The Need for an Interstate Compact Between Ogallala States

Analysis of Four Management Options as Guidance for an Innovative Compact Proposal

By Alexandra Thompson

The Ogallala Aquifer is an important economic resource for both the High Plains Region of the United States and the entire country due to its vital contributions to the world market. The Ogallala Aquifer spreads across eight states in its entirety: South Dakota, Wyoming, Nebraska, Kansas, Oklahoma, Colorado, New Mexico, and Texas. Agriculture in these states depends heavily on the water the Ogallala provides, and the economy of the United States would face severe impacts if it ever ran dry. The chief problem the aquifer faces in terms of sustainability, is the difference in regulation the encountered from state to state. This results in issues with future planning and management for the states regarding irrigation for agriculture, dairy farms, cattle ranchers, and municipal water supplies. As a result of people pumping groundwater faster than the aquifer is able to naturally recharge itself, the Ogallala faces a seriously depleted water table. The question is not why or how the aquifer will go dry, but when. Upon a research of this subject, this review proposes that all eight of the states must create a compact and be in agreement on one method of management to implement, granting some lee-way for particular local needs and acknowledging the varied availability of water in different sections of the aquifer. Secondly, states must allot correlative rights based on property rights determined through groundwater acre-feet per acre of surface property owned. The compact must also possess a binding long-term sustainability plan and require mandatory metering of every property owner in every state. It is up to the next generation of college graduates and future occupants of political positions to reverse current trends towards environmental exploitation and create an atmosphere conducive to environmental stabilization and the preservation of the Ogallala Aquifer.

The Ogallala Aquifer is an important economic resource for both the High Plains Region of the United States and the entire country due to its vital contributions to the world market. The Ogallala Aquifer spreads across eight states in its entirety: South Dakota, Wyoming, Nebraska, Kansas, Oklahoma, Colorado, New Mexico, and Texas. Agriculture in these states depends heavily on the water the Ogallala provides, and the economy of the United States would face severe impacts if it ever ran dry. The chief problem the aquifer faces in terms of sustainability, is the difference in regulation encountered from state to state. Each state has different laws and policies regulating the pumping and usage of groundwater resources. This results in issues with future planning and management for states regarding irrigation for agriculture, dairy farms, cattle ranchers, and municipal water supplies. As a result of people pumping groundwater faster than the aquifer is able to naturally recharge itself, the Ogallala faces a seriously depleted water table. Some debate whether or not it will eventually be drained dry, but experts, scientists, land owners, and city officials all know it's inevitable. The question is not why or how the aquifer will go dry, but when. A brief analysis of management styles of the aquifer within a report presented to the Texas State Comptroller of Public Affairs, Glenn Hegar, helps clarify the different approaches to aquifer management presently used and proposed. This capstone report presented to Hegar was created by students at Texas A&M University in the Bush School of Government & Public Services and will be used as a guideline for a possible management strategy to a new interstate compact proposal amongst the states that share the Ogallala Aquifer. The need for an interstate compact among the states that share this vital and finite resource can no longer be ignored. It is an undeniable reality that if these states truly want to preserve and utilize, to the best extent, the benefits this resource has to offer, and extend its economic contributions to the United States' economy long-term for future generations, changes must be made to the aquifer's management.

Threats the Ogallala Aquifer Faces

The main issues this finite resource faces are depletion, contamination, and a lack of collaborative management styles between the states that use this aquifer; the latter of which is further discussed in the next section When many states originally created their groundwater management rules, they did not have proper models to use other than those used for surface water laws. There was also less scientific evidence about groundwater when most of these laws were written into state constitutions, and not all states have been adequately revising them as technology and scientific evidence provides reasoning to do so.

The depletion of the aquifer is complicated by the fact that certain areas are more depleted than others. The overall amount of groundwater available within the aquifer seems like a large amount, but the water is distributed unevenly across the High Plains. This is due to over pumping of the groundwater in certain areas and the geology of the aquifer itself. The southeast flow of the aquifer's groundwater combined with current depletion rates guarantees the present steady fall in groundwater levels.

In Texas, the aquifer has dropped 25 percent in drainable water—water that is not in the process of infiltration, but is underneath the water table and able to pump. Water levels have dropped an average of 40 feet since pumping from the Ogallala began in Texas and continues to drop about one to two feet per year. In New Mexico, 20 percent of the aquifer's water is gone. This is problematic because the saturated thickness of the drainable water has to be at least 30 feet in order to be usable for irrigation. Some areas are hurting worse than others with drainable water plummeting between 50 to 100 feet in the worst sections. Other locations have seen saturated thickness drop more than 50 percent. In Colorado, their small share of the water from the Ogallala, much like New Mexico's sharp decline in water levels, has depleted so rapidly that the majority of the Ogallala water throughout the state is less than 50 feet thick. Other states throughout the aquifer have patterns of depletion similar to those previously mentioned, with certain areas still possessing abundant water reserves, and many others already seeing the impacts of gradual depletion.

In recent years, the causes of falling water tables have diversified. The need for municipal water supplies for cities and suburbs increasingly occupies a larger share of water use in many areas, driving up the cost of pumping water. This increased cost of pumping, coupled with falling water levels, creates a positive feedback loop that operates against farmers' interests. Increased pumping costs place such high

financial strain on farmers that many pursue three primary courses of action to alleviate financial stress: attempting to switch crops that are more economically feasible to grow, selling the farm to another land owner to consolidate properties, or selling to developers. If the farmer sells to developers, those developers often then use the land to create housing that requires a steady water supply. These residents then use the already-depleted water the farmer could not afford to pump and continues to drain the aquifer at an alarmingly fast pace.

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The Ogallala Aquifer also faces overuse from a new population of migrants: California dairy farmers. Californians severely depleted their own groundwater resources in recent years, leading many dairy farmers from the state to relocate to the High Plains. The climate, price of land, and the lenient laws have attracted dairy farmers to the region, but their impact is not altogether positive. While dairy farms have the potential to contribute more economically than other typical agricultural crops, they also require and use a lot of fresh water in order to stay in production—water that is increasingly difficult to access.

The aquifer also faces the issue of groundwater contamination. Many of the farmers depleting the aquifer through irrigation also contaminate it with chemicals used to produce crops at the best yield possible each year. One particular process called chemigation relies on the injection of chemicals into water set aside for irrigation and the dispersal of the treated water among the crops. This process is highly efficient and leads to less waste of product. Through chemigation, farmers are able to multitask, resulting in an incredibly efficient method of irrigation and crop maintenance. The problem with chemigation, however, lies in the very source of its effectiveness—by introducing the fertilizer into the water, the chemicals are mixed directly with the water molecules. The chemigated water not absorbed by the crops or that does not evaporate, returns to the soil and eventually makes its way down to the water table, bringing contamination directly to the High Plains' most important water source. Some claim the soil will naturally filter these agents out, but eventually even the ground becomes so saturated with chemicals that natural filtration can no longer occur. At this point, all those chemicals simply mix into the previously clean groundwater.

Sewage leakage from old septic tanks and wastewater lines also pose serious threats to groundwater contamination, as does the problem of brackish and saline water. Some of this quality degradation occurs naturally and can, in part, be tied to higher contaminant concentrations in the depleted water levels that once filtered out and dispersed these constituents within the water. Much of the contamination though relates back directly to human activity. This all means that not only is there not as much water available, but the water that does remain becomes less and less usable.

How States Currently Manage Groundwater Resources

Management of groundwater resources varies from state to state, making the work of managing and preserving the aquifer quite difficult. Water rights laws are supposed to solve three problems: who owns the water, who has the right to use the water, and how much water can be pumped. In determining ownership of the water, most of the states across the High Plains tend to agree that the water should be public property, though Texas and Oklahoma deviate from the majority on this point. Oklahoma deems ownership to the person who owns the overlying land. In Texas, the law states that, "water is owned in place by the landowner." Texas treats groundwater ownership as a property right by rule of capture as tort law, as determined in the 1904 court case Houston & Texas Railway Company v East. Because of this rule of capture designation, a landowner can also pump their neighbor's water without legally owing their neighbor compensation. The law also does not require surface water—such as the portion of through flow and groundwater flow that feeds springs, streams, lakes, and rivers—to be considered in one's pumping practices. Some amendments do attempt to regulate pumping practices within Groundwater Conservation Districts so as to help level the playing field; but where these exist, they are the exception rather than the rule. Ashworth refers to the Texas's rule of capture

operations as a "textbook example of the tragedy of the commons in operation," (71).

Determining who has the right to use the water, is a slightly more complicated problem water rights laws attempt to solve. All the states in the High Plains require that all the water is put to "beneficial use," but its definition varies among the states. In Wyoming, Colorado, and New Mexico there is a permit required for any and all wells, including those designated for domestic use and drinking water for livestock. The other five states have exemptions for domestic and livestock water supply and only require permits for "high capacity" wells intended for purposes such as irrigation and municipal water supplies. Oklahoma, Colorado, and New Mexico allow the sale of groundwater rights between private entities for profit. Four other states, Kansas, Nebraska, Wyoming, and South Dakota, designate water rights to individual wells, meaning water must be pumped from the ground before it may be sold. In Texas, the property owner may sell their groundwater right separately to a third party, but the third party must still acquire a permit to drill a well on the surface property.

The third problem concerns the volume of water that can be pumped, and groundwater management districts play a key role in determining the amount. All the High Plains states have some form of groundwater management district, though they may vary in name and roles in each state. South Dakota is the only state of the eight that has its groundwater completely controlled by the state with a "top-down" method of management, meaning all authority ultimately rests with the state government. In Colorado and New Mexico, a state engineer oversees and manages the groundwater districts. Both Colorado and New Mexico also practice Conjunctive Management, meaning the state governments recognize the connections between Surface and Groundwater and how activities with one will inherently affect the other.

Each of the states practice some form of prior appropriation, correlative rights, or a unique mixture of both, depending on location. Prior appropriation is usually associated with the saying, "first in time, first in right." This system designates the first person to apply for a water right as the senior water rights holder. The senior right holder possesses privileges such as the right to pump during times of drought, while everyone who applied for water rights after them, known as junior water rights holders, will usually be cut off first. Correlative rights revolve around attempting to treat everybody fairly, regardless of who obtained rights first. Property acreage typically determines how much water an individual is allowed to pump. In times of drought, all water rights holders are required to limit their pumping. In Texas, Texas statutes chapter 36 allows groundwater districts to have the ability to decide for themselves which method they choose to use and implement.

Each state also implements its own rules for addressing draw-down rates and restrictions necessary to minimize them. Variation in regulation may even be broken down within the different groundwater districts as every state, with the exception of South Dakota, implements a "bottom-up" form of management so as to keep regulation local. This allows regulators to better address the specific conditions and environment of a particular area. These seven states attempt to limit amounts of depletion within the Ogallala Aquifer using various methods, from caps on the amount of water that can be withdrawn to limits on the speed of water table decline.

In Texas, the Groundwater Conservation Districts (GCDs) compile desired future conditions (DFCs). These DFCs act as a basis for 50-year plans of the future of the aquifer as a water source for each particular district. These plans are revised every five years with the aid of the most recent scientific data procured from technology the GCDs use to monitor the aquifer. The GCDs also closely monitor conditions such as the aquifer flows, water table levels, and possible methods of lowering the depletion rates

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of the aquifer as they appear. Texas additionally creates zones known as Groundwater Management Areas (GMAs) that correlate to entire aquifers, whereas GCDs tend to be political entities usually contained within a single county, regardless of the natural boundaries of the aquifers. These GMAs review the desired future conditions established by local GCDs and vote to determine approval of the conditions. If the list is approved by the GMA, then it is sent to the Texas Water Development Board, where a model of available groundwater is generated and used as guidance by the Groundwater Conservation District

for the future use of its locally available groundwater. All future use of groundwater within a GCD must be in line with the approved DFC until it is updated in the future. Unfortunately, Texas does not legally acknowledge or practice conjunctive management between surface water and groundwater. So far, the desired future conditions for the Ogallala within the state of Texas for High Plains Underground Water Conservation District No. 1 is to allow the depletion of the aquifer by 50 percent within a 50-year period, even though it has already depleted by 50 percent since the development and irrigation of the Ogallala began in the early 1900s. This would place the DFC-projected levels at a quarter of the original volume of the aquifer, a level wholly unacceptable and unsustainable.

The most glaring example of the issues caused by Texas's rule of capture operations with its groundwater lies in the current groundwater disagreements between Texas and New Mexico. New Mexico's dwindling water levels forces the state to proceed very carefully with how it manages its remaining Ogallala water. In Texas, the rule of capture allows farmers to legally to drain water beneath a neighbor's land. New Mexican farmers must follow different laws that do not permit this, resulting in frequent disputes over water use between neighboring farms along the state line. Texas and New Mexico also come into conflict because New Mexico practices conjunctive management, meaning the state recognizes connections between surface water and groundwater. This results in laws from the New Mexican state government that aim to ensure long-term accessibility of groundwater and surface water for rights holders by protecting both from overuse and contamination. Ironically, Texas does not legally recognize or practice conjunctive management, yet is in legal battles with New Mexico concerning over pumping of groundwater and the affects on the amount of surface water that Texas was supposed to be legally allotted to receive, as per the 1938 Rio Grande Compact between the two states. This case continues today, and the Texas Commission on Environmental Quality's website says this on the matter:

> *Texas is deprived of water apportioned to it in the Compact because New Mexico has authorized and permitted wells that have been developed near the Rio Grande in New Mexico. The more than 3,000 wells pump tens of thousands of acre-feet of water that is hydrologically connected to the Rio Grande. In addition, New Mexico has permitted wells that would facilitate water use, which in the future will likely significantly increase pumping of Compact water. (Texas Commission on Environmental Quality)*

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New Mexico is not the only state with which Texas has sparred over water rights. Texas also had a court case against Oklahoma in 2013 regarding surface water and the Red River Compact.

Simply put, Texas needs to legally affirm and adopt conjunctive management in its policymaking process because of the scientifically proven fact that surface water and groundwater are connected. State officials know this, but they refuse to practice and acknowledge conjunctive management. Texas needs to reorganize the way it governs all water rights allotted throughout the state to reflect conjunctive management, and many other issues need to be addressed with that. Troubles extend beyond lacking clear consensus on the need to recognize conjunctive management; the fact that the states all manage their water with different policies, none of which the aquifer itself is obliged to follow, makes no sense. The sustainability of the aquifer and the future of its use is dangerously jeopardized when all parties present attempt to claim and drain as much water as they can, as fast as they can. Every state within the Ogallala Aquifer, their respective economies, and the United States' economy as a whole benefits from the proper care and management of this finite resource.

Reorganizing Groundwater Regulation as a guideline for an interstate compact for the states that utilize the Ogallala Aquifer

On May 9, 2016, a group of students from the Bush School of Government & Public Service at Texas A&M University presented their capstone

report to the Texas Comptroller of Public Affairs at the state capitol. This report is titled Reorganizing Groundwater Regulation in Texas and it discusses four options designed by the students as possible solutions for Texas to adopt for its management of, and policies for, the various groundwater resources. This report serves as a guideline for an interstate compact of my own design between Texas and the other states that utilize the Ogallala Aquifer.

The data for the Ogallala Aquifer in this report clearly shows that if consumption stays at its current rate, the Ogallala only has a total of 35 years left of supply, according to the 50% Total Estimated Recoverable Storage (TERS) calculation, (Brady, et. al). This means that the High Plains Underground Water Conservation District No. 1's plan to use 50 percent of the available water over a 50-year period will not suffice. The water will be gone long before that 50-year period expires if water management practices do not change. Activities in other states north of Texas, including the way they manage their groundwater pumping, contribute to this grim possibility, only further emphasizing the need for an interstate compact regulating the preservation and use of the Ogallala Aquifer.

The four options presented by the A&M students in their report *Reorganizing Groundwater Regulations in Texas* vary in their designations of regulatory power and the various roles that different government bodies would have under each proposed regulation style. The students followed each proposed option with the pros and cons of the management changes. They also included suggestions to mitigate the issues that the parties likely to be negatively impacted by the change in governing style—parties such as members of the mostly agricultural communities—might face. As different as the four management options are in some respects, there is one commonality: treating groundwater pumping as a true property right. In Texas, groundwater pumping has always officially been classified as a property right, but in reality, the ability of land owners to obtain the necessary permits to begin pumping is often hindered due to bureaucratic red tape, such as permitting fees that vary depending on the intended purpose of the pump. In some cases, permits are even denied to property owners because of the varying purposes for which they intend to use the water (Brady, et. al.). To eliminate this undue burden, the students proposed in all the four management styles that there be a correlative rights system established with property owners so that the amount of acreage anyone owns is directly tied to the amount of water anyone can pump, regardless of the purpose behind the pump.

Option 1 is similar to the way Texas manages its groundwater currently, where GCD's maintain local governing control. However, the regulatory process changes so that correlative property rights with established pumping caps govern how much water may be removed. Permits are issued in a uniform manner with a standard fee structure and enforced mandatory metering. This system allows people to buy and sell water rights privately.

Option 2 is similar to Option 1, but where GCD's presently govern the water and possess regulatory power, new entities will be created along hydrological boundaries. As a result, eight new aquifer authorities similar to the Edward's Aquifer Authority will need to be created for the remaining eight major aquifers in Texas. These aquifer authorities will each have a board consisting of members. Of these members, three will be appointed by the governor, and four elected into offices after each aquifer is divided into four voting districts. This system establishes the same rules for everyone, ensuring that community members are able to elect members to keep the program in check. This system allows for more long term certainty of development as management regulations are based on the specific conditions affecting each aquifer.

Option 3 differs from the first two options in that it calls for a state-wide agency tasked with regulating groundwater modeled after the Texas Railroad Commission and its state-wide management practices. The body would have three elected board members and 16 district offices—much like the GMAs that currently exist in Texas. These new offices would be responsible for metering reports and monitoring wells in their districts as well as issuing permits at standard fees that respect property rights on a correlative rights system. Permits will be issued with consideration to the safety of pumping in a given location, well spacing, the amount of land a permit applicant owns, the hydrological makeup of the aquifer of the area, and current aquifer conditions. This system also only allows transferrable rights within zones, with the zones based on the hydrology of the aquifer.

Option 4 uses the correlative rights system to determine the exact amount that each property owner is allotted to create a water bank that uses the water market features to manage the water usage. By identifying the exact amount a property owner has to use, much like a debit account with a bank, the limited water supply incentivizes conservation of the resource. Once a property owner consumes the entirety of their water reserves, the only option they are left with is to purchase either a water right or water itself from another property owner. This plan centers itself around local control and keeping the local GCDs. This option creates scarcity of water, guaranteeing market demand of the resource, increasing the value of water appropriately. Each water user or property owner receives monthly banking statements, and the aquifer's natural recharge grants credits into the account based on scientific evidence and the hydrogeology of the aquifer, further incentivizing conservation. Property owners are also allowed the use of an initial five percent of the water under their property however they want for 50 years. This system allows for water rights to be sold and shown on the account of both members as a transaction, but no such transaction may take place outside the water's district of origin.

As stated earlier, pros and cons for each type of proposed management style exist. There would likely be some resistance from local control, as under all four options the local areas would have to incorporate correlative rights. This, in turn, would meet resistance from property owners and industries, as well as some municipalities. Agricultural land owners would likely not be pleased with correlative rights, yet the alternative method of selling their property rights as a possible way to make up for their loss in crop profit exists. There also exists the possibility of metering fraud for those that unwilling to comply, but each proposed system also brings an increased legal basis from which to take regulatory action.

Conclusion

It is time to manage the Ogallala Aquifer so that further depletion will be avoided as much as possible while still getting the most beneficial use out of it. This might seem contradictory, but that is why the options presented in the A&M student's capstone report are a valuable reference, especially since each option goes into great detail as to how exactly the different governing bodies would operate, and how permits would be allotted.

I propose a mixture of all four options would best suit the Ogallala Aquifer. I based this approach on the aquifer's rapid decline of available water for certain areas, the economic importance of the Ogallala Aquifer, and the issues present in Texas refusing to accept conjunctive management practices over the present rule of capture. First, all eight of the states must create a compact and be in agreement on one method of management to implement, granting some lee-way for particular local needs and acknowledging the varied availability of water in different sections of the aquifer.

For this to happen, it is most important that all eight states legally acknowledge and put in place conjunctive management practices. The scientific evidence is too strong to ignore that surface water and groundwater have a direct relationship. Secondly, states must allot correlative rights based on property rights determined through groundwater acre-feet per acre of surface property owned. Treatment under the law must be administered equally with no one abiding by a separate set of rules. Also, creating a water market within the Ogallala Aquifer—meaning one could only purchase from water rights holders within the Ogallala Compact—would help create scarcity and demand, further encouraging conservation by allowing demand to drive water prices within the market. The question of whether the states, the groundwater districts, or one giant aquifer authority should possess regulatory authority is more complicated. Certain amounts of regulation should be kept local through an Ogallala Aquifer Authority within each state that possesses the same structure proposed in A&M's Option 2. It will consist of a body of delegates both elected and appointed, and local voting for regulation changes must take place. Within this, though, state legislatures shall retain the power of intervention, much like the Texas legislature's ability to intervene when the Edward's Aquifer Authority fails to meet its required duties and needs guidance from a more powerful legal body. Finally, if the state legislatures fail to uphold the Ogallala Compact rules and regulations, the U.S. federal government should have the authority to step in to make sure the states and aquifer authority act in accordance with the compact. This power and authority the federal government possesses rests in the

Interstate Commerce Act, as this agricultural region of the United States contributes significantly to the country's economy. The Endangered Species Act further empowers the federal government to intervene in this region as over-pumping of the groundwater could affect the streams and bodies of surface water which endangered species throughout regions of the Ogallala Aquifer inhabit.

This compact must also possess a binding long-term sustainability plan, similar to California's management of its groundwater resources since the passage of their Sustainable Groundwater Management Act in 2014, which allows for the state to take over should the agency fail to properly perform its duties. This long-term sustainability plan should be based on the hydrogeological needs and conditions of the Ogallala Aquifer, including the varying locations of recharge. The plan must also require mandatory metering of every property owner in every state. Similar to Texas's DFC-based 50-year plan that current GCD's create and revise every 5 years, each state's Ogallala Aquifer Authority should meet every 5 years and revise the long-term sustainability plan using current, accurate scientific evidence available at the time to generate appropriate management practices for future use.

The realization of this proposal requires a massive collaboration between all eight states where they agree upon one style of management. It's difficult enough for Texas to agree upon a single style of management for groundwater within its own boundaries. This plan also requires massive increases in government funding, which is problematic as the current government tries to cut as much funding as possible for anything pertinent to environmental policy. It is up to the next generation of college graduates and future occupants of political positions to reverse current trends towards environmental exploitation and create an atmosphere conducive to environmental stabilization and the preservation of the Ogallala Aquifer.

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