Reforming Bi-national Water Management on the Mexico-U.S. Border

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Abstract
Mexico and the United States share border water under bi-national agreements that need to be updated. Rather than seeking a new treaty, amending the 1944 Treaty will overcome existing shortcomings.

(1) Conceptually, water managers on the border should adopt the principles of Integrated Water Basin Management (IWBM). IWBM, now being implemented in France, the European Union and California, seeks to link management of surface and ground water, river and adjoining land, and economic development and health of the ecosystem.

(2) The multi-state Murray-Darling Commission in Australia, established in 1988, provides a model for sustainable water management in a semi-arid environment that resembles conditions on the Mexico border. The Commission has used IWBM to develop innovative transboundary water management.

(3) The 1909 Treaty for bi-national management of water resources on the U.S-Canada border offers a precedent for addressing new water concerns as they arise. The Treaty was amended repeatedly to reduce water and air pollution, establish organizations for basin (rather than river) management, and use scientific research to build a solid foundation for action proposals.

Each model will be briefly described; the findings will be used to present an outline for reforming water management on the Mexico border.

Water on the Border
Colorado and Rio Grande are the major rivers draining either side of the Rocky Mountains in the arid Southwestern United States and Northern Mexico (see figure 1). In the 1983 La Paz Agreement, Mexico and the U.S. defined the border area as the corridor extending 100 km (66 miles) on either side of the international border. The U. S. Geological Survey has delineated the border area from the perspective of shared water resources (see figure 2; U.S. Department of Interior 1996). Using hydrological criteria the border area includes the lower reaches of the Colorado, Gila, Rio Grande, Rio Conchos, Pecos, Rio Salado and Rio San Juan. The hydrological border area contains 408,185 km$^2$ (157,600 square miles)—comparable in size to California. The area includes 86 basins and sub-basins. The most important ones are Colorado, Rio Grande, Conchos, Pecos and Salado. Sixty-three per cent of the border area lies in the U.S. and thirty-seven per cent lies in Mexico. About half of the land within the U.S. part of the border area is owned or administered by the Federal Government. The Colorado forms the international boundary for just 27 km (17 miles) but traverses much of the border corridor. The Rio Grande marks the boundary for 3,057 km (1,900 miles) from El Paso to the Gulf of Mexico. The river has been listed as one of nine international river basins currently undergoing conflict. (Correira 1999)
The border region between Mexico and the United States is arid to semi-arid. People live mostly in twin cities—one on each side of the border. Beginning during World War II, the population has doubled every twenty years, and is projected to follow this path in the future. This trend was initially triggered by the need for good weather training facilities on the part of the U.S. Air Force, and later reinforced by the labor demand of custom free production facilities set up in Northern Mexico under the maquiladora program. As a result, demand for municipal and industrial water increases steadily. Traditionally, 80 to 90 percent of available water has been used by agriculture which has long been established in parts of the border region with fertile soil. Now, and even more so in the future, there will be fierce competition between municipal, agricultural and in stream water. In this fast growing, arid region water is the single most important natural resource for development. Almost all of the available water comes from rivers and aquifers that are shared by Mexico and the U.S. How this water is shared, and how responsibly it is used, will determine the future of the region.

The Agreements
Agreements between Mexico and the U.S. for sharing water resources on the common border date from 1906 (for the Upper Rio Grande) and 1944 (for both the Colorado River and the Lower Rio Grande). The key provisions are:

Convention of 1906: Mexico receives 60,000 acre-feet/yr from the Upper Rio Grande at El Paso, Texas. During periods of drought this amount is reduced in the same proportion as water deliveries to U.S. irrigation districts in Southern New Mexico and Far West Texas are reduced.

Treaty of 1944: Mexico receives 1.8 million acre-feet/yr from the Colorado River. In exchange, the U.S. receives 350,000 acre-feet/yr from the Río Conchos in the Lower Rio Grande Basin. There is no provision for dealing with drought. However, deficiencies in water deliveries in any particular year can be made up over the course of the next five years. As part of the Treaty the two countries agreed to jointly build and manage Amistad and Falcón Reservoirs on the Lower Rio Grande and to authorize the International Boundary and Water Commission (IBWC) and its Mexican counterpart, the Comisión Internacional de Agua (CILA), to jointly manage the rivers on the border from Baja California to the Gulf of Mexico.

In many respects, the 1906 Convention and the 1944 Treaty have served both countries well. IBWC and CILA cooperatively handle flood control, reservoir management and water allocation. This is done competently by staff trained primarily in engineering. But many shortcomings exist. These are due to limited treaty authority, resource constraints and an outdated operating style used by IBWC/CILA. The most glaring weaknesses include: lack of a regime for managing bi-national aquifers, absence of drought provisions in the Treaty, lack of efficient mechanisms for working with border communities and stakeholders, missing capacity for pro-active planning, limited concern for the ecological health of waterways and riparian land, and lack of capacity to conduct scientific studies and assessments that are needed for management decisions. Many of these deficiencies can be explained by the age of both the Convention and the Treaty. During the first half of the last century, the area was sparsely populated. When the agreements were negotiated, both countries were mostly interested in flood control and water for agriculture. Growth was not anticipated. The concept of basin wide sustainable water management was decades away, as was the practice of proactive planning based on the results of scientific studies and assessments. It is exactly these tasks that need to be addressed today.

Updating of 1944 Treaty rather than new treaty.
I will argue that many of these deficiencies can be addressed within the framework of the existing bi-national agreements. Thus formal renegotiations and Senate approval with all their
uncertainties and delays would be avoided. Necessary elements of reform include: using water basins, rather than rivers, as management units; developing institutions and procedures that are appropriate for transboundary water management in arid lands; and using legal precedent for expanding the 1944 Treaty. I will address each of these issues and use the results to present a reform proposal for IBWC and CILA.

Moving to integrated water basin management (IWBM)
At present, water planners for the rivers on the Mexican border work on river segments within political boundaries. This makes it difficult to consider changes to water supply and demand that transcend political boundaries, both between states (within the U.S.) and between countries (Mexico and the U.S.). Worldwide, water management is changing from a focus on rivers to river basins—the river and its entire catchment area.

Integrated basin- or watershed-wide management responds to the fact that river systems are subject to a variety of natural and socio-economic stresses. Natural stresses include water scarcity, drought, climate variation or change, desertification and increased soil salinity. Socio-economic stresses include population growth, urbanization, irrigated agriculture, lack of infrastructure and poor water management. These stresses and their impacts tend to be interactive. The resulting complex problem clusters are difficult to entangle—a major challenge for science. The National Academy of Sciences has outlined a blueprint for a more integrated and holistic way to study problem clusters of this kind (National Research Council 1999b). IWBM embraces this approach by placing rivers and aquifers in the context of the surrounding natural and social systems. As such, it serves three interrelated goals: quantifying the available amount of water for different uses that is sustainable over many years; maintaining and improving environmental quality; and supporting sustainable economic development in the basin. To reach these goals IWBM needs institutions and resources for basin-wide planning, community and stakeholder participation, and access to multidisciplinary scientific support.


Reform of French Water Management
Under a 1964 law, France decentralized water management (Academie de l’Eau 1999). Until then, water was managed by administrative subdivisions of the state (called départements). Few special arrangements existed for rivers traversing multiple jurisdictions. The new law made the river basin the principal management unit. The country was divided into six large river basins. Each basin was charged with preparing and periodically updating a comprehensive water plan. New institutions were created: the basin water authority is responsible for management and administration, and a river basin committee, chaired by a local elected official, reviews plans and budgets. A user fee system, based on the polluter pays principle, was introduced. The income is used to fund water improvements.

1 The State of California is also in the early stage of adopting the principles of IBWM. It is not clear, however, whether this initiative goes beyond administrative coordination between two state agencies (California Environmental Protection Agency 2003).
As experience was gained, water planning was further devolved to the smaller geographical scale of sub-basins and tributaries (RMC 2000). This step allows for consideration of place-based socio-economic as well as natural conditions. During the nineties, the concept of “water contracts” between sub-basins and basin-wide water authorities was introduced. As part of the contract, local stakeholders and experts, organized as a local water commission, prepare a water plan for review and funding by the basin assembly and management authority. Thus conditions and needs in the sub-basin are incorporated into the basin-wide plan. The French reform of water policy was driven, for most of its history, by concern with water pollution. Only recently, have new priorities emerged, such as river restoration and other ecological concerns. The impacts of climate change have been studied by scientists and the French Environment Ministry (Redaud 2002). There is no information on whether the regional water agencies make use of this information.

Reform of European Water Management

In 2000 the European Union (EU) issued a water directive that is now being incorporated into national law in twenty-five member states. The directive mandates three goals that are to be addressed at the basin level: conjunctive management of ground and surface water, balancing of economic and ecological concerns, and full participation by stakeholders. The ten-year time plan includes a number of milestones: 2003, revision of national and provincial water laws; 2004, completion of basin-wide assessments of current conditions and problems; 2006, monitoring system is to be operational; 2009, first basin management plans to be completed. Even after full implementation, the traditional water management institutions, organized in most countries at the provincial or national level, will remain in charge. Basin-wide tasks will be addressed through cooperation with other political jurisdictions.

The EU directive focuses on environmental concerns, such as water quality, land degradation, and loss of wetlands. It does not address the special concerns encountered in arid regions.

A model for transboundary water management in arid regions

The southeast Australian experience in the Murray-Darling basin provides guidance in this regard. First, because the basin is mostly arid and semi-arid; environmental conditions are similar to the Mexico-U.S. border. Second, because capacity building for new skills and institutions has been at the heart of the work undertaken for the last twenty years in the Murray-Darling Basin (Blackmore 1995, Ellway 2002, Gippel 2002, Global Water Partnership 2003, Goss 2002).

The Murray is one of Australia’s most important waterways, stretching 2,560 km, providing water for close to half of Australia’s commercial agriculture and drinking water for two million people. The basin is dominated by extensive dryland agriculture. Irrigated agriculture is second in economic importance, using 70 percent of Australian water. The catchment area also includes the Darling and Murrumbidgee rivers. The basin includes five states and covers 14 percent of Australia’s land mass. About 80 percent of the basin is arid or semi-arid. Ninety percent of the basin area contributes little or no runoff, except during occasional flooding. Runoff originates in the cool and humid eastern uplands, the temperate mallee country of the southeast, and the subtropical areas of the northeast.

In 1985, the Murray-Darling Ministerial Council was created. Membership includes the federal government, five states and the Australian Capital Territory. As its first project the Council conducted a Basin Environmental Resources Study. The study documented widespread degradation of natural resources in the basin. To reverse these trends an executive agency was created in 1988. The Murray-Darling Basin Commission was given the following mandate:
“Through the Government-community partnership, to foster joint action to achieve the sustainable use of water, land and other environmental resources of the Basin for national benefit of present and future generation, and to maintain responsible, efficient and cost-effective delivery services of water of agreed quality from the River Murray.” A third institution—the Murray-Darling Community Advisory Committee—was established to provide stakeholder input. Members are appointed by the Ministerial Council.

Early on the Commission adopted key principles of IWBM for its work, such as integrated scientific assessments, stakeholder participation and partnerships between federal and state governments. Several plans and agreements have been completed. These include a river sustainability audit, a salinity management strategy, and specific project plans as well as an overall strategic plan. In 1995, the Ministerial Council agreed on a cap on new water diversions. The cap allows for new developments only if they meet their water needs by using current allocations more efficiently or by purchasing water from existing users. Minimum environmental flows for the rivers are now under discussion. Several agreements between the participating states have been concluded to share water through a water trading scheme.

The Commission has a staff of sixty and an annual budget of about $US35 million. The secretariat is funded by the federal government, and all partners contribute to the financing of various water management programs.

**Legal precedent for expanding the 1944 Treaty**

The Canada-U.S. International Joint Commission (IJC) has used its treaty as a flexible framework under which new tasks were addressed as they arose (International Joint Commission 1997 and 2000). The IJC was created by the 1909 Boundary Water Treaty and resembles in important respects the IBWC set up under the United States-Mexico Treaty of 1944. For example, U.S. commissioners are appointed by the President, and Canadian commissioners by the Prime Minister. The two countries maintain Canadian and U.S. sections that closely work together on all issues. Funding is provided as part of the budgets of the State Department or the Department of Foreign Affairs and International Trade. The Commission is authorized to conduct joint fact finding studies, which often lead to recommendations that are submitted to the two governments for action. Similar arrangements are part of the Treaty. Yet comparable structures have led to different results. The IJC has used its mandate to address new policy issues as they arose. The Water Quality Agreement of 1972 assigned monitoring and auditory roles to the Commission in the clean up of the Great Lakes. Under the Clean Air Agreement of 1978 the Commission helped with reducing air pollution in the boundary region. The IJC also contributed, in a minor role, to the resolution of the dispute between Canada and the U.S. over the causes and impacts of acid rain. The Commission is now organizing bi-national boards for the management of border water basins. To support its additional responsibilities the IJC created a common scientific office, permanent advisory boards with broad stakeholder participation, and temporary task forces to address special concerns. In each case, the new initiatives were implemented through joint fact finding, recommendations to national governments, and subsequent agreements between the two countries.

These IJC accomplishments provide an important reference point for updating and expanding the Mexico-U.S. Treaty of 1944.
A proposal for reforming IBWC and CILA
Overall, IBWC/CILA should use their fact-finding authority—the so-called minute process—to submit to the two governments a detailed plan for applying the concepts and tools of IWBM to the operations of the Mexican and U.S. sections of the border agency.

The plan would include a number of specific recommendations:

Create—parallel to the existing engineering divisions—an office for integrated watershed assessments.

Organize the new unit as a joint bi-national office, to be called the Joint Office for Watershed Assessments (the Joint Office).

Charge the Joint Office with the task of building a shared data base on water resources and related socio-economic and environmental conditions in the border region and to prepare recommendations on water improvements for consideration by the two governments.

Organize participatory water planning by convening two bi-national basin councils, one for the California-Arizona border, and the other for the international reach of the Rio Grande. Membership of the councils will include federal, regional and local authorities, non-governmental organizations and other stakeholders.

Give the basin councils the authority and resources to operate as permanent bodies for bi-national consultation, fact finding and planning. Each council should be tasked with preparing and regularly updating a comprehensive plan linking ground and surface water resources to development in the basin.

Assign staff of the Joint Office to provide management support to the basin councils.

Establish scientific advisory committees to support the work of each basin council.

Charge the councils to cooperate with non-governmental water groups operating at the smaller geographical scale of the sub-basin. The five-year old bi-national Paso del Norte Water Task Force, with membership from city water utilities, irrigation districts, universities and communities, provides a useful model.

Once the reform plan is completed, the two governments should convene a joint working group of experts to provide comments and recommendations. This would be followed by government representatives drafting specific amendments to the 1944 Treaty.
Figures

Figure 1
Figure 2
Shared Water Resources on the Border with Mexico

Region 1 Pacific Basins/Salton Trough
Region 2 Colorado River/Sea of Cortez
Region 3 Mexican Highlands
Region 4 Mimbres/Animas Basins
Region 5 Rio Grande—Elephant Butte Reservoir to above Río Conchos
Region 6 Rio Grande—Río Conchos to Amistad Reservoir
Region 7 Rio Grande—below Amistad Reservoir to Falcon Reservoir
Region 8 Rio Grande Valley—below Falcon Reservoir to Gulf of Mexico
References


