

Texas-Mexico Groundwater and Global Applications

By

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Thesis

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Chapter 1. Executive Summary

The debate over groundwater aquifers that underlie more than one sovereign nation is not peculiar to Texas and Mexico. When one nation withdraws groundwater from a transboundary aquifer, the other side may perceive that it loses a portion of its own supply. Groundwater users are typically unwilling to surrender their beneficial utilization of these waters, even while this use causes damage or depletion of the aquifer or exacerbates existing tensions with a neighboring state. Unlike surface water, groundwater flows through underground geologic formations, so it is less tangible, measurable, and quantifiable than surface water. The facts regarding aquifer capacity or quality can be difficult to estimate, particularly as the volume of recharge in a given year is hard to predict. National and state groundwater laws among different nations can conflict or be incompatible. In the absence of a common policy on groundwater, neither party is obligated to conserve the resource.

The establishment of jointly accepted rules of aquifer withdrawal, whether or not through a groundwater treaty, would be a tangible step toward conserving a natural resource and improving relations with a neighboring country. In the case of Texas and Mexico, there is a need for

such rules due to patterns of groundwater mining both in Mexico and in the United States over the past five years.

This thesis does not seek to argue for a common transboundary groundwater policy between the United States and Mexico. It does suggest options for the administration Texas-Mexico aquifers, should the parties decide to develop common groundwater policies. These options are based on a review of current studies of bilateral transboundary groundwater management between Texas and Mexico and between the Palestinian Authority and Israel.

Texas-Mexico Groundwater

The second and third chapters of this thesis deal with the issues related to transboundary groundwater between Texas and Mexico. Chapter two contains an overview of the hydrologic situation, as well as the duties and purview of existing water management institutions. It summarizes of water laws on both sides of the border and applicable international water law. Chapter three reports on the views of experts as they seek to analyze the situation and develop potential solutions. The literature addressed in the third chapter provides examples of existing opinions on the issues raised in this thesis. Items mentioned in the literature review are not the only articles available on the subject, but

illustrate professional viewpoints related to the issue of transboundary groundwater.

Texas shares five major aquifers with Mexico: the Hueco-Mesilla Bolson (two aquifers divided by a rock ridge); the Edwards-Trinity Plateau; the Carrizo-Wilcox; and the Gulf Coast Aquifer. A series of minor aquifers called West Texas Boolsns also cross Texas' border with Mexico.

In an area as dry as the border region, water management is important to secure adequate supplies for years to come. A continued increase in population developing along the border, particularly in cities such as Tijuana and Ciudad Juárez, strains an underground water supply that is already stretched beyond its sustainable limit. Northern Mexico, a region with little annual rainfall and few natural springs, looks to groundwater and the Rio Grande for its water supply for municipal and agricultural needs. In Juárez, for example, the municipal water supply consists exclusively of groundwater. The Paso del Norte region in Texas finds itself in a similar position. In El Paso, TX, groundwater accounts for the bulk of municipal water use. As populations on both sides of the border increase, and if uncontrolled groundwater pumping continues, aquifer supplies inevitably will diminish. At present rates of groundwater withdrawal, both sides run the risk of permanent damage to their aquifers,

which, coupled with the perennial water shortages, could harm water consumers on both sides of the border. Regardless of whether the present drought continues or ends, perennial water supplies in a naturally dry region cannot accommodate continued reliance on irrigation of crops, economic development brought about through the North American Free Trade Agreement (NAFTA), and a continuing influx and natural increase in population, irrigation, and economic activity. The quantity of water demanded inevitably increases with an increase in population. Government representatives on both sides of the border recognize the importance of a coherent groundwater policy to limit groundwater withdrawals, but as yet neither side is ready to act.

Texas state law is an obstacle to this effort; under state water law, a landowner may freely pump water lying beneath his land without limit and is under no obligation to desist from drilling once a well has run dry. The landowner may simply dig a new well, providing the well lies on his own land, even if it sits on the edge of the property boundary and in effect siphons water lying beneath a neighbor's property. Texas water law does not restrict a landowner, providing that he does not knowingly damage his neighbor's property as part of his drilling and water extraction.

While the decentralized nature of United States policy leaves control over groundwater pumping to individual states, Mexico operates

with a centralized system of national laws, which also can be an obstacle to an agreement. Mexican states must garner the support of their federal government prior to drilling new wells. The state of Chihuahua, for example, may wish to develop an agreement with the United States, but the central government must determine if it wishes to proceed. Mexicans in favor of decentralization argue that states should be granted greater powers to consider applications for new wells and issue drilling permits as required. Presently, the central government issues few new permits and applicants may not drill prior to receiving a permit, irrespective of their holding permits in the past. The same is true if an individual currently holds a well on a dry site. When a well dries up, a new permit must be issued in a process that may last months. While a Texas landowner could drill new wells and extract water as fast as he can, Mexicans must look to their government for permission to drill in a process slowed by bureaucracy.

The International Boundary and Water Commission (IBWC) and its Mexican partner agency La Comisión Internacional de Límites y Aguas (CILA) form a Joint Commission and the principal governmental unit charged with matters related to the border, including all transboundary water between the two countries. A 1944 treaty affirmed the jurisdiction of the IBWC/CILA (The Joint Commission) over shared water supplies.

While shared groundwater supplies could fall within the Joint Commission's purview, their current water research and policy efforts concentrate primarily on surface water issues. The Joint Commission has funded research on transboundary groundwater, but to date the only agreement on paper resembling a policy on transboundary groundwater is in the form of Minute 242. This Minute establishes limits on pumping near Arizona's border with the Mexican state of Sonora and identifies the need for consultation prior to developing new pumping projects that will adversely affect conditions on either side of the US-Mexico border. Minute 242 is a concrete step in the process of developing a comprehensive groundwater agreement, but lacks elements such as pumping limits and an emergency action plan.

Policy regarding Texas-Mexico groundwater is elusive. Beyond the previously mentioned difficulties inherent in incompatible laws and the complications associated with groundwater's physical nature, it remains unclear as to how transboundary aquifers are best managed in this situation and who would be responsible for maintaining the pumping limits, should limits be adopted in a future agreement. Not only may "trust" be an issue, but with groundwater it may be difficult to verify volumes pumped. The time available is rapidly passing for any joint groundwater policy, as the groundwaters are being depleted on both sides.

Israeli-Palestinian Groundwater

Chapters four and five of this thesis describe some of the challenges faced by Israel and the Palestinian Authority relating to groundwater policy and management, offering a lens with which to examine the case of Texas and Mexico. Chapter four highlights the groundwater issues between Israel and the Palestinian autonomous areas¹ and policy that exists between the two. Chapter five is a review of literature by experts in the field, including their commentaries on existing supplies, current policy, and future management solutions. The authors included in the chapter represent both Palestinian and Israeli views on the situation as well as the opinions of others who relate their observations on groundwater policy and water management solutions to the Israeli-Palestinian case.

Israel and the Palestinian autonomous areas share two aquifers: the Coastal Aquifer, lying beneath the Gaza Strip and extending along the Mediterranean coast into Israel and the Mountain Aquifer, which lies beneath the western two-thirds of the West Bank and parts of central Israel. Within the State of Israel's borders, citizens must be issued a permit before drilling for groundwater.² The Palestinian Authority has a permit policy in the areas under its control, but limited capacity to enforce

its rules, as compared to Israel's surveillance and enforcement procedures. In the occupied territories, an Israeli military commander asserts control over the people and resources within the areas under occupation including issuance of permits to drill groundwater. This rule includes jurisdiction over groundwater extraction; therefore, the ability to limit drilling rests with the commander and his staff. In other words, neither the State of Israel nor its internal laws determine levels of groundwater extraction in the occupied territories.

A preliminary transboundary groundwater policy does exist, however. Groundwater policy between Israelis and Palestinians began with the development of the second Oslo treaty in 1996, as negotiators met to discuss an equitable division of these water supplies. The groundwater policy addressed therein is temporary, merely outlining groundwater usage at the time of the treaty's signing and creating a joint committee to address groundwater without a recommended method of managing shared groundwater supplies. It nonetheless serves as an example of a groundwater policy involving water quantity. Water negotiators for the Oslo II agreement met to determine the definition of an equitable division of groundwater supplies for the purposes of the interim treaty. Their conclusion was that the treaty's language should indicate the current division of groundwater, allocating roughly 80 percent to Israelis and 20

percent to Palestinians. A final treaty would determine equitable division for the future.

New negotiations may facilitate an equitable division consider alternatives to groundwater to increase available water supplies, and address groundwater quality management. Alternative water sources, considered by both the Palestinian Authority and Israeli water managers and politicians, can exist naturally or be created through a variety of methods. Either party on both sides could seek to increase water supplies and constrain demand. Proposed theories on increasing water supply in Israel include water shipments from Turkey in the forms of pipeline transportation or maritime importation as well as desalination of seawater. Both options are expensive, but are being considered. Other theorists conclude that the best way to decrease groundwater demand is to increase the scope of water conservation projects already underway in Israel, such as water recycling and drip irrigation in agriculture. Still others feel that the best method of decreasing demand is not only to continue to recycle wastewater, but also decrease the size of Israel's agricultural sector. This option is unpopular, given the historical importance of agriculture in Israel's history and its desire for self-sufficiency. It is argued that if Israel can increase its own water supply and decrease its demand for groundwater through technological innovation, the potential is enhanced

for a stable solution to allocation of groundwater supplies between the Palestinians and Israel.

The debate over how best to manage Palestinian-Israeli transboundary aquifers remains unresolved. Some experts suggest that all shared water supplies are best managed by a third party, whether a neutral country, international non-governmental body, or a private company. Others argue that joint management of the aquifers is a superior solution, as it creates a climate whereby the equitable division of water is determined, agreed upon, and monitored by both parties.

Policy Options

The final chapter of this thesis addresses the future of transboundary groundwater policy between the United States and Mexico, outlining potential solutions, taking into account the lessons learned in the Israeli-Palestinian case, and providing recommendations based on the work and suggestions of professional analysts. Although the relationship between Israel and the Palestinian Authority differs from Texas' or the United States' relations with Mexico, groundwater laws in both cases are comparable. The Israeli-Palestinian case also provides insight into the problems experienced in Texas and Mexico relating to groundwater policy. In both cases, the need for policy is immediate as aquifers are

being depleted and populations are increasing. It is not clear what management method best suited to each case. While it is argued that joint management may be a wise solution in the Israeli-Palestinian case, it may not be the best alternative in the case of Texas and Mexico.

The Joint Commission of IBWC/CILA is in a unique position to handle the task of managing shared groundwater supplies. Even if Texas' water laws stand in the way of a system of joint management between the United States and Mexico, the Joint Commission can assert legal jurisdiction over all transboundary waters. Another potential solution is a system of coordinated unilateral management between Texas and Mexico. Such a plan would allow the two sides to operate and manage groundwater resources on their own side of the border, while sharing information pertinent to the other side and developing a plan for water crisis response.

This thesis comes to no conclusions as to the viability of a given water management plan or the possibility of success, nor does it recommend a change in national or state law. The thesis instead argues in favor of a solution that includes the increase of the Joint Commission's authority to include groundwater management and outlines policy recommendations toward this initiative. Recommendations include efforts to increase data collection, assess groundwater withdrawals and quantity, determine the uses of groundwater on both sides of the border, identify

potential alternative water sources, and develop a water quantity emergency response system. No matter what solution is acceptable eventually to both sides, each side would be better off if the IBWC/CILA could undertake these actions now.