

Reaching Groundwater Agreements on the Border Between Mexico and the United States: Science and Policy Fundamentals

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Abstract

Groundwater is vital to the sustainability and survival of human communities in the U.S.-Mexico border region, a nearly 2000 mile-long, arid zone in North America where climate uncertainty prevails. More than 30 aquifers are known to abut or span the international boundary, supporting a border area population exceeding 15 million persons in 2020 (Figure 1). Groundwater is the sole or principal water source for more than half-a-dozen sister cities or communities ranging from one of the largest binational metropolitan zones, El Paso-Cd. Juárez, to the thriving binational metropolis of Ambos Nogales, to smaller coadjacent communities on the western land boundary and along the Rio Grande River. Unfortunately, groundwater utilization is regulated by international agreement in just one small area, the San Luis Mesa, along the southerly international boundary. That agreement, signed in 1973, noted the need for a comprehensive groundwater agreement for the border region, a goal that has eluded the two countries for nearly half a century. This paper examines the prospect of reaching additional groundwater agreements between the two countries. It first considers the institutional setting shaping binational cooperation on transboundary groundwater management. It then reviews advances in binational technical and scientific cooperation on transboundary water relevant to shared aquifers. It follows by considering how emerging diplomatic principles and practices may facilitate cooperative approaches to managing shared aquifers along the U.S.-Mexico boundary, drawing on recent experience in groundwater assessment gained from binational engagement in the Transboundary Aquifer Assessment Program. The paper concludes by identifying principles and practices that are most conducive to advancing binational collaboration on transboundary aquifer management to utilize these essential resources more sustainably.

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Figure 2.
Elements and conditions for a Binational Groundwater Agreement between the United States and Mexico



(© Own Elaboration)

Managing Groundwater Along the U.S.-Mexico Border: The Institutional Setting

Any initiative to manage the use of transboundary aquifers along the U.S.-Mexico boundary plays in a complex institutional arena. Each nation governs its aquifers differently. Mexico's subsoil resources belong to the Nation. The Executive Branch exerts its authority over national waters by way of Mexico's National Water Commission (CONAGUA), extending water rights to private and public users. In the U.S., regulatory authority over groundwater is largely vested with the states. The border states of California, Arizona, New Mexico, and Texas regulate groundwater use, often with further differentiation within the states. Federal regulations in both countries establish water quality standards for drinking and water discharges.

Transboundary aquifer management today, in the absence of binational agreements, is effectively a domestic function. There is, however, a diplomatic mechanism for crafting and administering transboundary aquifer

agreements. The International Boundary and Water Commission (IBWC), established under the authority of the 1944 U.S.-Mexico Water Treaty, is charged with interpreting the treaty and resolving any disputes that may arise concerning transboundary waters. Functioning as two separate national sections, each under the authority of its respective foreign ministry, the IBWC is authorized to interpret the 1944 Treaty through the adoption of binational implementing agreements (Minutes). Though the treaty did not address shared aquifers, the IBWC's jurisdiction for settling transboundary aquifer disputes was recognized in 1973 by Minute 242, which settled a longstanding dispute over Colorado River salinity and regulated groundwater extraction on the San Luis Mesa. Minute 242's consideration of groundwater establishes the study and management of transboundary aquifers as a legitimate application of 1944 Treaty authority should the governments so desire.

Principles, practices, and possibilities for transboundary groundwater collaboration

Though there is the potential for binational groundwater management of groundwater shared by border communities large and small, the history of U.S.-Mexico collaboration on groundwater resources is not much different from what has happened in other places around the world. Transboundary aquifers represent the sole or primary source of water for many border communities worldwide. Yet only a handful of agreements for the assessment and management of shared groundwater resources exist. The 2008 Draft Articles on the Law of Transboundary Aquifers (UN Draft Articles) provide guidelines for the use of shared groundwater resources focusing on best practices for the protection, preservation, and management of transboundary aquifer systems (confined and unconfined). The principles of the UN Draft Articles followed available common practices of groundwater agreements in place and have also served as the base for the development of other agreements, such as the case of the Guaraní Aquifer Agreement shared between Argentina, Brazil, Paraguay, and Uruguay. Even though there might be different technical conceptions between the use of cooperation and collaboration in a stricter sense, for the purposes of this paper we do not make a distinction between either of them as there is not enough evidence to support this distinction from the history of cooperation/collaboration efforts between Mexico and the United States.

Common principles and practices of collaboration in transboundary groundwater management agreements around the world include of the presence of data exchange provisions, the concurrence for binational aquifer assessment, the establishment of technical advisory committees, and respect for the legal framework and jurisdictional

requirements of the involved countries. All these features are present in the agreements on transboundary groundwater resources for the Guaraní Aquifer System, the Franco-Swiss Genevese Aquifer System, the Iullemeden Aquifer System, the Nubian Sandstone Aquifer System, and the Al-Saq/Al-Disi Aquifer System (Tapia-Villaseñor and Megdal, 2021).

Though no binational groundwater management agreements between the U.S. and Mexico have been signed since 1973, the scope and scale of recent efforts are encouraging and suggestive of collaborative management schemes. Apart from Minute 242, the semi-formal cooperative framework of the Transboundary Aquifer Assessment Program (TAAP), and some limited provisions related to groundwater in Minutes 304, 319, and 320, the reported efforts on binational groundwater collaboration tend to be inclined to more local, non-formal, decentralized, short-termed practices (Sanchez and Eckstein, 2020). Minute 304 recognizes a joint grant contribution program aimed at addressing border region wastewater infrastructure projects as complementary to the IBWC's mandate to resolve transboundary sanitation problems—problems that may extend to groundwater. Minute 319, on binational sharing of water shortage on the Colorado River, addresses groundwater in two ways: first, as a function of salinity control measures related to the implementation of Minute 242; and second, as a potential water augmentation resource—though no specific commitments are made. Minute 320, a general framework agreement authorizing binational cooperation on transboundary issues in the Tijuana River Basin, does not exclude consideration of transboundary groundwater problems within its scope of work should the two governments agree to do so.

The UN Draft Articles principles that are the basis of the existent international groundwater collaboration are highly relevant for formal border-wide agreements/treaties (e.g., containing a binding mechanism). However, in the case of informal cooperation efforts, local scale and decentralized practices play a significant role in defining the principles of collaboration. They seem to work more effectively at the local level where social-based interactions, community closeness, individual leaderships and institutional trust are the drivers for transboundary cooperation. Though none of these elements is officially recognized as principles of current international groundwater agreements, the success of both formal and informal cooperation instruments is highly dependable on these local-based variables (Sanchez and Eckstein, 2020).

The TAAP Cooperative Framework between the United States and Mexico, is consistent with three UN Draft Articles: Article 3 “Sovereignty of Aquifer States”, Article 7, “General Obligation to Cooperate” and Article 8, “Regular Exchange of Data and Information”. However, success has been uneven. For the San Pedro and Santa Cruz transboundary aquifers shared by Arizona (U.S.) and Sonora (Mexico), progress has been fostered by cultural, social, and professional bonding, some of which predated TAAP efforts.

The path forward

This complex of principles, agreements and practices affecting binational cooperation on shared groundwaters over the past 30 years holds promise for facilitating further cooperation on transboundary groundwater. Reaching a comprehensive agreement as envisioned in Minute 242, however, may be feasible but only in the form of a general framework agreement that sets the parameters for future negotiations addressing challenges on in specific

Relationships vary considerably by locality. In contrast, the level of binational engagement and cooperation of TAAP in the cases of Hueco-Bolson/Valle de Juarez (Hueco-Bolson aquifer) and Mesilla Bolson/Conejos Medanos (Mesilla aquifer) remains limited.

Because transboundary groundwater is a local resource subject to the particular and differing regulatory regimes of the relevant jurisdictions, global examples of binational cooperation can provide only limited guidance. For shared aquifers along the U.S.-Mexico border, a general framework agreement that sets the parameters for future aquifer-level, locally driven negotiations could represent the path forward in terms of groundwater management collaboration. This approach clearly recognizes that, within a framework approved by the two counties, binational groundwater management must also consider domestic and local priorities for evaluating, assessing, and managing shared groundwater sustainably. A “parallel driveway” is needed, where informal local efforts are consistent with the official elements of the framework agreement. Clearly, the success of the binational collaboration is strongly linked to local social, cultural, and resource conditions, but, at the same time, the cooperation needs to be supported by mature, systemic, long-term institutional commitment.

transboundary aquifers along the international boundary. Such a framework agreement must accommodate the hydrological, economic, and political complexity of the circumstances affecting stakeholders sharing these aquifers.

If IBWC’s experience is any guide, which we believe it is, several conditions must be met if such a framework agreement is to be had (See Figure 2). Both countries must agree on a

factual set of baseline conditions and a clear set of objectives to guide diplomatic discussions that are accepted by all major stakeholders, governmental and non-governmental. The negotiation goals and objectives should be embraced as beneficial to interests/stakeholders in both countries. The scope and the general purport of the framework agreement should be accepted at the start. The terms of reference should aim at a framework that allows sufficient latitude for substantive subsidiary talks to occur addressing issues in discrete aquifers along the boundary.

As discussions that will lead to negotiations commence, it is essential to identify needs, issues, fears, and concerns, many of which may not be evident to all stakeholders (Verdini Trejo, 2017). The parties should be willing to externalize these concerns and consider means of addressing the full suite of problems that stakeholders may wish to raise in the negotiations. The respective countries and their stakeholders should each be clear as to why they may need a formal framework agreement that allows place and aquifer specific discussions to go forward when the relevant stakeholders are ready to do so. They should also be clear and transparent as to the consequences of failing to achieve an agreement, of defaulting to the status-quo ante.

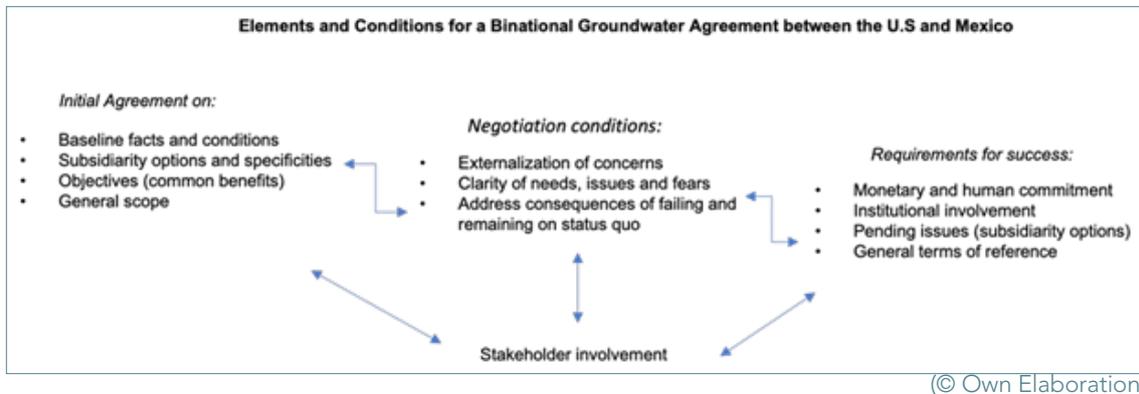
If negotiations progress, other conditions for success arise. The parties must agree to the costs of implementation and determine their willingness to commit the monetary and human resources and share the administrative costs that may be required to give the agreement effect.

A potential sticking point is sure to be any joint agreement on the management mechanisms that may be utilized under the agreement. Even if the specific arrangements for dealing with particular aquifers are left to subsequent talks on substantive

subsidiary agreements, some general terms of reference are apt to be necessary in the framework agreement to guide those further discussions. Such terms of reference could be based on, but not limited to the lessons learned from transboundary aquifer agreements around the world and include some of the principles described in the UN Draft Articles that have played a significant role on current international agreements such as the Guaraní Aquifer States and others. These lessons and principles can be adapted to the particularities of both the U.S. and Mexico.

In sum, achieving such a framework agreement will be challenging, even it allows ample room for subsequent detailed negotiations of substantive problems affecting specific shared aquifers and groundwater resources along and across the international boundary. However, binational experience, particularly through the IBWC over the last 30 years, have recorded long-term solutions for the binational Colorado River basin that have covered more than surface water and riparian problems. This fact suggests that this could be a favorable path forward if greater cooperation for the sustainable use of transboundary groundwater is to be had along the U.S.-Mexico border.

Figure 2.
Elements and conditions for a Binational Groundwater Agreement between the United States and Mexico



Conclusion

Over the past decades, designated workgroups formed by binational scientific teams have worked simultaneously on finding scientific and technical solutions for different water problems. Steppingstones such as the ones described in this paper show that binational relationships are maturing. This suggests a more promising outlook for establishing transboundary groundwater management discussions in a cordial, non-conflicting environment, thereby paving the path toward collaborative groundwater management. Such collaboration could lead to a framework agreement for groundwater resources that sets the stage for follow-on agreements that incorporate the local

circumstances of U.S.-Mexico transboundary aquifers. Alternatively, an aquifer-based approach could move forward without a framework Minute, as happened with Minute 242 discussed above. Or perhaps a combination of the two would result. What is clear, though, is that formal institutional involvement of the IBWC and cooperating entities, incorporation of scientific findings and policy considerations specific to each aquifer, and, of course, stakeholder representation and involvement in the policy formulation processes are necessary to reaching workable and sustainable binational groundwater agreements.

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