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# Managing Border Water to the Year 2020: The Challenge of Sustainable Development

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## Abstract

The demand for water today outpaces the available water supply in many regions on both sides of the U.S.-Mexican border. Nearly 60 years of institutional development has created a complex matrix of jurisdictions and practices that, allowing even for the most recent reforms, remains deficient for advancing sustainable development. Policy is still fundamentally national, driven by sovereign concerns, and coordinated binationally at the federal level. However, the benefits of water are binational and have synergistic effects. As a result, binational cooperation is fundamental for the sustainable development of water as a resource. The framework for allocating and planning is insufficient for dealing with the sustainable development of water resources in the next 20 years. Almost all renewable water resources in northern Mexico are already being used at maximum capacity. Water use in Mexico will double within the next 20 years. During the same period in El Paso, the municipal-industrial use of water is projected to increase 30%, which is indicative of the rapid increase in consumption on the U.S. side of the border. Water transfers from agriculture are unavoidable.

Although the 1944 U.S.-Mexico Water Treaty allots water quantities for each country, it is inadequate in dealing with long-term drought, the management of groundwater, ecological needs, and water quality. New binational institutions struggle in dealing with the complexities of multiple jurisdictions and the competing goals of binational, national, tribal, state, and municipal agencies charged with water management. The binational water planning system provides limited capacity for fashioning cooperative, long-term binational policy responses to systemic, border-wide water challenges. Sovereignty is both an opportunity and an obstacle in attaining sustainable development. Innovative solutions to address drought, groundwater, and ecology require strong support by federal governments.

The foundations of the 1944 Water Treaty need to be strengthened in order to manage drought, groundwater, and ecological uses of water. Priorities need to be established through Border XXI and subsequent border programs. The capacities of the Border Environment Cooperation Commission (BECC) and North American Development Bank (NADBank) need to be reinforced while still maintaining their transparency and ability to respond to problems. These programs need more funding and an even greater focus on sustainable development. At the binational level, coordination of strategic planning needs to improve.

Sustainable development should be more than just a vision—it should work. The sustainable use of water resources in the border region is only possible through binational cooperation. Although it would be difficult to develop an all-encompassing border water plan, the use of watershed management principles in decision-making would enable the two countries to make progress toward this goal. Market-based solutions should contribute to watershed management.





# El Manejo del Agua en el Área Fronteriza Hasta el Año 2020: El Reto del Desarrollo Sustentable

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## Resumen

La demanda para el agua ahora supera al surtido de la misma en muchas regiones en ambos lados de la frontera. El agua se debe de manejar de una manera sustentable si la frontera será prospera en las próximas dos décadas. El manejo del agua en la zona fronteriza es administrado por grupos complejos de instituciones nacionales y binacionales que tienen objetivos de soberanía. Pero los beneficios del agua son binacionales y tienen efectos sinergéticos. Por lo tanto, la cooperación binacional es fundamental para el desarrollo sustentable del agua como recurso. El marco de la asignación y planeación no es suficiente para el reto del desarrollo sustentable del agua como recurso en los próximos 20 años. Casi todos los recursos renovables del agua en el norte de México ya están siendo usados a su máxima capacidad. El uso del agua en México se duplicará en 20 años. El uso municipal-industrial en El Paso se incrementará el 30 por ciento durante la misma etapa, lo cual es evidencia de un rápido incremento en el consumo en la región fronteriza del lado norteamericano. Las transferencias de agua de la agricultura no se pueden evitar.

Aunque el venerable tratado de 1944 sobre el agua preserva las cantidades de agua para cada país, no es suficiente para tratar una sequía de largo plazo, el manejo del agua subterránea, las necesidades ecológicas, y la calidad del agua. Nuevas instituciones binacionales tienen problemas por la complejidad de la múltiples jurisdicciones y por las metas diferentes de las agencias binacionales, nacionales, tribales, estatales y municipales sobre el manejo del agua. El sistema binacional de la planeación sobre el agua nos deja

con una capacidad limitada para construir respuestas binacionales, cooperativas, y de largo plazo a los retos sobre el agua en la frontera. La soberanía es una oportunidad y también un obstáculo para lograr el desarrollo sustentable. Soluciones innovadores sobre la sequía, el agua subterránea, y la ecología requieren un fuerte apoyo de parte de los gobiernos federales.

Hay que reforzar las bases del Tratado para manejar la sequía, el agua subterránea, y los usos ecológicos del agua. Hay que establecer las prioridades dentro del programa Frontera XXI; reforzar la capacidad del Comisión de Cooperación Ecológica Fronteriza (COCEF) y Banco de Desarrollo de América del Norte (BANDAN) mientras se preserva su capacidad para responder a los problemas y preservar su transparencia; también hay que enfocarse en el desarrollo sustentable, y reforzar el apoyo financiero para estos programas. Hay que mejorar la coordinación de la planeación estratégica que ya existen a nivel binacional.

El desarrollo sustentable debe de ser más que una visión, debe de funcionar. El uso sustentable de los recursos hidráulicos fronterizos solamente es posible por medio de la cooperación binacional. Aunque sería difícil lograr un plan fronterizo global para el desarrollo del agua, el uso de los principios del manejo de las cuencas en la toma de decisiones hará posible que los dos países avancen hacía esa meta. Soluciones basadas en el mercado deben de contribuir al manejo de las cuencas.

## Introduction

Few resources are as vital to the U.S.-Mexican border's future as water. Along the border from Texas and Tamaulipas to California and Baja, no subject has dominated the past decade's headlines like water, or more accurately, the scarcity of water and its human dimensions.

The border is an arid region. Its wettest zone, the Lower Rio Grande Valley, rarely sees more than 21 inches of annual rainfall; its driest years average less than five inches. The border region also saw some of the fastest human settlement growth in North America in the 1990s. Placing these facts side-by-side, it seems counterintuitive





to argue that the rapid development of the border area is fueled by an abundant water supply. Yet that is the prevailing perception. And from the manicured turf of hundreds of golf greens to the galvanized roofs of thousands of maquiladoras, it is certainly a problem that must be dealt with today.

On both sides of the border communities are running out of water; this would be the case even if these areas had not been experiencing persistent, sustained drought for the last several years (Gleick 2002). The border's explosion in human settlements, climate and social attractions, historic role as a breadbasket for North America, and comparative advantage as a crossroads for trade and investment combine to place unprecedented stress on its limited water supplies. Moreover, as consumptive demands have cumulated, norms and values related to water and its multiple uses have also changed. More is expected today of the water supply than at any time in history. Water is valued not simply as the draught of life for the material essentials it ensures or the recreational values that enhance life's quality, but as sustenance for a seamless ecosystem, a web of life that links the border to the Yukon and Northwest Territories to the north, to Chiapas in the south, and beyond.

Today it is recognized as never before the myriad ways water affects lives and the world around them—the many ways water sustains. That is why, now, 11 years since the United Nations Conference on Environment and Development in Rio de Janeiro, conservationists are compelled to frame the border's multiplying challenges in managing its limited water supply as a problem of sustainable development. As for the first part of this concept—sustainability—there should be no doubt that in an arid region water is the most essential resource and managing it to ensure its adequacy in the present and its availability in the future is the responsible thing to do. Water is certainly a sustaining resource. And sustaining and perfecting its use is the essential task of development; indeed, this may well be an acceptable definition of development.

In the border zone, when the multiple uses of water are taken into account, it is increasingly difficult to deny that these are binational in scope and synergistic in effect. Both geography and economy make this true. The water resources of the border region are geographically organized in vast watersheds of rivers—including the

Tijuana, the Colorado, the Santa Cruz, the San Pedro, the Mimbres, the Conchos, the Pecos, the San Juan, and the Rio Grande—virtually all of which are international in scope. The human societies located astride these folds and conduits are increasingly part of an equally vast stream of trade and commerce and the resources they use are North American and global in origin and distribution. As Mexico and the United States accelerate the pace of economic integration, the border region has been thrust to center stage and made more interdependent than ever. The growth and development of the national economies in the border region has become ever more tightly linked. In this context, management decisions for water resources are no longer truly sovereign, for while they may yet be sovereign in execution they are most certainly not sovereign in their effects. The unintended or neglected effects of failing to account for the externalities of local management decisions impedes development and restricts the capacity to make better use of the limited resources available.

From this perspective, which is both a sustainability perspective and a binational perspective, the fundamental challenge in achieving sustainable water use in the border area is one of avoiding the human tendency to exhaust the common resource through isolated, abstracted decisions. Institutional practices that produce such results must be modified, conservation must become a priority, and better use must be made of resources across a wide panorama of human and ecological needs. These aims must be achieved through greater binational cooperation at the economic, political, and institutional levels.

At the binational level, it has often been said that the system in place for managing international rivers and water resources symbolizes a mutual capacity for resolving otherwise contentious issues peaceably; in many ways, this has been the case (Friedkin 1967). However, a cautionary note must be sounded. While the architecture of binational allocation and planning has served both countries for more than 50 years, it is no longer sufficient to ensure sustainable development in this new century, nor does it adequately incorporate non-traditional stakeholders in border water decision-making. The 2002 U.S.-Mexican water deficit dispute affords a stark lesson in this regard.





To better understand the basis for these preoccupations and the challenges of strengthening cooperative approaches to the sustainable use of water resources on the border, it is useful to trace briefly the current situation in water availability and use, and sketch the role and reach of binational institutions now in place along the border. The intention here is not to replicate the more detailed work subsequent chapters will offer, but rather to identify some of the important challenges of sustainability that lie ahead and highlight certain institutional options that the United States and Mexico, separately or in concert, should consider in striving to satisfy these needs and demands.

## *Border Water Availability and Use Trends to the Year 2020*

Water capital on the border to the year 2020 is shaped by two fundamental factors: the variable supply of naturally occurring water and the steadily rising water demand driven by human settlements and economic growth in the border area. On the supply side, if naturally occurring rainfall is the measure, it has been known for quite a while that earlier precipitation estimates for the region's major catchment basins were overgenerous. The extraction of naturally occurring groundwater is no panacea, as most known groundwater basins are currently at risk of overdraft. Thus, net supply is lower than anticipated at the middle of the 20th century, creating a supply problem even if long-term climate trends were not expected to reduce precipitation in the next quarter century. Various supply enhancement options exist, ranging from water conservation and groundwater infusion to cloud seeding, desalinization, and water importation (Wood 2002), but until recently these options have proven inordinately costly in regulatory or monetary terms. This may be changing, but the simple truth is that the end of the reclamation era of big dams and storage projects, now more than a quarter century past (Western Policy Review Advisory Commission 1999), spelled the end of easy solutions to augmenting border water supplies.

On the demand side, the growth of border cities, the satisfaction of indigenous water rights claims, and the emergence of non-tradi-

tional demands is competing with irrigated agriculture for border water as never before. In northern Mexico, nearly all water that can be extracted from renewable resources is now being extracted (INEGI 1999). While 87% of all water consumed in northern Mexico is used by agriculture, an increasing volume, 13%, is consumed by municipal-industrial uses (Instituto Nacional de Estadística, Geografía e Informática [INEGI] 1999). The industrialization of Mexican border cities means steadily rising per capita demand as the population multiplies at remarkable rates (Westerhoff 2000). Multiplying annual liters consumed per capita in 1995 by the medium population projections for 1995 and 2020 used by Peach and Williams shows Mexican border water consumption should double. Expectations are that it will rise from 1.07 billion annual liters consumed per capita in 1995 to 2.35 billion annual liters consumed per capita by 2020—an increase of nearly 120% even if current rates of consumption hold constant, which is unlikely (Peach 2000; Westerhoff 2000). In Ciudad Juárez, for example, the Paso del Norte Task Force projects municipal and industrial demand will rise from 151,000 acre-feet (af) annually in 2000 to 301,000af annually in 2020 (Paso del Norte Water Task Force 2001). Satisfying this burgeoning demand is a major challenge for water authorities. While in the past increasing the efficiency of urban water use could increase supply, Mexican border cities are now operating at relatively high levels of water-use efficiency, foreclosing this water conservation mechanism in the near future (INEGI 1999). There is now little margin for avoiding direct transfers from agricultural to municipal uses as urban demand grows.

These dynamics raise important questions about the proper valuation of water among uses and users. Mexico, for example, is just now confronting critical questions about measuring the real cost of water provision, social and economic tradeoffs associated with particular subsidies, and the provision of data central to tackling these issues. Without a clear valuation of the costs and benefits of alternative policies, designing an economically sound and financially sustainable water system is simply not possible. However, Mexico's Water Consulting Council is taking on these questions in order to properly advise the Comisión Nacional del Agua (CNA).

The picture is similar on the U.S. side. Population-wise, U.S.





border states are among the fastest growing in the country, with Arizona and New Mexico registering double-digit growth between 1995 and 2000 (Western Policy Review Advisory Commission 1999). Five of the 10 fastest growing U.S. cities are border cities (Western Policy Review Advisory Commission 1999). The U.S. Geological Survey reports that in U.S. western states between 1960 and 1990, irrigated agriculture consumed 86% of the total water supply, with domestic and industrial uses accounting for just 10% (Western Policy Review Advisory Commission 1999). Per capita municipal water use is not growing as quickly as in Mexico, but it is 41% greater than per capita water consumption in Mexican border cities (Westerhoff 2000). In the case of El Paso, the Paso del Norte Task Force foresees a 30% increase in municipal and industrial water use by 2020 (Paso del Norte Water Task Force 2001). These trends, when seen in the light of rapid urban population growth, exert significant pressure on existing supplies, particularly on irrigated agriculture. Statistics show a net decline in irrigated agriculture in all border states except California between 1982 and 1997, which supports existing evidence that transferring water from agriculture to urban uses is unavoidable and already occurring (Lorey 1993).

These multiple and burgeoning demands on border-area water resources have practically eliminated any institutional slack in border water management. In response, communities border-wide are redoubling their efforts to secure adequate water supplies. In the Imperial Valley, conservation measures in place for a decade are the basis for securing water uses while satisfying the competing claims of Southern California's water-thirsty coastal cities. An Interior Department-brokered arrangement between lower Colorado River users mandates greater efficiencies in U.S. downstream water use, practically eliminating surplus flows for 15 years. In El Paso, where fresh groundwater is rapidly depleting, city officials are shifting to greater dependence on limited Rio Grande surface stocks while investigating a range of complex augmentation and conservation measures including desalinizing groundwater, remote imports, and a groundwater management agreement with Mexico.

Such demands are testing the institutional framework for binational water management as never before, at once amplifying the imperative of binational cooperation while highlighting the com-

plexities of doing so. Differences in national governance and policy structures coupled with the rigidities and frailties of binational water management institutions complicate the process of building sustainable water management practices at the border. It is worth a moment to review this architecture and the difficulties it presents before moving to an issue-specific review of the border water management challenges for the next 20 years.

## *Binational Governance and Water Resources on the Border*

The institutional fabric of binational water management is a rich tapestry of domestic statutes and international agreements reflecting the different and shared histories of each country. In both countries, these institutions evolved over time, producing a mix of jurisdictions, agencies, commitments, and practices designed to capture and deliver water for national development and to protect and preserve public health. Subsequently, other institutions emerged with mandates for environmental protection. In many ways these institutions have served us well. They are not, however, a coherent, harmonized, or well-integrated policy that can be readily mobilized in the enterprise of sustainable development.

The evidence is found at every tier of the system. At the domestic level, for instance, the institutions could not be more different. Mexican water management is centralized, federal, and predicated on administrative and proprietary principles that concede a greater interest to the state in managing water resources. Recent trends toward privatization and decentralization have modified—not replaced—these tendencies. The U.S. tradition—which gives federal jurisdiction to matters of navigation, commerce, defense, and regional development—places fundamental control over water in the hands of the separate states and, by extension, private holders of water rights. This federal arrangement, in addition to supporting a decentralized water policy system, has also encouraged a multi-sectoral and administratively segmented approach to water management at the national and state levels.

Binational water management institutions reflect these differences. The most important framework document for border water





management is the 1944 U.S.-Mexico Water Treaty. This document is largely an allocation document aimed at securing and defending national water endowments. Without going into its details, it is fair to say its provisions adequately reflect the state of water management along the border at the time it was written, as evidenced by the fact that it is not a comprehensive document but one that segments water resources by basins (the Colorado, the Rio Grande, and the Tijuana). As such, it reflects the priorities and the influence of the various political localities along the border with a stake in the development of each river's water resources. That certain water resources were neglected by its terms may be attributed in part to the desire of subsidiary bodies (in this case, U.S. basin states) to hedge their bets and make the most of uncertainty and complexity in the hope of gaining control over additional water resources.

The 1944 treaty is also archaic. Its Article 3 priorities failed to anticipate important contemporary water concerns, reflecting a preoccupation with old-style development, industry, and agriculture—not sustainable development. Its drought provisions arguably failed to anticipate or arrange for an adequate response to long-term drought and climate change.

The treaty also established a management system that directly reflects the power of decentralized interests as well as the institutional infighting among big U.S. water agencies. In 1945, the International Boundary and Water Commission (IBWC) and its Mexican counterpart, Comisión Internacional de Límites y Aguas (CILA), or, "that Texas state agency" as one New York congressmen used to call it, was located on the border, not the beltway, reflecting the power of U.S. regional interests. IBWC was endowed with infrastructure development functions that in Mexico remained in the hands of lead domestic water agencies, not with CILA. This situation is reflected in the official responses to drought in the past decade where most conservation options fall outside CILA's jurisdiction and, technically at least, beyond the scope of the 1944 treaty. The U.S. border states made certain they had a body they could control, not one located in the U.S. Department of the Interior that would be beholden to the entire western region or, as the U.S. Army Corps of Engineers does, cater to the U.S. eastern seaboard and the Mississippi basin.

At the level of endowment defense, the 1944 treaty has performed the role both countries more or less expected it to perform. The treaty framework, however, was less adaptable to emerging and contemporary concerns for sustainable development. Its very intractability as a mechanism for dealing with transboundary water pollution led to the La Paz Agreement. The La Paz framework, which commits the two countries to a process of cooperation in dealing with border environment concerns, including those related to water, directly takes into account the fragmentation of water policy at the federal and subnational levels, aiming less at substantive results than simply establishing venues in which different agencies from each country can exchange information and intercede with national and international counterparts in a cooperative manner that at least appears to be responsive to public stakeholders. The Border XXI Program was crafted atop this framework to provide an overarching strategic vision and binational commitment to the broader values of sustainable development. It is worth noting that the term "sustainable development" does not appear in the 1983 La Paz Agreement, but is a major theme and general objective in the Border XXI Program, the 1993 BECC-NADBank agreement, and the 1993 North American Agreement on Environmental Cooperation.

Much the same may be said of BECC and NADBank, agencies that are driven by the North American Free Trade Agreement (NAFTA). The 1944 treaty, while providing a mechanism for developing solutions to binational sanitation and sewage problems, proved much too narrow for addressing a wide range of border water infrastructure needs. The 1993 BECC-NADBank agreement is innovative in stipulating that "sustainable development" must be a criterion for authorization of BECC-NADBank projects and in that particular sense it links these projects to a larger vision of sustainability for the border. However, the development of BECC's projects is far from programmatic. Like earlier institutions, BECC's binational mandate for border infrastructure provision is designed to fit atop the particular needs and policy mechanics of border localities fitted into the welter of national and subnational jurisdictions in play in any particular part of the border region. While its mandate reaches to functional areas in water management beyond the scope of earlier agreements, its operational structure is predicated on national





administrative differences, jurisdictional complexities, and the decentralized patterns of governance found in the border zone.

In sum, nearly 60 years of institutional development has created a complex matrix of jurisdictions and practices that, allowing even for the most recent reforms, remains deficient for advancing sustainable development. Policy is still fundamentally national, driven by sovereign concerns, and coordinated binationally at the federal level. Water priorities are set in an ad hoc manner and water disputes resolved in similar fashion. Jurisdictions at all levels overlap and compete. Both formal practice and economic trends favor consumption over savings and investment in the mix of development factors. Water policy instruments are not comprehensive and often conflict with economic, fiscal, agricultural, and urban development policies, which adds to public confusion over what national, sectoral, and regional priorities really are, as is evident in the heated binational debate over the Rio Grande water deficit.

These attributes of the binational water management system have created a limited capacity for fashioning cooperative, long-term, binational policy responses to systemic, border-wide water challenges. A host of problems—including adjustments in the balance of consumptive uses, managing climate-induced water scarcity, and sustaining regional ecosystems—can only be dealt with in the most ad hoc fashion by government and the market, given present political and policy limitations. Mexico's most recent national environmental plan, for example, admits that despite the institutional improvements in national environmental management, the country has pursued an unsustainable route toward development (Programa de Medio Ambiente 2001).

It is unrealistic to suppose these structural realities will not continue to define the context for binational water management well into this century, and resist best efforts to advance the agenda of sustainable development of border water resources. Given the circumstances, promoting sustainable development seems destined to be more of a bottom-up and incremental process than a centrally driven, rational-comprehensive one. However, recent events have brought into focus the need to deal with several compelling challenges. Dealing with these challenges cannot, and should not, be done in a mutually exclusive way, since the solution to any one challenge is likely to be implicated in solutions to others.

## *Challenges in Achieving Sustainable Development in Border Water Management*

Moving toward sustainability in binational water management along the border means dealing more effectively with a range of issues at the top of the binational agenda. These include finding ways to manage or cope with prolonged drought, allocating and managing groundwater in a more sustainable and cooperative way, accommodating non-traditional demands for water resources, and maintaining water quality. It also means strengthening the capacity for binational strategic planning in managing border water resources.

### *Persistent, Prolonged Drought*

The specter of prolonged drought is now here. Unfortunately, the institutional capacity to deal with acute protracted drought is limited under the 1944 treaty and other existing institutional mechanisms. Clear relief along the Rio Grande—where shortages on tributary streams like the Río Conchos have already fired tensions in binational relations—has appeared.

The problem of Mexico's water deficit on the Rio Grande points to several enduring deficiencies in the framework for dealing with climate-induced water scarcity. The first arises from the treaty's framework for rationing water under circumstances of "extraordinary drought." The treaty, in the case of the Rio Grande, stipulates a rationing scheme for extraordinary drought based on five-year cycles. It allows debtors to repay creditors, if they also agree to the scheme, in the next cycle for arrears incurred in the first. The difficulty with this formula, as recently seen, arises when debtors lack the capacity to repay their arrears in the second cycle. Under these circumstances, debtors might well choose to approach creditors for a further rollover of their arrears, which Mexico has done recently. Creditors, of course, may justly demand repayment, which the United States has done, or may agree to rollover the debt to another cycle.

The merit of this scheme is its flexibility, providing at least a limited mechanism for adjustment and cooperation when hydrological and political circumstances allow. Its demerits arise from the fact that the cycles are essentially political and not based on hydraulic realities. Excepting the proviso that a new cycle must be declared if





U.S. conservation capacity in the two major downstream dams—Amistad and Falcon—is met (Water Treaty 1944), there is no reference or mechanism for adjusting national expectations to hydrological realities. The outcomes remain zero-sum within a specified temporal context, enhancing the prospects for conflict. Conflicts under this system may be expected in at least two circumstances that are not mutually exclusive: First, when the scope of drought affects the entire basin, establishing a generalized sense of scarcity that affects both debtor and creditor; and second, when the duration of a drought exceeds the 10-year timeline the treaty provides for normal repayment. (That the treaty formula is highly political is evident in the U.S.-Mexican dispute over the baseline for initiating the system of cycles in the early 1950s).

Those familiar with the Rio Grande drought situation will also rightly point to the dramatic increment in regional water demand, the need for better water conservation, and other social pressures that have steadily reduced those surpluses that in the past might have cushioned a debtor's ability to repay under the treaty's provisions. Solving this problem with demand-side solutions, even allowing for near-term implementation of efficient water management and new technology, may take years, the provisions for which are not in the treaty. (IBWC-CILA Minute 293 [1995] and Minute 307 [2001] commit the two countries to technical cooperation and data-sharing in seeking a solution to the Mexican water debt- and drought-based shortages on the Rio Grande.)

A second, long-recognized, problem is related to the treaty's failure to establish the meaning of "extraordinary drought," which is mentioned in the document with reference to both the Rio Grande and the Colorado. While the recent negotiations on Mexico's water debt—reflected in IBWC's Minutes 293 and 307—clearly respond to the treaty's terms in Article 4 paragraph B, which establish contingency in the event of "extraordinary drought," it is fascinating that neither agreement formally acknowledges that fact (IBWC-CILA 1995 and 2001). Part of the problem may be related to the fact that the protocols for responding to "extraordinary drought" differ from one basin to another. Thus, the provisions for coping with drought on the Rio Grande differ from those on the Colorado, a situation that derives from the different hydrological and political realities that influenced treaty framers in allocating waters in each of these

basins.

Yet, the failure to arrive at an accepted definition of the concept of "extraordinary drought" introduces considerable uncertainty into the reckoning of drought conditions and responses, further politicizing national and binational responses to drought situations (IBWC-CILA 1995 and 2001). The failure to make reference to extraordinary drought in Minutes 293 and 307 could be interpreted as allowing an extrapolation from the circumstances of the recent drought in the Conchos to construct a definition of the concept. Alternatively, it could be interpreted as allowing the implementation of provisions in Article 4, paragraph B, in the case of what might be called "normal" drought. At present, many Mexicans, including Mexico's Secretaría de Relaciones Exteriores (its Foreign Ministry), view the concept of "extraordinary drought" as adequate justification to avoid covering the current deficit.

As the two nations have grappled with the problem of the Mexican water debt, some progress has been made. Under Minutes 293 and 307, for instance, the United States and Mexico have agreed to share important technical data on water availability and management and to "work jointly to identify measures of cooperation on drought management and sustainable management" of the Rio Grande river basin (IBWC-CILA 1995 and 2001). Outside these agreements important progress has been made toward providing technical assistance on water conservation. But serious problems remain. Absent a definition of "extraordinary drought," each drought situation will be determined on a case-by-case basis, as Minutes 203 and 307 provide no specific guidance on handling future droughts. There has, as yet, been no effort to extrapolate the 1944 treaty to address the problem of drought in border-wide strategic planning terms.

It seems obvious a good deal more could and should be done. Working within the treaty's framework, the IBWC's capacity to serve as a clearinghouse and coordinator of binational drought management efforts might be strengthened. The Commission for Environmental Cooperation (CEC) already serves as coordinator of the Border XXI binational interagency water task force and could build upon this mechanism to develop a drought contingency planning group or related body to consider responses to drought emergencies. While much of the effort to deal with drought unavoidably falls on federal and subnational bodies in each country, the CEC could spearhead efforts to better articulate binational-, federal-, and state-level planning. The two countries should move expeditiously to clarify the meaning of the "extraordinary drought" clauses within the treaty and should link that definition to new protocols dealing with climate change.





Any broad-gauged and sustainable solution to binational drought management has to be based on better conservation of water resources in the border region. Many of these conservation options lie outside the narrow scope of the treaty, though they are complementary to it. Programs and agencies such as Border XXI, CEC, and BECC and NADBank have important roles to play in supporting and assisting border water managers as they pursue water conservation initiatives. Other recent federal and state programs, such as the border-wide binational GIS system and the Border Environmental Indicators database, will provide valuable assessment and prognostic tools that are essential to informing and coordinating regional drought response. Complicating this picture, however, is the fact that the headwaters of major river basins extend well outside the administrative zones for the Border XXI Program, and BECC and NADBank.

In sum, an agenda of sustainable development must begin to take the prospect of drought seriously. Climatic and socio-economic circumstances now appear to be converging in ways that suggest more frequent and more acute droughts are likely and may aggravate the social impact of drought. As decentralized as water management is along the border, there is little doubt the federal governments will need to take the lead in orchestrating systematic responses to binational cooperation in mitigating the effects of prolonged drought. With heightened attention to national security now strengthening federal prerogative, now is the time to grapple with this issue. It is not too broad a stretch to argue that the national security of both countries depends on more effective binational cooperation in this area.

This point cannot be over-stressed. Despite the border region's known vulnerability to periodic drought, no formal mechanism for drought management currently exists in the border area. While

Texas has recently passed legislation mandating development of a state-wide drought management plan, the process is in its initial stages. A comprehensive, border-wide evaluation of the sectoral and intersectoral impacts of drought, an essential precondition for responding to drought emergencies, has yet to be done. This is also the view of Mexico's latest urban development program, which highlights the urgent need for post-evaluation of drought mitigation measures. As well, Mexico's national water program expresses concern for the devastating impacts of prolonged droughts but specifies no policy responses.

*Groundwater Management*

The 1944 Water Treaty's failure to allocate or otherwise prescribe an approach to managing border groundwater is often considered one of the most important lacunaes in border water management. While groundwater has figured in the balance of border water use for more than a century—considering Native American and frontier dependence on springs and bogs—it is now a critical source of supply for urban and agricultural water interests all along the border zone. More border cities are blending groundwater with surface supplies to improve water quality. Some cities, El Paso and Ciudad Juárez, for instance, are critically reliant on groundwater to satisfy municipal water needs. Even high-tech solutions to inland water supply problems—desalinization being just one—may depend on the extraction of groundwater in various border localities. Groundwater storage is also emerging as a vital water banking option as conservation schemes in various localities look to infusion as a means of augmenting and safeguarding water supplies.

The sustainable management of border groundwater requires binational cooperation on both allocating and conserving groundwater stocks. Although no formal agreements have been reached in allocating border groundwater since the IBWC's Minute 242 set limits on pumping in the San Luis Río Colorado zone and recognized the need for a binational understanding on groundwater, some binational progress has been made in the past decade. The IBWC, in cooperation with federal, state, and municipal agencies on both sides of the border, is spearheading the technical assessment of groundwater basins, which is essential if the two countries are to





cooperate in managing shared groundwater basins. In fact, IBWC's Strategic Plan made groundwater investigations its first strategic objective under the Transboundary Cooperation category. Much remains to be done in understanding the quantity, quality, and hydrodynamics of most groundwater basins on the border. Border XXI provides a framework for identification and remediation of potential threats to groundwater quality. The evolution of state-level regulation, as seen in Arizona, is a positive development, as are basin-specific initiatives such as the Paso del Norte Watershed Council (U.S. Good Neighbor Environmental Board [GNEB] 2000).

Unfortunately, the demands on border groundwater resources are such that some of these basins may be badly depleted or contaminated by the time the two countries are prepared to reach an agreement. Complicating matters is the enduring ambiguity of whether the 1944 treaty actually extends to the settlement of groundwater questions as the IBWC's Minute 242 clearly implies, or whether an entirely new agreement or set of agreements would need to be reached on groundwater questions, as some experts would argue needs to be done. While these allocative issues are thorny, the two countries need not wait to make moves to protect groundwater stocks and storage basins from the threat of point-source and nonpoint pollution and to conserve the resource for urban and agricultural use.

*Non-Traditional Uses and Claimants*

The notion of non-traditional water uses may well be a misnomer. As transboundary water has been allocated, however, various uses fall into this category. Traditional water uses, if the 1944 Water Treaty's stipulated order of uses is the cardinal example, include domestic and municipal, agricultural, hydroelectrical, industrial, navigational, and certain limited recreational uses of water. Nontraditional uses, as defined in the treaty, are for all practical purposes a residual category of other beneficial uses apart from those named above.

Now there is little doubt that an ecological use of water is and should be a legitimate priority within the treaty context, and that such a non-traditional use is essential for the sustainable development of the border region. Allocating water to ecological functions

should be understood as an essential support for local and continent-wide ecosystems, habitats that sustain values essential to quality of life, and the maintenance of species on which the future depends. Unfortunately, the over-allocation of border water resources in the traditional spectrum of uses and the absence of binational agreements dedicating water to these aims has left little or no margin for setting aside water for conservation of natural values. Instead, operating within the context of the U.S. law protecting endangered species, high-risk litigation all too frequently becomes the only option to force traditional rights-holders to relinquish water for these functions.

To date, the volume of water that might be needed to protect and sustain existing ecosystems within the border region has not been quantified. If examples like the San Pedro or the Colorado Delta are any indication, however, the volume of water needed to sustain and partially restore native habitats is apt to be modest within the greater balance of uses. Unfortunately, up-basin trends on the border are moving in the opposite direction, implementing greater efficiencies and conservation of water for traditional purposes. Greater binational commitment is needed to prioritize and defend these ecological values and to mobilize public concern in their defense.

But there is some good news on both counts. Though a modest beginning, the IBWC's Minute 306, struck in December 2000, provides a framework for technical and scientific cooperation in studying the Colorado Delta's water needs in the express interests of preserving its ecology. Though it falls well short of amounting to an ecology clause to the 1944 treaty, it is a constructive beginning. A substantial binational coalition of regional and international nongovernmental organizations, which includes academic and scholarly research centers, has mobilized to explore the options for securing the delta's minimum water needs, drawing on market and non-market mechanisms. If they succeed, their example will prove useful in mobilizing political support for securing critical ecological needs elsewhere in the border region. Both in the delta case and elsewhere along the border, recent litigation aims to force U.S. federal, state, and local agencies to manage water to protect endangered species. This litigation is sure to shape the strategies and arguments deployed in the future in defense of border watershed ecology.

Just as there are growing demands for non-traditional uses of





border water resources, there are also non-traditional claimants. However, the notion of non-traditional claimants may be a misnomer since, along with environmentalists, these new claimants include the oldest stakeholders in the border community—indigenous people. Some 27 tribal governments are found in the U.S. border zone alone, and if river basins are considered, just one, the Colorado, has 34 tribal entities (EPA 2001; GNEB 2001). In the United States, the quantification of Native American tribes' water rights as an extension of federal reserved water rights is one of the most important redistributive initiatives presently underway, affecting the whole range of traditional uses and stakeholders (Western Policy Review Advisory Commission 1999). While the settlement of these disputes is far from finished, the uncertainty created contributes to the jealous guarding of individual and corporate water rights in the U.S. part of the transboundary river watersheds. Few observers dispute that settling these claims is critical to establishing a new equilibrium in the allocation of border water supplies, and this new equilibrium is vital to creating water use solutions that support the sustainable development of border water resources. In Mexico, long-neglected assertion of indigenous resource claims and the representation of indigenous stakeholders in binational policy is now beginning to make itself felt (EPA 2001).

*Maintaining Water Quality*

With trade integration, the quality of border region water resources is stressed as never before. The border's water quality problems are nearly as old as its human settlements. Water quality was also a driver of the 1983 La Paz Agreement. Since NAFTA, the range of actual and potential pollution and salinity problems from point and non-point sources has increased. The problem list is lengthy. Industrial and commercial facilities bleed contaminants from inadequate on-site collection and disposal facilities. The need for wastewater infrastructure remains acute. At the binational level, differences persist about what quality of water is operationally necessary to meet basic public health requirements. Existing standards of treatment may be inadequate at the level of pathogenic disease. The lack of adequate solid and hazardous waste disposal facilities poses a severe threat to groundwater and surface runoff. Practically none of the existing binational programs deal with diffuse, non-point, pol-

lution control. The list goes on (EPA 2001).

Without delving into the many details, which have been adequately profiled elsewhere, it is safe to say that there has been substantive and institutional progress on water quality. While NAFTA brought pressures that may outstrip its solutions, those solutions, in the form of new institutions and greater binational concert in response to these problems, are not immaterial. BECC and NADBank have mandates to develop water and wastewater infrastructure along the border, and that effort is directly linked to advancing sustainable development. With the support of the EPA and Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT), the two countries have invested more of their Border XXI Program funds in this area than any other (EPA 2001). More border residents have water services than in the past, thanks to the achievements of the Border XXI Water Resource group, which in the years between 1996 and 2000:

- Increased potable water service from 88% of the population served in 1995 to 93% served in 2000
- Increased wastewater collection service from 34% of the population served in 1995 to 95% served in 2000
- Disinfected 100% of border drinking water since 1996
- Increased total funding for border environmental infrastructure projects to $550.8 million, of which the United States contributed $425.5 million and Mexico contributed $125.3 million
- Began 36 BECC-certified projects (including three solid waste projects) for an estimated investment of $891 million; six projects have been completed, 16 more are under construction
- Granted a total of 22 U.S. tribal water infrastructure awards, totaling $11.8 million

Virtually all nine of Border XXI's working groups have responsibilities affecting water quality management. Critical indicators of water quality have been adopted, baselines set, and progress studied. Watershed management principles have been incorporated in technical studies and policy discussion. The search for solutions has led to more creative approaches to financing binational infrastructure involving the traditional turf of IBWC-CILA, including inter-





agency agreements that are changing the orientation and commitments of these established bodies. It has pushed agencies toward partnerships in technical assessment. BECC's and NADBank's mandates have been widened to accommodate a broader range of projects impacting water quality. The NAFTA-linked CEC has helped direct attention at water quality problems in the border region through its Article 13-15 procedures, which enable non-governmental and citizens' groups to highlight problems in national environmental enforcement. In 1998, the U.S. section of the Border Health Commission was created to better coordinate U.S. federal, state, and local agencies in dealing with Mexico on border area health issues, many of which are water-related (Border Health Commission 1998). And this does not include a wide range of local and municipal efforts to deal with water quality.

At the political and policy-development level, there is greater attention to public participation and institutional transparency than ever before, and an explicit binational commitment to strengthening local capacity for environmental management and incorporating citizens in project decision-making. Both Border XXI and BECC advance these principles and provide new venues for their expression.

These achievements, as good as they are, will not suffice if border water quality is to be improved and sustainable development advanced. Neglected problems such as non-point source management must be taken up. Within the context of Border XXI, the governments must set and deliver on critical priorities. More national and binational partnerships must be built between federal, state, and local agencies that coordinate water quality solutions. Comprehensive technical assessment of water basins must go forward, but it must not be an end in itself. More BECC-certified projects should be built within a broader framework of border-wide priorities for infrastructure development and adequate technical assistance for needy communities. Obviously much of this depends on the governments' willingness to back these programs with adequate funding, which, in turn, depends heavily on the effectiveness of border states' congressional delegations in articulating the importance of these programs in both the short and longer terms. And, as the two governments recognized in March 2001 when Presidents

Vicente Fox and George W. Bush met, it also depends on the willingness of U.S. authorities to extend to Mexico greater access to funds and credits as an investment in the binational future.

*Strategic Planning for Sustainable Development of Water Resources*

Any serious approach to sustainable development generally must incorporate longer-term planning and evaluative perspective. And that must be based on a pragmatic balancing of evaluation criteria and ecological and socio-economic concerns and objectives. It must be mutually arrived at through an open, transparent, and participative processes. In fact, the General Accounting Office (GAO) has recently called for more strategic planning in the management of environmental affairs along the U.S.-Mexican border. (GAO 2000; Spalding 2000). Achieving and implementing an integrative and long-term vision of common goals and objectives in support of sustainable water management practices is an immense challenge in the border region, especially considering the welter of jurisdictions and mix of national and subnational priorities and practices now in place. Some progress has been made, however. It is worth reviewing this progress before considering the challenges and possibilities of moving further in consolidating strategic planning of water resources in the border region.

Border water policy is still a considerable way from anything approaching integrated and comprehensive binational planning of even shared water resources (transboundary water basins), and it may never fully reach this goal, but a number of important reforms at the binational and national levels—including those achieved by the Border XXI Water Resources Group outlined previously—move modestly in this direction.

The most important is the Border XXI framework for environmental cooperation, which, operating within the authority of the 1983 La Paz Agreement, sets out an overarching set of goals and objectives encompassing sustainable development extending to water management. Border XXI, chaired by the national environmental ministries and operating through its Water Working Group and related work groups, provides a regular venue and consultative mechanism that brings together national agencies at multiple levels of government in a binational effort to identify actual and potential





water problems and coordinate national responses to the extent feasible. Because it operates within the La Paz process, it is possible to use this mechanism to reach binational protocols, outlined in the form of annexes to the 1983 agreement. However, this option remains under-used. The Border XXI process has recently been strengthened to better incorporate tribal, state, and local governments through the Ten Party Coordination Principles Agreement in 2000 (EPA 2001; GNEB 2000).

Like the La Paz Agreement on which it is based, Border XXI has been much criticized as an ad-hoc framework driven by administrative and sectoral differences amongst participating national agencies (EPA 2001). The process inevitably reflects the realities of political and policy decentralization in managing water resources. As a binational coordinating mechanism, it is liable to all deficiencies found in national systems of water administration, particularly the fiscal balkanization amongst agencies. As Border XXI is now up for review and renewal, it is possible the governments may address some of these deficiencies. Despite these administrative weaknesses, Border XXI has advanced the level of contact, discussion, evaluation, public participation, and accountability evident in considering binational water management concerns. It also has the advantage of providing a framework for cross-sectoral discussions within the broader umbrella of Border XXI's coordinating mechanism. The program has been a key mechanism for developing critical border-based environmental data, particularly water quality data, essential to long-term planning. Seen from the perspective of sustainable and binational development of border water resources it is a considerable improvement over the status quo.

BECC and NADBank also have mandates to promote sustainable development in the border region and attend to the water-related infrastructure needs of border communities. These mandates are largely implemented on a project-by-project basis. A recent agreement to expand their operational range has opened a window to more systematic, border-wide assessments of needs and priorities and broadened the range of water-related projects they may consider for certification and funding. Unfortunately, even with enhanced mandates, the agencies remain more reactive than proactive, depending heavily on locality, non-governmental, and private-sector

initiatives in setting their agenda.

At the national level, the IBWC has recently, and for the first time, developed a strategic plan that establishes a mission fixed on environmentally friendly boundary and water services driven by sustainable development principles. Its aims and objectives (Table 1), though limited to IBWC and not including CILA, are binational in spirit and scope. Its strategic goals in the categories of transboundary cooperation and water management are supportive of sustainable development and ecologically sensitive practices in spite of the fact that the mandate of its 1944 treaty, inclusive of formal minutes, does not yet extend this far. On the Mexican side, CILA has not yet formalized such a statement of mission, goals, and objectives, but may do so in the near term. While the status of such operational codes is unclear at the binational level and would need to be formalized to alleviate this ambiguity, there should be little doubt that these initiatives represent a constructive re-centering of IBWC's national section orientations within the treaty's limits. Though BECC—by dint of its investment-driving capacity, geographic scope, and direct links to Border XXI and IBWC—may offer the best venue for a cooperative binational effort to promote sustainable border water management, the IBWC, with its treaty mandate and river basin orientation, is a vital strategic partner.

Deserving mention at this level, too, is the U.S. Good Neighbor Environmental Board (GNEB), an independent federal advisory committee created in 1992 and charged with informing Congress and the U.S. president about environmental conditions and infrastructure needs of U.S. border communities. As an advisory body, GNEB lacks operating or implementing authority but its mandate allows a broad view of environmental needs in the border region with an eye toward sustainable development based on cross-jurisdictional and cross-sectoral expertise. Water management, particularly water quality problems, have been featured in each of its annual reports. Its fourth annual report (2000) urged the U.S. government to adopt a strategic water plan for the border region based on a watershed approach. GNEB attempts to reflect a multi-stakeholder perspective and, though it is not truly binational, it consults with a similar body for Mexico's northern border states, the Region 1 National Advisory Council for Sustainable Development. Though it





is not very visible in the policy community, GNEB has been successful in profiling more innovative approaches to water management and providing needed support for the action-oriented programs mentioned above.

In addition to these binational and national initiatives, a number of recent quasi-governmental and non-governmental initiatives aim to support or advance strategic planning and management at the river-basin level. Within the framework of the Border XXI Program, the Rio Grande Alliance, now unfortunately in administrative limbo, sought to engage mostly governmental stakeholders on both sides of the border in diagnostic and planning activities with respect to the Rio Grande/Río Bravo basin. In the same basin, the non-governmental Río Bravo Coalition initiative is coordinating stakeholder groups basin-wide in monitoring, advocacy, and policy development aimed at conservation and conflict-resolution in managing the river's water resources. Other river-basin planning initiatives exist on the San Pedro, Santa Cruz, and Tijuana rivers (Table 2).

Collectively, these various planning initiatives share a concern for sustainable development, an ecologically sensitive vision of the complexities of managing water resources, an explicit orientation toward binational cooperation, and an appreciation of the need for multi-stakeholder perspectives and venues in managing border water resources. At minimum, they reflect greater governmental and public awareness of the competing pressures on border water resources and the greater need for a conservation perspective over the long-term.

Effective strategic planning, however, requires effective governance which, in turn, implies responsible, accountable administration. However, overlaying the various jurisdictions, missions, strategic roles, and goals and objectives in border water management would present clear evidence of fundamental problems in pursuing sustainable water management. The most obvious problems are jurisdiction. The scope of authority varies considerably among these agencies, ranging from broad border-wide initiatives like Border XXI and those with narrower mandates, such as the IBWC, to irrigation districts and state and local agencies dealing with particular river basins and watersheds. Despite their commitments in principle to sustainable development at the organizational level, their operating modes vary considerably. BECC still operates largely on a case-

## Table 1. Binational Strategic Planning Mechanisms Related to Sustainable Water Use on the U.S.-Mexican Border

| | *Border XXI Program* | *BECC/NADBank* | *IBWC/CILA* |
|---|---|---|---|
| *Goals and Strategies* | To work toward sustainable development through the protection of human health and the environment and proper management of natural resources in the United States and Mexico through public involvement; decentralization of environmental management through state and local capacity building; and improved communication and cooperation among federal, state, and local governmental agencies. | To provide technical assistance to border communities and to certify environmental infrastructure projects in the border region for financing consideration by the NADBank and other sources. | To Provide environmentally sensitive, timely, and fiscally responsible boundary and water services, while applying sustainable development principles, along the U.S.-Mexico border region...to provide these services in an atmosphere of binational cooperation and in a manner that is responsive to the public<br>Specific goals include transboundary cooperation, boundary preservation, water agency management, and agency resource optimization |
| *Objectives* | Variable by working group. Water working group objectives focus on improving water and wastewater infrastructure, pollution prevention, watershed planning and management, water quality monitoring, training and development, efficient water use, and public participation. | Ensuring community support for projects that meet the principles of sustainable development; strengthening the institutional capacity of public utilities; developing programs and projects that are adequately designed and financially feasible; identifying additional sources of capital and credit, and developing financial packages based on the capacity to meet financial obligations; promoting structural changes essential to long-term project success, including proposals for reforming the legal and institutional frameworks in which projects are developed. | Under the transboundary cooperation specific goal:<br>• Partner with other entities with to carry out border ground water investigations in support of regional sustainable development efforts<br>• Partner with other entities in developing water marketing and water transfer approaches to dealing with water quality and quality and quality questions<br>• Coordinate exchange of expertise, technology, and other information<br>• Cultivate regional and international stake holder support; partner with other entities in problem prevention and resolution<br>• Partner with other agencies in international problem prevention and resolution<br><br>Under the water resources management specific goal:<br>• Apply and renovate flood control activities that incorporate stakeholder input<br>• Renovate water data gathering, exchange, and accounting activities in support of stakeholders needs<br>• Operate river system structures... in concert with other agencies in a manner that is responsive to stakeholders and the riparian ecology |
| Geographic Scope | 100 kilometers on either side of the border, coast to coast. | 100 kilometers either side of the border, recommended expansion to 300 kilometers south of the border. | Boundary line coast to coast; jurisdiction narrowly focused on transboundary aspects with the proviso that problems originating in treaty-denominated river basins may also fall within its authority. |
| Planning Interval | 5 Years | Variable by Project | Variable by Project |
| Assessment Mechanisms | Water quality indicators; investment indicators; project-by-project assessment. | Projects approved meet or exceed rigorous sustainable development criteria; little post-project review by these binational bodies. | Variable by functions and projects. |

Sources: EPA; McKinney; IBWC

by-case basis to develop urban border water infrastructure, and its managers are responsible to a representative and binational board of directors reflecting a diverse range of stakeholder views. IBWC, in turn, functions as a unified organizational hierarchy at the level of its national sections with an overriding goal of preserving national endowments—a goal to which other objectives are subordinate. Its treaty basis is the most rigid legal instrument for water management found at the binational level. Border XXI operates more at the level of a confederation of federal, tribal, and state agencies in which certain agencies, by dint of their administrative and budgetary position within their respective governments, carry more weight in driving policy action.

Planning horizons also vary, though most, including Border XXI, fall well short of the longer-term strategic aims necessary for truly sustainable development. Most investment decisions, whether taken in the context of Border XXI, BECC, NADBank, IBWC, or some combination thereof, are still reactive and politically driven rather than proactive or precautionary and based on a long-term calculus of sustainability. Other mechanisms—the river basin councils, for instance—operate less formally to educate and build consensus on problems and solutions.

Balkanization of authority and effort has temporarily derailed one of the most innovative planning initiatives to come along in some time, namely, the CEC initiative for a North American Transboundary Environmental Impact Assessment (TEIA) agreement. Such an agreement would certainly provide another piecemeal mechanism for mitigating against certain adverse ecological effects of water-related development. While supported in principle by the three federal governments, U.S. border states continue to resist any preemption of their local project licensing authority while Mexico, with its tradition of administrative centralism, insists on nothing less.

Given the political realities of federal government and regional planning on both sides of the border, there is a slim likelihood of achieving anything in the next decade or two that resembles comprehensive strategic planning of border water resources. This does not mean, however, that the border community cannot aim for and demand a greater level of functional articulation between the binational and nationally constituted units presently in place, nor that it should not demand longer-term planning horizons and policy commitments. The planning and quasi-planning initiatives that have been undertaken thus far are certainly contributing to the binational capacity to frame problems within the optic of sustainable development and explore solutions along these lines.





## Table 2. A Partial List of Watershed Councils, Commissions, Forums, and Task Forces Along the Border Created Since 1990*

| Watershed/River Basin | Governmental/Quasi-Governmental | Non-Governmental |
|---|---|---|
| | | |
| Rio Grande/Río Bravo | Rio Grande Alliance | Rio Grande/Río Bravo Coalition |
| | Rio Grande Citizens Forum | Alliance for Rio Grande Heritage |
| | Paso del Norte Watershed Council | Rio Grande Restoration |
| | Paso del Norte Water Task Force | Rio Grande Institute |
| | Consejo de Cuenca, Río Bravo | |
| | | |
| Rio Conchos | Fundacion para Conservacion del Rio Conchos | |
| | | |
| San Pedro River | Upper San Pedro Initiative | Upper San Pedro Program |
| | | |
| Santa Cruz River | Nogales Citizens Committee | |
| | | |
| Colorado River | Consejo de Cuenca, Rio Colorado | |
| | Colorado Delta Binational Technical Task Force | |
| | | |
| Salton Sea/New River | Salton Sea Authority | |
| | | |
| Tijuana River | South Bay Citizens Forum | |

*This list is not meant to be comprehensive, nor does it include university and research institutes, government agencies, particular environmental organizations, irrigation districts, and many other bodies and stakeholders interested in managing these watersheds.
Source: Authors

More can and should be done. Much of the progress realized over the past two decades has been achieved through framework agreements and memoranda of understanding at the interagency and binational levels, which allows for the better coordination and commitment of

government efforts in pursuit of environmental and water management objectives. These procedures should be reinforced and elaborated. The Border XXI agreement, for example, should move toward more public participation, institutional capacity building, specific interagency commitments in pursuit of water management objectives, and commitments that advance its strategies of decentralization (EPA 2001). Following the letter and spirit of the Border XXI Coordination Principles, tribes, states, and municipalities should be better incorporated into the working group processes. Participating governmental organizations should continue to develop and strengthen strategic partnerships with non-governmental and citizen bodies in promoting sustainable water management objectives. Even these changes will require greater presidential commitment on both sides of the border. IBWC-CILA should move toward formalizing their respective sectional commitments to sustainable development. A further mechanism should be created that would enable IBWC-CILA to engage the BECC, NADBank, and subgovernmental units in both nations in long-term planning for border environmental infrastructure. Finally, the two governments should renew their efforts to reach a viable TEIA agreement that can be used at the project level to explore options for mitigating the adverse environmental impacts of development related to the use of border water resources.

## *Innovative Management Concepts: Markets and Watersheds*

The search for innovative strategies to advance sustainable water management in the border region has lately embraced both market and watershed tools. Markets and watersheds are not mutually exclusive ideas; both concepts challenge politically denominated boundaries. As policy prescriptions for sustainable development, however, they move in different directions, responding to different problems and offering different solutions.





### *Market Solutions*

Market-based solutions are usually advanced for solving the problem of resource supply, or scarcity. As economists are fond of saying, market effectiveness is contingent on a clear assignment of property rights supporting the dynamics of negotiation and exchange among owners. In the absence of clearly assigned rights, property values remain poorly represented and uncertain, restricting the effective transfers of property necessary for the operation of an efficient market system. Markets are fundamentally decentralizing and, in the minds of many advocates, distorted by government intervention. Thus market-based solutions usually entail some prescription for a reduction of government ownership or regulation.

Because market principles and mechanisms are well-institutionalized for the assignment of water uses in both the United States and Mexico, there should be little doubt that markets will be part of any repertoire of mechanisms for promoting sustainable development of border water resources. They are vital on two levels: First, in facilitating transfers of water to higher-value uses along the border, and second, in enabling and directing investment in support of needed water-related infrastructure. Market solutions currently figure in policy responses to any number of specific water-based issues in the border area, be it a long-term solution to minimal water requirements of the Colorado River delta ecosystem or fiscal capacity-building for projects seeking BECC's certification.

Applied to the problem of advancing the sustainable development of water resources in the border, however, markets are deficient in several aspects. First, they do not function in a vacuum but directly express pre-existing inequities in the assignment of uses within and between states. In a border environment defined by underdevelopment and poverty, markets cannot be relied upon to remedy inequities by themselves, and perceptions of equity may affect the willingness of stakeholders to participate in the cooperative practices essential to sustainable development. Second, markets function in highly decentralized and particular ways that often favor short-term profit-taking over long-term investment and savings. Markets may clash with the long-term perspective that is central to sustainable development. Third, markets are theoretically boundless. Evidence of their global reach and force is voluminous at the border.

They cannot be expected in themselves to advance place-oriented goals and values. Fourth, as common-pool theorists generally caution, where shared, transboundary, resources are concerned, the uncertainty associated with dissimilar systems of use assignment, in the absence of international agreement, supports market-driven exploitation of the resource to the point of exhaustion. These problems and others point to the necessity of public intervention if markets are to be harnessed to reach the goal of sustainable border region water use.

With these cautions in mind, market solutions are favored by leading international agencies and many stakeholder bodies. The World Bank and the Organisation for Economic Co-operation and Development (OECD) both support water pricing as a key instrument for dealing with water scarcity and redistributing water to areas of greatest need (CEC 2001). Policies promoting the absorption of the real cost of water by end-users are apparent at the border level in the certification and financing of border water infrastructure by BECC and NADBank. The key to successful application of these market reforms in regions of relatively high economic disparity, like the U.S.-Mexican border, is taking into account local capacity and willingness to pay, guarding against the development of exploitative monopolies, and imposing sufficient regulation to guard against the externalization of important social costs, such as adverse environmental effects.

*Watershed Management*

Advocacy of a watershed approach is predicated on the assumption that sustainable development is more likely to be achieved when a full accounting of the complex ecological and socio-economic interrelationships is made within a particular hydrographic unit. The term "watershed" is generally preferred to the term "river basin" as its meaning is somewhat more elastic. A watershed may be co-extensive with a river basin, or part of it, and incorporate the natural landscape in its reach. Using watersheds as a geographic referent in water management is not new, they are often the focus of apportionment efforts. Indeed, one could argue that a de facto acknowledgment of watershed realities is seen in binational efforts to divide equitably the surface runoff of the principal transboundary river





basins in the border region (GNEB 2000). As a policy concept, however, the attractiveness of watershed-based management has been driven by environmental concerns. Pollution prevention, biodiversity protection, and conservation of renewable and non-renewable resources are problems that, as related to water, are best understood within the natural catchment framework of watersheds. At the social level, the sense of the natural integrity of watersheds and their complexity supports both a sense of place and a logic of looking beyond fixed jurisdictions and organizational sectors to cooperate in sustaining the fluid dynamics on which life depends.

The problems of employing a watershed approach are economic and political, but ultimately they are social. First, watersheds usually clash with markets. Whereas a watershed approach is inherently conservative, examining a water-based problem through the lens and limits of the catchment, markets treat water as a commodity that ought to flow freely toward higher values whether or not these are catchment-contained. Both the Rio Grande and the Colorado now flow outside their original catchment in response to agricultural and urban demands in the Rocky Mountain region. The old adage of "water flowing uphill to money" accurately captures this reality. Water policy in the United States and Mexico has long been based, to a large extent, on market practices, and this means implementing watershed management concepts frequently requires modifying market-based commitments. This, in turn, amplifies the state's role in water governance.

Second, watersheds cross established political and administrative jurisdictions. This obvious fact has proven the bane of watershed management efforts in North America and remains the most difficult challenge. At the international level, the problem is aggravated by greater variation in political and administrative approaches to water management. This produces something of a paradox, namely that in theory, watershed management requires more governance than market-based systems because it conflicts with established jurisdictions. In short, watershed management is governmentally demanding and politically messy.

Despite these difficulties, watershed management's attractiveness is driven by the need to integrate and harmonize management practices across jurisdictions and better represent a greater range of

stakeholders in management decisions. Watershed management principles have been embraced by federal authorities in both countries with varying degrees of success. A recent report by the Western Water Policy Review Advisory Commission has gone so far as to propose the creation of a new federal authority to oversee the development of watershed management initiatives in the western United States (Western Water Policy Review Advisory Commission 1998). On the U.S. side, the EPA and other federal agencies have endorsed watershed management. The development of river basin or watershed councils, or *consejos de cuencas*, under Mexico's 1990 National Water Law has gradually evolved and these councils are now in place on both the Rio Grande and Colorado rivers. Mexico's previously mentioned latest environmental plan also fully supports the watershed approach as a unit for managing the nation's natural resources within the framework of integrated basin management.

On the border, national initiatives in watershed management are beginning to create opportunities. Watershed management approaches are seen in innovative efforts to: coordinate intergovernmental planning within major river basins and tributary watersheds; forge new partnerships with governmental and non-governmental stakeholders; establish new advisory and attention groups, sometimes formalized as watershed councils; and initiate studies within an ambit of public participation and stakeholder involvement. (A partial list of such initiatives in the border area is in Table 1). With the support of foundations, universities, and non-governmental organizations, a number of important citizen-based watershed initiatives have taken root.

As so many of these watershed initiatives are new, it is simply not possible to assess their general effects on border water management. Their operational scope, mode of decision-making, and links to participating actors vary considerably by area and project throughout the border region. What is certain is that more information on water management is now produced, exchanged, and diffused binationally than at any previous time in the border's history. At the level of particular watersheds, these collaborative and transjurisdictional endeavors have certainly contributed to binational understanding and a greater level of cooperation than before.

Much more difficult, however, is reaching consensus on management practices at the watershed level, even in a strictly national context. Within the context of the Border XXI Program, the Water Working Group is struggling to agree on binational priorities for watershed management in the two major international river basins, and various particular technical studies are linked to this effort (EPA 2001). Yet it is not by accident or failure of good intentions that the United States and Mexico have yet to establish a truly binational watershed council for the Rio Grande/Río Bravo, or the Colorado River, even at the framework level. GNEB strikes a more optimistic note in this regard (GNEB 2001). Despite the many impediments, watershed management approaches appear to offer the greatest promise for supporting a sustainable approach to the use of border-area water resources while drawing a broader range of stakeholders into the process. With the federal governments moving in this direction and as local experience grows, it should be possible to strengthen institutional commitments to these new modes of evaluation and decision-making in managing border water resources commitments that increasingly bridge the border.

## Conclusion and Recommendations

At the binational level, the prospect of comprehensive, programmatic planning for sustainable development seems remote. The rapidly building pressures on the border environment from development have outstripped the capacity of current institutions to meet the challenge of sustainable development in the near-term.

In the face of the many critical pressures outlined above, there should be little doubt that sustainable development of border-area water resources requires further institutional development at the binational and national levels. Institutional progress must advance on both the substantive and procedural levels. Substantively, the countries must quicken their efforts to deal with the pressing problems of drought, groundwater management, ecological uses, and water quality. Procedurally, the governments must make better use of existing institutional mechanisms, give greater priority to binational cooperation and planning, and encourage more partnerships, inter-sectoral alliances, and public collaboration in planning mechanisms.

Progress is possible in all these areas, although the march of events has already begun. Some progress must come by revising binational mandates. In the cases of drought, groundwater, and non-traditional water uses, for instance, the clarification of treaty language is imperative if common water resources are to be sustainably managed. The legal ambiguities and substantive lacunae that contribute to unilateral and short-term benefits and resource exhaustion must be critically re-examined for the possibility of solutions that are long-term, binational, and satisfy the inter-generational criteria of sustainability.

Progress may also be had by demanding more existing institutional infrastructure. As the recent debate over BECC-NADBank functions shows, a reinterpretation of the basic mission may enhance the institutional capabilities and build operational synergies with favorable impacts border-wide. It may even be necessary, as Presidents Fox and Bush recently proposed, to rewrite the 1993 agreement to further integrate and optimize these institutions' functions (Abel 2002). Better use could also be made of the IBWC in coordinating binational responses to drought and groundwater scarcity. Recent efforts by IBWC-CILA's national sections to formalize commitments to sustainable development are a favorable sign and part of the process of intellectual agency orientation re-framing that is essential to building new partnerships and working across national and binational sectoral lines to find new solutions to pressing problems.

Central in this institutional re-orientation is that border water management must become drought management. This is a critical lesson of the present Rio Grande water crisis and one that is exceedingly relevant for the entire border region. As Ismael Aguilar and colleagues recently observed, an adequate drought management regime requires a radical policy departure, one that moves beyond the reactive mode of crisis-response to embrace a permanent, long-term drought mitigation effort (Aguilar et al. 2001). Absent such a proactive program—one that unites the various agencies of the two governments in a coherent action plan—efforts to achieve regional water security will be severely limited (Aguilar et al. 2001; Utton 1999).

To date, much of the real advancement toward treating border





water sustainably has come not through fixed treaties and agreements but through framework agreements that aim at opening procedural windows for binational cooperation. The La Paz Agreement and its second-generation offspring, the Border XXI Program, have contributed to an unprecedented level of binational interaction and information exchange. This should continue, but it is not enough. Binational commitment to specific tasks through specific partnerships that contribute to the broader goals and objectives within the Border XXI Program is needed. And these commitments must be better funded. The federal governments should heed the call of Border XXI's critics to develop budgetary review that requires participating ministries and departments to give priority to inter-agency investments. It may not be necessary (as some have argued with reference to particular problems with the U.S. budgetary process) to narrow Border XXI's scope by eliminating its natural resources functions, as this risks losing the very inter-sectoral synergies that Border XXI has nourished since 1996. Achieving further policy integration and force will, however, require greater executive attention to the process in both countries.

The importance of executive intervention compels us to recognize that the persistence of sovereignty, while often a barrier to binational cooperation, also affords an opportunity, even as both countries rightly pursue greater decentralization and local involvement in binational decision-making. The very structure of sovereign systems enables central governments to advance concepts and solutions that subsidiary governments may well resist for entirely parochial reasons. Alternatively, local governments and citizens groups are often better poised to articulate the place-based and ecologically sensitive values that central governments overlook or fail to comprehend. There should be little doubt that innovative solutions to regional drought or transboundary environmental impact assessment require considerable federal resolve, while watershed management needs local initiative and collaborative effort from stakeholders at all levels.

In this respect, there is much to be gained by looking carefully at the cooperative dynamics associated with watershed-based planning efforts in the border area. While cooperative management of transboundary watercourses is still in its infancy, if that, the multiplica-

tion of governmental and non-governmental mechanisms oriented to watershed planning is heartening. Whether the mechanism is river basin councils or less formal multi-stakeholder exercises in watershed stewardship, such processes soften the hard edges of established jurisdictions and spur innovation on trans-institutional and binational cooperation. Collaborative management approaches have applications for the conjunctive management of surface and groundwater. As such, they hold promise for dealing with both treaty-defined and non-treaty water stocks addressing both qualitative and quantitative issues. Although the proprietary aspect of water use is apt to complicate the process of reaching formal agreements on binational watershed management, it may be possible, following the recent effort in binational air quality management, to build such practices into the La Paz Agreement as annexes. Where impediments arise from treaty-based commitments or lacunae, as with groundwater, the development of framework agreements linked to treaty obligations offers a channel for reaching an agreement on technical issues and may serve as a catalyst for building binational coalitions for cooperative solutions.

In sum, there is much the two countries can and should do to improve their institutional arrangements for sustainable water resources management as they anticipate developments to the year 2020. The complex array of local, state, regional, federal, and international institutions at play in border water management presents an enormous challenge. Certainly it is in the best interest of the two nations and the binational border region that water is managed effectively. Yet, time is pressing and may prove the master of events. The United States and Mexico are now committed to a long-term process of economic integration that will intensify development in the border area for the foreseeable future. Whether that development ensures collective health and sustains common resources is an open question. What is certain, and what was learned so graphically on September 11, 2001, is that if this is to be, then binational cooperation is not an option. It is essential to health, well-being, and even national security over the very long haul. To do that, stakeholders must consolidate gains, thicken involvements, and strengthen commitment to sustainable development in the border region.





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