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Beyond the Rio Grande Water Debt

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The Rio Grande water war¹ is over, at least for now. A summer's worth of rancor, recrimination, violent protests, and one tragic death ended abruptly on October 21, three days before payment in full was due, when Mexico agreed to transfer water stored in Rio Grande dams to the United States.

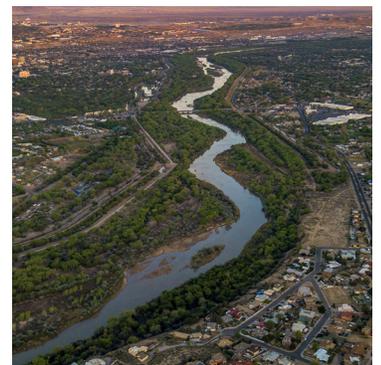
Mexico's last-minute decision to meet its 1944 water treaty² obligation was greeted with both sighs of relief and annoyance in Texas where irrigation demand peaked July through September, diminishing the utility of the suddenly restored water supply (Arevalo 2020). It peeved Mexican irrigators as well. In Chihuahua, riled farmers seized control of La Boquilla Dam in the upper Rio Conchos in August to avert depletion of that reservoir to fulfill Mexico's treaty obligation, and a protest erupted resulting in a woman's death when federal officials tried to regain control (McDonnell 2020). And, in the downstream state of Tamaulipas, where municipalities and farmers rely on the international dams, Falcon and Amistad, Mexican irrigators saw their winter water supply transferred to the United States (Vizcarra 2020). The deal was not a Pyrrhic victory for either country, but neither was it satisfactory. Without additional cooperative measures, conflict driven by water shortages is sure to reoccur.

The 2020 Rio Grande water dispute marks the second time in under 20 years that Mexico faced a second cycle water deficit, something the 1944 treaty's designers failed to contemplate. Amplified water demand in Mexico coupled with a sustained decades-long drought now strains

Mexico's capacity to meet the treaty's requirements. There is clearly a need to rethink at least some of the elements that factor into the fulfillment of Mexico's Rio Grande treaty obligations.

Ironically, the pertinent provisions of the 1944 water treaty, officially titled "Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande," were thought, at the time, to be exceptionally flexible and to Mexico's advantage in meeting its treaty deal (Enriquez Coyro 1976, 1174). Those provisions, located in the treaty's Article 4, commit Mexico to delivering 350,000 acre-feet of water annually to the United States, a figure that is calculated as an average over a water delivery cycle of five years, a sum obligation of 1,750,000 acre-feet in each cycle. This was designed to be subject to a wild-card escape provision that would allow any Mexican arrearage to be cancelled in the event that both nations' storage in the Amistad and Falcon dams is filled to capacity, commencing a new cycle. There is also a forbearance provision that allows Mexico to ask for a roll-over from one cycle to the next in the event it comes up short in a given cycle, under circumstances of extraordinary drought (Treaty 1944).

Once the Amistad Dam was completed in 1969, the two countries, acting through the International Boundary and Water Commission (IBWC), struck a further deal in IBWC Minute 234,³ specifying that any debt incurred in a preceding cycle must be fully repaid in the next cycle, together with the full obligation inhering in the subsequent cycle (IBWC 1969). This essentially created



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FIGURE 1 — MEXICO'S RIO GRANDE TRIBUTARIES

SOURCE Finn 2017

a 10-year limit on debt repayment. Left unspecified was any agreement on what actually constituted an extraordinary drought.

None of this was a problem until 1997 when, for the first time, Mexico found itself needing to ask for a roll-over from one cycle to the next. The United States consented. But Mexico, confronting persistent region-wide drought, invoked the treaty's extraordinary drought clause in 1999, and fell short again in 2002 (Mumme, Hernandez, and Verdini 2018). The United States cried foul, claiming Mexico was unnecessarily hoarding water in its upstream dams. Mexico denied hoarding, claiming its reservoirs were depleted by drought, their waters scarcely sufficient to supply its own irrigators' needs. IBWC agreements struck in 2002—Minutes 307 and 308—resulted in modest releases to the United States and an agreement to ramp up conservation measures in Mexican irrigation districts, which freed up saved water to serve the treaty (IBWC 2002a; 2002b). Then, in 2005, Mother Nature intervened, filling the international dams and resetting the treaty clock.

There things stood. Mexico met its obligation in 2010. But in 2015, it fell short again, needing another water debt roll-over. Mexico subsequently repaid its arrears and was on course to meet its new-cycle water obligation through 2018 (Clark 2016; IBWC 2020a). But then things stalled, arguably by dint of a miscalculation by Mexico's National Water Commission (CONAGUA) in attempting to satisfy burgeoning local water demands amidst the persistence of region-wide drought. Mexico entered 2020 with more than a year's arrearage in meeting its treaty target, and the 2020 water *fracaso* was officially on.

That the persistent, region-wide drought is the larger culprit in this spat is undeniable. Yet equally plain is the evidence of excessive demand on the water supply, coupled with human error in gauging the multiple commitments now bearing down on the treaty's implementation. This is not just a Mexican problem, but a problem confronting both Mexico and Texas as they struggle to find a reliable and sustainable mechanism for meeting the treaty's requirements.

There is little doubt in the glare of hindsight that the treaty's very flexibility is part of the problem, incentivizing CONAGUA's hedging and brinkmanship in calculating necessary reservoir releases for satisfying Mexico's cyclic obligation. Both countries' water demand peaks in the scorching months of summer, incentivizing Mexico to favor national irrigators when water is scarce, and more so if promised water has shaped irrigators' investments in fields and farms. The fact that nature's potential to drench the Rio Grande Valley and the Mexican Sierras also peaks during the summer and fall undoubtedly creates a temptation to bet on redemption from Mother Nature.

Yet this is just one facet of the problem. Long standing over-allocation of water rights on both sides of the border has contributed to the demand-side pressures on the treaty water supply. Substantial water and conveyance losses owing to poorly maintained and less-efficient irrigation infrastructure hampers Mexico's treaty compliance capacity. Binational

progress in sharing hydrological data, such that each nation understands the real-time pattern of water availability, has been slow to emerge. And in the mutually acknowledged, if variously interpreted, context of long-term persistent drought, neither country has yet been willing to share sovereignty in managing the middle-lower Rio Grande River basin's water resources in times of acute stress or to implement drought conservation plans of the sort now practiced on the Colorado River.

The over-allocation problem on the river is well known and needn't absorb much ink here. Suffice it to say that irrigable acreage in both countries steadily developed in modern times, driven in part by the water security assurances conferred in the 1944 treaty. At the time the treaty was ratified in 1945, Mexico planned a major expansion of its irrigation districts on the upper Rio Conchos, other tributaries, and downstream developments in Tamaulipas (Enriquez Coyro 1976, 738-739; Day 1970). These projects went forward aggressively between 1946 and 1970 (Orive Alba 1970). Other wildcat projects siphoning water from federal projects or tapping groundwater were allowed to proceed. While actual water usage has varied over the past three decades (see, for instance, Kelly 2001), the result today is simply a set of authorized and unauthorized claims on Mexico's federal treaty water assets that are difficult to fulfill even in times of water abundance. CONAGUA's 2017 review of the Rio Bravo basin determined that the volume of water now officially permitted doubly exceeds the volume of the reliable renewable water supply (Armas Carrillo 2018, 179).

The situation in Texas is analogous. An extensive system of water rights governed by the rule of prior appropriation and overseen by the Texas Watermaster is predicated to a large extent on Texas' year-to-year and five-year cycle treaty expectations for the middle and lower Texas stretch of the Rio Grande. While this system works to ration Rio Grande water when water is scarce, it sets annual expectations at the treaty quotient—350,000 acre-foot annually—ensuring that shortages are painfully felt and fully tied to Mexico's

non-compliance. The U.S. Bureau of Reclamation's 2013 report noted that total projected 2010 water demand (1,482,932 acre-feet) exceeded surface water supply (1,015,958 acre-feet) by 467,974 acre-feet, well beyond the 350,000 acre-feet obligated by the treaty (USBR 2013). Such chronic excess demand amplifies treaty expectations even under normal hydrologic conditions.

Irrigation inefficiencies in Mexico have been targeted as a structural problem restricting Mexico's capacity to meet its treaty duty. Deteriorating conveyance systems in Mexico's Rio Grande Basin irrigation districts and inefficient metering are thought to account for considerable water loss. Researchers at Texas A&M University calculated inefficiencies as high as 60% in 2003 in Chihuahua's irrigation districts (Rosson, Hobbs, and Adcock 2003, 8). This was the focus of the IBWC's Minute 308 in 2002, which leveraged funds from the North American Development Bank to replace and improve irrigation infrastructure in the Rio Conchos basin. The water savings of nearly 300,000 acre-feet were to be dedicated to treaty compliance (BECC 2002). These projects, finished in 2007, enhanced Mexico's capacity to meet the treaty's conditions, but, from Mexico's perspective, were not sufficient to compensate for worsening droughts in the recently concluded delivery cycle.

Improvements in hydrological measurement and data sharing have more recently occupied the IBWC's attention, beginning with a new initiative in 2017 establishing joint hydrological assessment and policy working teams under the commission's oversight (IBWC 2017b). The commission, with the support of both governments, has deployed RiverWare dynamic modeling software and a range of new technologies to gauge precipitation and streamflow on Mexico's Rio Grande tributaries, enabling both countries to use a common metric for guiding discussions on treaty compliance (Finn 2017).

These measures are very much in evidence in the recent water deal ending the last delivery cycle, the IBWC's Minute 325. The new agreement, in addition to transferring the requisite water to the United

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States to satisfy the cyclic treaty obligation, formally institutionalizes the Rio Grande policy and hydrology working groups, the latter overseen by the former. The two bodies are tasked with reaching a new agreement no later than December 2023 (a three-year window) to provide “increased reliability and predictability in Rio Grande water deliveries to users in the United States and Mexico” (IBWC 2020).

This is real progress toward addressing the thorniest problem in U.S.-Mexico water relations in the past 25 years. Much in evidence is the IBWC’s recent experience resolving shortage and environmental challenges on the Colorado and Tijuana Rivers over the past decade. These agreements, Minute 319 and 323 on the Colorado River and Minute 320 on the Tijuana River, share in common the embrace

of officially established binational working groups that are focused on discrete practical problems affecting treaty compliance and adopting a collaborative, whole-of-the-river (or watershed) approach to resolving problems. If Minute 325 falls short of recommendations advanced by participants in the IBWC’s 2005 and 2012 binational water forums (see Tables 1 and 2 below), it is still an advance in treaty application.

It remains to be seen what operational measures will be advanced by the newly formalized Minute 325 working teams, though some heightened binational cooperation toward enabling Mexico to meet its Article 4 treaty obligation should be expected. Whatever measures are forthcoming will need to confront the reality of persistent long-term drought and the likelihood that some adjustments to the 1944

TABLE 1 — WORKGROUP RECOMMENDATIONS: BINATIONAL RIO GRANDE SUMMIT (2005)

Workgroup	Recommendations
Binational Basin Management	Investigate and develop incentives and regulatory tools for all water users (including irrigators) to save water.
	Establish a binational group/mechanism to define a consistent measure of extraordinary drought.
	Create two IBWC advisory groups (one scientific and another that addresses socio-economic needs).
	Conduct binational information sharing to facilitate planning (regional, etc.) and create a binational database and modeling (common tools) for information sharing and planning.
	Establish watershed councils (binational) at the sub-basin level for information sharing and to support decision-making processes.
	Convene an annual summit.
	Explore adjusting water concessions/rights (through buy-out, forbearance, transfer of use, etc.).
Legal and Institutional Issues	Interpret the term extraordinary drought as it is used in Article 4 of the 1944 treaty.
	Ensure that the IBWC and the Comisión Internacional de Límites y Aguas comply with their functions under the 1944 treaty.
Finance	Establish comprehensive long-term plan schemes among sister cities.
	Explore the feasibility of developing regional planning projects to benefit various small cities, whether binational or not.
	Develop big-picture binational plans for water matters with common planning horizons.
	Promote the reuse of treated wastewater, expanding the viability of the project for treatment of municipal waters.
	Explore alternatives for final disposal of urban solid waste, including special management recycling, reuse, and sanitation; find uses for methane; and close open-air dumps.

SOURCE IBWC 2005

treaty calculus on the Rio Grande may be needed. New parameters for understanding extraordinary drought and establishing shortage-sharing conditions, echoing what was recently done on the Colorado River, should be considered, along with drought conservation plans affecting both upstream and downstream stakeholders.

As the commission pursues binational cooperation on managing Rio Grande shortage conditions, it should also consider measures to protect natural resource endowments, a topic that is glaringly absent from the Rio Grande water-sharing discussions to date. The effect of water shortages on the Rio Grande River's riparian ecology has received much less attention than seen on the Colorado River, where flows below the south international boundary were radically curtailed. But potential adverse impacts of shortage-related conservation measures should be considered as the two nations ponder management scenarios for a water-scarce future (Briggs 2012; Kelly 2001; Brock et al. 2001). The time has also come to consider a mechanism for advancing binational strategies for sustainably managing groundwater along the boundary, as surface shortages are already driving groundwater consumption in the Rio Grande basin and elsewhere along the boundary.

If there is a larger lesson to be had from the Rio Grande water war and its temporary resolution, it is simply that the 1944 water treaty has once again proven resilient (see Mumme 2019) and adaptable to the challenges confronting both nations as they share their transboundary water resources. There was no apocalypse, no treaty termination, no referral of the water debt to the International Court of Justice, as some analysts may have speculated (see, for example, Barrera and Naranjo 2017). There is every reason to suppose that further progress will be made in confronting persistent drought and the challenges presented by a changing climate. While the Minute 325 solution may be suboptimal as viewed from the fields of needy farmers in both countries, it is plotting a course toward a less vexing and more sustainable future in Rio Grande River water management.

TABLE 2 — THE 2012 IBWC BORDER WATER RESOURCES SUMMIT: SELECT RECOMMENDATIONS FROM FOUR WORKGROUPS

With rapid population growth, climate change, and scarce water resources, the U.S.–Mexico border region needs to look to alternative water strategies such as conservation, reuse, and desalination.

The IBWC, the United States, and Mexico should be proactive in working along the border to develop strategies to cope with the impacts of climate change.

New and better ways to collaborate at all levels, including binationally, must be explored.

In order to improve dialogue and cooperation between both countries, binational watershed forums should be established for transboundary watersheds.

A clearinghouse to facilitate the creation and exchange of binational watershed data should be established. Harmonizing and sharing U.S. and Mexican water data should be a priority.

Research and analysis of possible and best-case practices of adaptive management and mitigation strategies will support sound policy decisions.

Long-term planning and forecasts based on scientific research are needed to inform and provide alternatives for policy decisions regarding adaptations.

New approaches to watershed analysis and management across the border should be developed that include criteria such as water availability and quality, ecosystem health, population characteristics, and legal, social, and political considerations.

Infrastructure investment should be encouraged.

The Transboundary Aquifer Assessment Program needs to have other local partners to share in the funding.

Government decision-makers need to recognize that an increasing number of U.S. and Mexican border citizens are demanding more environmental restoration projects in addition to traditional water supply projects.

Technical improvements of irrigation districts should be promoted to achieve water savings.

IBWC should strengthen its public participation processes in the projects that it develops.

IBWC should promote decreased water consumption through efficiencies that result in greater production yield using economic incentives.

IBWC should consider increasing the reuse of effluent from its binational plants.

Hydrological variables, including the various land uses and environments, need to be monitored throughout the entire watershed.

The relationship between groundwater quality and quantity should be identified, and issues related to aquifer overexploitation need to be evaluated, as well as soil and surface water quality.

There is concern over the availability of resources to continue environmental monitoring and education programs, as well as to secure the economic benefits associated with environmental values.

SOURCE IBWC 2012b. See also Ganster 2012.

ENDNOTES

1. The recent dispute erupted in June 2020 after Texas Governor Greg Abbott delivered a letter of protest concerning Mexico's arrears in fulfilling its water delivery obligation to Texas to U.S. IBWC Commissioner Jayne Harkins. In August 2020, protests directed at Mexico's National Water Commission (CONAGUA) erupted as Chihuahua farmers learned of CONAGUA's plan to deliver obligated treaty water to Texas. Those protests turned violent in September as the October 24, 2020 deadline for Mexico's treaty compliance approached.

2. The 1944 water treaty, which was ratified and took effect in 1945, is the principal agreement between the U.S. and Mexico allocating the water of transboundary rivers, including the Rio Grande and the Colorado River, and providing for the management of the Tijuana River. The treaty also addresses sanitation management along the boundary and entrusts the administration of these commitments, as well as the administration of all boundary treaties and the resolution of any problems that may arise under the authority of these various agreements, to the International Boundary and Water Commission, the United States, and Mexico.

3. The term "minute" refers to the IBWC's official agreements that interpret the treaties and subsidiary agreements in its charge. Under Article 24 of the 1944 water treaty, official minutes recorded by the IBWC require the approval of the two governments within 30 days of signing to take effect. Should neither country object within 30 days, the new minute enters into force. If one or both governments should object, the minute is rejected and does not enter into force.

REFERENCES

- Arevalo, Dina. 2020. "Mexico Makes Good on Water Debt to U.S." *The Monitor*, October 22, 2020. <https://www.themonitor.com/2020/10/22/mexico-makes-good-water-debt-us/>.
- Armas Carrillo, Manuela. 2018. "Aspectos Economicos y Financieros." In *La Cuenca del Rio Bravo y el Cambio Climatico*, 168-194. Puebla: Universidad de las Americas, Puebla.
- Barrera, Ruben R. and Dan A. Naranjo. 2017. "A River Runs Through It: Resolving the Rio Grande Water Dispute Between the United States and Mexico," *San Antonio Lawyer*, (January/February).
- BECC (Border Environment Cooperation Commission). 2002. Project for Modernization and Technical Improvement to the Conchos River Irrigation Districts. BECC Certification Document. September 2002.
- Briggs, Mark. 2012. "The Rio Grande/Bravo Through Big Bend: Challenges and Opportunities for Bringing Back an Impaired River." Paper presented at the International Boundary and Water Commission's Binational Water Summit, September 28, 2012, Ciudad Juárez, Chihuahua.
- Brock, Laura, Mary E. Kelly, and Karen Chapman. 2001. *Legal and Institutional Framework for Restoring Instream Flows in the Rio Grande: Fort Quitman to Amistad*. A Report submitted the World Wildlife Fund. Austin: Texas Center for Policy Studies. March 16, 2001.
- Clark, Steve. 2016. "Mexico Pays Off Five-Year Rio Grande Water Debt to US." *Valley Morning Star*, February 26, 2016.
- Day, John C. 1970. *Managing the Lower Rio Grande*. Chicago: University of Chicago, Department of Geography, Research Paper No. 125.
- Enriquez Coyro, Ernesto. 1976. *El Tratado entre Mexico y los Estados Unidos de America sobre Rios Internacionales. Tomo II*. Mexico, D.F.: Facultad de Ciencias Politicas y Sociales, Universidad Autonoma de Mexico.

- Finn, Billy. 2017. LRG Binational Solution to Assure 1944 Treaty Compliance, and Better Predictability/Reliability in Future Water Deliveries. https://ibwc.gov/Files/LRG_Binational_Solution_110817.pdf.
- Ganster, Paul. 2012. Watershed Discussion at the Binational Border Water Resources Summit, El Paso–Ciudad Juárez, September 28, 2012.
- IBWC (International Boundary and Water Commission). 1969. Minute 234. Waters of the Rio Grande allotted to the U.S. from the Conchos, San Diego, San Rodrigo, Escondido, and Salado Rivers and the Las Vacas Arroyo. December 2, 1969, Ciudad Juárez, Chihuahua.
- IBWC. 2001. Minute 307. Partial Coverage of Allocation of the Rio Grande Treaty Tributary Water Deficit from Fort Quitman to Falcon Dam. March 16, 2001, Washington, D.C.
- IBWC. 2002. Minute 308. United States Allocation of Rio Grande Waters During the last Year of the Current Cycle. June 28, 2002, Ciudad Juárez, Chihuahua.
- IBWC. 2005. Binational Rio Grande Summit. Reynosa, November 17–18. Tamaulipas and McAllen, Texas. https://www.ibwc.gov/Organization/rg_summit.html
- IBWC. 2012a. Minute 319. Interim International Cooperative Measures in the Colorado River Basin through 2017 and Extension of Minute 318 Cooperative Measures to Address the Continued Effects of the April 2010 Earthquake in the Mexicali Valley, Baja California. Coronado, CA. November 20, 2012.
- IBWC. 2012b. Water Summit Binational Border Water Resources Summit Concludes with Recommendations for Future Actions. September 27–28, 2012, Ciudad Juárez, Chihuahua. <https://www.ibwc.gov/2012Summit.html>.
- IBWC. 2015. Minute 320. General Framework for Binational Cooperation on Transboundary Issues in the Tijuana River Basin. October 5, 2015, Tijuana, Baja California.
- IBWC. 2017a. Minute 323. Extension of Cooperative Measures and Adoption of a Binational Water Scarcity Contingency Plan in the Colorado River Basin. September 21, 2017, Ciudad Juárez, Chihuahua.
- IBWC. 2017b. Lower Rio Grande Citizen Forum. November 8, 2017. https://ibwc.gov/Files/CF_LRG_Minutes_110817.pdf.
- IBWC. 2020a. Rio Grande River Basin Estimated Volumes Allotted to the United States by Mexico from Six Named Mexican Tributaries and Other Accepted Sources under the 1944 Water Treaty (October 25, 2020 through October 31, 2020). https://www.ibwc.gov/wad/images/current_cycle.pdf.
- IBWC. 2020b. Minute 325. Measures to End the Current Rio Grande Water Delivery Cycle Without a Shortfall, to Provide Humanitarian Support for the Municipal Water Supply for Mexican Communities, and to Establish Mechanisms for Future Cooperation to Improve the Predictability and Reliability of Rio Grande Water Deliveries to Users in the United States and Mexico. October 21, 2020, Ciudad Juárez, Chihuahua.
- Kelly, Mary. 2001. *The Rio Conchos: A Preliminary Overview*. Austin: Texas Center for Policy Studies. January, 2001.
- McDonnell, Patrick J. 2020. “Mexican water wars: Dam seized, troops deployed, at least one killed in protests about sharing with U.S.” *Los Angeles Times*, September 11, 2020. <https://www.latimes.com/world-nation/story/2020-09-11/mexican-water-wars-dam-seized-troops-summoned-at-least-one-killed-in-dispute-about-water-sharing-with-u-s>.
- Mumme, Stephen. 2019. *The 1944 Water Treaty as a Constitutional Document*. The Center for the U.S. and Mexico, Rice University’s Baker Institute for Public Policy, March, 2019, 1–14. <https://www.bakerinstitute.org/research/1944-us-mexico-water-treaty-constitutional-document/>.

- Mumme, Stephen P., Oscar Ibanez Hernandez, and Bruno Verdini. 2018. "Extraordinary Drought in U.S.–Mexico Water Governance," *Journal of Water Law* 26: 1–16.
- Orive Alba, Adolfo. 1970. *La Irrigacion en Mexico*. Mexico, D.F.: Editorial Grijalbo, S.A.
- RiverWare. 2020. <https://www.riverware.org/>.
- Rosson, C. Parr, Aaron Hobbs, and Flynn Adcock. 2003. "The U.S./Mexico Water Dispute: Impacts of Increased Irrigation in Chihuahua, Mexico." Paper presented at the annual meeting of the Southern Agricultural Association, Mobile, Alabama. February 1–3, 2003.
- Treaty. 1944. Utilization of the Waters of the Colorado and Tijuana Rivers and of the Rio Grande. February 3, 1944, Washington, D.C. <https://www.ibwc.gov/Files/1944Treaty.pdf>.
- USBR (United States Bureau of Reclamation). 2013. "Lower Rio Grande Basin Study." Denver: U.S. Department of the Interior, USBR. December, 2013.
- Vizcarra, Eduardo. 2020. "Violacion al tratado de aguas internacionales dejara sin agua a 60 mil productores de la frontera," *Notiviza Tamaulipas*, October 23, 2020.

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