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## Interstate Management of the High Plains Aquifer: A Case Study of Western Texas and Eastern New Mexico

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## WRITING COMPETITION ENTRY

#9

*Interstate Management of the High Plains Aquifer: A Case Study Of  
Western Texas And Eastern New Mexico*

INTERSTATE MANAGEMENT OF THE HIGH PLAINS AQUIFER: A CASE STUDY  
OF WESTERN TEXAS AND EASTERN NEW MEXICO

Introduction

Drought conditions in the western United States have brought water issues to the front of the current political debate. With surface water sources fully or over appropriated the West has shifted a large amount of its water needs to groundwater. This shift has not been coupled with a significant shift in water law or policy in regards to this resource; thus the West's aquifers have been mined for years with little regulation. Consequently many areas that rely on groundwater are feeling the effects of years of unregulated pumping. One of the effects of this unregulated use is stress on interstate relations. As with surface water, groundwater sources cross state political boundaries, causing the effects of pumping to not only impinge on one state, but large regions encompassing multiple states. Yet groundwater use remains solely within state control causing problems between states that will mushroom in the coming years when the resource dries up.

This paper attempts to address this increasingly volatile issue by suggesting a form of interstate groundwater management through focus on one geographical area, the Llano Estacado region of Eastern New Mexico and Western Texas. This region shares a common groundwater source that is quickly being

depleted, the High Plains Aquifer (the Aquifer). Up to the present the management of the Aquifer has remained localized under each state's water law. A new management mechanism is needed because often state water laws are inapt for promoting efficient use of groundwater and are also extremely inflexible in allowing for the change of use of a right or change of right holder.<sup>1</sup> This inability to control overdraft of the Aquifer has led to crisis in the southern region where the Aquifer's supply is being depleted at an alarming rate.

The paper will first provide background on the Aquifer and its depletion in the region. A background of the region itself will also be provided including population and economic data. Then the paper will move on to the problems that are arising in the region in respect to groundwater and what the future problems will be. Furthermore, it will examine the perceptions of those living in the region toward groundwater and how interested political parties are responding to the issue. Last, recommendations for comprehensive groundwater management of the region will be made through discussion of the formation of an interstate commission with federal backing and representation.

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<sup>1</sup> White, Stephen E. & David E. Kromm, Appropriation and Water Rights Issues in the High Plains Ogallala Region, 33 The Social

## Background

The Llano Estacado region is also referred to as the Southern High Plains and lies within the panhandle of West Texas and Eastern New Mexico south of the Canadian River.<sup>2</sup> The region's groundwater source is the High Plains Aquifer, which is part of the Ogallala formation.<sup>3</sup> The Aquifer extends for 453,000 Square kilometers into parts of eight different states: Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas and Wyoming.<sup>4</sup> The area encompassed by the aquifer is "five times greater than the world's largest freshwater lake and over 150 percent larger than the surface area of all five Great Lakes combined."<sup>5</sup> This paper will focus specifically on the area of the aquifer underlying Eastern New Mexico and Western Texas, which is an area that encompasses 36,080 square miles under West Texas and about 10,000 square miles in Eastern New Mexico.<sup>6</sup>

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Science Journal no. 4, 437, at 444 (1996).

<sup>2</sup> Groundwater Atlas of the United States, Oklahoma, Texas, Arizona, Colorado, New Mexico, Utah, United States Geological Survey, at [http://capp.water.usgs.gov/gwa/ch\\_c/C-text5.html](http://capp.water.usgs.gov/gwa/ch_c/C-text5.html) (last visited January 6, 2004).

<sup>3</sup> Id.

<sup>4</sup> Id.; Postel, Sandra, When the Worlds Wells Run Dry, 12 World Watch 5, 31 (1999).

<sup>5</sup> Office of Congressman Jerry Moran, Moran Supports Funding for Ogalla Aquifer, found at [http://www.waterchat.com/News/Federal/03/Q4/fed\\_031031-04.htm](http://www.waterchat.com/News/Federal/03/Q4/fed_031031-04.htm) (last visited January 3, 2004).

<sup>6</sup> High Plains Underground Conservation District, Llano Estacado Regional Water Planning Group, found at <http://www.hpwd.com/ogallal/llanogroup.asp>. (last visited January 3, 2004).

The Aquifer holds an enormous amount of water. Prior to use of its stored water, the Aquifer held 3,700 cubic kilometers of water, "a volume equal to the annual flow of more than 200 Colorado Rivers."<sup>7</sup> The amount of recoverable water in the aquifer beneath New Mexico is relatively small; in 1990 it was only 47,000,000-acre feet,<sup>8</sup> an amount that makes up only 1.5 percent of the water in storage in the Aquifer.<sup>9</sup> A much larger amount of water lies under Texas. About 12 percent of the water in storage in the aquifer is located under Texas, or approximately 417 million-acre feet.<sup>10</sup> While these are vast reserves of water they are being quickly depleted due to over-harvesting in the region.

To say that the Aquifer is being pumped extensively is an understatement. In the high plains region of the United States the Aquifer provides 99 percent of the water supply.<sup>11</sup> Ninety-five percent of this water is used for irrigation.<sup>12</sup> About 20

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<sup>7</sup> Postel, Sandra, When the Worlds Wells Run Dry, 12 World Watch 5, 31 (1999).

<sup>8</sup> Id.

<sup>9</sup> High Plains Underground Water Conservation District, The Ogallala Aquifer, found at <http://www.hpwd.com/ogallala/ogallala.asp> (last visited January 5, 2004).

<sup>10</sup> Id.

<sup>11</sup> Office of Congressman Jerry Moran, Moran Supports Funding for Ogallala Aquifer, found at [http://www.waterchat.com/News/Federal/03/Q4/fed\\_031031-04.htm](http://www.waterchat.com/News/Federal/03/Q4/fed_031031-04.htm) (last visited January 5, 2004).

<sup>12</sup> Groundwater Atlas of the United States, Oklahoma, Texas, Arizona, Colorado, New Mexico, Utah, United States Geological

percent of all irrigated land in the United States is in this region and about 30 percent of all groundwater used for irrigation purposes in the entire United States is pumped from the Aquifer.<sup>13</sup>

In the southern part of the Aquifer, including the Llano Estacado region of West Texas and Eastern New Mexico, the Aquifer has been depleted 325 bcm, which is equal to the annual flow of 18 Colorado Rivers.<sup>14</sup> Over two-thirds of this depletion has occurred in Texas.<sup>15</sup> Specifically, in the 1980 growing season 5,169,000 acre-feet of water was pumped for irrigation in Texas from the Aquifer, supplying water to approximately 75,000 irrigation wells.<sup>16</sup> During the same growing season 519,000 acre-feet of water from the Aquifer was used in New Mexico for irrigation.<sup>17</sup>

One of the reasons that the Aquifer is being depleted so quickly in this region is the small amount of recharge. Unlike

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Survey, at [http://capp.water.usgs.gov/gwa/ch\\_c/C-text5.html](http://capp.water.usgs.gov/gwa/ch_c/C-text5.html) (last visited January 5, 2004).

<sup>13</sup> United States Geological Survey, High Plains Regional Ground Water (HPGW) Study, found at [http://co.water.usgs.gov/nawqa/hpgw/HPGW\\_home.html](http://co.water.usgs.gov/nawqa/hpgw/HPGW_home.html) (last visited January 5, 2004).

<sup>14</sup> Postel, Sandra, When the Worlds Wells Run Dry, 12 World Watch 5, 31 (1999).

<sup>15</sup> Id.

<sup>16</sup> Groundwater Atlas of the United States, Oklahoma, Texas, Arizona, Colorado, New Mexico, Utah, United States Geological Survey, at [http://capp.water.usgs.gov/gwa/ch\\_c/C-text5.html](http://capp.water.usgs.gov/gwa/ch_c/C-text5.html) (last visited January 3, 2004).

<sup>17</sup> Id.

other aquifers that are recharged through rivers and downward flows off mountains, the High Plains is only recharged by the precipitation that falls directly on the Aquifer.<sup>18</sup> In the Llano Estacado region the climate is dry and thus receives little rainfall compared to other regions overlaying the Aquifer. In fact, the southwestern part of the Aquifer receives only about 12 inches of precipitation a year.<sup>19</sup> Furthermore, the climate of the southwestern region of the Aquifer produces high evaporation rates due to its semi-aridness and constant winds. In Lubbock, Texas the annual evaporation rate is about 80 inches per year.<sup>20</sup> Such a high evaporation rate further lowers recharge levels. In Texas recharge is estimated at only 0.024 inches per year. In New Mexico the average is 0.07 inches per year.<sup>21</sup> The recharge rates are much lower in this southern region of the Aquifer than in the North where recharge can be as great at 6 inches per year.<sup>22</sup>

With such small recharge rates and such high use overdraft has become the norm in these areas. To date the Aquifer under

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<sup>18</sup> Id.

<sup>19</sup> Id.

<sup>20</sup> High Plains Underground Water Conservation District, The Ogallala Aquifer, found at <http://www.hpwd.com/ogallala/ogallala.asp> (last visited January 5, 2004).

<sup>21</sup> Id.

<sup>22</sup> Groundwater Atlas of the United States: Kansas, Missouri, and Nebraska - High Plains Aquifer, United States Geological Survey,



Texas has been depleted by at least 23 percent, which is the highest depletion rate of any state in the Ogallala region.<sup>23</sup> This overdraft has lowered water levels as much as 200 feet in the area.<sup>24</sup> In New Mexico 16 percent of the original volume of the Aquifer had been depleted by 1980.<sup>25</sup> The Aquifer in this region is all one mass thus the overdraft in Texas has an effect on the water level in New Mexico. Moreover, only about 15 percent of the water in Aquifer is believed to be recoverable through the use of irrigation pumps, further limiting its life expectancy.<sup>26</sup>

If overdraft of the Aquifer continues at its current level the region will be plagued by serious social and economic consequences. Many of the effects of overdraft are already being felt in the region. Between 1978 and 1988 the irrigated acreage that used the Aquifer's water had dropped 20 percent due to higher pumping costs, which are attributed to declining water

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found at [http://capp.water.usgs.gov/gwa/ch\\_d/D-text2.html](http://capp.water.usgs.gov/gwa/ch_d/D-text2.html) (last visited January 6, 2004).

<sup>23</sup> Ashley, Jeffrey S. & Zachary A. Smith, Groundwater Management in the West, 241-42 (University of Nebraska Press 1999).

<sup>24</sup> Id.

<sup>25</sup> Groundwater Atlas of the United States, Oklahoma, Texas, Arizona, Colorado, New Mexico, Utah, United States Geological Survey, at [http://capp.water.usgs.gov/gwa/ch\\_c/C-text5.html](http://capp.water.usgs.gov/gwa/ch_c/C-text5.html) (last visited January 3, 2004).

<sup>26</sup> Avalos, Manuel & Timothy De Young, Preferences for Water Policy in the Ogallala Region of New Mexico: Distributive vs. Regulatory Solutions, 23 Policy Studies Journal 688, 689 (1995).

tables.<sup>27</sup> In fact, parts of the Aquifer in northern Texas and west central Kansas have already been depleted fully.<sup>28</sup> Currently, the area of greatest risk of going dry is the Llano Estacado region south of the Canadian River.<sup>29</sup>

Even with these facts and predictions the Texas Water Plan projects that the Aquifer will be able to meet Texas's needs for one hundred to two hundred more years if conservation measures are taken.<sup>30</sup> The United States Geologic Survey's (USGS) predictions are not so positive. The USGS has projected that the southern high plains region will "experience severe consequences from depletion before 2020" and that irrigatable acreage in the high plains of Texas will decrease by over one half of the present amount by 2030.<sup>31</sup> Other projections state that within 25 years parts of the Aquifer could be completely dry.<sup>32</sup> Moreover, the New Mexico State Engineer's Office has

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<sup>27</sup> Id.

<sup>28</sup> Peterson. [http://choicesmagazine.org/archives/2003/q1/2003-1-04\\_print.htm](http://choicesmagazine.org/archives/2003/q1/2003-1-04_print.htm).

<sup>29</sup> Postel, Sandra, When the Worlds Wells Run Dry, 12 World Watch 5, 34 (1999).

<sup>30</sup> Ashley, supra note 21, at 4 (these conservation measures include the economy shifting away from agriculture and the water supply being augmented with water from other sources).

<sup>31</sup> Avalos & De Young, supra note 24, at 5; Groundwater Atlas of the United States, Oklahoma, Texas, Arizona, Colorado, New Mexico, Utah, United States Geological Survey, at [http://capp.water.usgs.gov/gwa/ch\\_c/C-text5.html](http://capp.water.usgs.gov/gwa/ch_c/C-text5.html) (last visited January 3, 2004).

<sup>32</sup> Hydrogeologic Survey Hydroelectric Project Deadline: Hearing on Miscellaneous Water Bills and Power Before the U.S. Senate

estimated that concentrated pumping in Bailey County, Texas as well as Roosevelt and Curry Counties in New Mexico will lead to the Aquifer drying up in those areas as early as 2010.<sup>33</sup>

Combined these counties support a population of nearly 70,000 people who would be displaced without the water from the aquifer.<sup>34</sup>

As with the three counties mentioned above, in the entire Llano Estacado region such shortages in groundwater will have dire social and economic consequences. The population of the area of Texas that relies on the Aquifer is nearly one million, and the population of the area of Eastern New Mexico that relies on the aquifer is 132,121.<sup>35</sup> Furthermore, while in both Texas and New Mexico farming only makes up 3 percent of the total industry for the state, in the Llano Estacado region of West Texas it makes up 19 percent of the total industry and in Eastern New Mexico it makes up 15 percent.<sup>36</sup> In Curry County, New Mexico, agriculture accounted for \$208 million dollars of gross output of goods and services, or over half of the total

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Committee on Energy and Natural Resources, 180th Cong. 195 (2003) (statement of Senator Sam Brownback).

<sup>33</sup> Save our Water Supply - About the Ogallala, Concerned Citizens for Clean Water, Inc., at <http://www.saveourwatersupply.com/ogallala/ogallala2.html> (last visited January 5, 2004).

<sup>34</sup> United States Census Quickfacts on States and Counties, United States Census 2000, at <http://quickfacts.census.gov> (last visited January 5, 2004).

<sup>35</sup> Id.

gross output in 1977.<sup>37</sup> Also, counties in the Llano Estacado region of both Texas and New Mexico that do not rely as highly on farming, such as Midland and Ector Counties in Texas, and Lea County in New Mexico, rely highly on oil drilling, another water intensive operation. In these counties oil drilling makes up over 20% of the industry.<sup>38</sup> This demonstrates the need for water from the Aquifer even in those counties that do not rely as highly on agriculture.<sup>39</sup>

If the aquifer dries up in these regions over one million people will be displaced. Even if the aquifer gets to the level where it is no longer economically sound to continue pumping for agricultural purposes the region will be severely damaged. A

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<sup>36</sup> Id.

<sup>37</sup> Lansford Robert, R, Noel R Gollehon, Bobby J. Creel, Shaul Ben-David, Earl F. Sorensen, James M. Hill, M. Emily Miller & Craig L. Mapel, High Plains-Ogallala Aquifer Study Curry County, New Mexico, Office of the State Engineer for New Mexico (1982), found at <http://wrii.nmsu.edu/publish/techrpt/abstracts/abs147.html> (last visited January 6, 2004).

<sup>38</sup> United States Census Quickfacts on States and Counties, United States Census 2000, at <http://quickfacts.census.gov> (last visited January 5, 2004).

<sup>39</sup> It is important to note though that while oil drilling is water intensive it is not nearly as intensive as agricultural use of water. In the United States 1% of the water used annually is used in mining, the same as is used for domestic use. On the other hand, agriculture claims 39% of all water used in the United States annually. Moreover, one-third of the water used for mining purposes is saline and thus undrinkable without extensive treatment. Water Questions and Answers: Water Use, United States Geological Survey, found at <http://ga.water.usgs.gov/edu/qausage.html> (last visited January 6, 2004).

15% loss in the industry of the region will severely impair it economically and probably lead to the migration of people from this area to other, probably more urban, areas. To visualize what a huge amount 15% of all industry is imagine if West Virginia lost all of its coal mining or the pacific northwest lost all of its logging industry. Then contemplate the fact that coal mining only makes up 5.4% of all industry in West Virginia, and in Oregon and Washington combined logging only make up 4.4% of all industry.<sup>40</sup>

If broad and sweeping change of the overuse of the Aquifer, as to be discussed later in the paper, is to be successful in the region it will need support from the population of the area and political support. In both West Texas and Eastern New Mexico there is a strong concern for the depleting groundwater reserves and the need for conservation.<sup>41</sup> In fact the residents of eastern New Mexico who rely on the Aquifer favor mandatory regulation measures at a rate five times greater than the rest

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<sup>40</sup> United States Census State Quickfacts, United States Census 2000, found at <http://quickfact.census.gov/qfd/> (last visited January 6, 2004).

<sup>41</sup> Somma, Mark, Institutions, Ideology, and the Tragedy of the Commons: West Texas Groundwater Policy, 27 Publius at 1 (1997) (discussing the population of West Texas's concern for depleting groundwater reserves); Avalos, Manuel & Timothy De Young, Preferences for Water Policy in the Ogallala Region of New Mexico: Distributive vs. Regulatory Solutions, 23 Policy Studies Journal at 688 (1995) (discussing the population of eastern New Mexico's want for stronger conservation policy in the High Plains Aquifer region).

of New Mexico.<sup>42</sup> This indicates that because of the foreseeable consequences to overdraft in the region the traditionally high opposition to mandatory regulation may be weakening, opening up the door to broader management in the area.<sup>43</sup> Also, people of both West Texas and Eastern New Mexico are combining their efforts in grassroots organizations to support better management of the Aquifer, in part due to the recognition of the economic consequences the loss of the Aquifer will have on the region.<sup>44</sup> Other states along the High Plains Aquifer have also expressed the view that they "want more, not less, groundwater management."<sup>45</sup>

Better water management along the Ogallala formation is also gaining political support. In January 2003, Senator Bingaman (D. New Mexico) introduced Senate Bill 212 (S.212), known as the High Plains Aquifer Hydrogeologic Characterization,

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<sup>42</sup> Avalos, Manuel & Timothy De Young, Preferences for Water Policy in the Ogallala Region of New Mexico: Distributive vs. Regulatory Solutions, 23 Policy Studies Journal at 688 (1995); 180 Cong. Rec. Statement of Senator Sam Brownback to the Committee on Senate Energy and Natural Resources (regarding S.212, the High Plains Aquifer Hydrogeologic Characterization, Mapping, Modeling and Monitoring Act)

<sup>43</sup> Avalos, Manuel & Timothy De Young, Preferences for Water Policy in the Ogallala Region of New Mexico: Distributive vs. Regulatory Solutions, 23 Policy Studies Journal at 688 (1995).

<sup>44</sup> Save our Water Supply, Concerned Citizens for Clean Water, Inc., at <http://www.saveourwatersupply.com> (last visited January 5, 2004).

<sup>45</sup> Stephen E. White & David E. Kromm, Local Groundwater Management Effectiveness in the Colorado and Kansas Ogallala Region, 35 Nat. Resources J. 275, 295 (1995).

Mapping, and Modeling Act.<sup>46</sup> The Act sets up a review panel made up of members of the USGS and one member from each of the High Plains Aquifer states recommended by the state governor.<sup>47</sup> The review panel evaluates funding for the Act and coordinates priorities under the Act. The objectives of the Act are: (1) to provide for the characterization, mapping and modeling of the aquifer through a partnership between the USGS and the High Plains States; (2) to coordinate Federal, State, and local data, maps and models into an integrated physical characterization of the aquifer; (3) to support state and local activities with scientific and technical specialists, and; (4) to undertake activities and provide technical capabilities not available at the State and local levels as may be requested by the Governor of a state on the aquifer.<sup>48</sup> Fifty percent of the funding remains with the federal government to be used by the USGS and

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<sup>46</sup> S.212, 180<sup>th</sup> Cong. (2003), as found at <http://thomas.loc.gov/cgi-bin/query/D?c108:4:./temp/~c108dt7bk0::> (last visited January 6, 2004). It is also important to note that New Mexico Governor Bill Richardson has made water management one of his top priorities and has expressed support for protection of the High Plains aquifer in Eastern New Mexico. Save our Water Supply - Newsroom, Concerned Citizens for Clean Water, Inc., at [http://saveourwatersupply.com/newsroom/bill\\_richardson.html](http://saveourwatersupply.com/newsroom/bill_richardson.html) (last visited January 5, 2004).

<sup>47</sup> S.212, 180<sup>th</sup> Cong. (2003), as found at <http://thomas.loc.gov/cgi-bin/query/D?c108:4:./temp/~c108dt7bk0::> (last visited January 6, 2004).

<sup>48</sup> Id.

fifty percent goes to the individual states.<sup>49</sup> The same bill passed the Senate in 2002 but never saw action in the House.<sup>50</sup> As with the similar 2002 bill, S.212 did not get out of the House in 2003. It made it to the House Subcommittee on Water and Power where a hearing was held on October 27, 2003, but never left the committee.<sup>51</sup>

Even with the support of the New Mexico senators, S.212 and the idea of federal involvement in the management of the High Plains Aquifer is greatly resisted by Texas politicians. Texas Congressman Randy Neugebauer testified at the October 27<sup>th</sup> subcommittee hearing that "legislation to coordinate water research and conservation efforts at the federal level is bad for West Texas."<sup>52</sup> A representative of both the Texas Farm Bureau and the High Plains Under Ground Water Conservation District also testified against the bill.<sup>53</sup> The testimony

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<sup>49</sup> Id.

<sup>50</sup> Hydrogeologic Survey Hydroelectric Project Deadline: Hearing on Miscellaneous Water Bills and Power Before the U.S. Senate Committee on Energy and Natural Resources, 180th Cong. 195 (2003) (statement of Senator Sam Brownback).

<sup>51</sup> S.212, 180<sup>th</sup> Cong. (2003), as found at <http://thomas.loc.gov/cgi-bin/query/D?c108:4:./temp/~c108dt7bk0:> (last visited January 6, 2004).

<sup>52</sup> Neugebauer Testifies Against Federal Control of the Ogallala Aquifer, Office of Representative Neugebauer Press Release, released Thursday, October, 27, 2003, found at [http://www.house.gov/apps/list/press/tx19\\_neugebauer/Ogallala10\\_27.html](http://www.house.gov/apps/list/press/tx19_neugebauer/Ogallala10_27.html) (last visited January 5, 2004).

<sup>53</sup> Id. The High Plains Underground Water Conservation District was set up by the Texas Legislature in 1994 and resides over an



against S.212 revolved around the belief that ground water resources are local in nature and should be managed on a local level and that the bill would only duplicate research already being done at the state level.<sup>54</sup> Representative Neugebauer also sent a letter to both the subcommittee chairman and Representative Richard Pombo, the House Resources Committee Chairman, expressing his opposition to the bill, on which three other Texas representatives signed.<sup>55</sup>

Texas has good reason for being resistant to centralized instead of state control of the Aquifer. Texas water law is based on the riparian system, or English common law doctrine.<sup>56</sup> Under the Texas system the Texas landowner gets absolute right

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area of over 10,000 square miles in West Texas, all of which rely on the High Plains aquifer. It is made up of 80 elected officials and is governed by a five-member Board of Directors by the people in the Director's precinct they represent. The group's mission statement is "to develop, promote, and implement water conservation, augmentation, and management strategies to provide adequate water supplies for the Llano Estacado Water Planning Region of the High Plains of Texas and to stabilize or improve the economic and social viability and longevity of the region through these activities." High Plains Underground Water Conservation District, About High Plains Underground Water Conservation District No. 1, found at <http://www.hpwd.com/About/AboutHPWD.asp> (last visited January 3, 2004).

<sup>54</sup> Neugebauer Testifies Against Federal Control of the Ogallala Aquifer, Office of Representative Neugebauer Press Release, released Thursday, October, 27, 2003, found at [http://www.house.gov/apps/list/press/txl9\\_neugebauer/Ogallala10\\_27.html](http://www.house.gov/apps/list/press/txl9_neugebauer/Ogallala10_27.html) (last visited January 5, 2004).

<sup>55</sup> Id.

<sup>56</sup> Ashley, Jeffrey S. & Zachary A. Smith, Groundwater Management in the West, 236 (University of Nebraska Press 1999).

to the use of the water beneath it.<sup>57</sup> The use of the water is never questioned nor is the effect one user will have on another.<sup>58</sup> In fact, any conservation measures taken by one user just provides more water for those who do not conserve.<sup>59</sup>

Oppositely, New Mexico water law is statutorily regulated.<sup>60</sup> Before the 1920's groundwater in New Mexico was also based on absolute ownership borrowed from the English common law, but conflicts led to groundwater appropriation statutes.<sup>61</sup> Due to this statutory regulation, in New Mexico the Office of the State Engineer has strict control over ground water use in declared basins.<sup>62</sup> The majority of the state's groundwater basins have now been "declared" by the State Engineer. To obtain a permit to use groundwater in a declared basin a person must apply for a permit with the State Engineer and prove that their use will not impact surrounding users.<sup>63</sup> Kansas and Colorado have similar

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<sup>57</sup> Id. See also Houston & Tex. Cent. R.R. v. East, 98 Tex. 146, 81 S.W. 279 (1904) (the leading Texas case establishing absolute ownership instead of reasonable use in Texas groundwater law).

<sup>58</sup> Ashley, Jeffrey S. & Zachary A. Smith, Groundwater Management in the West, 236 (University of Nebraska Press 1999).

<sup>59</sup> Somma, Mark. Institutions, Ideology, and the Tragedy of the Commons: West Texas Groundwater Policy, 27 Publius 1, at 3 (1997).

<sup>60</sup> Ashley, Jeffrey S. & Zachary A. Smith, Groundwater Management in the West 219 (University of Nebraska Press 1999).

<sup>61</sup> Id. at 218-19.

<sup>62</sup> Id. at 219.

<sup>63</sup> Id. at 219-20.

policies.<sup>64</sup> In a basin such as the southern portion of the Aquifer, where any use will impact surrounding users because the Aquifer does not recharge, the impact level for obtaining a permit in New Mexico is different. To obtain a permit in the region of New Mexico that relies on the Aquifer, a party must show that the top third of the aquifer, the easiest water to obtain for drinking purposes, will be viable for 40 years before their use will impact.<sup>65</sup>

Even with this concession it is much easier for a Texan to gain a right to use of the water of the Aquifer than a New Mexican based on water law differences between the two states. As a result, continuing to only regulate the use of the Aquifer via state law is highly favorable to Texans where it is easy to obtain a right to that water. Thus the residents of west Texas will not look highly upon federal control that may make use of the water more difficult.

Likewise the geography of the Aquifer also explains Texas's reluctance for centralized control. The aquifer is

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<sup>64</sup> Peterson, Jeffrey M., Thomas L. Marsh & Jeffery R. Williams, Conserving the Ogallala Aquifer: Efficiency, Equity, and Moral Motives, Choices Magazine, Jan. 1, 2004, found at [http://www.choicesmagazine.org/archives/2003/q1/2003-1-04\\_print.htm](http://www.choicesmagazine.org/archives/2003/q1/2003-1-04_print.htm) (last visited January 5, 2004).

<sup>65</sup> Mathers v. Texaco, Inc., 77 N.M. 239, 421 P.2d 771 (1966) (the NM Supreme Court held that while a user will lower the water table and thus affect other groundwater users in the area, a permit is still allowed as long as the top third of the aquifer will be unaffected by the new permit holder for 40 years).

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Likewise the geography of the Aquifer also explains Texas's reluctance for centralized control. The aquifer is

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<sup>64</sup> Peterson, Jeffrey M., Thomas L. Marsh & Jeffery R. Williams, Conserving the Ogallala Aquifer: Efficiency, Equity, and Moral Motives, Choices Magazine, Jan. 1, 2004, found at [http://www.choicesmagazine.org/archives/2003/q1/2003-1-04\\_print.htm](http://www.choicesmagazine.org/archives/2003/q1/2003-1-04_print.htm) (last visited January 5, 2004).

<sup>65</sup> Mathers v. Texaco, Inc., 77 N.M. 239, 421 P.2d 771 (1966) (the NM Supreme Court held that while a user will lower the water table and thus affect other groundwater users in the area, a permit is still allowed as long as the top third of the aquifer will be unaffected by the new permit holder for 40 years).

heterogeneous, which means that the depth of its base varies throughout.<sup>66</sup> These variations result in variations in the amount of water in the formation called the saturated thickness, or the area from the top of the water table to the base of the formation. In Nebraska the saturated thickness in areas is close to 1200 feet.<sup>67</sup> In other areas of the Aquifer the saturated thickness is less than 20 feet.<sup>68</sup> The variations in saturated thickness lead to the large variations in how much water each state lies over. In Texas, there are large areas of saturation over 400 feet, while in New Mexico the majority of the area encompassed by the Aquifer is less than 100 feet deep.<sup>69</sup> As a result, New Mexico lies over only 1.5% of the total water in storage in the Aquifer while Texas lies over 12%.<sup>70</sup> Thus Texas has been able to pump much more water than New Mexico

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<sup>66</sup> High Plains Underground Water Conservation District, The Ogallala Aquifer, found at <http://www.hpwd.com/ogallala/ogallala.asp> (last visited January 3, 2004).

<sup>67</sup> Peterson, Jeffrey M., Thomas L. Marsh & Jeffery R. Williams, Conserving the Ogallala Aquifer: Efficiency, Equity, and Moral Motives, Choices Magazine, Jan. 1, 2004, Figure 1, found at [http://www.choicesmagazine.org/archives/2003/q1/2003-1-04\\_print.htm](http://www.choicesmagazine.org/archives/2003/q1/2003-1-04_print.htm) (last visited January 5, 2004).

<sup>68</sup> High Plains Underground Water Conservation District, supra note 59, at 13.

<sup>69</sup> Peterson, Jeffrey M., Thomas L. Marsh & Jeffery R. Williams, Conserving the Ogallala Aquifer: Efficiency, Equity, and Moral Motives, Choices Magazine, Jan. 1, 2004, Figure 1, found at [http://www.choicesmagazine.org/archives/2003/q1/2003-1-04\\_print.htm](http://www.choicesmagazine.org/archives/2003/q1/2003-1-04_print.htm) (last visited January 5, 2004).

<sup>70</sup> High Plains Underground Water Conservation District, supra note 59, at 13.

because it has over ten times more water than New Mexico and the Aquifer lies under more land in Texas than in New Mexico.

Yet Texas cannot ignore the problem of consistent overdrafting of the Aquifer. The New Mexico State Engineer Hydrology Report 99-2 stated that based on current withdrawal rates most of Bailey and Parmer Counties in Texas will be dewatered by 2040. In these two counties farming makes up over 25 percent of all industry.<sup>71</sup> West Texas will be greatly economically impacted if something is not done to reduce its withdrawals from the Aquifer. Yet they still favor local management. This type of resistance to federal involvement in management of the Aquifer will be difficult to overcome.

Thus far federal and state support for the management of the Aquifer is superficial. While studies of the Aquifer, like those suggested in S.212, are vital they should be part of a larger management plan, especially because of the speed at which the Aquifer is being depleted in the southern regions. For instance, S.212's final report is not due until 2011. According to many estimates this would leave less than ten years to development and implement management plan before complete drying

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<sup>71</sup> United States Census Quickfacts on States and Counties, United States Census 2000, at <http://quickfacts.census.gov> (last visited January 5, 2004).

of the aquifer or at least severe social and economic repercussions in the area from the drop in the water table.<sup>72</sup>

Furthermore, in the general population of the region, while there is knowledge of the problem of overdraft on the Aquifer there is still strong resistance to centralized regulation over groundwater use.<sup>73</sup> While many irrigators along the Aquifer want to reduce groundwater depletion they seem to only support it in principle, not actuality.<sup>74</sup> But centralized regulation seems to be favored by others who do not feel that local regulation is fair unless those states that are also connected to same water source are equally regulated.<sup>75</sup> For example, citizens in New Mexico have voiced the opinion that it is unfair that New Mexico laws restrict how much water residents can take from the Aquifer while Texas laws do not restrict at all, a complaint that seems to support centralized as opposed to local regulation.<sup>76</sup>

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<sup>72</sup> S.212, 180<sup>th</sup> Cong. (2003), as found at <http://thomas.loc.gov/cgi-bin/query/D?c108:4:./temp/~c108dt7bk0::> (last visited January 6, 2004).

<sup>73</sup> Somma, Mark, Institutions, Ideology, and the Tragedy of the Commons: West Texas Groundwater Policy, 27 Publius 1, at 8 (1997)

<sup>74</sup> Stephen E. White & David E. Kromm, Local Groundwater Management Effectiveness in the Colorado and Kansas Ogallala Region, 35 Nat. Resources J. 275, 295 (1995).

<sup>75</sup> Avalos, Manuel & Timothy De Young, Preferences for Water Policy in the Ogallala Region of New Mexico: Distributive vs. Regulatory Solutions, 23 Policy Studies Journal 668 at 679 (1995).

<sup>76</sup> State Water Plan Public Comments. Comments from New Mexico State Water Plan Public Meeting: Roswell, Wednesday, September

Thus the issue is how to take advantage of the growing support for management in this region in setting up a centralized regulatory system of the Aquifer in way that will be successful in controlling the overdraft of it, yet not alienating those who rely on its water. A major hurdle to address in looking at this issue is how to overcome the resistance to centralized control that is so abundant in Texas. The remainder of this paper addresses these problems and describes what form of interstate groundwater management would be most successful in regulating the Aquifer.

#### Analysis

An interstate groundwater commission that regulates the entire basin of the Aquifer is the key to preserving the resource. The Commission must have a strong federal presence to help coordinate the eight states as well as help fund the expensive endeavor. Therefore the Commission will be made up representatives from eight states and federal representatives. Furthermore it will have complete authority over the Aquifer, including overriding any state laws that conflict with its programs. Here the focus will remain on the Texas/New Mexico region and how the Commission will work within it.

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10, 2003, New Mexico Office of the State Engineer, found at <http://www.seo.state.nm.us/water-info/NMWaterPlanning/public-comments/Roswell-09-10-03.html> (last visited January 5, 2003).



Initially, it is important to note that while focusing on a small part of the Aquifer the recommendations made here must apply to the entire region encompassed by the Aquifer to be successful and can apply to other regional aquifers that underlie multiple states as well. As stated above the Aquifer lays under eight states, all of which use its water for agricultural purposes. Furthermore, about 2 million people depend on the Aquifer as their source of drinking water.<sup>77</sup> While each state faces varying levels of threat regarding the drying up of the Aquifer for equity reasons all the states must be involved in the comprehensive management of it. It would not be just to only regulate a few states that use the water of the Aquifer while continuing to let the other states go unmanaged. Similar complaints to those that already exist between state's that border each other would result and it would be much harder to get all the states to participate if others are not involved.

This does not mean that all the states will operate the same within the management system. For instance, in the northern region of the Aquifer more pumping may be allowed than in the southern region because recharge in the north is much

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<sup>77</sup> Neugebauer Testifies Against Federal Control of the Ogallala Aquifer, Office of Representative Neugebauer Press Release, released Thursday, October, 27, 2003, found at [http://www.house.gov/apps/list/press/tx19\\_neugebauer/Ogallala10\\_27.html](http://www.house.gov/apps/list/press/tx19_neugebauer/Ogallala10_27.html) (last visited January 5, 2004).

greater, thus overdrafting is not as large of an issue.<sup>78</sup> As a result, the southern region may get more federal benefits for shifting from agriculture to other less water intensive industries because such a shift is more needed in that region than in the north. Also, it will be more important that neighboring states, such as Texas and New Mexico work closely in the management system than states that are highly disconnected such as New Mexico and Nebraska. This is because the effects of each others uses of the Aquifer impact those that are closely related, by drawing the water table down in those areas. But all the states must be involved for centralized management to be successful.

First is the question of how centralized management of the aquifer is to be initiated: How do you get all of the parties to the table? This is where the role of the federal government is crucial. New Mexico seems willing to sit down and discuss the issue but Texas does not. While some Texas residents are joining forces with New Mexicans to protect the Aquifer, the majority,<sup>79</sup> as witnessed by the West Texas congressional delegation's stark opposition to S.212, is still extremely hesitant.

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<sup>78</sup> Groundwater Atlas of the United States, supra note 22, at 4.

<sup>79</sup> See, Save our Water Supply, Concerned Citizens for Clean Water, Inc., at <http://www.saveourwatersupply.com> (last visited January 5, 2004).

To start the process of centralizing management of the Aquifer the federal government will need to motivate as well as mandate all the states that rely on the Aquifer to join the program. The motivation would come from federal funding. The federal government must fund at least 60 percent of the project. The amount that each state is already spending on the management of the Aquifer, such as the tax used to fund the High Plains Underground Water Conservation District in Texas, should be locked in and matched by the federal government. But the majority of the money must be federal. To get all the parties to the table this motivation must be there.

Motivation may not be enough for some states so a federal mandate will probably be necessary as well. The mandate should include a date that participation must begin by, if not met the state will lose federal monies. The United States Supreme Court, as stated in Sporhase v. Nebraska ex. rel. Douglas, has long accepted that the federal government has the power to regulate groundwater under the Commerce Clause.<sup>80</sup> In Sporhase the Court recognized that the multi-state character of the Ogallala aquifer "confirms the view that there is a significant federal interest in conservation as well as in fair allocation of this diminishing resource."<sup>81</sup> Furthermore, the Federal Courts

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<sup>80</sup> 458 U.S. 941, 102 S.Ct. 3456 (1982).

<sup>81</sup> Sporhase, 458 U.S. at 953-54, 102 S.Ct. at 3462-63.

have held that Congress has the power to regulate activities that pollute waters that traverse through one or more state "even though the threat may come only from intrastate activities."<sup>82</sup> As a result of this caselaw, the federal government clearly has the power to regulate and mandate the states on the Aquifer under the Commerce Clause and should do so if needed to force participation in the Commission.

Centralized management of the Aquifer must begin with scientific development. The federal government must lead this development, as has already been suggested in S.212. As with S.212 this development must include hydrogeologic characterization, mapping, modeling and monitoring of the aquifer.<sup>83</sup> But unlike S.212 the scientific development stage must be completed quickly, within two or three years, as the threat to the Aquifer is upon the region and will only get worse in the future.

The federal government is necessary in the scientific development stage for uniformity and equity reasons. Comprehensive scientific data has not been collected across the entire Aquifer in over 20 years.<sup>84</sup> With water levels declining

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<sup>82</sup> *United States v. NL Industries, Inc.*, 936 F.Supp. 545, 557-58 (S.D.Ill. 1996) (citing *United States v. Lopez*, 514 U.S. 549, 554, 115 S.Ct. 1624, 1629 (1995)).

<sup>83</sup> See *supra* notes 46-49 and accompanying text.

<sup>84</sup> Hydrogeologic Survey Hydroelectric Project Deadline: Hearing on Miscellaneous Water Bills and Power Before the U.S. Senate

two to three feet a year in areas new data is extremely important to really understanding the aquifer and its possible lifetime.<sup>85</sup> Without comprehensive data it is nearly impossible to be able to even begin a program of conservation. It is first necessary to have an in depth understanding of how much water is in the Aquifer, what effect overdrafting is having, the exact recharge in different areas and the movement of water in the Aquifer. This data will be used to determine what percent of overdraft will be allowed in each region of the aquifer and how quickly the current amount will be phased down to the goal amount.

As the Neugebauer testimony suggested, Texas is very opposed to federal control over the scientific development of the Aquifer and instead strongly supports local management only.<sup>86</sup> The problem with local control of the scientific collection of data in the Aquifer is uniformity. This is evidenced by the already contradicting information coming out of

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Committee on Energy and Natural Resources, 180th Cong. 195 (2003) (statement of Senator Sam Brownback).

<sup>85</sup> Save our Water Supply - About the Ogallala, Concerned Citizens for Clean Water, Inc., at <http://www.saveourwatersupply.com/ogallala/ogallala2.html> (last visited January 5, 2004).

<sup>86</sup> Neugebauer Testifies Against Federal Control of the Ogallala Aquifer, Office of Representative Neugebauer Press Release, released Thursday, October, 27, 2003, found at [http://www.house.gov/apps/list/press/tx19\\_neugebauer/Ogallala10\\_27.html](http://www.house.gov/apps/list/press/tx19_neugebauer/Ogallala10_27.html) (last visited January 5, 2004).

Texas as compared to other states and organizations.<sup>87</sup> If one uniform measurement and data collecting means were used throughout the entire aquifer such conflicting information would no longer be a problem.

This is not to say that states and localities will not be involved in the data collection process. Cooperation between local, state and federal entities would be necessary for cost purposes. It would be cost prohibitive for federal entities to have to do all the work, as they do not have the structure throughout the entire Aquifer. Each state already has some or all of the structure in place and combining the efforts of each state will create a comprehensive aquifer-wide structure whose base is already in existence. But without the federal organization and guidelines for the local and state entities to work with the continued uniformity problems will persist and defeat later conservation efforts because the data will not be clear enough to base conservation measures on.

Another important part of the initial phase of scientific development is education. As the scientific development starts a region-wide education program should also begin to curtail the anxiety of the people who live in the region. When scientist start poking around in these people's towns and on their farms it is important that everyone is told and taught about what

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<sup>87</sup> See supra notes 31-33 and accompanying text.

exactly is going on. People will be more resistant to the program if they do not understand it or are never given the proper guidance in understanding it. Furthermore, education must start when the scientific development starts to prepare the people for the changes that will start to occur as the development comes to a close and the commission starts implementing its conservation measures.

The educational portion will consist of several programs. First, a toll free hotline will be put in place for people to call and ask questions about the new regulatory program. Second it will be important to have an office in every few hundred miles within the region where people can pick up printed information packets as well as voice any concerns. This office will also be used as the control center for the scientific data collection and other educational programs.

Third programs in local school systems will be initiated. Starting in elementary school all the way through high school it is important to educate the children of the region about the water problems and solutions to the problems. The main focus of the school program will just be basic understanding of the water source of the region. Many children are never told where their water comes from and without knowing where the water comes from, and thus knowing the possibility of water shortages, conservation measures have no backbone. These children will be

the adults of tomorrow and it is vitally important that they understand their water and how they can help to keep the region's water source viable for future generations.

Last town meetings must be set up throughout the region and greatly publicized. At these meetings the centralized regulation of the Aquifer can be fully explained and questions answered. It will be important to have a full panel of people at each meeting to address all of the varied concerns of the citizens. For example there must be people familiar with the scientific aspect as well as people familiar with the social and political aspects. In short, the educational portion of the program cannot be skimmed on; it may well be the most important portion. People need to understand the program, how it will affect them and its overall purpose. Without this information many people in the region will not cooperate with the program. It is the people that use the water and without their cooperation it will be difficult for centralized management to be successful.

After this initial phase of development and education begins the actual Commission must be formed. It should be formed early on, not after the development is complete. This way the Commission can be involved in the educational programs and can be reported to continually by the opening programs. This will allow the Commission to start its work and develop



ideas for future work instead of having to wait until all the development is complete.

The framework of the Commission is very important. Another interstate water resource management commission in existence is the Delaware River Basin Commission (DRBC). The DRBC is made up of the four governors of each basin state and a federal representative appointed by the President of the United States.<sup>88</sup> While it is important to have a similar framework to the DRBC it is also important to regionalize the Aquifer's Commission. Thus the Commission itself will be made up of the State Engineers, or a similar officer, of each state under which the Aquifer lies as well as a federal representative appointed by the President of the United States. The Commission will make the final decisions on all programs and regulations and will meet to vote four times annually. But it is the regional sections that will be reporting matters to the Commission and forming the regulations and programs to be voted on.

Therefore the more important part of the Commission will be its regional sections. The regional sections will be made up of states that border each other and thus share a section of the Aquifer. For instance, one regional section will be the Texas

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<sup>88</sup> Overview of the Delaware River Basin Commission, Delaware River Basin Commission - DRBC Overview found at <http://www.state.nj.us/drbc/over.htm> (last visited January 5, 2004).

New Mexico section, while another will be the Texas Oklahoma section. Thus Nebraska who shares borders with four other states on the Aquifer will be a part of four of the regional sections.<sup>89</sup> These regional sections will be made up of three local representatives from each state, two of whom must be county or water district officials already, voted on by the citizenry of the counties effected by the Aquifer as well as two federal representative appointed by the Secretary of the Interior. They will meet six times annually and report to the Commission at each of their four meetings.

This localized regional form is very important because of the regional nature of the Aquifer. Each region has its own independent problems that must be worked out in that specific area. For example the southern region is much drier climate and is being depleted much quicker than the far northern region.<sup>90</sup> Also, states that are resistant to centralized federal regulation are much more supportive of localized regulation. Texas has resisted such control but has expressed the need for local control of the Aquifer due to concern for depletion of the

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<sup>89</sup> Groundwater Atlas of the United States, Oklahoma, Texas, Arizona, Colorado, New Mexico, Utah, United States Geological Survey, at [http://capp.water.usgs.gov/gwa/ch\\_c/C-text5.html](http://capp.water.usgs.gov/gwa/ch_c/C-text5.html) (last visited January 5, 2004). It is important to note that this will not give Nebraska more power within the Commission because it is the Commission itself not the regional sections that vote on programs and Nebraska has the same number of votes on the Commission as all other states.

groundwater.<sup>91</sup> The localized regional sections of the Commission will keep the federal hand in the Commission while also allowing a great deal of local control over the situation, hopefully pleasing all sides. Moreover, local entities have a better understanding of the Aquifer in that particular area and thus will better be able to manage it.

The Commission and its regional sections will be in charge of determining drought regulations, water quality levels and how much water can be used, including both urban and agricultural uses for the region. The most complex area that the Commission will regulate is overdraft. The Commission, early on, must articulate specific goals for the amount of overdraft that will be allowed in each region or if none will be allowed at all. It is impossible to make this determination without scientific data but it is clear from existing research that the amount of overdraft from the Aquifer will need to be significantly lowered, if not halted, especially in the southern region of the Aquifer.

Overdraft will have to be handled on a regional basis because it varies so much. In the southern region it will have to be phased down over time, it cannot be halted all together.

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<sup>90</sup> See infra note 22 and accompanying text.

<sup>91</sup> Somma, Mark, Institutions, Ideology, and the Tragedy of the Commons: West Texas Groundwater Policy, 27 Publius 1, at 8-9 (1997).

The people of the region must be given time to adjust to the changes in the amount of water they can use. This phasing down will have to be aided by strict regulations as well as federal incentives. One example of a regulation that will help will be higher prices for water as well as incentives for conservation. Also, agriculture incentives for water use must end.<sup>92</sup>

Incentives for dry land farming, low water use crops and retirement of land must be put in place. In urban areas incentives for low flow toilets and other water conserving household appliances as well as for xeriscaping and gray water use on parks and golf courses can be used to increase conservation. It will be up to each region to decide which programs will be most successful and should be implemented in that area.

Furthermore, it will be important for the regional sections to examine alternative economic development, especially in the regions that rely so highly on agriculture. Federal and state incentives, such as tax breaks, should be given to low water use industries that are willing to move to the regions. The economic effects of lower water use on highly agricultural areas

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<sup>92</sup> For example Texas irrigators get a "depletion allowance" every year in their federal income taxes. The allowance is based on how much the farmer's water table has dropped and what the value of that depleted water is. Such programs must end and the money saved put to use for conservation instead of overuse. See

will have a huge impact on the regions but with careful planning may be kept to a minimum.

Thus the Commission will be completely in charge of all areas relating to the Aquifer itself and the effects lowering its usage will have on the area. Its regional components as well as federal oversight will create an entity that is well suited for such a huge task. Without such a Commission the current means of regulation will continue and the drying of the Aquifer will become a reality in the not so distant future.

#### CONCLUSION

While initiating such a Commission will not be an easy task it is vitally important to the management of the Aquifer, especially in its southern region. The continued overdrafting of the Aquifer has created a situation that can no longer be managed on a local level without creating interstate tension. In fact, the tension is already there, as seen in the complaints of New Mexico residents. The attitude of the people and the beginnings of political support in the region seems to be shifting in a way that may sustain the idea more than in the past. As a result there is no better time than now for such interstate management to come into being. Without it, the Llano Estacado region may well become a thing of the past within the

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Postel, Sandra, When the Worlds Wells Run Dry, 12 World Watch 5, 31 (1999).

next 50 years. That threat alone is all the support needed for such a program.