

The most contemporary mechanism for the regulation of transboundary water management is the 1944 Water Treaty between the United States and Mexico. The 1944 treaty provides the framework for sharing between the two countries the water resources of the Rio Grande/Rio Bravo, from Fort Quitman to the Gulf of Mexico, and the waters of the Colorado River. The treaty also granted authority to the International Boundary and Water Commission (IBWC) for the application of its terms, the regulation and exercise of the rights and obligations assumed by the two governments, and dispute settlement.[9] It is unlikely the treaty will be formally renegotiated in the foreseeable future, but article 25 of the treaty provides for a "minute" process through which the terms and conditions can be altered. Decisions of the IBWC (as expressed in minutes), signed by the commissioners from both countries and not disputed by either of the governments within 30 days, have the force of treaty. It is through this process that the two governments have negotiated dispute resolutions, and addressed issues on water management that were not anticipated when the treaty was signed almost 60 years ago.

In 1969 the United States and Mexico agreed in IBWC Minute 234 that in the event of a deficit in a five-year cycle, the deficit must be made up in the following five-year cycle, together with any quantity of water that is required to avoid a deficiency in that cycle.

Mexico ended the 1992–1997 water-accounting cycle with an unprecedented deficit of over 1 million acre-feet of water. Mexico has claimed that it was unable to provide more water in the 1992–1997 period due to extraordinary drought. The term "extraordinary drought" is not defined under the treaty, nor do the two governments have an agreed upon interpretation of that term. Deliveries in the current water-accounting cycle (i.e., from 1997 to 2002) are also lagging far

[9] "The Boundary and Water Treaties," International Boundary and Water Commission, at <http://www.ibwc.state.gov/ORGANIZA/about_us.htm>.

behind what is called for under the treaty. A resolution, minute 308, was reached on June 28, 2002, which called for an immediate release of 90,000 acre-feet—only 6 percent of the total water debt. Controversy remains, especially due to speculation that Mexican border states are not suffering as much as Mexico purports. It is a fundamental tenet of treaty law that the parties must respect their obligations arising under treaties and implement those obligations in good faith. It is also well established that disputes concerning a treaty should be settled in conformity with the terms of the treaty and principles of international law.

The two governments and their respective stakeholders recognize that this resolution, which is set out in minute 308 to the treaty, is only a stopgap and does not represent a permanent solution to the water debt issue. It does not address important issues of treaty interpretation, such as whether Mexico has a force majeur–type of entitlement to increase its cumulative water debt during the current five-year cycle under severe drought conditions. More importantly, neither the minute nor the treaty itself does anything to address the absence in Mexico of basin-wide allocation rules or effective enforcement of Mexico's existing National Water Commission (CNA) allocations in the face of local resistance, as in the case of Chihuahua.

This problem has been acknowledged by Mexican officials, who view minute 308 as an opportunity to capitalize on U.S. pressure to create such rules and enforcement, thereby enabling Mexico to meet its treaty obligations—at least to the extent of allocating one-third of the total available flow of the Conchos to the United States as a primary rights holder under Mexican law. In addition, a positive sign is the Mexican federal government's agreement with the border states for an internal review of the country's water allocation mechanisms. On June 5, 2002, President Vicente Fox of Mexico signed an agreement for improved distribution of the Rio Bravo water, which among other provisions, calls for modernization of irrigation systems for water conservation, restructuring of irrigation districts in an effort to improve efficiency, and development of a more equitable distribution of water within a new framework of Mexican irrigation districts.

This attitude on the part of the Mexican federal government provides the council with an opportunity to develop practical proposals for addressing the water debt issue that might be endorsed by both governments.

The minute process is a potentially powerful tool to effectively manage water binationally. Minutes 307 and 308, agreed upon on March 16, 2001, and June 28, 2002, respectively, have made some progress in addressing certain issues taken up by the council in this report, particularly with regard to drought management and data sharing. Despite this progress, it has become evident that the two countries tend to respond differently to treaty obligations involving the issues discussed in this report. Compounding this, there are increasing pressures in both countries to prioritize immediate domestic concerns over international treaty obligations. For example, in times of shortage, when political stakes are highest, the tendency has been, and will continue to be, for Mexico to allow domestic matters to override

treaty obligations. The recent history could be a glimpse of what the future holds for both nations. It is the council's view that consideration should be given to a comprehensive, long-term strategy that takes into account drought conditions and clarifies treaty definitions and concepts, as opposed to the piecemeal and reactive minute-after-minute approach that has characterized recent history.

First Steps

There is agreement on both sides of the border that there are certain measures that must be taken in the short term before progress can be made over the medium and long term. Without these initial steps, developing a binational strategy for water management will be difficult, if not impossible, to attain.

The first such step is to improve the quality of data about sources and uses of water (both surface water and groundwater) and make that data available in a consistent and user-friendly form to stakeholders on both sides of the border.

A second step should be to develop a long-term, binational strategy for water management that anticipates drought. This could be addressed in two ways. Either both nations could use the third recommendation of minute 307, which was negotiated during the recent water-debt dispute and calls on both nations to jointly identify "measures of cooperation on drought management and sustainable management of [the] basin," as a springboard for developing a more comprehensive, long-term strategy. Negotiations toward this end broke down in the wake of the water-debt dispute but could be revisited. The second way to address the issue could be to negotiate a new minute to the treaty that would be dedicated explicitly to the development of a long-term strategy that both protects the underlying rights of each country and enables the treaty to be realistically implemented under conditions of long-term drought.

These steps would set the stage for a longer-term effort to modify the institutional structures for water management in the border region in a manner that encourages more efficient water use through more effective enforcement, the use of market-based incentives, and increased investment.

■ **Improve data collection, information gathering, and transparency.**

Mexico and the United States could benefit from improvements in the availability and reliability of information regarding water supply and water usage. An accurate and harmonious system of data collection would serve as a fundamental starting point for cross-border management. On the supply side, groundwater is under accounted for. Information gathering has been hampered due to lack of political will and insufficient financial resources for technology improvements.

■ **PREPARE EARLY FOR DROUGHT CONDITIONS.**

A drought is an extended period in which rainfall is deficient relative to the statistical mean for that region. Such a meteorological phenomenon does not occur overnight. Thus, contingency plans should be in place both regionally and binationally to determine what the reallocation should be under drought conditions. The Rio Grande below Fort Quitman and above Presidio can go dry. In the upper region, the only significant source of surface water is the snow pack in the mountains in Colorado that surround the headwaters. The snow pack is currently low, and forecasts for the next few years are low as well. This could signal an oncoming drought in the upper basin. In anticipation of this possibility, the upper basin should begin preparations now for a drought.

Given the unequal allocation rules in place between the United States and Mexico in apportionment of surface and groundwater, Mexico should adopt a basin-by-basin structure along the lines of the Texas Water Master (as determined by the Texas court in the Lower Valley water case) with, for example, the regional director of Mexico's CNA acting as the counterpart to the Texas Water Master. These rules should be designed to achieve an equitable result under continuing severe drought conditions and, in the case of the Rio Conchos basin, incorporate the priority right of the United States under the 1944 Water Treaty to one-third of the flow up to 350,000 acre-feet per year. Only when such rules and an effective enforcement mechanism have been put in place will the United States and Mexico have a reasonable negotiating position from which to talk about integrated, binational allocation rules.

- *Monitor water distribution.* Both nations should strive for compliance with the allocation provisions of the 1944 Water Treaty. The treaty could be more fairly enforced with improved monitoring of water flows and levels, for which Mexico needs a system of water meters to monitor the distribution of water for irrigation purposes. Mexico should undertake a comprehensive and systematic project to monitor water usage—both agricultural and municipal. Financial help from U.S. government or multilateral institutions are possible sources of such funding.
- *Create a water-supply information system.* A widely available, preferably Web-based, Rio Grande basin water information system with current and historical data on rainfall, runoff, stream flows, reservoir levels, and irrigation diversions is needed. Ideally, this would include a geographic information system (GIS) and all the necessary data to run hydrologic models. This information system should be developed and maintained cooperatively by U.S. and Mexican scientists, perhaps through universities, and needs to support "what if" analyses to assure that the next drought is not a surprise. Texas is developing a statewide system (the Texas Integrated Water Simulation System) under the leadership of the University of Texas at Austin and Texas A&M University. Such a system should be extended to the entirety of the Rio Grande. The funding for such a project could be provided by the North American Development Bank

(NADB) through grant funds expected to be allocated for water conservation. It is estimated that about 5–10 percent of the $80 million dollars in grants would be enough to support a four-year effort. Most of the Mexican resources should be targeted to active irrigation-water-conservation programs, and U.S. funds should be used to extend the Texas Integrated Water Simulation System to the Rio Grande basin.

- *Factor in climate change.* The likelihood of higher temperatures, decreased snowmelt and rainfall, and more extreme weather patterns should be factored into any discussion of how to improve water management along the border.

■ **Encourage a balanced bottom-up approach.**

One of the internationally accepted principles of river basin management is decentralization of decisionmaking to the lowest appropriate level. A bottom-up approach focusing on the input of local stakeholders, in conjunction with viable allocation enforcement mechanisms, is one way to mitigate inequitable politicization of water management and encourage the development and effective enforcement of allocation rules. Focusing on the subbasins first and encouraging the active participation of a broad range of community stakeholders at the outset may prevent the issue from snowballing to seemingly unmanageable levels. Local, regional, and state interests should be factored in to any federal natural resource management plan and treated uniformly. There may be lessons to be learned from the Paso del Norte Water Task Force. The task force was created to bring together interested parties in the Rio Grande region, from the Elephant Butte Reservoir and extending to Fort Quitman, Texas, commonly referred to as the dividing line between the upper and lower basins. Drawing on scientific analysis and community consultation at the local level may be conducive to reaching pragmatic, workable, and mutually agreeable solutions.

Although the local basin-level approach is key, a more imaginative and compelling use of carrots and sticks at the federal level would bring local stakeholders into the process without allowing them to hijack it. In particular, U.S. financial support, through NADB or otherwise, aimed at improving water infrastructure in Mexico should be given only when there is an adequate expectation that allocation can be separated from purely political interests. Additionally, Mexico's obligation to honor its 1944 treaty obligations should not be forgotten. A follow-on minute to minute 308 that would lay out a practical long-term route to treaty compliance, in conjunction with U.S. assistance in developing new market-based approaches in Mexico, such as a Conchos Water Bank, could help reduce waste and create the political breathing room necessary for reallocations.

Institutional Structures for Water Management

The recent water dispute has brought into question the current institutional framework for managing water, both domestically and bilaterally. Coordination has been deficient both within each government and between governments. Lack of transparency, inadequate legal frameworks, insufficient mandates, and political considerations have made national and binational negotiations more difficult. The first recommendation applies to both countries and is fundamental to improving methods for water allocation, and for generating the political will necessary for movement on this issue. The recommendations for each country, which follow, aim to improve the institutions charged with water management and to control the use of water for political ends.

■ **Make citizen input a priority.**

Increasing public awareness of the limitations and potentialities of the water sources along the border should be a priority. Often, government agencies handling the problem keep information to themselves, whereas sharing information with those actually using the water could contribute to solving the problem. In fact, a contributing factor to the current crisis situation is that the inhabitants of these areas do not collaborate or cooperate as active participants in water management. However, if people understand the limitations that exist, they may be more willing to contribute to the effort.

Mexico

Under article 27 of the Mexican constitution, water is among the natural resources belonging to the Mexican state. Only by its authority can water be made private property. In addition, under article 115, Mexican municipalities have the authority to determine the laws governing water distribution. In practice, exclusive federal control of water in Mexico has resulted in its allocation being too influenced by political concerns with too little influence of economics. This absence of private property rights in water has made it difficult to provide incentives for conservation.

■ **Reform the National Water Commission.**

At the federal level the CNA grants water-use rights. However, the municipalities control the rights allocated to them and have the power to grant concessions to private parties. In this way, water allocation has the potential to become highly politicized. It is uncertain to what degree the CNA operates with the characteristics of a professional civil service. In order for the CNA to operate more efficiently, it should seek to better reconcile the interests of individual states and municipalities with those of the country-at-large.

- **Develop an interstate academic council.**

The development of an interstate academic council with representatives from the academic institutions of each Mexican border state would improve communication and enhance information sharing between states and across the border. In addition, the council could serve as a resource for governments, the private sector, and nongovernmental organizations (NGOs). This could help mitigate some of the current tensions and distrust among Mexican states with regard to work emanating from state-controlled universities.

- **Increase state and local authority.**

Mexico's federal government should look for more opportunities to divest power to the states and localities in addition to the small income and sales tax authority granted them by the recent fiscal reform. The federal government should enhance the authority of local and state governments to assess and collect taxes for infrastructure development and to incur debt to finance such projects. This recommendation may require reform of article 27 of the Mexican constitution.

- **Increase nonprofit sector contributions.**

Regional nonprofit organizations have been helpful in the binational environmental relationship, such as in updating Mexico's emissions inventory system and increasing application and implementation of current environmental laws. Enhanced U.S. and international funding can be provided to activities of nonprofit organizations that are aimed at solving environmental problems in the border region. A more active Mexican NGO community could spur movement in an atmosphere in which it has been difficult to move the issue through official channels. An example mentioned previously is the Paso del Norte Task Force, which contributes to in-country leveraging on this issue.

United States

In the case of the United States, the historical precedent for "first in time, first in right" water-rights system, which holds that the older water right has first priority during times of low flow or shortage, has created a patchwork of water rights that on its face impedes conservation and transfers to higher-value uses. However, it is a mistaken belief that this system is in place everywhere. In the middle and lower Rio Grande Basin, municipal and industrial rights have priority over irrigation rights if and when water shortages require that supplies be allocated from the Falcon and Amistad Reservoirs. As a result, no priority dates exist for rights to water stored in Falcon and Amistad. Elsewhere in Texas, the doctrine of prior appropriation governs. By enabling water to be given a market value, the system has, over time, provided incentives for more efficient use of water and transfers from lower-value agricultural to higher-value municipal uses. Recent innovations in Texas, such as the Water Master program, the development of water markets, and Texas Senate Bill 1, which incorporates regional plans into state planning are steps in this direction.

■ **Encourage more active federal involvement.**

Given the constitutional disconnects regarding the property right of water in the United States and Mexico (i.e., in Mexico water management is a federal responsibility, whereas in the United States it is primarily a state issue), greater U.S. federal attention to water management could assuage some of the high tensions among states. This more comprehensive approach to border water issues could help resolve pressing transboundary water issues more rapidly, as part of an overall foreign policy strategy.

Binational Mechanisms

■ **Reform the International Boundary and Water Commission/ Comisión Internacional de Límites y Aguas (IBWC/CILA).**

The IBWC is the official organization for communication between the two countries on water issues along the boundary. It has the authority to settle conflicts arising over interpretation of agreements settled on by the 1944 Water Treaty. The IBWC has not been entirely effective in communicating with Washington, D.C., and Mexico City. In addition the IBWC has come under criticism for its lack of transparency. The IBWC could be improved by undertaking the recommendations below.

- *Consider international models.* The U.S.-Canada International Joint Commission (IJC) has evolved more effectively than the IBWC over time, in that it functions as a true water council. Through the development of over 20 specialized boards, which divide research tasks, the IJC has made progress in the cleanup of the Great Lakes, for example, and more equitably balances competing interests.

  The French model has a system of water management that emphasizes inclusiveness of stakeholders and transparency. In addition, its management system is based on market principles, in that "water pays for water," with consumers bearing the cost for further investment. France's bottom-up planning process from subbasin to basin has been successful in building financial support for water management. In addition, France's demonstrated commitment to ecological concerns and research capability is something the IBWC should review.

- *Improve the political profile of the commissioners.* The 1944 Water Treaty stipulates that the IBWC commissioners from each country must be engineers. Although IBWC commissioners generally have had state or local experience, few have the profile to catch the attention of and raise the issue's priority level in Washington and Mexico City. Bringing someone to the position on each side of the border with the ear of his or her respective capital is key for binational water management and planning.

- *Encourage citizen input.* The restrictive nature of the IBWC and its lack of transparency is a problem. Unlike the North American Agreement on

Environmental Cooperation (NAAEC), the environmental side agreement to NAFTA, the 1944 Water Treaty includes no provision stipulating a formal channel for citizen input. The mission of the IBWC would be better served with a system through which individual citizens and community groups could communicate.

- *Set up a binational water council.* IBWC/CILA should move toward evolving as a binational water council, designed to reflect the input of subsidiary basin councils, which in turn, reflect compromises hammered out by stakeholders at the local level. Planning efforts under way to conserve water on each side of the border are not comprehensive. Officials of Texas, New Mexico, Arizona, and California meet informally with Mexican federal officials on this issue, but Mexican state governments lack the power of U.S. states to implement water conservation plans. One way to ensure that the state and federal governments on both sides of the border participate equally in the planning process is for the IBWC to act as a binational mechanism for water-supply planning that spans the entire border region. This mechanism would include participation by state and local governments, as well as by interested citizens. The water council should be formed to assess the expected water-supply level at the border over the next 50 years, as well as to conduct studies of water availability and demand for both national economies over the next two decades. Participants should include representatives of both countries' federal governments, state governments, and citizens' groups. However, as suggested previously, even binational basin councils could be inadequate as long as Mexico does not have more effective rules and mechanisms for allocating water on its side of the border.
- *Include research and ecological concern components.* The IBWC is not currently equipped to handle the myriad ecological concerns that plague the border region's water supply. In addition, it lacks a research capability. Because the IBWC is charged specifically with managing water along the border, and the EPA has shown little desire to involve itself in the issue, adding ecological and research components to the IBWC would be one way to ensure steady focus on these issues, as they relate to the border area.

■ **Further reform the North American Development Bank (NADB) and the Border Environment Cooperation Commission (BECC).**

NADB was established in 1993 to help finance projects dealing with local water supplies, wastewater treatment, and solid waste disposal along the border between the two countries. The BECC certifies projects for NADB funding and provides technical assistance to local communities via $27.2 million in funds allocated, to date, by the U.S. Environmental Protection Agency (EPA) through its Project Development Assistance Program. The NADB has had much difficulty lending money due to its loan rates, which have been unaffordable for many border communities. Many border communities cannot qualify for the loans due

to lack of a revenue stream both to pay off the loans and to provide operating costs for the infrastructure projects built with the funds. Moreover, by federal law, Mexican communities are prohibited from seeking infrastructure debt financing outside of Mexico's domestic market, and they cannot issue debt. Certain provisions have been made to allow Mexican communities to use NADB funding, but these measures have met with only limited success. In contrast, U.S. communities have alternatives including state revolving funds, municipal bonds, or other grants. In November 2000, the NADB Board of Directors approved a resolution authorizing the bank to finance other types of projects within its current charter, while maintaining water, wastewater, and municipal solid waste as a priority. Projects that may qualify as environmental infrastructure under the charter include, but are not limited to, air quality improvement, public transportation, clean and efficient energy, and municipal planning, development, and water management. In addition, the board defined "related matters" to include: industrial and hazardous waste projects; water conservation projects; water and wastewater hookups for housing; and recycling and waste-reduction projects. The types of new endeavors referred to in the resolution expressly included projects to improve the efficiency of water use. In May 2002, NADB implemented a series of reforms aimed at improving the effectiveness of NADB and the usability of its services. Among the reforms are expanding the regional jurisdiction of NADB from 100 km. to 300 km. inside Mexico's border, doubling the low-interest-rate lending facility to $100 million, and establishing $50 million in grant financing. Nonetheless, without congressionally authorized changes, NADB's structure and water-only mandate remain unchanged. It is within this context that the U.S.-Mexico Binational Council makes the following recommendations.

- *Evaluate November 2000 reforms.* There is no agreement as to whether the NADB and the BECC have made meaningful progress in implementing the resolutions and how they should move forward in light of the water debt controversy. In particular, the relationships of the two institutions to IBWC/CILA and to basin, national, or binational councils need to be clarified.
- *Increase capital funds for NADB.* Both governments should commit to an orderly annual expansion of NADB's capital funds in order to reach a negotiated common goal between the two countries.
- *Widen the scope of NADB projects.* NADB should be authorized to widen the range of projects it is permitted to fund, including financially viable efforts (improvements to rail and port infrastructure, for example), which will provide the revenue flow needed to enable the bank to expand lower-cost funding to often unprofitable types of infrastructure projects, such as water projects.

BECC was established specifically to certify water, wastewater treatment, and solid waste disposal projects for funding by the NADB, and it provides some project development and project design assistance to local communities. The

certification process, though not perfect, does force transparency, public notice, and a certain amount of accountability. There is not, however, adequate follow-up once projects are certified to ensure sound project implementation with public participation at the community level. The role of the BECC in overall water conservation planning is limited. As was recommended in the council's previous report,[10] the BECC has made some strides in solid waste disposal. The Solid Waste Project Development Program (SWPD) was approved in November 2000 and works to assist communities in the planning and design of solid waste management projects. In addition, the BECC approved minimum requirements for sustainable development as part of project certification, and it developed a public participation manual for border communities and project sponsors.

Controversy remains as to whether or not the NADB and BECC are in need of further reform. On the positive side, the NADB, as was pointed out in a recent *San Antonio Express News* article,[11] has accomplished something most other development banks have not: it has not burdened its borrowers with debt they cannot repay. Though lending has been far below its lending capacity, the NADB has made headway where it has been able to invest well.

Ecological Concerns

There are 450 native species along the U.S.-Mexico border and 700 migratory species. Of the species that are listed by the U.S. Department of the Interior as threatened or endangered, 31 percent can be found in the border region. On the Mexican side of the border, 85 species of plants and animals are in danger of extinction. In addition, the river itself is a user of water, and incorporating environmental concerns into any management plan is essential. Currently, no water is officially allocated to support downstream ecosystem needs, and in-stream flow below the Amistad is often reduced to a trickle during irrigation season. Clearly, the issue of effectively managing water along the border has potential repercussions for the ecosystem. The reality is that setting aside a portion of the already overcommitted stream flows to preserve ecosystems is going to require much political will and a sustained commitment by governments on both sides of the border. Governments must give environmental organizations a place at the table and make sure that their concerns are given weight competitive with those of economic interests, if there is to be any hope of success.

[10] U.S.-Mexico Binational Council, *New Horizons in U.S.-Mexico Relations: Recommendations for Policymakers* (Washington, D.C.: CSIS, 2001).
[11] David Hendricks, "Confab Players Can Learn from NADBank," *San Antonio Express News*, March 21, 2002, p. 10A.

Sustainable Water Use and Apportionment

Both the United States and Mexico must have the legal and institutional frameworks in place to enable market mechanisms to work before binational water planning and management can be optimized. Such a legal and institutional framework does not yet exist in Mexico, and therefore Mexico is unable to take advantage of its potential to finance investments in improving the efficiency of water use by capturing the market value of conserved water. Accordingly, it is faced with the choice of financing such improvements through financing from NADB or other governmental sources or through direct charges to users. Historically, the former option has figured most prominently. To improve the current reality, the United States should work with Mexico in creating the legal and institutional framework necessary to enable limited public funds to be supplemented by user payments for future water rights.

■ **INCREASE THE USE OF MARKET-BASED SOLUTIONS.**

- *Create a binational water market.* A water market involves the buying and selling of water between legally approved users. Water markets currently exist in Texas, and the middle and lower Rio Grande have seen an average of 30 to 50 contracts per month. Federal and state governments on both sides of the border should investigate the possibility of establishing water markets in which water rights owned by irrigation districts, or in some cases by individual farmers, can be routinely auctioned or publicly sold by some other method to municipal or other users. The establishment of such markets could result in the transfer of water to users with the greatest need, and appropriately priced water could result in more efficient water use. Some have voiced concern for agriculture, which could find it more difficult than industry and municipalities to pay the market price for water. However, informal water markets already exist in Mexico as a result of drought-forced cooperation. Existing legal frameworks are conducive to the establishment of water markets, although in Mexico, currently, the precedent for a market involves mostly groundwater.
- *Create a binational water bank.* Water banks have proven to be an effective mechanism for encouraging transfers and promoting conservation because they are sanctioned by government and have fixed prices. Banks also are more politically acceptable than unregulated private markets. Examples of success stories include California's Drought Water Bank, which was instituted in 1991. The state operates the "bank," which is actually more of a wholesale warehouse. During times of drought, the bank allows the "dry" to buy water from the "wet" at more-or-less market-determined prices.
- *Increase state and local autonomy for usage.* Through federal planning, allocate a fixed amount of water proportionally to each community, then allow the local community to decide how that water should be used. Estimate what the cost of water is in a given community, and then base the economy on that.

- *Design a U.S.-Mexico commission.* A U.S.-Mexico commission that functions along the lines of the U.S-Canada International Joint Commission should be explored. This model allows for joint monitoring authority between both governments. Lessons can also be drawn from France's experience with managing water resources. France organizes its water management based on watersheds, building from the bottom up.
- *Encourage market pricing.* Water pricing according to its true market value should be employed to encourage conservation. Water pricing involves setting varied prices depending upon the quantity of water available, the amount consumed, and lower costs for retreated water to create a conservation incentive for raw water. It is suggested that the market price for water be set at an estimate of the marginal cost of treating and transporting the final unit of water, as well as adding estimated environmental costs and marginal user costs for the depletion of future natural resources. New development can pay the higher true cost of water while allowing current users to pay only incrementally more immediately, easing the transition to full pricing.

■ **Encourage nonmarket-based solutions.**

The council also recognizes that there is a school of thought that opposes the privatization and commodification of water. The thinking is based on two premises. First and foremost is the belief that market-based solutions would not reverse the degradation of the aquatic ecosystems. Second, market-based solutions could create incentives for a more unequal distribution of clean water on the basis of wealth. Advocates of this viewpoint see access to clean water as a fundamental human right and not as an asset subject to the principles of the marketplace.[12] The emphasis, therefore, should be placed on maintaining public control of water resources either directly or though strict regulation of water if privatized. Conservation should be encouraged in order to alter the current patterns of water consumption.

■ **Improve water quality.**

Having a safe, reliable source of drinking water is critical to ensuring adequate public health, because many disease-causing organisms live in contaminated water. Improving water quality would be a cost-effective way to increase water supply, even if "God isn't making any more water."

- *Curb contamination.* The lack of attention devoted to water quality has been well documented. Extensive testing has revealed that extreme fecal contamination leaves border residents at risk for Hepatitis A. According to the Texas Department of Health, since NAFTA went into effect the Hepatitis A rate for Cameron County rose from 17.8 per 100,000 residents to 87.4 per 100,000 an increase of almost 400 percent. The Hepatitis A rate for Maverick County increased by 122 percent since 1993. Webb

[12] Maude Barlow and Tony Clarke, *Blue Gold: The Fight to Stop the Corporate Theft of the World's Water* (New York: New Press, 2002).

County's rate also increased by 78 percent. Although some speculate whether these numbers are more the result of an increase in identification and reporting and not of actual cases, they remain cause for concern.

- *Improve disposal of hazardous waste.* Mexico generates about 8 million metric tons of hazardous waste each year (excluding the mining sector). The Mexican government estimates that only about 11 percent of this waste is properly disposed of, with the remaining illegally dumped on land, in bodies of water, or in the municipal sewer system—the last being by far the most common option. The Hazardous Waste Tracking System (Haztraks) accounts for shipments of hazardous waste across the border and alerts local, state, and federal officials on both sides to potential violations. However, Mexico still does not have reliable data on the total generation of hazardous waste by the maquiladora industry, pointing to a serious long-term problem in the safe handling of these industrial wastes. In addition, Mexico has developed a number of abandoned and health-threatening hazardous waste sites over the years. Out of 166 such sites, about 6 are located at the border. Mexico has only one hazardous waste disposal facility, and it is located outside the border region. This affects the ability of firms outside the maquiladora program to comply with hazardous waste laws.
- *Build treatment facilities.* Mexico should follow through with its 1996 plan to locate sites for and promote the construction of hazardous waste management facilities throughout the country. Mexico can identify and negotiate with international firms that possess expertise to build such facilities and invite those firms to participate in the planning process. Lack of treatment facilities is a problem on both sides of the border. Raw sewage is routinely dumped in the river, contaminating the water supply for both sides of the border.
- *Increase technical instruction.* The U.S. government or the North American Commission for Environmental Cooperation can provide greater technical assistance to Mexico in the area of waste management.

■ **Account for changing demographics.**

Population growth is rising at unsustainable rates. By 2030 the population in the subbasin region will be 4 million; the population of the city of El Paso doubles every 25 years. Efforts should be undertaken to discourage population growth in areas experiencing difficulty sustaining a sufficient water supply. One option for slowing growth could be to implement rigid pricing regimes for water.

■ **Improve irrigation/agricultural management.**

- *Promote crop and climate compatibility.* Certain types of crop production should be discouraged through proactive government programs. Texas, California, and some Mexican states are producing crops that are not well suited to farming in semiarid regions. One prime example of this is sugarcane production, which is increasing in Texas.

- *Promote conservation.* Without active irrigation-water-conservation programs on both sides of the border, large amounts of water will continue to be wasted. The U.S. Department of Agriculture, for example, is financing a $3.1-million irrigation-water-conservation program led by the Texas Agricultural Experiment Station, Texas Cooperative Extension, and New Mexico State University. The project includes: economic and engineering assessments of proposed infrastructure projects; irrigation education and training; studies of what institutional incentives are needed for efficient water use; on-farm irrigation-system management; urban water conservation; protection of the environment and water quality; saline and wastewater management and water reuse.
- *Develop an irrigation conservation program in Mexico.* An effort similar to the one mentioned above is needed in Mexico, especially Chihuahua and Tamaulipas, and it needs to be closely coordinated with the Texas–New Mexico project. Without such efforts, improvements in infrastructure and infield irrigation technologies, water will continue to be largely wasted.
- *Improve irrigation systems.* The irrigation systems in both countries need to be optimized by improving conveyance systems and field-water delivery systems. The water-intensive practice of field flooding, used both in the United States and Mexico, should be replaced when possible with drip irrigation methods. In both Texas and Mexico, fees can be established for water conveyance improvements. Alternatively, Texas can authorize state bonds for water projects aimed at conserving existing supplies. However, this option does not exist for Mexican states, which do not have constitutional authority to issue such bonds.

■ **Provide for increased municipal usage.**

The influx of maquila migration has brought about a demand of 330 liters per inhabitant per day. There is a need to increase the amount of potable water along the border.

- *Improve the distribution system in Ciudad Juárez.* Ciudad Juárez uses an old distribution system, especially in the downtown area, with losses of up to 20 percent. Currently the city has a plan to develop a new water-treatment plant in El Paso/Southern New Mexico that would treat 30,000 acre-feet per year and send a portion of it to Juarez. Juarez, in exchange, would pass on treated sewage water to agricultural districts. This is a proposal that is endorsed by engineers.
- *Reduce evaporative losses.* Transfer water from high-evaporation reservoirs such as Elephant Butte to lower-evaporation reservoirs such as Abiquiu or to aquifers.
- *Improve the quality of water emanating from water treatment plants along the border to qualify that water for municipal usage.*

Conclusion

The council recognizes that failure to adequately address U.S.-Mexico transboundary water management could generate a destabilizing mixture of value conflicts within and between our two nations. This conflict could pit rural against urban/municipal communities, indigenous/Native American people against at-large populations, and international coalitions of economic development advocates against hard-line environmentalists. We also recognize that any progress on a binational level will require an interdisciplinary approach that is comprehensive and inclusive. The inclusive nature of the issue is of paramount importance, as our nations continue the trend toward decentralization and the empowerment of numerous actors. The council hopes that this report not only stimulates thinking on this issue, but also helps to generate the political will required on both sides of the border to achieve equitable and sustainable transboundary water management.

Binational Water Management: Strategies for Medium- and Long-term Planning for the Rio Grande/Rio Bravo

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