

Notes

A Horizontal Federalism Solution to the Management of Interstate Aquifers: Considering an Interstate Compact for the High Plains Aquifer^{*}

I. Introduction

This Note focuses on the tremendous problems with the current management of the High Plains Aquifer—the largest aquifer in the continental United States and a critical source of water for agriculture and other American industries.¹ The aquifer underlies portions of eight states,² and thus it is currently governed by eight very different and sometimes conflicting groundwater regimes. This governance structure has not been up to the task—the aquifer, which is essential to our country’s agriculture industry, is now in jeopardy of depletion within only a few decades.³

This Note proposes a new management scheme for the High Plains Aquifer that derives from the principles of horizontal federalism⁴—an interstate groundwater compact. There are currently no compacts governing

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1. See Dylan O. Drummond, Comment, *Texas Groundwater Law in the Twenty-first Century: A Compendium of Historical Approaches, Current Problems, and Future Solutions Focusing on the High Plains Aquifer and the Panhandle*, 4 TEX. TECH J. TEX. ADMIN. L. 173, 179 (2003) (stating that the High Plains Aquifer is the “largest contiguous aquifer in the lower forty-eight states” and that it “provides water for twenty-seven percent of the Nation’s irrigated crop production annually”).

2. See V.L. MCGUIRE, U.S. GEOLOGICAL SURVEY, WATER-LEVEL CHANGES IN THE HIGH PLAINS AQUIFER, PREDEVELOPMENT TO 2005 AND 2003 TO 2005, at 1 (2007) (listing the eight states of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming).

3. See, e.g., Scott C. Lucas, *Halting the Downward Spiral of Monoculturation and Genetic Vulnerability: Toward a Sustainable and Biodiverse Food Supply*, 17 J. ENVTL. L. & LITIG. 161, 197 n.187 (2002) (“The [High Plains] Aquifer . . . will be depleted in thirty to forty years at current rates of extraction.”).

4. Horizontal federalism focuses on the horizontal relationship between the states, as opposed to the more common vertical federalism, which focuses on the relationship between the states and the federal government. Allan Erbsen, *Horizontal Federalism*, 93 MINN. L. REV. 493, 494 (2008). Horizontal federalism has been defined “as encompassing the set of constitutional mechanisms for preventing or mitigating interstate friction that may arise from the out-of-state effects on in-state decisions.” *Id.* at 503.

interstate aquifers,⁵ and there has been no serious discussion or proposal of this type of governance scheme for interstate aquifers.⁶ But compacts are commonly used for managing other types of interstate water resources,⁷ and I suggest that the interstate compact for the High Plains Aquifer be modeled according to a particular eastern river-basin compact, as opposed to the western interstate river compacts that are commonplace in the western United States.⁸ At the same time, I do not advocate for the rote adoption of just any interstate compact. Instead, I will suggest modifications to these eastern-style river-basin compacts that I find faithful to principles of horizontal federalism, such as providing opportunities for an attractive form of local decisional input in order to satisfy local interests.

Throughout this Note I suggest a new governance scheme for the High Plains Aquifer, yet many if not all of these suggestions may be applicable to any of the numerous interstate aquifers in the United States.⁹ Therefore, while I do not argue for implementation of interstate compacts for any and all transboundary domestic aquifers, these principles should be helpful for other interstate aquifers also in need of new management regimes.

The organization of this Note will be as follows: In Part II, I will briefly explain the important characteristics of the High Plains Aquifer and how the aquifer is threatened with imminent depletion. I will then explain the current management scheme within the aquifer—the various groundwater doctrines for each of the overlying eight states.

5. There are no compacts that completely govern the activities of an interstate aquifer, as most compacts govern a particular river or reservoir. Nonetheless, there are some compacts that govern the water-resources activities in a particular water basin, and those compacts govern the groundwater in addition to the streams, rivers, and reservoirs in the basin. For example, the Delaware River Basin Commission governs all withdrawals of groundwater and surface water in the basin. David C. Noonan et al., *Constraints to Managing Interstate Aquifer*, 110 J. WATER RESOURCES PLAN. & MGMT. 191, 191 (1984). But the Delaware River Basin Commission's governing authority extends to the boundaries of the basin in the four states, rather than to the boundaries of any interstate aquifer. *See id.* at 191–92 (noting that the compact controlled the waters “of the basin” and that the compact’s authority is “limited to the Delaware River’s surface drainage basin yet, the sedimentary deposits that comprise the Coastal Plain ground-water system extend both east and west beyond the river’s catchment”).

6. A few scholars have mentioned, only in passing, that the use of compacts to govern interstate aquifers might be a good idea. *See, e.g.,* Morton W. Bittinger & E. Bruce Jones, *Interstate and International Aquifers*, 8 WATER RESOURCES BULL. 386, 389–90 (1972) (mentioning that interstate compacts might be a potential solution to governing interstate aquifers but only briefly discussing the issue in two short paragraphs).

7. *See* Josh Clemons, *Interstate Water Disputes: A Road Map for States*, 12 SOUTHEASTERN ENVTL. L.J. 115, 129 (2004) (“There are now approximately twenty-five compacts apportioning interstate water among states.”).

8. The eastern river-basin compact I suggest be used as a model is the Delaware River Basin Compact. For the distinctions between the eastern- and western-based compacts, *see infra* subpart IV(B).

9. *See* Zachary A. Smith, *Interstate and International Competition for Water Resources*, 23 WATER RESOURCES BULL. 873, 874–76 (1987) (discussing the survey results showing the numerous instances of interstate aquifers and listing the twenty-three areas where the author’s survey revealed interstate competition problems for groundwater resources).

In Part III, I will develop my argument that a change in the governance scheme is needed. I start with the presumption that a governance scheme for a vital resource like groundwater should promote goals of equitable and sustainable use of that resource. I then argue that in interstate aquifers, such as the High Plains Aquifer, these goals are not being promoted for two main reasons—the current management scheme allows negative externalities and is administratively inefficient.

Then, in Part IV, I suggest that a new scheme should be adopted according to the principles of horizontal federalism. I explain why an interstate compact is preferable to other horizontal-federalism solutions, and then I explain the principles and current uses of interstate compacts.

Finally, in Part V, I argue that an interstate compact is the best solution for a management scheme in the High Plains Aquifer. I will show how an interstate compact will promote equitable and sustainable use of the aquifer, and alleviate concerns present in the current governance scheme of the aquifer. I will make specific recommendations that an interstate compact for the High Plains Aquifer should consider, and then I will address potential questions and concerns for an interstate groundwater compact.

II. The High Plains Aquifer and Its Governing Authorities

A. *The High Plains Aquifer*

The High Plains Aquifer is the largest aquifer in the continental United States,¹⁰ and it spans eight states: Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming.¹¹ The High Plains Aquifer is also known as the Ogallala Aquifer.¹² The area overlying the High Plains Aquifer is one of the major agricultural regions of the world,¹³ and the irrigated agricultural economy of the region depends primarily on the aquifer.¹⁴ Our entire nation depends on the High Plains Aquifer, as the aquifer provides water for twenty-seven percent of the irrigated crop production annually in the United States.¹⁵

While the use of the aquifer's water is substantial, there is little recharge¹⁶ of the aquifer. Approximately 2.00–2.50 inches of water are lost annually due to pumping, but the recharge rate is 0.80–0.85 inches—roughly

10. Drummond, *supra* note 1, at 179.

11. MCGUIRE, *supra* note 2, at 1.

12. Drummond, *supra* note 1, at 178–79.

13. MCGUIRE, *supra* note 2, at 1.

14. RICHARD R. LUCKEY & MARK F. BECKER, U.S. GEOLOGICAL SURVEY, HYDROGEOLOGY, WATER USE, AND SIMULATION OF FLOW IN THE HIGH PLAINS AQUIFER IN NORTHWESTERN OKLAHOMA, SOUTHEASTERN COLORADO, SOUTHWESTERN KANSAS, NORTHEASTERN NEW MEXICO, AND NORTHWESTERN TEXAS 2 (1999).

15. Drummond, *supra* note 1, at 179.

16. Recharge happens when precipitation or other water infiltrates the ground and essentially refills the aquifer. W. JESSE SCHWALBAUM, UNDERSTANDING GROUNDWATER 26 (1997).

forty percent of the pumping rate.¹⁷ So current usage of the aquifer is unsustainable¹⁸ because more water is being drawn from the aquifer than is being recharged. Furthermore, evidence that climate change may further reduce recharge rates indicates that this problem may worsen.¹⁹

Unfortunately, due to the region's unsustainable use of the water, the aquifer is in jeopardy of depletion in the near future. Some experts have claimed that with the current rates of extraction, the aquifer may become depleted within thirty to forty years.²⁰ And for the time being, water-level declines may increase the cost of groundwater withdrawals because of increased pumping lift and decreased well yields.²¹ Thus, current usage of the High Plains Aquifer poses a major threat to the region's main water supply and our nation's agricultural economy.

B. *Groundwater Management and Regulation in the High Plains Aquifer*

1. *Groundwater Doctrines in the United States.*—Most of the governing groundwater law is state law, as the states have generally assumed responsibility for managing the nation's groundwater.²² The federal government has exercised some authority in the groundwater area, such as on issues of groundwater quality and endangered species,²³ but this Note is exclusively concerned with groundwater quantity. I make no effort to discuss water-quality issues.²⁴ In each of the fifty states, the courts—and more recently the legislatures—have adopted varying approaches to groundwater law that can be generally divided into five categories.²⁵ Here I briefly discuss the five categories of state groundwater law: rule of capture, reasonable use

17. Drummond, *supra* note 1, at 187.

18. Note that there is not an agreed-upon definition of what constitutes “sustainable” use of an aquifer. See John D. Leshy, *Interstate Groundwater Resources: The Federal Role*, 14 HASTINGS W.-NW. J. ENVTL. L. & POL’Y 1475, 1493 (2008) (debating the question of how to define sustainability). For purposes of this Note, I define “sustainable” as use of the aquifer, at least over time, that does not exceed the recharge. Therefore, sustainable water use is essentially water use that would not eventually deplete the aquifer.

19. See Nora R. Pincus, *Groundwater and International Law: The Need for Specific Regulation*, 11 U. DENV. WATER L. REV. 313, 332 (2008) (“Climate change will affect groundwater resources in relation to the nature of recharge of aquifers . . .”).

20. See *supra* note 3 and accompanying text.

21. MCGUIRE, *supra* note 2, at 1.

22. John D. Leshy, *The Federal Role in Managing the Nation's Groundwater*, 14 HASTINGS W.-NW. J. ENVTL. L. & POL’Y 1323, 1323 (2008).

23. See JAMES R. RASBAND ET AL., NATURAL RESOURCES LAW AND POLICY 820–38 (2004) (discussing the Clean Water Act and the Endangered Species Act).

24. It is quite possible that my proposal to use an interstate compact to regulate groundwater quantity issues would also work for issues of quality. But due to the federal regulations already in existence, such as the Clean Water Act, I have limited my discussion to a compact for groundwater quantity only, as the issues become more complicated when a layer of federal regulation is involved.

25. RASBAND ET AL., *supra* note 23, at 784.

(American Rule), correlative rights, reasonable use (Restatement), and prior appropriation.²⁶

First, the rule of capture states that landowners can take as much water out of their land as they want, for whatever purpose they want, and they can use the water wherever they want.²⁷ The only common limitations are that the water cannot be removed maliciously²⁸ and the water cannot be wasted.²⁹ The rule of capture was the basic common law rule brought to America from England, but later, the reasonable use (American Rule) somewhat modified the rule of capture.³⁰ The reasonable use (American Rule) added two requirements to the rule of capture: (1) the landowner must make reasonable use of the water taken from the land; and (2) the water must be used on the land from which the water is withdrawn, unless it causes no injury to the other overlying landowners.³¹ The third rule, correlative rights, states that all overlying landowners of an aquifer have coequal or correlative rights to pump the groundwater and use it on their overlying land.³² In essence, the rule is much like the reasonable use (American Rule), but instead of the landowners being able to use unlimited water for any beneficial use until the aquifer is depleted, the landowners must share the water equitably.³³ The fourth rule, the reasonable use (Restatement) rule, comes from Section 858 of the Restatement (Second) of Torts.³⁴ This rule states that landowners can pump water for any beneficial purpose, whether for the overlying land or not, as long as the use does not cause unreasonable harm to neighboring landowners and other users.³⁵ The last groundwater rule, prior appropriation, was borrowed from the legal regimes of surface water.³⁶ In a prior-appropriation scheme, rather than viewing groundwater as a part of the land, the water is viewed as the collective property of its state's citizens, and the state distributes it to promote public ends.³⁷ The state water agencies then issue permits for people to use a certain amount of the groundwater, and those permits are given priority based on either the seniority of the water user in time or preferred water uses.³⁸

26. For a more detailed explanation of these five categories of state groundwater law, see *id.* at 784–89.

27. *Id.* at 785.

28. *Id.*

29. *City of Corpus Christi v. City of Pleasanton*, 276 S.W.2d 798, 802 (Tex. 1955).

30. RASBAND ET AL., *supra* note 23, at 785–86.

31. *Id.*

32. *Id.* at 786.

33. *Id.*

34. *Id.*

35. *Id.*

36. *See id.* at 787 (noting that, like for “surface water, most of the arid states in the West have adopted some form of prior appropriation for groundwater”).

37. *Id.*

38. *Id.*

2. *Various State Groundwater Doctrines Within the High Plains Aquifer.*—Since eight states overlie the High Plains Aquifer, there are eight different groundwater doctrines governing portions of the aquifer—some of which are conflicting.

Colorado and Kansas use the prior-appropriation doctrine.³⁹ Both Colorado and Kansas also use groundwater management districts, which are smaller local governing authorities that help regulate at the local level.⁴⁰ Wyoming uses a prior-appropriation doctrine and employs groundwater control areas, which are similar to groundwater management districts but are only created under certain conditions, such as declining water levels.⁴¹ While New Mexico and South Dakota also use the prior-appropriation doctrine, these states do not use groundwater management districts.⁴²

Alternatively, at the other end of the spectrum, Texas uses the rule of capture for its groundwater doctrine.⁴³ And though Texas still clearly uses the rule-of-capture doctrine, it has taken recent measures to move more in the prior-appropriation direction by creating groundwater management districts (known as groundwater conservation districts in Texas).⁴⁴ Oklahoma uses a reasonable use (Restatement) rule for aquifers like the High Plains Aquifer and encourages utilization of these groundwater resources.⁴⁵ Finally, Nebraska uses a mix of doctrines—parts of the state have groundwater

39. See William Fronczak, *Designated Ground Water: Colorado's Unique Way of Administering Its Underground Resources*, 7 U. DENV. WATER L. REV. 111, 114–15 (2003) (discussing Colorado's use of the prior-appropriation doctrine); John C. Peck, *Groundwater Management in Kansas: A Brief History and Assessment*, 15 KAN. J.L. & PUB. POL'Y 441, 442 (2006) (discussing Kansas's use of the prior-appropriation doctrine).

40. See Fronczak, *supra* note 39, at 115 (discussing how Colorado provided procedures for instituting local control over groundwater resources through the formation of groundwater management districts); Peck, *supra* note 39, at 442 (discussing Kansas's adoption of legislation designed to enable the creation of groundwater management districts).

41. See generally WYO. STAT. ANN. §§ 41-3-904 to -907 (2009) (providing rules for applying for groundwater appropriation); *id.* § 41-3-912(a) (listing the conditions under which the board of control may designate a control area).

42. See S.D. CODIFIED LAWS § 46-6-3 (2004) (providing that new appropriation of groundwater is subject to vested rights and prior appropriations); Amy Hardberger, Comment, *What Lies Beneath: Determining the Necessity of International Groundwater Policy Along the United States–Mexico Border and a Roadmap to an Agreement*, 35 TEX. TECH L. REV. 1211, 1241–42 (2004) (discussing New Mexico's prior-appropriation system).

43. Hardberger, *supra* note 42, at 1240.

44. See *id.* at 1241 (discussing Texas's use of groundwater conservation districts).

45. In Oklahoma, a tributary groundwater resource—one that forms a definite stream—is subject to the prior-appropriation doctrine. Kevin L. Patrick & Kelly E. Archer, *A Comparison of State Groundwater Laws*, 30 TULSA L.J. 123, 129 (1994). If the groundwater does not form a definite stream, however, Oklahoma applies a reasonable-use standard. *Id.* Oklahoma's reasonable-use policy encourages utilization, as opposed to conservation. *Id.* at 130. Because the groundwater in the High Plains Aquifer does not form a definite stream, the reasonable-use standard applies to the High Plains Aquifer. See LUCKEY & BECKER, *supra* note 14, at 10 (“The aquifer is composed of clay, silt, sand, and gravel with the sand and gravel sections contributing most of the water to wells, although considerable water is stored in the clay and silt sections.”).

management districts that use a prior-appropriation system, while other parts use the reasonable use (Restatement) rule.⁴⁶

The previous paragraphs illustrate the conflicting groundwater policies within the High Plains Aquifer. States like Colorado, Kansas, Wyoming, and New Mexico arguably aim to conserve the groundwater resource, while states like Texas and Oklahoma use groundwater policies that do not encourage conservation. Furthermore, the geographic proximity of some of the opposing groundwater doctrines within the High Plains Aquifer is remarkable. For example, five of the states overlie the aquifer within a forty-mile radius—Colorado, Kansas, New Mexico, Oklahoma, and Texas.⁴⁷ Within that small area, Oklahoma and Texas promote arguably unsustainable use of the aquifer, while Colorado, Kansas, and New Mexico aim to conserve the aquifer. Having such different legal regimes governing the same aquifer within a small area may be problematic. The liberal water-use policies of some states can undermine the conservative water-use policies of neighboring states.⁴⁸

III. Problems with the Current Governance Scheme in the High Plains Aquifer

In this Part, I argue that there are two main reasons why the current governance scheme in the High Plains Aquifer is inequitable and promotes unsustainable use: it creates negative externalities and is administratively inefficient. While advancing my argument for each of the aforementioned problems, I will give examples where these problems are already occurring in interstate aquifers, and I will pay particular attention to problems within the High Plains Aquifer. Of course, I begin with the presumption that at least two of our goals for governance of a vital interstate resource, such as an aquifer, should be to promote equitable and sustainable use. By equitable I mean that the regulations should promote fairness and substantial equality in meeting the needs of various users within the aquifer. Sustainable means use of the aquifer that is less than the natural recharge it receives—thus, water use that would not lead to an inevitable depletion. One may disagree with these goals, but my argument will presume that many people agree that these are reasonable objectives.

46. See Ronald Kaiser & Frank F. Skillern, *Deep Trouble: Options for Managing the Hidden Threat of Aquifer Depletion in Texas*, 32 TEX. TECH L. REV. 249, 287 (2001) (explaining that in Nebraska, “[r]easonable use has been replaced in special groundwater management areas by a permit system”).

47. See LUCKEY & BECKER, *supra* note 14, at 9 fig.4 (illustrating that the borders of Colorado, Kansas, New Mexico, and Texas are within a forty-mile radius of the middle of Oklahoma’s Cimarron County).

48. See Hardberger, *supra* note 42, at 1242 (“New Mexico’s control over shared water is undermined when a neighboring state allows unlimited pumping.”).

A. *Problems with Negative Externalities—or Spillover Effects*

The first problem with state regulation of groundwater in interstate aquifers is that this regulatory scheme creates negative externalities (or spillover effects). By negative externality I essentially mean the situation where the actions by one water user create a negative impact on another water user, over which the second user has little or no control.⁴⁹

It is easy to see how drawdown creates costs on other water users; I will explain with a hypothetical. Imagine one water user pumping water at some point in an aquifer—call him “X.” When a water user pumps water from an aquifer, the water table is lowered at that point, especially if he is overpumping.⁵⁰ In an aquifer, groundwater flows from an area where the water table is higher to an area where the water table is lower.⁵¹ So the groundwater in the area surrounding X would flow towards the point at which the water is being pumped by X. Furthermore, the more water a user pumps, the lower the water table becomes at that point and the faster the groundwater in the surrounding areas flows to that point.⁵² Now, in these surrounding areas of the aquifer assume there is another water user who would like to be able to pump water from the aquifer—call him “Y.” Since Y’s water table is now lowered, his cost to pump the water will increase because it generally costs more to pump deeper.⁵³ Additionally, X could eventually pump so much water as to deplete that portion of the aquifer, in which case Y would be unable to pump water. Hence, in either event, X is creating a cost for Y because of his pumping, and this cost is an externality.

This problem is worsened in the situation of an interstate aquifer, such as the High Plains Aquifer. For example, imagine X is located in Texas or Oklahoma, and Y is in another state—e.g., New Mexico. Now Y might not

49. Externalities include “external costs, external benefits, and pecuniary as well as nonpecuniary externalities.” Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347, 348 (1967). In this Note, however, my focus is on pecuniary and nonpecuniary external costs. Most people agree that water rights are a form of property rights. See, e.g., A. Dan Tarlock & Sarah Bates, *Western Growth and Sustainable Water Use: If There Are No “Natural Limits,” Should We Worry About Water Supplies?*, 38 ENVTL. L. REP. NEWS & ANALYSIS 10582, 10588 (2009) (“Water rights are property rights, but they differ significantly from land rights.”). One function of a property rights system is “that of guiding incentives to achieve a greater internalization of externalities.” Demsetz, *supra*, at 348. Therefore, one of our goals in a system of groundwater rights should be to internalize or decrease externalities as much as possible.

50. See SCHWALBAUM, *supra* note 16, at 34–35 (describing the phenomenon of drawdown).

51. This phenomenon is intuitive: just like water flows downhill, groundwater flows to a lower water table. Darcy’s equation describes this phenomenon. See *id.* at 28–35 (discussing Darcy’s equation and how groundwater flows in the direction of a lower water table).

52. See *id.* at 28–31 (explaining Darcy’s equation—the gradient will increase if the difference in the water tables increases, so the seepage velocity will also increase because it is directly related to the gradient).

53. See, e.g., Susan Batty Peterson, Note, *Designation and Protection of Critical Groundwater Areas*, 1991 BYU L. REV. 1393, 1398 (“As water is pumped from a groundwater basin, water levels drop, and users must pump the water a greater vertical distance to bring it to the surface. Increased energy costs result.”).

have any recourse at all—especially if *X* is in Texas where he is within his rights to pump as much as he wants.⁵⁴ Furthermore, if *X* is in Texas or Oklahoma, he is arguably going to pump more and injure *Y* further since those states' groundwater doctrines encourage the use of groundwater—which also consequentially encourages unsustainable use of the aquifer.⁵⁵ But if *X* and *Y* were both in New Mexico, hopefully the state water board would not grant a permit, or reissue it, if one water user were substantially harming another.⁵⁶ On the other hand, if *X* and *Y* were both in Texas, *Y* still may not have any recourse, but he is likely in a better situation since Texas is probably more willing to help another water user in Texas than in New Mexico.⁵⁷ Also, if both users were in the same state, *Y* may have recourse through the political process. So the problem is worsened with interstate aquifers because it is more difficult to internalize or even decrease the externality when the users are in different states. Further, these externalities obviously create an inequitable situation for the water user who is harmed by the externality.

There are also actual examples, as opposed to hypotheticals, of problems with externalities in interstate aquifers. One example is the Cambrian–Ordovician aquifer system, which transverses the Wisconsin–Illinois border.⁵⁸ In this aquifer, pumpage in either state can have drawdown effects in the neighboring state.⁵⁹ Even as early as 1981, the State of Wisconsin was concerned that groundwater pumping in Illinois was having a negative impact in Wisconsin because Illinois was pumping more water from the aquifer.⁶⁰ A more recent example is with the Memphis Sands Aquifer (also known as the “Sparta” Aquifer) on the Tennessee–Mississippi border.⁶¹ In a recent lawsuit, the State of Mississippi claimed that the city of Memphis, Tennessee has been taking massive amounts of water from the aquifer and that this was negatively affecting Mississippi's use of the water.⁶² Mississippi claimed that the pumping in Memphis has lowered the water table and created a cone of depression that extended over ten miles into the State of Mississippi.⁶³ Assuming Mississippi's claims are true, this cone of depression that lowers the water table in Mississippi is clearly a negative

54. See *supra* note 43 and accompanying text.

55. See *supra* notes 43–45 and accompanying text.

56. See Hardberger, *supra* note 42, at 1242 (noting that in New Mexico “[g]roundwater permits are managed and approved by the state engineer”).

57. See *supra* note 44 and accompanying text.

58. C.W. Fetter, Jr., *Interstate Conflict over Ground Water: Wisconsin–Illinois*, 19 *GROUND WATER* 201, 201 (1981).

59. *Id.*

60. See *id.* at 212–13 (thanking the Wisconsin Department of Justice for its funding and advice on the computer modeling reported therein).

61. Hood *ex rel.* Mississippi v. City of Memphis, 533 F. Supp. 2d 646, 648 (N.D. Miss. 2008).

62. Complaint at *3–5, Hood, 533 F. Supp. 2d 646 (No. 2:05CV32-D-B).

63. *Id.* at *5.

externality created by the City of Memphis. Were this problem happening internally in Mississippi, then Mississippi could deal with it; however, since the spillover effect is imposed across state lines, Mississippi must file a federal lawsuit—and still has not received recourse.⁶⁴ Finally, though I have found no lawsuits regarding groundwater pumping causing groundwater problems in the High Plains Aquifer, scholars have discussed the potential for problems in the High Plains Aquifer for decades.⁶⁵

As I have developed in the last several paragraphs, spillover effects are created by groundwater pumping by a user in one state affecting the groundwater pumping ability of a user in another state. The state-regulation regime makes internalizing or decreasing these negative externalities very difficult in interstate aquifers, which causes inequitable and unsustainable use within the aquifer.

B. Lack of Administrative Efficiency

State-by-state regulation of an interstate aquifer is also undesirable because of its inherent lack of administrative efficiency. But the word “efficient” is a relative term, so the real issue is whether state-by-state regulation in an interstate aquifer is administratively inefficient compared to other available alternatives. In this Note, I argue that a more administratively efficient alternative would be an interstate compact.

Essentially, many scholars argue that governance of a single entity by a single administrative or governing body is more efficient than governance by multiple bodies.⁶⁶ At least some of the inefficiencies created by the governance of multiple bodies are the result of overlapping, and thus redundant, responsibilities. For example, in the High Plains Aquifer there are eight states that overlie the aquifer, meaning that there are at least eight administrative bodies that oversee the aquifer. Though each of these administrative bodies only governs the particular part of the aquifer that they overlie, some of the duties of these administrative bodies, such as aquifer research and monitoring, are redundantly performed by several or all of the agencies.⁶⁷ Therefore, it would be more administratively efficient if these costs could be

64. *Hood*, 533 F. Supp. 2d at 651.

65. *See, e.g.*, Bittinger & Jones, *supra* note 6, at 387–88 (highlighting the potential for severe interstate problems due to the widely differing legal doctrines and regulations of states sharing the High Plains Aquifer).

66. *See, e.g.*, Susan Rose-Ackerman, *Cooperative Federalism and Co-optation*, 92 *YALE L.J.* 1344, 1346 (1983) (“In addition, administrative efficiency argues in favor of a single system instead of dual state and federal programs with beneficiaries having to qualify separately for each set of services.”).

67. *See, e.g.*, Oklahoma Water Resources Board: Water Supply Monitoring, <http://www.owrb.ok.gov/supply/monitoring/monitoring.php> (stating that the agency makes “[a]n annual effort to monitor the water levels of Oklahoma aquifers”); Texas Water Development Board Groundwater Monitoring Section Activities, <http://www.twdb.state.tx.us/GwRD/HEMON/GMSA.asp> (“The [Texas Water Development Board] measures groundwater levels annually in more than 2000 wells completed in the 30 major and minor aquifers and located throughout the state.”).

aggregated into one governing authority, which could be an interstate compact. Further, a more efficient governing authority could better monitor the aquifer to ensure it is being used sustainably. For these reasons, state-by-state regulation of interstate aquifers is undesirable and unsustainable because of its administrative inefficiency compared to interstate compacts.

IV. Horizontal Federalism and Various Approaches Through Interstate Compacts

A. *The Background and Theory of Horizontal Federalism*

There are two distinct dimensions to constitutional federalism: the federal government's interaction with the states, and the individual and group interactions between the many states.⁶⁸ The Supremacy Clause makes the interaction hierarchical between the federal government and the states, so this interaction is "vertical" in a sense.⁶⁹ Conversely, the interactions between the states are on an equal plane of constitutional status, so this interaction is "horizontal."⁷⁰ The Supreme Court has not focused on the theoretical distinctions between horizontal and vertical federalism, but these distinctions have recently started to appear prominently in legal scholarship.⁷¹ Additionally, in the past scholars have typically focused on vertical federalism—how powers should be allocated between the federal and state tiers of government.⁷² So solutions for problems associated with state regulation of interstate aquifers have typically looked to vertical federalism.⁷³ But focus in legal scholarship has recently started to intensify in the area of horizontal federalism.⁷⁴ Yet there has been no talk of using horizontal-federalism solutions for interstate aquifers.

Horizontal federalism has been defined "as encompassing the set of constitutional mechanisms for preventing or mitigating interstate friction that

68. Erbsen, *supra* note 4, at 501.

69. *Id.*

70. *Id.*

71. *Id.* at 501–02.

72. *Id.* at 502.

73. *See, e.g.*, Leshy, *supra* note 22, at 1324 ("The first part of this essay identifies the various ways the federal government can influence groundwater management.").

74. *See, e.g.*, Erbsen, *supra* note 4, at 494 (conducting a systematic survey of the doctrine of horizontal federalism); Noah D. Hall, *Toward a New Horizontal Federalism: Interstate Water Management in the Great Lakes Region*, 77 U. COLO. L. REV. 405, 405 (2006) (recounting how horizontal federalism was used in the context of the Great Lakes–St. Lawrence River Basin Water Resources Compact); Gillian E. Metzger, *Congress, Article IV, and Interstate Relations*, 120 HARV. L. REV. 1468, 1512–22 (2007) (describing the core postulates of horizontal federalism: state autonomy, state equality, and state territoriality); Judith Resnik, *Foreign as Domestic Affairs: Rethinking Horizontal Federalism and Foreign Affairs Preemption in Light of Translocal Internationalism*, 57 EMORY L.J. 31, 43 (2007) (exploring horizontal federalism and the institutions of translocalism).

may arise from the out-of-state effects of in-state decisions.”⁷⁵ Given this definition, and my argument that state regulation of interstate aquifers is inequitable, I will focus on those constitutional mechanisms provided by horizontal federalism for preventing or mitigating interstate friction. Though there are many constitutional methods for addressing interstate friction,⁷⁶ in the context of water-resources management perhaps the two most common are equitable apportionment and interstate compacts.⁷⁷

At least in the context of surface water, scholars have noted that interstate compacts are preferable to equitable apportionment.⁷⁸ I argue that this statement is also true in the context of interstate aquifers. The doctrine of equitable apportionment is a tool used by the U.S. Supreme Court to resolve interstate conflicts over water resources.⁷⁹ The doctrine is basically a method of judicially allocating disputed water resources between the relevant states.⁸⁰ One problem with the doctrine of equitable apportionment is that it is determined on a case-by-case basis,⁸¹ and because these water resources issues are complex, many commentators feel the Court does not have the time, experience, or resources to sufficiently resolve them.⁸² Another problem is that since the states are before the Court seeking a resolution by equitable apportionment, an obvious prerequisite is that the states were in an interstate water dispute to begin with. Therefore, the doctrine of equitable apportionment is only a method to resolve interstate friction after a dispute has already begun. I argue that it would be better if interstate friction could be addressed before it becomes a dispute that the parties are willing to litigate in the Supreme Court. This problem is resolved with an interstate compact

75. Erbsen, *supra* note 4, at 503.

76. *See id.* at 529–60 (cataloging various methods provided by the Constitution to “mitigate the risk of interstate conflict”).

77. *See* Hall, *supra* note 74, at 410 (“Absent congressional action, states manage water resources under various common law and statutory approaches and are left to resolve interstate disputes through either equitable apportionment in the Supreme Court or an interstate compact (two common forms of horizontal federalism).”).

78. *See, e.g., id.* (“States often find that an interstate compact is the preferred approach for apportioning and managing a shared water resource.”).

79. *See* Jeffrey Uhlman Beaverstock, Comment, *Learning to Get Along: Alabama, Georgia, Florida and the Chattahoochee River Compact*, 49 ALA. L. REV. 993, 1000–03 (1998) (discussing the various disputes that the Supreme Court has used equitable apportionment to resolve).

80. *See id.* at 1001 (“The result in *Kansas* was the Court’s adoption of the principle of equitable apportionment, which is a method of allocating water resources adapted from international water law.” (referring to *Kansas v. Colorado*, 206 U.S. 46 (1907))).

81. *See id.* at 1001–02 (identifying five generalizations that permeate the Supreme Court’s decisions).

82. *See, e.g.,* WILLIAM GOLDFARB, *WATER LAW* 32 (1984) (“[T]he [Supreme] Court lacks the technical resources to cope with the complicated hydrologic, economic, and sociological questions involved [in water-rights-apportionment disputes among states].”); Beaverstock, *supra* note 79, at 1003 (contending that some commentators believe the Court is not equipped to resolve water-rights-apportionment issues among the states); Jenny Huang, Note, *Finding Flow: The Need for a Dynamic Approach to Water Allocation*, 81 N.Y.U. L. REV. 734, 751 (2006) (“Adjudicative bodies lack expertise to effectively address technical water issues . . .”).

because the parties can reach an agreement themselves that will hopefully resolve future disputes over the interstate water resource.⁸³

B. *Interstate Compacts*

1. *General Overview of Interstate Compacts.*—The U.S. Constitution permits states to enter into compacts with one another.⁸⁴ An interstate compact is a binding agreement between two or more states that is approved by Congress.⁸⁵ Once approved, the compact is federal law, and it can preempt contradictory state law.⁸⁶ The most common use of a compact is to create an intermediate, regional level of regulation to resolve problems that extend beyond a single state but do not merit national attention.⁸⁷ General uses for interstate compacts in the past have included forest fire fighting, mining regulation, water allocation, sanitation, higher education, transportation, and taxes.⁸⁸

For the purposes of this Note, looking at the use of interstate compacts for water-resources allocation is most useful. There are numerous currently existing compacts that seek to apportion interstate water among the states.⁸⁹ But, the current interstate compacts only seek to allocate surface water such as rivers, reservoirs, or river basins, and there are no current interstate compacts that seek to govern an interstate aquifer.⁹⁰ Nevertheless, it is useful to look at these interstate surface-water compacts to see what an interstate groundwater compact might look like. Traditionally, interstate water compacts have tended to follow one of two models: western or eastern.⁹¹ In the following sections I discuss each model.

2. *Western Water Compacts.*—Western water compacts typically focus on allocating coveted water rights to a shared water resource among the party states.⁹² These compacts essentially divide the “pie” into agreed pieces, and then what each state does with its piece is beyond the scope of the compact.⁹³ Western compacts generally restrict the total amount of water available to each individual state by creating legal obligations for dividing the limited

83. See Beaverstock, *supra* note 79, at 1003–04 (examining interstate compacts generally).

84. See U.S. CONST. art. I, § 10, cl. 3 (“No State shall, without the Consent of Congress, . . . enter into any Agreement or Compact with another State . . .”).

85. Olen Paul Matthews & Michael Pease, *The Commerce Clause, Interstate Compacts, and Marketing Water Across State Boundaries*, 46 NAT. RESOURCES J. 601, 626 (2006).

86. *Id.* at 626–27.

87. Christi Davis & Douglas M. Branson, *Interstate Compacts in Commerce and Industry: A Proposal for “Common Markets Among States,”* 23 VT. L. REV. 133, 138–39 (1998).

88. *Id.* at 139.

89. See *supra* note 7 and accompanying text.

90. See *supra* note 5 and accompanying text.

91. Hall, *supra* note 74, at 411.

92. *Id.*

93. *Id.*

resource.⁹⁴ But the compacts generally do not provide standards or guidance for managing individual water withdrawals within the state's total allocation.⁹⁵

3. *Eastern Water Compacts.*—Eastern compacts, in contrast, generally create centralized interstate management authorities comprised of the party states and possibly the federal government.⁹⁶ The authorities, often called compact commissions, have broad regulatory powers for permitting and managing individual withdrawals of all waters in the river and river basin.⁹⁷ Though this centralized approach has the benefit of uniform management of a single resource, the downside is a significant loss of state autonomy.⁹⁸

An example of an eastern water compact is the Delaware River Basin Compact.⁹⁹ The Delaware River Basin Compact, considered one of the most successful interstate water-allocation agreements, is a compact between Delaware, New Jersey, New York, and Pennsylvania.¹⁰⁰ The Delaware River Basin Compact created a commission (the Delaware River Basin Commission) for implementation of the compact and management of the basin.¹⁰¹ The Commission governs all water uses in the basin, including surface water and groundwater use.¹⁰² The Commission is comprised of the governor of each compacting state, and it also has one federal commissioner who is appointed by the President of the United States.¹⁰³ Most decisions require only a majority vote, though changes in the water allocation require unanimous approval.¹⁰⁴

One central feature of the compact is its requirement of a comprehensive plan, developed by the Commission, for the present and future uses of the water in the river basin.¹⁰⁵ The plan serves as the basis for an annual water-resources program, which describes the quantity and quality of water needed over the following six years and the future projects and facilities required to meet those needs.¹⁰⁶ The comprehensive planning and

94. *Id.*

95. *Id.* at 411–12.

96. *Id.* at 412.

97. *Id.*

98. *Id.*

99. *Id.* The text of the Delaware River Basin Compact can be found at Pub. L. No. 87-328, 75 Stat. 688 (1961).

100. Jessica A. Bielecki, *Managing Resources with Interstate Compacts: A Perspective from the Great Lakes*, 14 BUFF. ENVTL. L.J. 173, 205 (2007).

101. *Id.* at 206.

102. *See supra* note 5 and accompanying text. But remember that the compact only governs groundwater within the basin, so the compact is not a compact for an interstate aquifer. *See supra* note 5 and accompanying text.

103. Clemons, *supra* note 7, at 133.

104. *Id.*

105. *Id.*

106. *Id.* at 133–34.

regional management scheme in the Delaware River Basin Compact has no equivalent—other compacts are primarily written to ratify apportionments and allow each state to protect its share.¹⁰⁷ The compact has been largely successful, as it has enabled the Delaware River Basin Commission to meet challenges including droughts, water-supply development, and pollution control.¹⁰⁸

V. An Interstate Groundwater Compact for the High Plains Aquifer

A. *Why Use an Interstate Compact to Govern the Aquifer?*

In Part III of this Note, I argued that state regulation of an interstate aquifer is inequitable and encourages unsustainable use of the aquifer. I stated two basic problems with the state regulation of interstate aquifers: negative externalities and a lack of administrative efficiency. In the High Plains Aquifer, these problems are arguably magnified since the aquifer underlies eight states¹⁰⁹ and, additionally, in one area of the aquifer there are five states within a forty-mile radius.¹¹⁰ Therefore, I argue that an interstate groundwater compact would be a more effective means of governing the High Plains Aquifer. Though there are many reasons why an interstate groundwater compact would be a better solution for the High Plains Aquifer, in this section I argue why an interstate groundwater compact will at least alleviate the two problems discussed in Part III.

1. Negative Externalities.—As compared to state regulation of the interstate aquifer, an interstate groundwater compact for the High Plains Aquifer will help internalize and decrease negative externalities. As I discussed in subpart III(A), when one water user pumps water he lowers the water table for surrounding water users in the same aquifer, and this water user creates a spillover effect on other water users who rely on the same aquifer. I mentioned that if these water users are in different states, the harmed water user is more limited in the recourse he may seek against the harmful water user, and depending on the groundwater doctrines of the states, the harmful water user may be encouraged to pump even more water.¹¹¹ So, it is much harder to internalize or decrease these externalities in a system where the individual states regulate the aquifer. But if there were an interstate groundwater compact encompassing the states where the water users are located, then the spillover effects would be more easily internalized and decreased. Since the interstate groundwater compact would have jurisdiction over both water users, the compact's commission could either

107. *Id.* at 134.

108. *Id.*

109. *See supra* note 11 and accompanying text.

110. *See supra* notes 47–48 and accompanying text.

111. *See supra* subpart III(A).

(1) decrease the harm created by the water user by limiting the amount of water that user can withdraw, or (2) internalize the externality created by the harmful user by penalizing that water user and perhaps reimbursing the harmed water user.

2. *Administrative Efficiency.*—An interstate groundwater compact, especially for the High Plains Aquifer, would also be more administratively efficient than a system of state regulation.

One way that state regulation of a shared water resource can be administratively inefficient is that there are too many regulatory authorities with overlapping and redundant responsibilities. Part of the success of the Delaware River Basin Compact has been its increase in administrative efficiency.¹¹² Within the Delaware River Basin there was once overlapping authority of forty-three state agencies, fourteen interstate agencies, and nineteen federal agencies.¹¹³ The Delaware River Basin Compact created a commission that replaced all of those other agencies.

If a compact were created for the High Plains Aquifer, the compact would have a similar effect on administrative efficiency. Though I have no official count of the number of agencies governing portions of the aquifer, there must be at least eight—one for each state overlying the aquifer. So the High Plains Aquifer would be governed more efficiently since one commission could perform tasks, such as aquifer research and monitoring, that are now redundantly performed by several governing agencies.¹¹⁴ Indeed, that is why some scholars have concluded that one of the main advantages of water compacts over other apportionment methods is that water compacts lower transaction costs by centralizing information.¹¹⁵

B. *Designing an Interstate Groundwater Compact for the High Plains Aquifer*

Fortunately, for any states planning to create an interstate groundwater compact, there are several interstate water compacts to learn from when creating a new compact. Furthermore, there are many different state

112. See David N. Copas Jr., Note, *The Southeastern Water Compact, Panacea or Pandora's Box? A Law and Economics Analysis of the Viability of Interstate Water Compacts*, 21 WM. & MARY ENVTL. L. & POL'Y REV. 697, 728 (1997) ("The Delaware River Basin compact ('DRBC') represents a significant step towards efficiency in the use of water compacts.").

113. *Id.* at 728–29.

114. See *supra* note 67 and accompanying text.

115. See, e.g., Charles W. Howe et al., *Transaction Costs as Determinants of Water Transfers*, 61 U. COLO. L. REV. 393, 404–05 (1990) (using regression analysis to describe the significant transaction costs incurred when states allocate water without an interstate compact); Wilson G. Barmeyer, Note, *The Problem of Reallocation in a Regulated Riparian System: Examining the Law in Georgia*, 40 GA. L. REV. 207, 238–40 (2005) (describing the advantages of a centralized water bank in lowering transaction costs); Copas, *supra* note 112, at 729 (concluding that the Delaware River Compact is the best solution under a Coasian analysis because it provides the complete information required to efficiently allocate the water among users).

groundwater policies that could potentially be a part of an interstate groundwater compact. As I have recommended an interstate groundwater compact for the High Plains Aquifer in this Note, in this subpart I make some recommendations for designing a potential groundwater compact for the High Plains Aquifer.

1. Create the Compact Using the Eastern-Water-Compact Model.—If a compact is created for the High Plains Aquifer, the compact should follow the eastern-water-compact model and not the western-water-compact model.

Though the western model may be easier to establish because it does not require setting up a commission or governing authority, there are several problems with using a western model compact for the High Plains Aquifer. First, though a western water compact may help decrease externalities, the western water compact would not help with administrative efficiency. In a western water compact, since all the compact would do is set allocations of groundwater for each of the compact states, presumably the states would all keep their governing agencies. Therefore, there would be no decrease in governing agencies in the High Plains Aquifer, and there may even be an increase in the number of governing authorities if a new agency is created to provide oversight on each state's water allocation. A second general problem with the western water compact is that compacts like the Colorado River Compact, a western water compact, have not worked well in practice.¹¹⁶

Conversely, eastern water compacts, such as the Delaware River Basin Compact, have been major successes.¹¹⁷ The creation of a commission to govern the aquifer would increase the administrative efficiency by replacing the many overlapping authorities with a single authority. Additionally, in an eastern water compact, the compact can be drafted in a way that gives the commission the flexibility to manage future uncertainties of water-resources development in the High Plains Aquifer.¹¹⁸ Thus, if a compact is created for the High Plains Aquifer, that compact should follow the eastern model of interstate water compacts.

2. Institute a Commission Similar to the Delaware River Basin Commission.—If a compact for the High Plains Aquifer follows the eastern-water-compact approach, then the compact should model its commission on the Delaware River Basin Commission. Other commissions, such as the one

116. See Charles T. DuMars & David Seeley, *The Failure of the Apalachicola-Chattahoochee-Flint River Basin and Alabama-Coosa-Tallapoosa River Basin Compacts and a Guide to the Successful Establishment of Interstate Water Compacts*, 21 GA. ST. U. L. REV. 373, 391–93 (2004) (identifying problems with the Colorado River Compact).

117. See *supra* note 108 and accompanying text.

118. See Clemons, *supra* note 7, at 134 (“The *Delaware River Basin Compact*’s flexible, cooperative, planning-oriented structure has enabled the DRBC to meet challenges including droughts, water supply development, and pollution control.”).

in the Great Lakes Compact, have also modeled their commissions on the Delaware River Basin Commission.¹¹⁹

One important feature a commission in the High Plains Aquifer should adopt from the Delaware River Basin Commission is the use of majority voting in most circumstances. Majority voting could help the commission from being deadlocked because one state decides to hold out. The Pecos River Compact is a good example of how requiring unanimous consent from commissioners can cause problems.¹²⁰ Part of the failure of the Apalachicola–Chattahoochee–Flint River Compact is also attributed to its requirement of unanimity.¹²¹ Another important feature a commission in the High Plains Aquifer should adopt from the Delaware River Basin Commission is the requirement of a comprehensive water plan for present and future uses of the aquifer. Given that the High Plains Aquifer is at risk of being depleted within a few decades,¹²² a water plan with future water-resource projections may be vital to ensure long-term use of the aquifer.

3. *Use Groundwater Management Districts at the Local Level.*—I suggest that any compact created for the High Plains Aquifer, or any other interstate aquifer, should consider using groundwater management districts to help give representation at the local level. This would be a new idea in the realm of interstate compacts, but groundwater management districts have been successfully used by state governing authorities for decades.¹²³ Just as some state governing agencies use groundwater management districts to help regulate at the local level, the commission for the High Plains Aquifer could use groundwater management districts to solicit valuable advice at the local level. There are many states that use groundwater management districts,¹²⁴ so the commission for the High Plains Aquifer Compact would have several models from which to borrow. Furthermore, since several states in the High Plains Aquifer already have groundwater management districts,¹²⁵ much of

119. See Bielecki, *supra* note 100, at 205–07 (comparing and contrasting the Delaware River Basin Compact’s commission with the commission for the Great Lakes Compact).

120. See Clemons, *supra* note 7, at 131 (stating that the Pecos River Compact is a “prime example” of the difficulties created when the compact’s decision-making requires “unanimous consent among commissioners”). The text of the Pecos River Compact can be found at TEX. WATER CODE ANN. § 42.010 (Vernon 2008).

121. See Bielecki, *supra* note 100, at 209 (“Part of the ACF’s failure may be attributed to the structure of the decision-making provisions. The agreement required unanimity, . . . which was fatal to negotiations.”). The text of the ACF Compact can be found at Pub. L. No. 105-104, 111 Stat. 2233 (1997).

122. See *supra* note 3 and accompanying text.

123. See *supra* notes 40–41 and accompanying text.

124. See, e.g., Groundwater Management Districts Association, <http://www.gmdausa.org/MemberStates.htm> (listing seven states—Colorado, Kansas, Louisiana, Mississippi, Nebraska, Oklahoma, and Texas—with groundwater management districts that belong to the Groundwater Management Districts Association).

125. See *supra* notes 40–41, 44, 46 and accompanying text.

the foundation for creating the groundwater management districts is already in place.

But I realize that adding groundwater management districts seems somewhat counterintuitive to the purpose of the compact—to regulate the large region equitably and sustainably in a uniform manner throughout the aquifer. So it is important to realize that the purpose of the groundwater management districts is not to reduce the autonomy of the overall commission or compact but to help the commission gain local expertise and receive local input. Therefore, the groundwater management districts may help alleviate one of the concerns of such a large interstate compact—that it might become akin to the federal government and lose sight of local interests. Additionally, many people feel that groundwater management districts have been used reasonably effectively in managing aquifers and meeting the needs of their constituents.¹²⁶

Of course, the details of the groundwater management districts would be resolved between the compacting states. Nonetheless, I recommend the groundwater management districts be more similar to the groundwater control areas in Wyoming than to the much more autonomous groundwater management districts in other states. In Wyoming, the groundwater control areas that are created serve in an advisory role to the state engineer rather than govern as relatively autonomous bodies.¹²⁷ So if a compact for the High Plains Aquifer uses groundwater management districts similar to the groundwater control areas in Wyoming, the commission would retain its autonomy and authority while still receiving input and advice from local groups.

There are many other details that would need to be resolved by the compacting states, such as the size, location, and other characteristics of the groundwater conservation districts. I only recommend that the commission create groundwater conservation districts in order to receive advice from local groups and thereby better serve local interests—while still retaining the autonomy and uniformity of the commission.

126. See, e.g., Stephen E. White & David E. Kromm, *Local Groundwater Management Effectiveness in the Colorado and Kansas Ogallala Region*, 35 NAT. RESOURCES J. 275, 306 (1995) (“Based on our field work within the region, a systematic assessment of performance, and a survey of irrigators, we believe that most of the groundwater management districts in the High Plains of Colorado and Kansas are reasonably effective in managing the aquifer and meeting the needs and preferences of their constituents.”).

127. See WYO. STAT. ANN. § 41-3-915(a) (2009) (“If the state engineer finds after the hearing, and after receiving the advice of the control area advisory board, that the underground water in the control area is insufficient for all of the appropriators, he may by order adopt [corrective controls] . . .”).

C. *Potential Questions and Concerns with an Interstate Groundwater Compact*

Though I strongly recommend the use of an interstate groundwater compact for the High Plains Aquifer, since there are no current compacts that govern interstate aquifers, there are some questions and concerns for creating such a compact.

1. *What Groundwater Doctrine Should the Compact Encompass?*—As previously discussed, there are currently five different groundwater doctrines that have been used by various states, and each has its own advantages and disadvantages.¹²⁸ The compact states will need to agree on a doctrine to at least have as a default or background rule.

Though I do not consider any doctrine to be the best, as they each have different purposes and advantages, the easiest and most equitable solution may be to use the doctrine of prior appropriation. As an initial matter, six of the eight states overlying the High Plains Aquifer already use varying forms of prior appropriation for groundwater, so these states bring experience with that doctrine.¹²⁹ Only Texas and Oklahoma (and Nebraska in some areas) use a different groundwater doctrine.¹³⁰ Nonetheless, Oklahoma has experience with using the prior-appropriation doctrine for some types of groundwater—just not for the High Plains Aquifer.¹³¹ Additionally, although Texas does not use prior appropriation for groundwater, it does have experience with the prior-appropriation doctrine for surface water.¹³² So the prior-appropriation doctrine may be the easiest to use because all the states have some experience with it.

Though there may be a more equitable doctrine, the prior-appropriation doctrine would likely at least give each compacting state a stake in the issuance of groundwater permits. The more difficult question may be, What degree of voting power should each state have with regard to the issuance of permits? Most likely, the groundwater commission, or a subcommittee of the commission, would have to be in charge of issuing permits. But each state would have some degree of representation on that commission. Among the many plausible alternatives are giving each state equal power, dividing power according to proportional volume of the aquifer underlying the state, and dividing power according to population or water need overlying the

128. *See supra* section II(B)(2).

129. The states of Colorado, Kansas, Nebraska, New Mexico, South Dakota, and Wyoming all have some sort of a prior-appropriation doctrine. *See supra* notes 39–42, 46 and accompanying text.

130. *See supra* notes 43–46 and accompanying text.

131. *See supra* note 45 and accompanying text.

132. *See* Eric Opiela, *The Rule of Capture in Texas: An Outdated Principle Beyond Its Time*, 6 U. DENV. WATER L. REV. 87, 89 n.9 (2002) (“[W]hile the rule of capture governs Texas groundwater, the doctrine of prior appropriation governs surface water in Texas, much like western states.”).

aquifer. Alternatively, an interesting scheme might be some sort of sliding scale based on the impact the water use of a permit may have on any particular state. As discussed in the next section, pumping groundwater has much stronger effects closer to the pump source. So, for example, Texas may have more power over permits in Oklahoma or New Mexico than it would for Wyoming or South Dakota.

Prior appropriation is likely the easiest solution for a groundwater doctrine, and it is at least somewhat equitable since each state should have some stake in the permits issued within the aquifer. Further, if sustainability of the aquifer is a concern, issuing permits potentially allows the flexibility to use more or less water within the aquifer depending on the projected sustainable-water-use limits.

2. *Hydrogeologic Concerns.*—Groundwater generally does not move as dynamically as surface water. Groundwater may move only a few feet per day,¹³³ but surface water obviously moves much faster, especially in rivers. In the context of an interstate compact governing a river, the activities of any upstream state can clearly affect downstream states, even if they are hundreds of miles away. But in an interstate aquifer, since groundwater moves so slowly, activities of states that are hundreds of miles away may not be so closely related. In the High Plains Aquifer, for example, Texas may not care as much about what Wyoming is doing in the aquifer, but Texas may be strongly concerned with New Mexico's or Oklahoma's actions. Thus, in an interstate groundwater compact, Texas may want more participation in activities closer to the state and less participation for activities farther away. Fortunately, if an eastern-water-compact model is used, then the commission's governing authority might be able to take this factor into consideration.

Another potential problem is the relationship between groundwater and surface water. Theoretically, though groundwater use will impact the surface water and vice versa,¹³⁴ a compact for the High Plains Aquifer would only have jurisdiction over groundwater. This could obviously create management problems. I propose two ways this problem might be remedied. First, though this is not within the scope of what I argue in this Note, the compact could try to govern the entire basin of the High Plains Aquifer—similarly to the Delaware River Basin Compact.¹³⁵ But this basin would probably be

133. See SCHWALBAUM, *supra* note 16, at 33–34 (stating that a 1.25 feet/day seepage velocity is a fairly typical rate of flow of groundwater in a sand and gravel aquifer).

134. Groundwater and surface water are related—for example, streams quite often gain or lose water from aquifers that lie beneath them. See Drummond, *supra* note 1, at 177–78 (describing the interaction of groundwater and surface water in gaining and losing streams). Therefore, if the water level in the aquifer gets low enough, then the water table becomes too low to continue to contribute water to the river or reservoir. See *id.* (noting that in these “losing streams, the water table of the shallow aquifer is typically lower than the water level of the stream”).

135. See *supra* note 5 and accompanying text.

extremely large once all the rivers that drain into the High Plains Aquifer are considered,¹³⁶ so this is likely not a good option. The other option is to let the compact govern only the groundwater and then let the commission of the compact work closely with the institutions that govern the surface water that is hydrologically connected to the High Plains Aquifer. Fortunately, many of the states that would be parties to the compact also have jurisdiction over the surface water that is connected to the aquifer¹³⁷—or are possibly a party to another compact that has jurisdiction over that surface water.¹³⁸ So while the relationship between groundwater and surface water may complicate the compact, the issue should be resolvable.

3. *States Acquiescing to a Groundwater Compact.*—Finally, there is a concern that one or more states may not want to become a party to a compact for the High Plains Aquifer. I suspect that Texas, for example, might not want to join a compact because that could interrupt the current status quo, where Texas uses as much water from the aquifer as it wants.¹³⁹ Unfortunately, if a state does not want to join an interstate compact it cannot be forced to, as an interstate compact is a voluntary agreement entered into by the states.¹⁴⁰ But there are reasons why a state may eventually change its mind and decide to join an interstate compact. First, if disputes over water resources become a problem, the states may seek equitable apportionment by the Supreme Court of the United States.¹⁴¹ Equitable apportionment by the Supreme Court may not be a favorable potential solution to many states,¹⁴² so a state may decide to join an interstate compact if equitable apportionment is the alternative. Indeed, this is more or less what spurred the creation of the Delaware River Basin Compact.¹⁴³ Second, if the situation in the High Plains Aquifer does not improve, the federal government could one day consider federal regulations. If the options were either federal government regulation of groundwater or an interstate compact, the state may prefer the interstate compact. Though after almost thirty years since *Sporhase v. Nebraska ex rel. Douglas*¹⁴⁴ determined federal regulation of groundwater quantity may be

136. See Drummond, *supra* note 1, at 184 fig.11-5 (illustrating the many rivers that drain into the High Plains Aquifer).

137. See *id.* (depicting the states with jurisdiction over the surface water in the High Plains Aquifer region).

138. See, e.g., TEX. WATER CODE ANN. § 46.013 (Vernon 2008) (enacting the Red River Compact, which allocates the river's water rights among Arkansas, Louisiana, Oklahoma, and Texas).

139. See *supra* note 43 and accompanying text.

140. See Davis & Branson, *supra* note 87, at 137 (noting that the interstate compact must be “ratified by the signatory states’ legislatures”).

141. See *supra* note 79 and accompanying text.

142. See *supra* notes 79–82 and accompanying text.

143. See Bielecki, *supra* note 100, at 205–06 (discussing how prior-apportionment hearings before the Supreme Court eventually led to the states’ desire to create the compact).

144. 458 U.S. 941 (1982).

possible,¹⁴⁵ the federal government has never done so, and thus it seems unlikely to happen anytime soon. Last, if the federal government liked the idea of a compact, then the federal government could give financial incentives for the states to enter into the compact. Hence, there are ways that states can be encouraged to enter into an interstate compact if there are any that do not initially desire to be a party.

VI. Conclusion

In conclusion, the current state-by-state regulation of the High Plains Aquifer is inequitable and unsustainable—it is allowing the potential for depletion within a few decades.¹⁴⁶ I outline at least two reasons why the current governance scheme is problematic, as it allows negative externalities and is administratively inefficient.

I argue that the solution for a better management scheme for the High Plains Aquifer lies within the constitutional mechanisms of horizontal federalism. A better governing structure for the High Plains Aquifer is an interstate compact. An interstate compact would lessen the problems of negative externalities and administrative inefficiency. A compact for the High Plains Aquifer should use the structure of the eastern water compacts as its model. Furthermore, the commission for the High Plains Aquifer Compact should be designed like the Delaware River Basin Commission. In addition, the interstate groundwater compact for the High Plains Aquifer should use groundwater management districts in order to gain local advice and expertise. By carefully and diligently crafting an interstate compact for the High Plains Aquifer, the region could enjoy much more effective means of regulation and management that would promote the equitable and sustainable use of the aquifer.

Finally, in this Note, though I make suggestions for this new management scheme for the High Plains Aquifer, many if not all of these suggestions may also be applicable to any of the numerous interstate aquifers in the United States.¹⁴⁷ While I do not advocate the adoption of compacts for any and all interstate aquifers, these principles may be helpful to other trans-boundary aquifers that may be having similar problems with different or conflicting state groundwater doctrines governing the same body of water.

—Rex A. Mann

145. See *id.* at 953–54 (concluding that “water is an article of commerce” and that “[groundwater] overdraft is a national problem and Congress has the power to deal with it on that scale”).

146. See *supra* note 3 and accompanying text.

147. See *supra* note 9 and accompanying text.