Federal Tools to Best Encourage Sustainable Ground Water Management

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I. INTRODUCTION

In 2015 California was experiencing one of its worst droughts in recorded history.[1] Farmers in the San Joaquin Valley were among those affected the most by the lack of water in the area.[2] Despite the ongoing water shortage, these farmers began converting their row crop fields into more water intensive almond orchards.[3] From the farmers' perspective, this transition was more economically rational than using agricultural techniques that would ultimately require less water because almonds are generally a higher value crop.[4] However, the benefits these almond orchards conferred on the private farmers came with a cost to the broader public interest in conserving water by increasing the overall demand for an already strained resource.[5] To satisfy the

1. Richard Frank, *Tragedy of the Commons—California Drought-Style*, LEGAL PLANET (July 13, 2015), https://legal-planet.org/2015/07/13/tragedy-of-the-commons-california-drought-style.

2. *Id.*

3. *Id.*

4. *Id.* This scenario is a more realistic illustration of the tragedy of commons in the context of shared groundwater resources, compared to Garret Hardin's classic textbook example of individual herders allowing their sheep to graze a common pasture. Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243 (Dec. 13, 1968). In both situations, the individually rational decision is misaligned with the societal interests of conservation of the benefits of the shared resource. These misaligned interests tend to incentivize overconsumption at the cost of long-term benefits for everyone. For a brief overview of the tragedy of commons as well as other current illustrations, see generally Deena Robinson, *What Is the 'Tragedy of the Commons'?*, EARTH.ORG (Sept. 5, 2021), https://earth.org/what-is-tragedy-of-the-commons.

5. Frank, *supra* note 1.

demand for water, and ameliorate the effect of a reduction in water deliveries from state and federal water management projects, many farmers resorted to pumping groundwater.[6] Despite evidence of a lowering water table from groundwater overdraft in parts of the San Joaquin Valley, "agricultural interests have pretty much unfettered ability to drill and pump from new groundwater wells."[7] The use of groundwater to maximize the farmers' individual revenues resulted in an increase in the aggregate demand for the finite water resources and chronic water shortages that climate scientists believe may represent the "new normal" for California's long-term water future.[8]

This tragedy of the commons scenario reflects the lack of a legal framework that incentivizes sustainable use in the face of a clear market failure.[9] To create effective policy decisions, the law needs to alter the natural incentive structure to better align the individual interests with the goal of long-term sustainability by lowering transaction costs and encouraging collective action in the form of efficient management.[10] Without efficient management of our groundwater resources, the risk of over-consumption, and the resulting problems such as deteriorated water quality and increased energy needed for pumping, become quite significant.[11] The country's dependency on groundwater for domestic and agricultural uses are expected to continue to grow in light of complications caused by a growing population and climate

6. *Id.*

7. *Id.*

8. *Id.*

9. *See* J.B. RUHL ET AL., THE PRACTICE AND POLICY OF ENVIRONMENTAL LAW 21–23 (Robert C. Clark et al., 4th ed. 2017) (discussing market failures and how public goods generally lead to the tragedy of the commons due to the challenge of estimating their value); Alexandria Spillakos, *Tragedy of the Commons: What It Is and 5 Examples*, HARV. BUS. SCH. ONLINE (Feb. 6, 2019), https://online.hbs.edu/blog/post/tragedy-of-the-commons-impact-on-sustainability-issues. ("The tragedy of the commons refers to a situation in which individuals with access to a public resource (also called a common) act in their own interest and, in doing so, ultimately deplete the resource."). The market failure in this situation is illustrated by the tension between economic interests of the individual farmers and the broader benefits to society. The market failure concept is a continuous theme in environmental statutes and policy. *Id.*

10. Spillakos, *supra* note 9.

11. Imani Williams, *5 Real World Examples of the Tragedy of the Commons*, POPULATION EDUC. (Mar. 26, 2020), https://populationeducation.org/5-real-world-examples-of-the-tragedy-of-the-commons.

change.[12] This is especially true for western states in dryer areas of the country, which are particularly vulnerable as a result of less rainfall.[13]

To further encourage sustainable policies aimed at preventing depletion of the groundwater sources over half the United States relies on for the basic necessities of life,[14] the federal government needs to exercise its authority on the issue to ensure that our interstate resources are not victims of the tragedy of the commons. By its very nature, interstate groundwater fits squarely within Congress's constitutional power to regulate interstate commerce, thus making it subject to federal regulation.[15] Further, Congress also has broad authority to encourage compliance with uniform policy objectives through the conditioning of federal funds by way of the Spending Clause.[16] Currently, there is no federal coordination aimed at protecting these sources from overuse. Therefore, the stage is set perfectly for a federal role aimed at preventing groundwater overdraft.

This Note proposes that having the federal government incentivize coordinated groundwater conservation policies is necessary to effectively manage and prevent over-consuming our groundwater resources. Part II of this Note will discuss and explain what groundwater

12. *See Groundwater & Climate Change*, INT'L GROUNDWATER RES. ASSESSMENT CTR., https://www.un-igrac.org/areas-expertise/groundwater-climate-change (last visited Aug. 7, 2021) (addressing how the Netherlands is responding to the negative impact climate change has on groundwater).

13. Thomas Meixner et al., *Implications of Projected Climate Change for Groundwater Recharge in the Western United States*, 534 J. HYDROLOGY 124, 132–35 (2016) (discussing the impact of climate change and less precipitation's effect on groundwater recharge for several aquifers).

14. *What Is Groundwater?*, THE GROUNDWATER FOUND., https://www.groundwater.org/get-informed/basics/groundwater.html (last visited Jan. 2, 2022).

15. *See* Sporhase v. Nebraska, 458 U.S. 941, 953–54 (1982) ("But appellee's claim that Nebraska ground water is not an article of commerce goes too far: it would not only exempt Nebraska ground water regulation from burden-on-commerce analysis, [but] it would also curtail the affirmative power of Congress to implement its own policies concerning such regulation . . . . Ground water overdraft is a national problem and Congress has the power to deal with it on that scale.").

16. Kevin McNiff, Note*, The Use of Federal Grant-Making Power to Expand State and Local Procurement Coverage Under the Transatlantic Trade and Investment Partnership*, 44 PUB. CONT. L.J. 327, 339–40 (2015); *see also* U.S. CONST. art. I, § 8, cl. 1 (providing that Congress had the authority to raise taxes and spend money "to pay the Debts and provide for the common Defence and general Welfare of the United States").

is, some of the context in which groundwater overdraft occurs, as well as the current legal sphere in which groundwater conservation exists. Part III will show that the current efforts to conserve and manage groundwater aquifers are insufficient to combat groundwater overdraft, as well as explain why the federal government is somewhat constrained on the issue despite having multiple sources of authority on the matter.[17] Part IV will propose that Congress should use its spending power to create legislation that will incentivize states to implement sustainable groundwater policies and encourage aquifer resiliency in the face of climate change. Part V will offer brief closing remarks about the importance of groundwater management and the need to ensure the security of our water resources.

II. HISTORY & BACKGROUND

Before fashioning a solution that can effectively handle the problems associated with managing groundwater as a natural resource, it is important to lay a foundation that provides the factual and legal context underlying the issue. The first step in laying that foundation is defining the subject matter of the problem to ensure that there is a common understanding of what groundwater is, its role in the environment generally, and the process that applies stress to these resources. Beyond the factual circumstances, the other half of that foundation consists of the legal context which lead to this situation. The legal context will consist of conflicting interests involved, to the extent that the public interests are at odds with the various systems that establish individual property rights in groundwater, as well as common law doctrines that were not yet equipped with the full knowledge necessary to create a more holistic framework for these issues. Further, it is beneficial to understand the different approaches taken by some states to tackle the issue of groundwater management in the context of vertical delegations of power.

17. Interestingly, this idea had previously garnered some attention from the United States General Accounting Office (GAO) in the early 1980s. Further, the Supreme Court has previously given the nod to congressional authority on the matter in a Nebraska case dealing with groundwater and the dormant commerce clause, which will also be discussed later in Parts II and III. *See infra* note 73.

A. What Is Groundwater?

First things first, it is important to understand what exactly groundwater is and adequately define the issue at hand. Groundwater is a naturally occurring part of the water cycle whereby precipitation that has fallen to the Earth's surface infiltrates the subsurface layers of the Earth's crust.[18] This water permeates the soil, sand, and rock underneath the Earth's surface as it moves throughout geologic features known as aquifers.[19] "An aquifer is a geologic formation, a group of formations, or a part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs."[20]

Before this water can become available for pumping and consumption, it must find its way under the surface through the recharging process.[21] The groundwater recharge process naturally occurs as part of the water cycle as precipitation falls to the surface and is driven by gravity through the soil and down toward the water table.[22] The water table is the subsurface level below which the porous spaces in the Earth are filled with water as opposed to air.[23] The recharge process can also occur artificially whereby an increased quantity of water can enter the aquifer through man-made systems like canals, basins, ponds, irrigation systems, or simply injecting water directly under the surface.[24]

18. Water Sci. Sch., *Groundwater: What Is Groundwater?*, U.S. GEOLOGICAL SURV. (Nov. 6, 2018), https://www.usgs.gov/special-topic/water-science-school/science/groundwater-what-groundwater?qt-science_center_objects.

19. *What Is Groundwater?*, THE GROUNDWATER FOUND., https://www.groundwater.org/get-informed/basics/groundwater.html (last visited Jan. 2, 2022). It might also be beneficial to understand that this note is focused more on groundwater as opposed to surface water—such as rivers, lakes, streams, ponds, etc.—despite the two variations being hydrologically connected.

20. Water Res., *Principal Aquifers of the United States*, U.S. GEOLOGICAL SURV. (Mar. 8, 2021), https://www.usgs.gov/mission-areas/water-resources/science/principal-aquifers-united-states?qt-science_center_objects.

21. Dave Owen, *Law, Land Use, and Groundwater Recharge*, 73 STAN. L. REV. 1163, 1168 (2021).

22. *Id.*

23. *Id.*

24. Water Res., *Artificial Groundwater Recharge*, U.S. GEOLOGICAL SURV. (Mar. 1, 2019), https://www.usgs.gov/mission-areas/water-resources/science/artificial-groundwater-recharge. It is worth noting that many human activities also have

Naturally, the recharge process plays a fundamental role in achieving sustainable groundwater management as it can provide management agencies the opportunity to limit the withdraw rate to ensure that it is proportional to the recharge rate and prevent overdraft.[25] Further, increasing the inflow of the recharge rate can help salvage the overall health of overdrafted basins.[26]

Groundwater overdraft is a process whereby the pumping and consumption of groundwater exceeds the rate at which the aquifer is refilled through artificial or natural processes.[27] In that sense, the amount of water stored in aquifers can be seen as analogous to a bank account. If the rate of which currency (groundwater) is withdrawn exceeds deposits (recharge process), eventually one will begin to see supply and demand problems.[28] At this point in the note, it should suffice to illustrate the process of groundwater depletion; in the analysis portion below, this note will examine the consequences of groundwater depletion.

B. Legal Developments

Beyond the factual context of groundwater generally, it is also important to understand the legal developments that led to this gap in the law in the first place. Generally, the law surrounding groundwater rights and management are relatively undeveloped when compared to surface water.[29] Further, state law is charged with the responsibility of allocating water rights concerning both groundwater and surface

effects on the recharge rates of aquifers. *See* Owen, *supra* note 21, at 1169. These activities include paving roads or other impermeable surfaces that divert water away from the soil, agriculture, and even our own urban irrigation systems. *Id.*

25. *Groundwater Recharge*, GROUNDWATER EXCH., https://groundwaterexchange.org/groundwater-recharge (last visited Jan. 2, 2022).

26. *Id.*

27. Tara Moran et al., *The Hidden Costs of Groundwater Overdraft*, WATER IN THE WEST, https://waterinthewest.stanford.edu/groundwater/overdraft (last updated Sept. 9, 2014).

28. Water Sci. Sch., *Groundwater Decline and Depletion*, U.S. GEOLOGICAL SURV. (June 6, 2018) [hereinafter *Groundwater Decline*], https://www.usgs.gov/special-topics/water-science-school/science/groundwater-decline-and-depletion?qt-science_center_objects.

29. John D. Leshy, *Interstate Groundwater Resources: The Federal Role*, 14 HASTINGS W.-NW. J. ENV'T L. & POL'Y 1475, 1480 (2008).

water.[30] Since groundwater was a largely uncertain phenomenon when common law doctrines began grappling with its allocation, the states have developed several legal regimes to assign these property rights.[31] This is an important aspect of American water law, as it is the main avenue for dealing with access to water on a quantitative scale.[32]

1. State Property Right Regimes

Any attempt to adjust groundwater use will have to overcome hurdles presented by the various property right systems at play across the country. These hurdles naturally arise in the form of conflict between private property rights to own and use the groundwater source and government regulation of the same, mostly due the Fifth Amendment's Takings Clause and the nature of property rights generally.[33] Thus, it would be beneficial to get a general overview of the five alternative groundwater right systems that states use to allocate property rights.

30. *Id.* The existing dichotomy between ground and surface water, and where the two intersect with the law, could be the subject of a whole Note. For the purposes of this Note, it is enough to understand that they are treated separately in general—despite the facts that both are part of the same hydrological cycle and that the distinction rests more on outdated ideas of hydrology and convenience in the moment. *See also id.* at 1478 (discussing the dichotomy of groundwater and surface water generally).

31. *See* RUHL, *supra* note 9, at 342–43 (discussing the nature of water right allocation and the interrelated issues of quality and quantity). Water quality is dealt with at the federal level through legislation like the Clean Water Act and other related statutes. Nonetheless, this conversation falls outside the scope of this Note.

32. Leshy, *supra* note 29. There are five different approaches employed across the country to allocate groundwater rights: capture, American reasonable use, correlative rights, the Restatement rule, and prior appropriation. *Id.* The exact mechanics of these allocative frameworks are also beyond the scope of this Note, but they are nonetheless illustrative of the legal complexities that accompany the issue of groundwater management. To add to this complexity, there are some cases where a state has delegated its authority in groundwater management to more localized governmental districts depending on the geographical area and characteristics of the aquifer itself. *Id.*

33. U.S. CONST. amend. V ("[P]rivate property [shall not] be taken for public use, without just compensation."); *see also* WATER SYS. COUNCIL, WHO OWNS THE WATER? (2016), http://nationalaglawcenter.org/wp-content/uploads/2017/03/Who-Owns-the-Water-2016-Update-FINAL.pdf (discussing the relationship between water rights and takings).

First, the rule of capture allows the landowner to pump water from aquifers under their land, regardless of purpose, amount, or impact on surrounding property owners.[34] Second, the reasonable use rule—a slight variation of the rule of capture—allows a landowner to use groundwater stored under the property, but limits that use by requiring a reasonable relationship to uses in connection with the overlying land.[35] Third, the correlative rights system, a variation of the reasonable use rule, gives the landowner a property right in a portion of the aquifer equal to the size of overlying land and allows off-site uses.[36] Fourth, the regulated riparian regime, also known as the Restatement rule, allows the state to issue permits for pumping so long as it will not cause problems for neighboring properties.[37] Finally, the prior appropriation system, as the name might suggest, is a first in time, first in right system.[38] The prior appropriation system allows the first owner to pump reasonable amounts of groundwater for beneficial use, and is sometimes accompanied by a permitting system.[39]

2. Public Trust Doctrine

While the complex system for state water property right allocation was developing, so too was the Americanized version of the public trust doctrine.[40] The public trust doctrine is an ancient common law rule that fits into the American legal system as a means to facilitate sovereign ownership of the states over navigable waters and the lands underneath to be held in trust for public use.[41] Because the public trust

34. Nathan Weinert, Note, *Solutions for Interstate Groundwater Allocation and the Implication of Day*, 44 TEX. ENVTL. L.J. 105, 109 (2014); *see also* WATER SYS. COUNCIL, *supra* note 33, at 4 (referring to this system as the "Absolute Dominion Rule" or "the English rule").

35. WATER SYS. COUNCIL, *supra* note 33, at 4–5; *see also* Weinert, *supra* note 34, at 109.

36. WATER SYS. COUNCIL, *supra* note 33, at 5; *see also* Weinert, *supra* note 34, at 109.

37. Weinert, *supra* note 34, at 109; *see also* ANTHONY DAN TARLOCK & JASON ANTHONY ROBINSON, L. OF WATER RIGHTS AND RESOURCES § 4.19, Westlaw (2022).

38. Weinert, *supra* note 34, at 109–10.

39. WATER SYS. COUNCIL, *supra* note 33, at 6.

40. Erin Ryan, *Short History of the Public Trust Doctrine and Its Intersection with Private Water Law*, 38 VA. ENVTL. L.J. 135, 137 (2020).

41. *Id.*

doctrine is a creature of state law, its exact parameters vary; however, the general principal is that the state legally "owns" the resource and must manage it for the benefit of public use.[42] The most relevant display of just how powerful this doctrine is comes from the Supreme Court decision in *Illinois Central Railroad Company v. Illinois*.[43] In that case, the Supreme Court went so far as to nullify a legislative conveyance of ownership rights to part of the Chicago Harbor to a private party.[44] While some states have expanded the breadth of this doctrine to groundwater in varying degrees,[45] other states have expressly decided in the contrary.[46]

The ability of the public trust doctrine to supersede property rights in the name of a state's trust obligations has led some scholars to conclude that it could be a key component in state conservation efforts regarding natural resources.[47] However, the natural tension that exists between the public trust doctrine and the various schemes of awarding property rights makes this an unlikely scenario even if the state would want to include groundwater in its trust duties. Depending on the

42. WATER SYS. COUNCIL, *supra* note 33, at 7–8. The principles of the public trust doctrine support the idea that the government should be involved in managing common resources for the benefits of public use. In doing so, it reflects the ideals that the availability of resources is crucial for societal development and recognizes the necessity of a balance between public interests and private ownership rights. *See* RONALD J. RYCHLAK & DAVID W. CASE, ENVIRONMENTAL LAW, 142–46 (Thomson Reuters 2011) (discussing the purpose, extent, and limits of the public trust doctrine).

43. Ill. Cent. R.R. Co. v. Illinois, 146 U.S. 387 (1892); *see also* RYCHLAK & CASE, *supra* note 42, at 144–46.

44. *Ill. Cent. R.R. Co.*, 146 U.S. at 460; *see also* RYCHLAK & CASE, *supra* note 42, at 165.

45. Jack Tuholske, *Trusting the Public Trust: Application of the Public Trust Doctrine to Groundwater Resources*, 9 VT. J. ENVTL. L. 189, 220 (2008). For example, New Hampshire's statute declares that the public trust extends to all water in the state, including groundwater, and explains that "[t]he maximum public benefit shall be sought, including the assurance of health and safety, the enhancement of ecological and aesthetic values, and the overall economic, recreational and social well-being of the people." *Id.* (quoting N.H. REV. STAT. ANN. § 481:1 (2004)).

46. *See* Rettkowski v. Dep't. of Ecology, 858 P.2d 232, 240 (Wash. 1993) (finding that the Washington Public Trust Doctrine does not cover groundwater because WASH. REV. CODE § 90.03 granted the authority to determine and adjudicate water rights to the superior courts).

47. *See* Ryan, *supra* note 40, at 140–42; *see also supra* note 42 and accompanying text.

degree to which a state's constitution extends its trust responsibilities to this resource, and the degree to which its courts are receptive to the idea of common ownership over the common law allocation regimes, there are still limitations on the extent to which this is a viable option for holistic conservation efforts.[48]

3. California's "Cooperative Subfederalism" Experiment

Outside of these common law developments, some states have attempted to achieve sustainable groundwater management through legislation. For example, California passed a series of bills—collectively referred to as the Sustainable Groundwater Management Act (SGMA)[49]—to combat the effects of the ongoing drought after decades of leaving the decision to regulate up to local governments with no effect on the steady depletion of its groundwater resources.[50] What is particularly interesting about this action is that instead of taking advantage of the state's full authority to completely centralize the management of their groundwater supply, the SGMA opted for what Professor Dave Owen refers to as "cooperative subfederalism."[51]

Using this approach, the law called for the creation of "local groundwater management agencies" from any local agency or agencies overlying groundwater basins.[52] The SGMA then required those localized agencies to develop sustainability plans for basins based on certain risk assessments,[53] and those plans may be aimed at securing various aspects of the basin, including water quality, protection of recharge

48. *See* Danielle Spiegel, Student Article, *Can the Public Trust Doctrine Save Western Groundwater?*, 18 N.Y.U. ENVTL. L.J. 412, 433–34 (2010) (discussing the controversy surrounding the retroactive effect of the public trust doctrine). For a good example of how the public trust doctrine and state water right allocation regimes reach a balance between public and private interests, see *Nat'l Audubon Soc'y v. Superior Ct. of Alpine Cnty.*, 658 P.2d 709, 726–29 (Cal. 1983).

49. Sustainable Groundwater Mgmt. Act, CAL. WATER CODE § 10720 (West 2022).

50. Dave Owen, *Cooperative Subfederalism*, 9 U.C. IRVINE L. REV. 177, 183–84 (2018).

51. *Id.* at 180.

52. *Id.* at 184; *see also* CAL. WATER CODE § 10723 (West 2017).

53. Tina Cannon Leahy, *Desperate Times Call for Sensible Measures: The Making of the California Sustainable Groundwater Management Act*, 9 GOLDEN GATE U. ENVTL. L.J. 5, 34–35 (2015).

areas, mitigation of overdraft, water storage, well construction, and development in tandem with state and federal regulatory agencies.[54] The SGMA also lays out the contents of what these plans should look like, similar to a model zoning code.[55]

This kind of system, one where localities are in charge of implementation of broad policy objectives and subject to administrative oversight, is not common at the state and local levels of government.[56] It does, however, closely resemble the same kind of power structure that the Clean Air Act employs.[57] This system was developed from two main ideas, the first being that the local and regional levels of government are best equipped to manage groundwater resources effectively because they are more familiar with the specifics of their area and are held more accountable for the policies they enact.[58] The second idea is that, while localities are better equipped to manage groundwater resources, when they fall behind on those duties the state must be able to step in and implement its own plan.[59]

54. CAL. WATER CODE § 10753.8 (West 2003). It is worth noting the statute's use of the word "may," as it gives the local agencies considerable leeway in determining what is more of a priority based on the characteristics and pumping habits of the area. *Id.* Section 10720.5 also carves out a limitation on the Act as a whole by indicating that it does not modify the existence of any privately held water rights, or the allocation of those rights, except that it may restrict pumping in medium- to high-risk basins. Here, it seems that the legislature wanted to avoid creating any more tension with existing property rights; however, in the right situation, this could possibly be considered a taking requiring just compensation.

55. CAL. WATER CODE § 10727.2 (West 2015). This section lays out what the Legislature believes the plan's contents should consist of. *Id.* An inexhaustive description of these contents includes the historic and current factual data surrounding the basin, such as water levels, quality, projected demands, maps of the boundaries of their jurisdiction, etc. *Id.* Further, it should contain the objective of the plan, how those objectives are being met, when the plan is to go into effect, certain undesirable results, and various monitoring and reporting requirements. *Id.*

56. Owen, *supra* note 50, at 184–85.

57. *Id.*; *see also* RYCHLAK & CASE, *supra* note 42, at 35–37 (discussing the operation of the Clean Air Act in a vertical federalism context); Clean Air Act, 42 U.S.C. §§ 7401–7671q.

58. Owen, *supra* note 50, at 184 (citing A.B. 1739, 2014 Assemb., 2014–15 Sess. §§ 6, 9 (Cal. 2014)).

59. *Id.*

4. The Centralized Texan Approach

While the California SGMA is one of the more ambitious forms of groundwater management, it is not the only one. Texas, for example, has chosen to focus on both quality and quantity in a comprehensive manner by enacting the Edwards Aquifer Authority Act.[60] In doing so, the state punts its regulatory authority to a state agency, the Edwards Aquifer Authority, to manage the aquifer in terms of recharging and pollution prevention.[61] The Edwards Authority's potential for curbing overconsumption, however, has been reigned in after Texas courts have held regulatory restrictions on pumping for private property owners constituted a taking of property and consequently required just compensation under both the Texas Constitution and the United States Constitution.[62]

C. The Federal Government's Authority to Regulate Natural Resources

In America's federalism system, the states generally play a larger role in enforcing environmental laws and policies than the federal government.[63] However, the federal government has also enacted its fair share of legislation aimed at protecting environmental resources, such as the Clean Water Act, the Clean Air Act, and the Endangered Species Act, to name a few. Often, federal and state environmental laws have some commonalities, and may even have concurrent jurisdiction over the subject or infraction.[64] To understand the extent and in what capacity the federal government has the authority to influence groundwater management, the evaluation has to start with the

60. RUHL, *supra* note 9, at 263.

61. *Id.*; *see also* TEX. WATER CODE ANN. §§ 36.001–36.457.

62. RUHL, *supra* note 9, at 263; Edwards Aquifer Auth. v. Day, 369 S.W.3d 814, 843 (Tex. 2012).

63. RUHL, *supra* note 9, at 953–54 (discussing the federal-state relationship); *see also* RUHL, *supra* note 9, at 25 ("Locals are closer to the problems, often understand them better, and have to live with the consequences of the environmental policy. At the same time, if the problem is one of transboundary pollution, the locals don't live with the consequences of their pollution. Those downstream do.").

64. RUHL, *supra* note 9, at 953–54 (discussing the federal-state relationship).

Constitution, its grants of power, and how they have influenced groundwater policy generally.

1. Interstate Dispute Resolution Methods

There are a couple different ways in which the federal government plays a role in shaping a state's groundwater policy in the context of interstate dispute resolution. First, the interstate compact involves two states coming together to reach an agreement on certain policy issues while sharing interstate waters.[65] These compacts are a good examples of proactive measures aimed at solving interstate ownership disputes over transboundary waters before they arise and require judicial review.[66] Due to the constitutional requirement that Congress sign off on these compacts alongside the participating state legislatures, the compacts operate similarly to federal law after being enacted.[67]

The second way the federal government gets involved is through the Supreme Court's original jurisdiction in controversies between states.[68] In the case of a dispute between states over transboundary water sources, the Supreme Court will apply the equitable apportionment doctrine to fairly and equitably allocate the resource and responsibilities between the states.[69] The equity aspect of this doctrine allows the Court to fashion a flexible remedy that respects the states as sovereigns and finds a balance between each state's competing interests, costs, benefits, and risks.[70] However, this comes with the expense of costly litigation and is highly fact-dependent, requiring technical

65. *Interstate Water Resource Management Agreements and Organizations*, INTERSTATE COUNCIL ON WATER POL'Y 1, 3 (Dec. 2020), https://icwp.org/wp-content/uploads/2020/12/Primer_ICWP-Interstate-Water-Agreements_FINAL_12_18_2020.pdf.

66. *See* Noah D. Hall & Joseph Regalia, *Interstate Groundwater Law Revisited:* Mississippi v. Tennessee, 34 VA. ENVTL. L.J. 152, 193 (2016).

67. *See* U.S. CONST. art. I, § 10 cl. 3 ("No state shall, without Consent of Congress, . . . enter into any Agreement or Compact with another state. . . .").

68. *See* U.S. CONST. art. III, § 2.

69. Mississippi v. Tennessee, 142 S.Ct. 31, 37 (2021) (applying the equitable apportionment doctrine to a dispute between Mississippi and Tennessee over waters in the Middle Claiborne Aquifer). The Middle Claiborne Aquifer is also commonly referred to as the Memphis-Sparta or Sparta-Memphis Aquifer. This Note will refer to the aquifer only as the Middle Claiborne Aquifer.

70. Hall & Regalia, *supra* note 66, at 195–96.

assessments of the situation to be evaluated and resulting in difficulty in determining appropriate standards and rights between the parties.[71]

2. Groundwater as an Article of Commerce

Beyond the power to facilitate groundwater use in interstate groundwater disputes, it is also important to understand that Congress retains all of its original authority conferred upon it by the Constitution. One of the most readily identifiable powers of Congress is the power to regulate interstate commerce among the several states.[72] Due to the operation of the Necessary and Proper Clause, the Court in *United States v. Lopez* construed the Commerce Clause to give Congress broad regulatory powers over three main aspects of interstate commerce.[73] The first of these is channels of interstate commerce, which essentially includes roads, waterways, and airspace.[74] The second aspect of commerce that Congress can regulate is the instrumentalities of interstate commerce, which includes persons and things in interstate commerce.[75] The last part of the commerce powers, the catch-all, is "the power to regulate those activities [which have] a substantial relation to interstate commerce, i.e., those activities that substantially affect interstate commerce."[76]

It is also worth noting the Supreme Court decision that links the commerce power to groundwater as an article of commerce. *Sporhase v. Nebraska* arose as a Dormant Commerce Clause case, as Nebraska had a law forbidding the withdrawal of groundwater intended for use in another state.[77] This decision led the Court to recognize that groundwater is an article of interstate commerce, and even gave credence to the idea that Congress should have the ability to combat groundwater

71. *Id.*

72. U.S. CONST. art. III, § 8.

73. United States v. Lopez, 514 U.S. 549, 558–59 (1995).

74. *Id.* at 558.

75. *Id.*

76. *Id.* at 558–59.

77. Sporhase v. Nebraska, 458 U.S. 941, 943 (1982). The Dormant Commerce Clause aspect of this case does not necessarily loom large for this Note, but rather is a vehicle for getting us to recognize that groundwater is inherently related to interstate commerce.

overdraft on a national scale.[78] The Court found a nexus between groundwater and commerce by reasoning that 80% of water resources were used for farm irrigation, and that those farms contribute to a market that is worldwide.[79] According to the Court, this is the exact type of situation that the Framers intended to trigger the Commerce Clause.[80] The Court also reasoned that groundwater had to be considered an article of commerce; otherwise, groundwater would be protected from scrutiny under a burden-on-commerce analysis and deny Congress affirmative regulatory powers over the subject matter.[81]

3. Congressional Spending Powers

The Constitution also gives Congress authority to exercise its spending powers.[82] This gives Congress the "Power To lay and collect Taxes . . . [and to] provide for the common Defence and general Welfare."[83] The best way to understand how the spending power can be used as a policy tool is to look at it as a method of encouragement through financial incentives rather than policy setting itself.[84] While Congress does have broad enough power to incentivize policies it would have no authority to implement directly, the Supreme Court has interpreted the Constitution to limit even this power.[85] The conditions include a requirement that the encouraged policy promote the general welfare, an unambiguous condition, the requirement of a reasonable nexus between the federal funds being conditioned and the policy's purpose, and the last limitation is that the encouragement cannot become coercion.[86]

78. *Id.* at 953–54. ("If Congress chooses to legislate in this area under its commerce power, its regulation need not be more limited in Nebraska than in Texas and States with similar property laws. Ground water overdraft is a national problem and Congress has the power to deal with it on that scale.").

79. *Id.* at 953.

80. *Id.*

81. *Id.*

82. U.S. CONST. art. 1, § 8, cl. 1.

83. *Id.*

84. Garrett L. Hartley, *No Sanctuary: An Analysis of the Trump Administration's War on Sanctuary Jurisdictions*, 49 CUMB. L. REV. 355, 373 (2019) (citing Cnty. of Santa Clara v. Trump, 275 F. Supp. 3d 1196, 1213–14 (N.D. Cal. 2017)).

85. *Id.*

86. *Id.* at 1216.

To illustrate how the spending power works, it will be beneficial to briefly overview the two cases that set the goalposts for what Congress does and does not have authority to do with this power. In *South Dakota v. Dole*, the Supreme Court considered a case in which Congress predicated a mere five percent of federal highway funds on complying with a twenty-one years of age minimum drinking age law.[87] After finding that the law satisfied the four limits for conditioning federal funds, the Court found that the conditioning of a mere five percent of federal highway funds—less than half of one percent of the state's overall budget—for a policy aimed at preventing driving under the influence was a mild enough encouragement to be upheld.[88] The Court reasoned that such a "mild encouragement" allowed the states to maintain authority over their own drinking age laws, not only in theory, but in fact.[89]

Another landmark Supreme Court case, *National Federation of Independent Business v. Sibelius*, illustrated an important limit on the spending powers as it shows when encouragement can go too far and become coercion.[90] In this case, the Affordable Care Act's Medicaid expansion provision conditioned all federal Medicaid funds on the state's participation in the Affordable Care Act.[91] Here, the threatened cut in funding constituted ten percent of the average state's overall budget, and this was enough for the Supreme Court to liken it to "a gun to the head" in terms of pressures turning into coercion.[92] The Court reasoned that the threatened loss of ten percent of the state's overall budget was an "economic dragooning that [left] the States with no real option but to acquiesce in the Medicaid expansion."[93] These cases

87. South Dakota v. Dole, 483 U.S. 203, 205 (1987).

88. *Id.* at 211. The four criteria analyzed by the Court included: (1) the purpose to serve the general welfare; (2) a clear statement of the condition; (3) the relationship between the condition and spending purpose; (4) no inducement to states to violate any independently protected constitutional rights. *Id.* at 205.

89. *Id.* at 205.

90. Nat'l Fed'n of Indep. Bus. v. Sibelius, 567 U.S. 519 (2012). Although the Court held that the penalty violated the Spending Clause and the Necessary and Proper Clause, the Court ultimately upheld it under Congress's Taxing Clause Powers. *Id.* at 572. However, this Note is specifically focused on the Spending Clause analysis.

91. *Id.* at 576.

92. *Id.* at 581–82.

93. *Id.* at 582.

leave us with an understanding of where the goalposts lie in terms of how much encouragement is allowed for federal policy making even when it encroaches into realms normally left to the state.

A Fourth Circuit case regarding sanctions on Virginia under the Clean Air Act provides an example of the use of the spending powers to encourage environmental policy.[94] In *Virginia v. Browner*, the Fourth Circuit upheld the Clean Air Act's highway sanctions provision withholding federal highway funds for failing to meet air quality standards because it satisfied the requirements for the conditions and did not go too far as to be considered coercion.[95] The court reasoned that Congress has the ability to allocate its funding in ways that prevent exacerbating the problem of air pollution, which the Clean Air Act itself was designed to deal with.[96] This same rationale could be naturally extended to other legislative acts aimed at incentivizing environmentally conscious policies. After all, the states are best equipped to manage local resources, despite the potential for these effects to turn into a national problem.

III. ANALYSIS

There are recurring themes that complicate the task of environmental policy making that are also significant barriers to groundwater management.[97] The problems include jurisdictional spillovers, scientific uncertainty, market failures, conflicting fiscal valuations, and competing interests.[98] Effective groundwater management requires an adjustment of the current legal framework so that cooperation, accurate data collection, and effective enforcement are incentivized.[99] The

94. Denis Binder, *The Spending Clause as a Positive Source of Environmental Protection: A Primer*, 4 CHAP. L. REV. 147, 158–59; *see also* Virginia v. Browner, 80 F.3d 869, 881 (4th Cir. 1996) (finding the Clean Air Act was constitutional despite sanctions that could potentially burden states because the sanction amounted to inducement and not coercion).

95. *Browner*, 80 F.3d at 881–82.

96. *Id.* at 882–83.

97. *See* RUHL, *supra* note 9, at 20–27 (discussing recurring themes that present practical challenges to resolving conflicts of environmental law and policymaking).

98. *Id.*

99. INT'L UNION FOR CONSERVATION OF NATURE AND NAT. RES., SPRING: MANAGING GROUNDWATER SUSTAINABILITY 20 (Mark Smith et al. eds., 2016) (ebook).

potential consequences posed by climate change, as well as the immense dependency on groundwater as a resource, make the need for an incentivized cooperative effort imperative.

A. Coordination Problems

Natural resources and ecological boundaries exist without reference to the artificial political borders we have developed throughout history. Due to the nature of water law in America, and the authority over groundwater historically belonging to states, states have evolved their own methods of management, if they have begun managing groundwater usage at all.[100] As a result, states that share common resources are left with systems that are quite different from each other, limiting their ability to effectively manage the shared interstate resource.[101] The challenges caused by these mismatched political systems result in higher transaction costs that hinder chances at collective action, difficulties in reaching equitable results among the competing interests, and issues with enforcement in the sense of allocating costs and benefits of environmental protection.[102]

For example, Virginia's Department of Environmental Quality has reported trouble coordinating with its North Carolina counterpart in the management of the Potomac aquifer due to Virginia's use of computer models in projecting the impact of new well permits, while North Carolina imposes no permitting requirements.[103] As a result of this poor management, a study conducted by the United States Geological Survey showed that over the last one hundred years there has been a more than two hundred foot decline in the water level in Southeastern

100. Brett Walton, *Mississippi's Claim that Tennessee Is Stealing Groundwater Is a Supreme Court First*, CIRCLE BLUE (Oct. 3, 2016) https://www.circleofblue.org/2016/groundwater/states-lag-management-interstate-groundwater.

101. *Id.*

102. RUHL, *supra* note 9, at 24–25 (discussing the problems associated with mismatched scales and jurisdictional spillovers of environmental problems).

103. Walton, *supra* note 100.

Virginia.[104] If the overdraft causing this decline continues, it may lead to water availability problems for individuals and local communities.[105]

These problems would manifest in several forms, each associated with its own costs. The most obvious manifestation is in the form of declining water levels, which would ultimately require deeper wells or finding alternative sources of water, and each would come with their own respective fiscal costs.[106] Another problem associated with declining water levels is decreased storage capacity in the aquifer because the lack of water leads to the settling of the porous spaces in the soil.[107] This permanent loss of storage would also increase future costs on Virginians, as it would require finding other water sources to offset this reduction in groundwater storage.[108]

Beyond coordination problems, there are also problems with successfully establishing management plans because states have piecemeal systems, or worse, no system at all.[109] For example, the Middle Claiborne Aquifer, the center of the dispute between Mississippi and Tennessee, stretches approximately 70,000 square miles ranging through 8 different states, but there is no interstate compact or cooperative management plan for this aquifer among those eight states.[110] On the other hand, Wyoming's 2007 management plan merely notes the fact that groundwater flows out of their state without any reference to data collection on how much water is moving beneath the state.[111] The problem with these inadequate management plans is that they simply fall short of the goal of sustainable management.

The Environmental Defense Fund and the Daugherty Water for Food Global Institute at the University of Nebraska put together a

104. Kurt Stephenson, *An Investigation of the Economic Impacts of Coastal Plain Aquifer Depletion and Actions that May Be Needed to Maintain Long-Term Availability and Productivity*, DEP'T OF AGRIC. & APPLIED ECON. 1, 4 (Aug. 2014), https://vtechworks.lib.vt.edu/bitstream/handle/10919/81551/VA_DEQ_GW_Impact_Final.pdf.

105. *Id.* at 5.

106. *Id.*

107. *Id.*

108. *Id.*

109. *Id.*

110. Christine A. Klein, *Owning Groundwater: The Example of* Mississippi v. Tennessee, 35 VA. ENVTL. L.J. 474, 520 (2017).

111. Walton, *supra* note 100.

report based on nine case studies of groundwater management schemes in six different states.[112] The purpose of this report was to help California water managers understand different approaches that have been successful in other management plans so that they could implement their own schemes for sustainable management.[113] The findings of these case studies evidence that there are five recurring themes that indicate successful implementations of sustainable management: trust building with the regulated community; accurate data collection to inform management decisions; full portfolio of management approaches; assurance of program performance; and sufficient funding.[114] The management styles of North Carolina, Virginia, Tennessee, Mississippi, and Wyoming plainly fail to incorporate some or all of these themes, thus decreasing the chances of implementing a successful, sustainable water management system.[115] This is evidenced by North Carolina's and Virginia's failure to coordinate their management of the Potomac aquifer, thus preventing accurate data collection.[116] Similarly, the lack of coordination surrounding the Middle Claiborne Aquifer and Wyoming's 2007 management plan fails to implement accurate data

112. *See* CHRISTINA BABBITT ET AL., *The Future of Groundwater in California*, ENV'T DEF. FUND (Jan. 22, 2018), https://www.edf.org/ecosystems/future-groundwater-california.

113. *Id.* at 5.

114. *Id.* at 15. Trust building in this context requires community acceptance of a fair system that allows sustainable use that will support the community over the long term through transparency and communal cooperation. *Id.* at 16. The accurate data part ties into both the transparency aspect of the plan and effective decision making by tracking the various water uses and water level monitoring. *Id.* The portfolio theme recognizes that management plans are not necessarily one-size-fits-all in terms of effective management. Using arrangements of permitting frameworks, tracking systems, educational resources, revenue sourcing, quantified allocation of rights, among other policy tools, allows management agencies to create flexible plans that increase chances of success. *Id.* at 17. Assurance of performance in this context means developing good monitoring and enforcement protocols; however, this also comes with the tension created between the management agency and the regulated water users. *Id.* This tension ties back into the need for transparency, trust, and communal support. *Id.* Lastly, the case study demonstrated that these management plans are often costly. The need for infrastructure for monitoring, recharge facilities, or shifting from groundwater to surface water use, comes with significant financial investments if it is to be successful. *Id.* at 18.

115. *See* Walton, *supra* note 100 and accompanying text.

116. *Id.*

collection measures, various management approaches, or assurances of program performances.

One of the continuing problems among all these challenges and pitfalls in effective management is the fact that these aquifers exist independently from state borders.[117] This simple fact is part of the reason that states without cooperative management measures end up bringing their counterparts to the court system. We can see an example of this in the recent dispute between Mississippi and Tennessee that ended up in front of the United States Supreme Court.[118] As the City of Memphis pumped water for its residents just miles from the border, cones of depression naturally formed, pulling water from within Mississippi into the borders of Tennessee.[119] Mississippi saw this as an opportunity to lay claims of sovereign ownership over transitory waters that happened to be stored under Mississippi.[120] Not only is this a novel claim in the sphere of state sovereign ownership over waters, but it also is counter-intuitive to the natural behaviors of groundwater. The Court ultimately held that interstate groundwater is subject to the doctrine of equitable apportionment; however since Mississippi expressly disclaimed the doctrine, the case was dismissed.[121] With widespread examples of states failing to coordinate, the problem closely resembles California's mismanagement prior to the SGMA, but on a national scale.[122] Similarly, this situation could also benefit from a push to organize and coordinate efforts to strive toward effective groundwater management.

B What Is at Stake?

To illustrate the importance of groundwater as a national resource, we have to look at just how much society relies on it for domestic and agricultural uses. While 99% of the Earth's water supply is

117. RUHL, *supra* note 9, at 24–25; Leanna First-Arai, *In a Cross-State Aquifer Spat, a View of a Water-Stressed Future*, GRIST (Sept. 20, 2020), https://grist.org/climate/in-a-cross-state-aquifer-spat-a-view-of-a-water-stressed-future.

118. Mississippi v. Tennessee, 142 S. Ct. 31 (2021).

119. *See generally Mississippi v. Tennessee*, BALLOTPEDIA, https://ballotpedia.org/Mississippi_v._Tennessee (last visited Jan. 6, 2022) (providing a general overview of the case).

120. *Mississippi*, 142 S. Ct. at 40–41.

121. *Id.* at 41.

122. *See supra* text accompanying notes 103, 110.

concentrated in unusable forms (e.g., the oceans and ice caps), nearly the entire remaining 1% is found underneath the surface of the Earth.[123] Despite making up such a tiny percentage of the world's water supply, over half of the United States population—including nearly everyone who lives in rural areas—relies on groundwater sources for drinking water and other domestic uses.[124] Beyond the massive dependence on groundwater for residential uses, it also plays a huge part in food security and agriculture as over fifty billion gallons of groundwater per day go to agricultural uses according to the United States Geological Survey.[125] This kind of heavy dependency increases the costs associated with depletion as the effects of a dwindled water supply grow from being a localized hardship to a broader impact on crop production and global food security as crop yields decrease and land becomes less productive.[126]

Of course, this dependency does not exist in a vacuum, and there are ways that people can alter their consumption habits to be more sustainable in the long run, but one of the main concerns at this point continues to be climate change.[127] While the exact effect of climate change on groundwater systems remains to be seen, some of the data purports to show an intensification of the water cycle causing wet areas to get wetter and dry areas to get drier.[128] This will loom large on

123. *Economic Uses of Groundwater*, ENCYCLOPEDIA, https://www.encyclopedia.com/environment/encyclopedias-almanacs-transcripts-and-maps/economic-uses-groundwater (last visited Jan. 6, 2022).

124. THE GROUNDWATER FOUND., *supra* note 14.

125. *Groundwater Decline*, *supra* note 28.

126. Bridget R. Scanlon et. al., *Groundwater Depletion and Sustainability of Irrigation in the US High Plains and Central Valley*, PNAS (May 29, 2012), https://www.pnas.org/content/109/24/9320; CONSULTATIVE GRP. ON INT'L AGRIC. RSCH., BUILDING RESILIENCE THROUGH SUSTAINABLE GROUNDWATER USE 4 (Marianne Gadeberg ed., 2017), http://www.iwmi.cgiar.org/Publications/wle/towards-sustainable-intensification-briefs/wle_towards_sustainable_intensification-insights_and_solutions-brief_no-1.pdf.

127. *See Groundwater & Climate Change*, INT'L GROUNDWATER RES. ASSESSMENT CTR., https://www.un-igrac.org/areas-expertise/groundwater-climate-change (last visited Jan. 6, 2022) (detailing how sustainable groundwater management can positively impact climate change).

128. Nina Roth et al., *A Call for Consistency with the Terms 'Wetter' and 'Drier' in Climate Change Studies*, ENV'T EVIDENCE (2021), https://environmentalevidencejournal.biomedcentral.com/track/pdf/10.1186/s13750-021-00224-0.pdf.

groundwater dependency as it is increasingly correlated with longer periods of droughts and flooding, which naturally has a domino effect resulting in higher risk of groundwater overdraft.[129]

Generally, the natural consequences of overdraft consist of depletion of the aquifer, contamination of the groundwater,[130] increased costs and energy consumption for pumping, as well as the lack of access to water for domestic and agricultural purposes.[131] Some of the less-direct consequences also include land subsidence, damage to ancillary ecosystems, and general economic costs to society as a whole from resorting to more costly options for access to water.[132]

The exact costs of these consequences are hard to quantify as much of the direct costs are born by groundwater pumpers who have to install wells that reach deeper under the surface to the water table.[133] Further, this quantification gets even more complex when accounting for indirect costs such as reduced surface flows, degraded water quality, increased food prices from the effect on the agricultural industries, and remediation of the direct consequences.[134] However, another theme that seems to plague environmental lawmaking is the fact that decisions often have to be made in the face of scientific uncertainty.[135] In that sense, the devil is in the details and the decision between taking the risk of waiting for certainty and having more information to form a solution, or using the best information available to act today to avoid

129. Water Sci. Sch., *Drought and Groundwater Levels*, USGS (June 6, 2018), https://www.usgs.gov/special-topics/water-science-school/science/drought-and-groundwater-levels#overview.

130. *See* Moran et al., *supra* note 27. Overdraft can contribute to the degradation of water quality due to the increased concentration of both natural and unnatural pollutants that exist in the remaining water supply. Further, for aquifers closer to the coastal regions of the United States, depleting groundwater sources can begin drawing in seawater causing groundwater salinization.

131. *Groundwater Decline*, supra note 28. Land subsidence occurs when the physical features of the land begin compacting due to the porous layers of the Earth no longer being filled by the groundwater itself. *Id.* This also brings about the problem of infrastructure damage, and is mostly inelastic in that the original surface of the land cannot be restored even if the water table is restored. *Id.*

132. *Id.*

133. *Id.*

134. *Id.*

135. RUHL, *supra* note 9, at 18–19 (discussing scientific uncertainty in the field of environmental law generally).

future harms becomes one of risk assessment.[136] With this theme in mind, as well as the enormous stakes involved in dealing with a resource as vital to human life as water availability, the federal government needs to choose to act today to mitigate potentially larger future harms.[137]

C. What Are We Left with?

With all this information in mind, and with the California blueprint in hand, there is an opportunity for the federal government to step up and follow in California's footsteps. California, one of the nation's largest groundwater users,[138] was able to strike an appropriate balance of authority and oversight, all while incentivizing sustainability and well-planned management schemes. On top of incentivizing behavior that rewards the public interest in the long term by protecting water access and food security, the California approach was also able to leave a considerable amount of discretionary power to the localized interests most directly affected by the legislation and maintain an oversight position to fill in where those interests fall short.[139]

This creates the situation of pondering what exactly the federal government can do to mount a concerted effort to bring about meaningful change in the management of groundwater resources. As discussed earlier, the federal government lacks the considerable amount of authority possessed by the states in the system of allocating property

136. *Id.*

137. *Id.* In this casebook, Ruhl provides a strong nautical metaphor for policy-making in the face of scientific uncertainty. While one might be able to foresee the advantages of waiting for more information to develop in order to make the fully educated decision, things are not always so simple. As Ruhl frames the issue, sometimes what we don't fully know now can develop into larger problems if left unmitigated over time. He likens the choice to act today to avoid those future harms to bailing water out of a sinking ship as opposed to studying its rate of descent to determine how long remedial measures are available. While this may paint a grim picture, the timeframe to implement those remedial measures is limited and can be altered by the decisions made during the present.

138. Water Sci. Sch., *Groundwater Use in the United States*, U.S. GEOLOGICAL SURV. (June 18, 2018), https://www.usgs.gov/special-topics/water-science-school/science/groundwater-use-united-states#overview.

139. Owen, *supra* note 50, at 184 (citing A.B. 1739, 2014 Assemb., 2014-15 Sess. §§ 6, 9 (Cal. 2014)).

rights in groundwater resources. Even if it had the same power as the states, it would come with the great costs of overriding the fractured and complex system of the allocation of rights across the country. Further, the public trust doctrine is also a creature of state sovereignty, and even a broad expansion of that to the federal level would likely come at the cost of private stakeholders because it would override the rights that states were lawfully conveyed and rightfully held. Any direct regulation under the Commerce Clause authority would likely come at the cost of those same rights as well as the very necessary aspect of flexibility that comes with the coordinated top-down federalism approach California has taken. This indicates that the most viable solution lies in Congress's spending powers.

To illustrate how groundwater management can be encouraged by congressional spending power, the analysis begins with noting that Congress has broad powers to use financial incentives to encourage policies that it may not have exclusive jurisdiction over.[140] This financial incentive must also fit within the four limitations on financial encouragement laid out in *Dole*.[141] Because the promotion of the general welfare is a broad grant of power in terms of congressional spending, sustainable management of groundwater fits well within that description.[142] If drafted carefully, it can surpass the explicit conditioning requirement by avoiding ambiguous language. Lastly, by conditioning receipt of federal funding on states taking the appropriate measures to begin creating groundwater management implementation plans, similar to the Clean Air Act,[143] it would have the required nexus between funding and the federal program's purpose of groundwater management to survive a constitutional challenge.

IV. SOLUTION—A TOP-DOWN COORDINATED FEDERALISM EFFORT

The most plausible solution for a federal effort to encourage groundwater sustainability is for Congress to use its spending power to enact legislation aimed at mimicking the California effort to incentivize

140. Hartley, *supra* note 84.

141. South Dakota v. Dole, 483 U.S. 203, 205 (1987).

142. *See* United States v. Butler, 297 U.S. 1, 65–67 (1936) (discussing the interpretation of general welfare).

143. *See* 42 U.S.C. § 7511a (providing the provisions for the creation and submission of state implementation plans).

the formation of coordinated subunit government agencies that can effectively manage regional and local aquifer operations. Just as California's SGMA empowers local governments to control management of the aquifers they use; this legislation should encourage states to follow suit by setting up the framework for creating local agencies that are capable of managing local water sources both intrastate and interstate. The states would then report those plans to the Environmental Protection Agency, which would play an oversight role to ensure that the programs are performing successfully. In a sense, Congress would be following suit with the Clean Air Act,[144] but with the necessary tweaks aimed at groundwater management rather than air pollution. With this legislation being a logical extension in terms of prior federal environmental protection statutes, and a sand-box sized blueprint in California's SGMA, this kind of legislative solution is the federal government's best option to secure the nation's water supply for generations to come. While the California model has fewer variables and moving parts to deal with by nature of the relationship of state and local government, the federal government has the resources and tools necessary to carefully craft legislation that empowers states to facilitate local, regional, and even interstate groundwater management systems.

A. Legislative Intent

In following in California's footsteps, Congress should start off by codifying legislative intentions in drafting this law. Using the SGMA as a blueprint,[145] the law would say, "The Legislature finds and declares that groundwater is a valuable natural resource and should be managed to ensure its quantity is sufficient to sustain future generations. It is the intent of Congress to encourage and incentivize the

144. *Id.* Here, I am using the Clean Air Act as an illustration of past similar congressional action that requires states to begin developing environmentally conscious plans aimed at achieving a national goal. While the Clean Air Act is effective in its own right, the framework doesn't quite add up the way the California Sustainable Groundwater Management Act does. The enforcement systems involved in the Clean Air Act would be too extensive a measure to pull off in the national groundwater management problem. As mentioned earlier in this note, groundwater management is most effective at the local level where they are most knowledgeable about the specific region and feel the pressures of accountability. *See supra* note 63 and accompanying text.

145. *See* CAL. WATER CODE § 10750.

several states to begin the process of creating systems of cooperative groundwater management at the local, regional, and interstate level. Just as water is a precious resource necessary to life itself, the ability to safely produce, store, and manage groundwater resources is an affirmative obligation of the state." This provision would give any judges who would have to interpret the statutory scheme a blueprint to help ascertain and effectuate the intent of the legislature.

B. Funding Structure

Similar to sections of the Clean Water Act that incentivize state programs aimed at eliminating water pollution through the use of grants and federal funding,[146] similar funding structures could be used to incentivize the creation of state programs that delegate authority to local and regional groundwater management agencies.[147] Of course, to survive any attack on Congress's authority to pass such legislation, it would have to conform to the rules set out in *Dole*.[148] Thus, the legislation would have to have clear and unambiguous conditions for the funding; be related to the public welfare; have a reasonable nexus between the public good and the funding at issue; and finally be such a gentle incentive in the right direction that it would not amount to coercion.[149] In regards to coercion in this situation, Chief Justice Roberts, joined by all other justices of the court, likened the federal-state

146. 33 U.S.C. § 1256(e).

147. Crudely mimicking and combining § 1256 and the Sustainable Groundwater Management Act, the groundwater legislation could allocate a certain amount of federal funding "for grants to States and to interstate agencies to assist in developing programs for the concerted localized programs to begin protecting, managing, and storing of groundwater resources." 33 U.S.C. § 1256(a). It would also have to include certain allotment procedures, limitations, reporting, and various other instruments of accountability and transparency, but these details are beyond the scope of this Note.

148. South Dakota v. Dole, 483 U.S. 203, 205–07 (1987).

149. *Id.* This is liklely not an issue in terms of spending power authority. The security of water is undoubtedly in the interest of the general welfare. The funds would be inextricably intertwined with the federal purpose. The conditions may be vague, but the purpose would be to allow states considerable leeway in managing their resources in their best interest without undue federal red tape. Finally, the incentives would not be overly coercive as they are not being forced to participate, or threatened to in anyway.

relationship to that of a contractual relationship.[150] In that sense, the legitimacy of the legislation would rest on whether the state voluntarily accepts the terms of the contract.[151]

Congress has a central role in determining the scope and nature of federal grant programs.[152] For the goals of this legislation, a block grant would likely be the best fit for the established purpose of the legislation. The use of a block grant would ensure a proper balance between the federal government and state recipients as the federal administrator would have a low degree of discretion over who receives grants due to the operation of specified formulas for fund allocation, the recipient's moderate degree of discretion concerning the implementation of aided activities, and the moderate degree of conditions placed on the grant.[153] To receive this grant, the state would have a set timeframe to submit plans that show they are developing the framework for the cooperative agencies that can manage its groundwater resources.[154] This legislation would undoubtedly serve to benefit the public welfare as it relates to water availability and food security for the general public. This grant would have a reasonable nexus between the public good served—groundwater management—and the funding used to develop their own management plans. Further, the grant could offer to pay up to seventy percent of the cost of implementation of the management agencies and necessary infrastructure, offering a strong incentive to participate in the program while minimizing the risk of coercion.

C. Miscellaneous Sections

The definition section of the act would also pose some challenges because it has to be broad enough to ensure that states are still able to choose how to best implement their sustainability management

150. Nat'l Fed'n of Indep. Bus. v. Sibelius, 567 U.S. 519, 676–77 (2012).

151. *Id.*

152. *Federal Grants to State and Local Governments: A Historical Perspective on Contemporary Issues*, CONG. RSCH. SERV., 1–2 (May 22, 2019), https://sgp.fas.org/crs/misc/R40638.pdf.

153. *Id.* at 2.

154. The sufficiency of the plan would be determined by standards set by EPA, and the EPA would have significant discretion in articulating those standards. However, these standards would have to be sufficiently clear and unambiguous to survive the condition aspect of *Dole*.

plans according to the local demands and avoid encroaching on state sovereignty interests. Conversely, it must be narrow enough to ensure that those efforts are in fact aimed at delegating and coordinating with local, regional, and interstate management programs to have a broad enough reach to make an impact across the board. Of course, management plans are not one-size-fits-all because of the various ecosystems in which groundwater resources exist, but coordination is key to the most effective forms of groundwater management.[155]

Other considerations for the definition section would have to include a careful concern of the various types of agencies that could be formed. Due to the various legal systems of the several states, there may be vastly different organizational structures concerning the delegation of authority, enforcement, and oversight protocols, and even interstate cooperative efforts. In a very broad sense, the act is going to have to take on the task of mirroring the California legislature by allowing local and intergovernmental agencies to form their organizational and jurisdictional structures, but on a nationwide scale concerning vastly different states vis-à-vis their local governments.

There are various other ways in which this law could copy other environmental statutes that delegate implementation to the more localized branch, and even more considerations that will have to be weighed carefully, enough so that it too could be the subject of a whole separate string of articles. Nonetheless, these are the few that will be the most important in creating a holistic system of sustainable groundwater management from the top down. In practice, it would hope to encourage states to begin developing networks aimed at groundwater sustainability implemented locally in a way that supports local struggles in management. A real-world example of where this would be most beneficial is the Southeastern United States above the Gulf of Mexico. As mentioned earlier, the Middle Claiborne Aquifer extends some 70,000 square miles and crosses into eight separate jurisdictions, yet there is no concerted effort among those states to manage and regulate their

155. Coordination is important because the simple act of pumping groundwater at a pace faster than the recharge rate is not unsustainable when appropriately managed in conjunction with other pumping efforts, as burdens on an aquifer can be lightened by sharing it with other aquifers. *Groundwater Recharge*, GROUNDWATER EXCH., https://groundwaterexchange.org/groundwater-recharge (last visited Jan. 2, 2022).

use.[156] This legislation would encourage those states to develop their own subagencies, and local subunits, aimed at managing their use in a cooperative effort with neighboring jurisdictions, all in an effort to achieve sustainability. With eight different legal systems that must work together toward a common goal, flexibility will be key. While the task is tough, and the bill is large, it is a necessary step to ensure that our resources are available for use for future generations.

D. Potential Pitfalls

When taking on a task as ambitious as the California SGMA, but on a scale fifty times the magnitude, there will likely be some major hurdles. One such hurdle involves the struggle of coordination between the localities of the several states. Naturally, groundwater exists in a space unaffected by political boundaries, and actors on each side of those artificial lines have their own political pressures, legal interests, and even rules and regulations to follow. It may not be an easy task, but it is a surmountable one. And when the objective is something as essential as one of the three main necessities that support life, success is crucial to our survival.[157]

One important step that the act must take is to avoid infringement on state sovereignty in the property right allocation. To make this possible, context for the act would be to follow the steps of the California legislation in Cal. Water Code § 10720.5.[158] In this section, the California legislature was careful to include a limitation by including an explicit statement that the SGMA did not intend to disrupt the current groundwater right allocation regime. There is already natural tension between private use of groundwater that the overuse groundwater management schemes are committed to preventing. The overuse is of

156. Christine A. Klein, *Owning Groundwater: The Example of* Mississippi v. Tennessee, 35 VA. ENVTL. L.J. 474, 520 (2017).

157. Erik Porse, *The Hard Work of Sustainable Groundwater Management*, CAL. WATER BLOG (Aug. 13, 2015), https://californiawaterblog.com/2015/08/13/the-hard-work-of-sustainable-groundwater-management. This article contains a story of a California water official who was so motivated to come to an agreement, he employed the old fashioned "stay there until we reach agreement" approach. It took four exhausting days of negotiations, but it ended in a regional strategy for long-term management of county-wide resources. *Id.*

158. CAL. WATER CODE § 10720.5.

course contributed to by private property right holders, as is the nature of the tragedy of the commons. With that in mind, the federal legislation would have to include a section that makes clear the intent not to disrupt or preempt a state's right to allocate groundwater use rights in conjunction with their police powers.

As mentioned previously in this article, private groundwater rights are creatures of state law and were developed in a time when there was great uncertainty regarding the nature of groundwater and its interconnectedness with the water cycle.[159] Due to the context in which these common law regimes developed, and the various legal systems in which they developed, there are wildly different systems for how property rights are determined. There is also the natural tension between those property rights and the idea of sustainable pumping because it is economically reasonable for an individual to pump as much as they can from the shared resource. Because the management plan would seek to combat the individual's incentive to maximize the use of their property rights to the shared resource, these groundwater management programs pose a risk of being challenged as a regulatory taking. This would result in the program being too costly to implement because of the constitutional requirement of just compensation.[160] These are formidable considerations, and if not accounted for properly, could create problems almost as significant as the scarcity of the commons crisis. Nonetheless, if the states are afforded the flexibility necessary to create their own systems, and carefully plan around those existing rights, Congress can find ways to enforce sustainable policies that do not infringe on individual landowners' private property rights.

E. Cost-Benefit Analysis

Environmental regulations can be tricky creatures when it comes to tracking the costs and benefits from said regulations. Yet here we are, fifty years after the passing of the Clean Air Act, a monumental step in environmental regulation schemes aimed at protecting yet another necessity of life, and we are celebrating dramatically improved

159. Leshy, *supra* note 29, at 1480.

160. RUHL, *supra* note 9. An example of this led to a jury award of $2.5 million dollars at the cost of the Edwards Water Authority in Texas.

air quality with positive benefits conferred on public health.[161] There certainly are some tradeoffs that must be accepted when sacrificing freedom and costs for the public interest in environmental management. One of these includes the costs of regulation for a benefit that likely will never be fully quantified in our lifetime, but that is true of environmental regulations generally. This note dealt earlier with the struggles that accompany tracking the costs on society when it comes to the consequences of groundwater overdraft and poor resource management.[162] We know that these consequences include land subsidence (and infrastructure damages resulting therefrom), increased energy consumption and costs from deeper drilling, damage to dependent ecosystems and waterways, the cost of having diminished access to water (which also includes increased agricultural costs), diminished water quality, and more.[163] Nonetheless, it is clear that calling these results undesirable is an understatement. They pose a real danger if not properly addressed.

On the other side of the coin, the cost of implementing this management system certainly would not be inexpensive. The Clean Water Act, for example, required a minimum of $75 million per fiscal year in the late eighties into the nineties, solely for the grant system that incentivized states to participate.[164] Additionally, there are the transaction costs associated with state negotiations, agency development, planning, research, monitoring, data sharing, and the list could go on. For this system to make sense economically, the benefits of avoiding the undesirable results of poor groundwater management and aquifer depletion must outweigh the costs associated with preventing those outcomes. Eventually, however, it comes to a point where the question is not going to be whether the benefits outweigh the costs, because they will absolutely have to. When examining the extent to which our country relies on groundwater for domestic and agricultural uses, it is clear that mismanagement, combined with the uncertain consequences of climate change, is a recipe for disaster. Groundwater is not a resource that would simply make life inconvenient to be without. Mismanagement

161. Paul Billings & Dan Fiorino, *Celebrating 50 Years of the Clean Air Act: Looking Back and Moving Forward to Provide Clean Air for All*, AMERICAN LUNG ASS'N (Oct. 24, 2020), https://www.lung.org/blog/50-years-clean-air-act-symposium.

162. *Groundwater Decline*, *supra* note 28.

163. *Id.*

164. 33 U.S.C. § 1256(a)(2).

would bring about serious social and economic repercussions, and the necessity of water to all types of life makes the choice clear. Without careful consideration of such a crucial resource on which we rely so heavily, we risk of facing devastating consequences that can avoided with careful planning.

V. CONCLUSION

As the law stands, groundwater resources are generally in a position of mismanagement, with little to no incentive to cooperate with other users to prevent individuals from overconsuming to the detriment of the public interest. Various systems of private water rights, backed by various legal systems with competing interests, make cooperation much more complicated. Meanwhile, the federal government has multiple options to intervene, but it must overcome the various constraints that complicate the issue even more. Currently, the federal government has opted to kick the can down the road because, by doing nothing, more burdensome costs will accumulate in the future when the resources are depleted, instead of bailing water out of the sinking boat while traversing complicated terrain with conflicting interests, systems, and rules. Using the congressional spending power to further incentivize cooperative sustainability measures is the only way for the federal government to step in and have a hand in creating change without trampling state law processes and existing property rights. If done correctly, the federal government can encourage individual actors to work together to secure a precious resource for future generations.