

Innovation and Creativity: Strategies for Unprecedented Challenges in Transboundary Aquifers between the United States and Mexico ¹

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1. Introduction

Currently, the challenge of water management becomes more complex when two or more nations are involved. In the context of transboundary water resources, variables such as population and economic growth, as well as the impacts on water availability due to the effects of climate variability, increases the likelihood of social conflicts and political tensions, both internally and binationally as it has been the case between Mexico and the United States.

This condition demands and encourages governments to strengthen and also to rethink the measures, both for international cooperation (hydro-diplomacy), and for development of domestic policies (including the funding of science). There is an urgent need to promote new areas of opportunity to guarantee a sustainable, resilient and democratic management of transboundary water, while respecting human rights, strengthening political relations, promoting greater economic investment and promoting the Goals of Sustainable development.

2. Our binational aquifers

Even though the North American region has a greater volume of water in its aquifers than South America, or even a greater quantity than the continents of Europe and Oceania have together,² the territory that joins Mexico and the United States is located largely in a desert



¹ The information not cited in this text comes from the Mexico-United States binational Conference on Transboundary Aquifers held on October 14 and 15, 2020: <https://binationalwaters.tamu.edu/events-archives/transboundary-conference/>

²SDC, UNESCO & IUCN

(2015):<https://groundwaterportal.net/sites/default/files/Report%20Workshop%20Legal%20and%20Instituti%20Aspects%20-%20Hydrodiplomacy.pdf>(pág. 16)

area,³ where 96% of the climates in the region are classified as dry and very dry.⁴

Despite that groundwater in borderlands plays an important role in terms of national security,⁵ its governance, regulation and available information are limited. Therefore, the growing dependence on this resource in the region as well as the prevalence of drought conditions,⁶ put its sustainability at its maximum risk level.

2.1 Limited information and dissemination

At the global level, there are currently approximately 600 transboundary aquifers shared by 153 countries.⁷ Between Mexico and the United States, the figure is not precise (lack of research on the subject), but it has been suggested that there could be 36.⁸ Similarly, the groundwater flows between the two nations (and its relationship with surface waters) are not fully understood. Delineation and identification of aquifers correspond more to a political-administrative criteria (the case of Mexico), than to the natural, systemic and dynamic movement of the aquifers (cross-border connectivity).

In addition to the limited scientific information, there is not enough dissemination of current research. There seems to be a gap of communication between academic institutions with decision-makers in both countries, resulting in science not having enough impact or clarity to advise accurately the policy-making process.

Finally, other current challenges related to information are those related with the non-existent transboundary conceptual framework for groundwater management; there are institutional asymmetries and diversity in the quality of the available data, as well as a difference in the publication times of the information.

2.2 Regulatory diversity

There are differences in standards / regulations and between the degrees of law enforcement between the two nations, but the common denominator across the border is that authorities have limited control over aquifers, especially in agricultural areas, which

³ Bustillos, S.

(2004):<http://institucional.us.es/revistas/Araucaria/A%C3%B1o%206%20%20N%C2%BA%2011%20%202004/Sandra%20Bustillos%20Dur%C3%A1n.pdf>(pág. 106)

⁴ Angles, M. (2006): <https://revistas.iuridicas.unam.mx/index.php/derecho-internacional/article/view/151/239>

⁵ Sanchez, R. & Tracy, J. (2020):<https://onlinelibrary.wiley.com/doi/epdf/10.1111/1752-1688.12856> (pág. 357 y 358)

⁶ Sánchez, A. (2006): <https://fronteranorte.colef.mx/index.php/fronteranorte/article/view/1029/500>(pág. 140 y 141)

⁷ UN Water (2019): <https://www.acnur.org/5c93e4c34.pdf> (pág. 18)

⁸ Sanchez, R & Tracy, J. (2020):<https://onlinelibrary.wiley.com/doi/epdf/10.1111/1752-1688.12856> (Pág. 358)

translates into a shared governance gap.⁹ In the US the administration is polycentric (each state has its own regulations and groundwater can be private) and in Mexico it is centralized system, where the federal government has the power to manage and the water belongs to the nation.

At the same time, the 1944 treaty does not contemplate shared groundwater under its framework, but there are parallel instruments such as Minute 242 signed in 1973, which stipulates that the International Boundary and Water Commission (CILA) can promote agreements between both countries in the matter of transboundary aquifers, however, there is little progress on this issue.¹⁰

2.3 Overexploitation and reduction in availability

Currently, in the border region there is a greater demand for groundwater, both for drinking use by the growing border population and as part of the development of different economic activities, especially those related to the production of energy and food. In Mexico, at least ten border aquifers located in the states of Chihuahua, Sonora and Baja California¹¹ are considered without availability. Therefore, it is necessary to understand systemically the relationship between the different sectors and its interdependencies involved to promote efficient use of the resource.

Likewise, there is an important concern associated with the lack of allocation of water for environmental use, while at the same time deforestation keeps its pace as well as land use change in favor of economic activities that consume intensive volumes of groundwater, such as agriculture and fracking. The foregoing leads to a situation that causes greater water and climate vulnerability in the region.

2.4 Effects of climate change

Several recent studies indicate that due to changes in temperature and precipitation in the border basins, runoff is decreasing and evapotranspiration has increased, which ultimately means less recharge and availability on transboundary aquifers. In the same way, reservoirs show significant reduction in storage levels, which implies greater pressure on groundwater, mainly in times of drought.

The impacts of climate change can mainly harm shallow aquifers which have a sensitive relationship with surface water, and are the most used for different anthropogenic

⁹ Foster, J. (2018): <http://www.law.tamu.edu/docs/default-source/faculty-documents/texas-mexico-ground-water.pdf?sfvrsn=2> (pág. 9 y 103)

¹⁰ Sánchez, A. (2006): <https://fronteranorte.colef.mx/index.php/fronteranorte/article/view/1029/500> (pág. 140 y 141)

¹¹ CONAGUA (2018): <http://sina.conagua.gob.mx/sina/tema.php?tema=acuiferos>

activities. These conditions, together with the lack of information, increases the degree of uncertainty in the region, which has determined an important factor in the fulfillment of international agreements, such as the 1944 water treaty.

2.5 Gaps in the Existing Legal Framework

The current condition of groundwater resources analyzed in this text reflects legal, institutional, budgetary, climate and information limitations, but also the lack of binational governmental leadership.

It is noteworthy that none of the 20 priority strategies of the National Water Program 2020-2024 of the Mexican federal government includes the revision, strengthening, or the development of regulation of specific policies related to transboundary waters.¹²¹³ The development of the new National Water Law offers an opportunity to incorporate scientific knowledge and stakeholder participation in the decision-making process on transboundary basins and aquifers.

At the same time, the political moment between Mexico and the United States can be used to promote changes on this issue in view of the real limits of surface water to satisfy future water demands.

3. General proposals

The proposals arising from the academic analysis and debate are described below:

1. Investment in multidisciplinary research and local-scale initiatives. Data availability, information and scientific models are key to understand, monitor and assess the status and use of transboundary groundwater. Likewise, there is an overall need for a joint effort to integrate, standardize, access and transparency policies, agreements on methodologies, protocols and formats for data exchange, collection and access. In the same way, it is important to identify and coordinate with academic and social related organizations that work at different scales to promote dissemination of their projects and results, in order to provide them with targeted support, especially at the local level.
2. Science-based government decisions. Governments need to take into account technical / scientific recommendations for transboundary water management. Science can and should be part of the development plans of political administrations, creating policies

¹² CONAGUA (2020):<https://www.gob.mx/conagua/articulos/consulta-para-el-del-programa-nacional-hidrico-2019-2024-190499>

¹³CONAGUA (2020):
https://www.gob.mx/cms/uploads/attachment/file/553479/PNH_Resumen_Imprenta_v200311.pdf

that generate synergies between the different sectors and scales, and at the same time provide reliability for private sector investment.

3. Define priorities / urgent projects in the area. Recognizing the budgetary, feasibility and institutional limitations of both nations, it will be important to establish priorities within specific areas of management of shared aquifers, where science can have an essential role identifying hot spots where most vulnerable populations might be at higher risk, and to promote development projects that allow prevention of undesirable conditions.

4. Include all stakeholders in the decision-making process. Empirical evidence has shown that implementing democratic processes (both formal and informal) regarding natural resources has a positive impact, in the short and long term, avoiding socio-political conflicts, in addition to improve environmental conditions and services on which society depends. The inclusion of various local actors also implies a process of education and awareness, along with new participatory mechanisms to make decisions in consensus to avoid potential conflicts.

5. Incorporate climate change variables into the binational management process. Due to the impacts that have been identified on transboundary basins, it is crucial to integrate variables of climate change into the assessment and management of binational waters. This would support that adaptation process, as well as to take mitigation measures and reduce vulnerability in the region.

6. Provide new attributions to IBWC/CILA and NADBank. Assigning new attributions (and necessary resources) to existing institutions can allow the development of better binational strategies based on flexibility and adaptability that provide solutions to the current and upcoming challenges.

7. Promote efficiency in the use of groundwater in the region and find synergies between the water-energy-food sectors. The economic sectors in the border region increasingly demand higher water consumption, therefore integrating, balancing, prioritizing and reconciling interests will be highly needed to assure as well the conservation needs and protection of transboundary aquifers, as well as to promote social and economic development of the region.

8. Incorporate the Human Right to Water and Sanitation. This legal element can be key as a criterion for achieving binational water equity and justice. Its conceptual, legal, ethical and practical frameworks could avoid the emergence of conflicts and favor cross-border social welfare on the issue of water.

9. Allocate volumes of transboundary water for ecological use. To achieve the sustainability of binational aquifers, it is important to agree and grant the necessary volumes of water to regional ecosystems that allow their existence. In the long term, this will provide a greater degree of sustainability and conservation of the resource and of the biodiversity of the region, which contributes to the prevention of conflicts between sectors.
10. Stop deforestation and land use change. The vegetal mass is vital for the maintenance of the water cycle, and for the conservation of transboundary groundwater. Therefore, it is important to develop strategies in priority areas for soil restoration, and reforestation campaigns, involving the different sectors of the region.
11. Consider new acts within the 1944 Treaty. The current historical context, where new challenges are negatively affecting binational basins, it is imperative that agreements between the two countries are updated; negotiating mutual and equitable benefits, as well as proposing innovative ways that allow better cooperation to face the shared challenges.
12. Promote holistic transboundary water management within binational regulations. Institutional recognition of the comprehensive / systemic administration of transboundary waters is essential achieve changes at policy and legal binational framework. For example, in Mexico a new General Water Law is being developed that could include best practices in the management and cooperation of groundwater, and set a global example to encourage other countries to make improvements that favor regional water security.