THE TRAGEDY OF THE VITAL COMMONS

BY
M. ALEXANDER PEARL*

The concept of the Tragedy of the Commons is well known, but it does not adequately capture the gravity of harm caused by the mismanagement of certain common pool resources (CPRs). Not all commons are created equal; some are more important than others. If the common pasture where cows graze is overused and rendered barren, the community shifts to a vegan diet. But, if the groundwater aquifer used to grow soybeans and other foods is exhausted and no water remains for extraction, then individuals, families, and entire communities perish. Present commons scholarship is unable to differentiate between varying levels of importance among commons resources. I correct that problem by introducing the model of the Vital Commons. This is a type of CPR that is both vital to human existence and supports a massive population. The Earth's atmosphere and groundwater aquifers are two important examples of Vital Commons. Overuse of either creates a tragedy—but it appears like an apocalypse. The traditional response to tragic overuse of a commons is the creation of private property. Using this technique with a Vital Commons, however, makes things far worse and only expedites the coming catastrophe. Informal norms or principles of private ordering are also completely ineffective at sustaining the long-term health of a Vital Commons. Instead, the only answer to the tragedy of the Vital Commons is the wholesale removal of property rights to this essential and depleted resource.

* Assistant Professor of Law, Texas Tech University School of Law. Enrolled citizen of the Chickasaw Nation of Oklahoma. My thanks to Ezra Rosser, Howard Wasserman, Tracy Pearl, Bryan Camp, Eric Chiappinelli, and Amy Hardberger. I must make special mention of Jake Rutherford who provided invaluable comments, research, and editing throughout this article. Finally, I have to thank Ted Hresko and Linda Hresko for their unwavering support and interest.

"We should turn to history, along with self-reflection, to understand the stories that we once used to tell ourselves about property, as well as the ones we are telling ourselves now."

—Carol Rose[1]

I. INTRODUCTION

Don Marble is an eighty-year-old cotton farmer in the South Plains region of Texas.[2] He started farming in 1951 and notes that throughout the

[1] Carol M. Rose, *Left Brain, Right Brain and History in the New Law and Economics of Property*, 79 OR. L. REV. 479, 488 (2000).

course of his life, "[W]e've done some serious damage to our Ogallala Aquifer."[3] The Ogallala Aquifer is among the world's largest and most important groundwater aquifers. It stretches beneath eight states and more than 174,000 square miles.[4] Groundwater pumped from the Ogallala is responsible for irrigating nearly one third of the nation's cropland.[5] "The aquifer is the lifeblood of this place," says another West Texas farmer.[6] The Ogallala Aquifer is a commons resource—something that is used by everyone in the community.[7]

Another Texas farmer cannot recall a time more ravaged by drought. Mr. Marble warns that, "If we don't do something to try to get some kind of control on how much water we're pumping, we may be looking for drinking water."[8] "It's that serious," Mr. Marble added.[9] Hard-nosed West Texas culture does not lend itself to hyperbole, especially when describing a difficult time. Whether you are talking about shaking off an injury on the football field in Austin, College Station, or Lubbock, or getting up before dawn to prepare for fieldwork, West Texans are resilient. However, resilience is no match for record-breaking drought. As of June 2014, more than seventy percent of the state is suffering extreme or exceptional drought.[10] This impacts groundwater supplies, like the Ogallala, because the aquifer relies upon precipitation for replenishment. Sam Stevens, another farmer, said that he went through multiple wells in 2012—they all dried up.[11] Most of the farming community, and the industries that exist to support it, wonder the same thing: what will become of us if the drought continues.[12]

The Ogallala Aquifer is currently overdrafted.[13] The rate of recharge is already insufficient to meet the regional water demands; the sustained and significant drought has made matters much worse regarding recharge; the population continues to grow; and the demand for water by the irrigated agricultural sector and municipalities shows no sign of slowing.[14] In short,

2 Kate Galbraith, *Push Comes to Shove over Water Restrictions*, N.Y. TIMES, Mar. 17, 2012, http://www.nytimes.com/2012/03/18/us/in-west-texas-push-comes-to-shove-over-water-restrictions.html (last visited Nov. 21, 2015).

3 *Id.*

4 ARJEN Y. HOEKSTRA, THE WATER FOOTPRINT OF MODERN CONSUMER SOCIETY 34 (2013).

5 *Id.*

6 Galbraith, *supra* note 2.

7 *See* Garret Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1244–45 (1968) [hereinafter *Tragedy*] (describing the commons as a resource open to many); *see also* Eliff v. Texon Drilling Co., 210 S.W.2d 558, 560–62 (Tex. 1948) (finding that a common pool is a resource under multiple land owners' property).

8 Galbraith, *supra* note 2.

9 *Id.*

10 StateImpact, *Everything You Need to Know About the Texas Drought*, http://stateimpact.npr.org/texas/tag/drought/ (last visited Nov. 21, 2015).

11 Julie Cart, *Texas Drought Has Farmers on the Ropes*, L.A. TIMES, May 22, 2011, http://articles.latimes.com/2011/may/22/nation/la-na-drought-texas-20110522 (last visited Nov. 21, 2015).

12 *Id.*

13 *See* BRIAN RICHTER, CHASING WATER: A GUIDE FOR MOVING FROM SCARCITY TO SUSTAINABILITY 30 (2014).

14 *See* discussion *infra* notes 197–198 and accompanying text.

this is exactly the tragedy of the commons allegedly solved by implementation of private property rights. This Article explains why privatization has not only failed to render efficient allocation of a commons resource, but why privatization exacerbates destruction of the common resource.

The commons has long fascinated legal scholars, economists, ecologists, sociologists, game theorists, political science scholars, and countless other academics of all stripes.[15] A renewed interest in the assessment of common pool resource (CPR) issues developed due to recent scholarly contributions and novel CPRs created by human conduct, such as patents in biomedical research.[16] This Article adds to the company of commons scholarship by closely examining a specific type of commons—groundwater aquifers. Fundamentally, this Article is inspired by the dire straits of West Texas and the High Plains: Water is scarce; communities teeter on the brink of death by drought; and everyone is praying for rain.[17] For these reasons, a new type of commons model is needed, the Vital Commons, along with a unique solution.

This Article takes a normative approach by suggesting that we need better tools to understand the gravity of harm caused by overuse of certain vital resources. Indeed, the overuse of certain resources causes more damage than overuse of others and we need a way of understanding the difference. I propose a new model for understanding certain CPRs, which I call the Vital Commons. Overuse of a Vital Commons is like a slow-moving but known apocalypse, and it presents a categorically different challenge than other types of CPR problems. Groundwater depletion is an example. The current commons theory and solutions are unable to distinguish between the levels of importance of various CPRs within a given community. My model corrects that problem.

Part I proceeds with a review of the founding scholars of CPR literature to provide the foundation for understanding groundwater aquifers as a type of commons. Part II provides an overview of the science and geology of groundwater aquifers. This Section provides context for understanding both groundwater and aquifers through statistics on consumption, availability, and trends in growing freshwater demands. In addition, I provide a detailed view of Texas groundwater consumption and law since it is an outlier among western states. Part III focuses on the most important, and largest, aquifer in the United States—the Ogallala Aquifer.[18] Here, the Vital Commons model is applied and assessed. This Section explains why the previous commons scholarship is unable to either describe the true nature of the Ogallala

15 Frank van Laerhoven & Elinor Ostrom, *Traditions and Trends in the Study of the Commons*, 1 INT'L J. COMMONS 3, 6–7 (2007), *available at* http://www.thecommonsjournal.org/index.php/ijc/article/download/76/7.

16 *See, e.g.*, David W. Operbeck, *The Penguin's Genome, or Coase and Open Source Biotechnology*, 18 HARV. J. L. & TECH. 167, 226 (2004).

17 Timothy Egan, Opinion, *Rick Perry's Unanswered Prayers*, N.Y. TIMES, Aug. 11, 2011, http://opinionator.blogs.nytimes.com/2011/08/11/rick-perrys-unanswered-prayers/ (last visited Nov. 21, 2015).

18 *See* discussion *infra* Part III.A.

Aquifer's overuse or present a solution. I explain the need for urgent and drastic legal reform of groundwater regulation in Texas—and other states overlying the Ogallala Aquifer—in order to avoid a near-term devastating tragedy of a Vital Commons. Part IV concludes by acknowledging the role played by CPR theory within the larger debate in property theory among Progressivists and Information Theorists. Ultimately, I argue that, in the context of the Vital Commons, the Progressivists do not go nearly as far as is needed and that property law is unable to create efficient use and long-term stability of such resources.

II. COMMONS SCHOLARSHIP FOUNDATION

In the popular reality show, *Deadliest Catch*, Alaskan crab fishermen catch various species of crab and—most of the time—interact with each other without violence.[19] Why? During the undergraduate experience of dorm living, the common room was pristine on day one and a cesspool by midsemester. Why? These are commons problems. While many of these ideas may have originated in thinkers not mentioned here, the following scholars are among the most innovative in the field. This Section proceeds in rough chronological order, although the work of many of the authors spans decades and overlaps with a number of peers also described.

A. Hardin: Branding the Tragedy of the Commons

While not the first to identify the concept, Garret Hardin's seminal piece is necessarily the starting point for commons scholarship.[20] The published work that struck the match for commons research is Garret Hardin's *The Tragedy of the Commons*.[21] An ecologist writing in the late 1960s, his work should be properly situated within the political, social, and legal forces operating at that time: The Cold War continued to rage, leftist sentiment in the United States was at its highest level since the Great Depression, and Congress was just beginning to consider enacting wide-ranging full-scale environmental laws.[22] Rachel Carson's trail-blazing work on environmental concerns, *Silent Spring*, preceded Hardin by six years.[23] In short, solutions to emerging environmental problems were in demand, but at the same time there was great concern that United States policy should reflect capitalist/private property principles in order to continue the war against the communist ideals of the U.S.S.R.

While the piece is best known for coining the phrase, "the tragedy of the commons," Hardin's work is ultimately about the need for population

19 Alessandra Stanley, *Salt and Sweat, Blood and Guts, But No Girls!*, N.Y. TIMES, July 24, 2011, at AR1.

20 *Tragedy*, *supra* note 7.

21 van Laerhoven & Ostrom, *supra* note 15, at 5.

22 ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 88–89 (4th ed. 2003).

23 RACHEL CARSON, SILENT SPRING (1962).

controls.[24] His normative argument is based on the notion that resources are finite—be they a common pasture grazed by cattle owners in a community or the oceans and fish stock open to anyone.[25] Hardin states that we cannot maximize "the greatest good for the greatest number" because there are two variables within this axiom that cannot be maximized contemporaneously.[26] Furthermore, population will continue to grow while resources remain finite or lag behind in growth, thereby rendering the principle of maximizing the greatest good for the greatest number impossible.[27] This is what drove Hardin to the conclusion that "[r]uin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all."[28]

Hardin's economic analysis is simple and appealing. Assume a common pasture used by all. Each rancher allows his cattle to graze on the pasture.[29] By adding an additional cow, the rancher internalizes the benefit of such an addition since she is able to sell the cow and recover the profit for herself.[30] At the same time, each additional cow costs the pasture in the form of reducing the grass available for grazing by other cattle.[31] The cost is distributed among all other ranchers.[32] They collectively bear the burden, albeit at a small individualized rate for each bovine addition.[33] In short, the costs are nearly entirely externalized while the benefit is completely internalized. Therefore, says Hardin, the economically rational outcome will bring destruction and ruin to the commons, since no individual has an obligation to internalize the costs.[34] The principle derived from this theory—promoting the internalization of negative externalities—was the primary objective of early environmental policy and is alive and well in the present day.[35] The goal is to increase the marginal cost of production for each actor within the to-be-regulated industry, thereby altering the economic calculus and creating different behavioral outcomes.[36]

Hardin also wrote a 1978 article further detailing his conceptions of commons issues.[37] In *Political Requirements for Preserving Our Common*

24 *Tragedy*, *supra* note 7, at 1248.

25 *Id.* at 1243–45.

26 *Id.* at 1243.

27 *Id.* at 1243–44.

28 *Id.* at 1244.

29 *Id.*

30 *Id.*

31 *Id.*

32 *Id.*

33 *Id.*

34 *Id.*

35 *See* PROPERTY RIGHTS, ECONOMICS AND THE ENVIRONMENT: THE ECONOMICS OF LEGAL RELATIONSHIPS 267, 273–74 (Michael D. Kaplowitz ed., 2000) (explaining that internalizing negative externalities has been a goal of environmental law and policy in the United States from the 1960s onward).

36 *See* PERCIVAL ET AL., *supra* note 22, at 1.

37 Garrett Hardin, *Political Requirements for Preserving Our Common Heritage*, *in* WILDLIFE & AMERICA: CONTRIBUTIONS TO AN UNDERSTANDING OF AMERICAN WILDLIFE AND ITS CONSERVATION 310 (Howard P. Brokaw ed., 1978) [hereinafter *Heritage*].

Heritage, Hardin bleakly begins with the statement that "[e]veryone knows the whales are headed for extinction."[38] This conclusion is based on the idea that the animals in the ocean are either owned by everyone or owned by no one, therefore nothing exists to curtail overfishing.[39] Hardin reminds us of Aristotle's maxim. "That which is common to the greatest number [of people] has the least care bestowed on it."[40] Hardin then transitions from the specific dire status of whales to the larger problem, noting that "we do not fully comprehend the political crisis of the environment."[41]

Many of Hardin's insights ring true today. One such insight is that, under his theoretical woodlands and deer scarcity example, a harvester of deer—who is presumptively rational and in full possession of the facts—will necessarily "foresee the ruinous long-term consequences of their egoistic actions."[42] Such rational harvesters are given the Hobson's choice of short-term gains versus long-term sustainability—even though Hardin did not use that word.[43] Next, Hardin suggests that a rational harvester will decide to curtail her conduct. She hunts less and uses her take more efficiently in order to maximize the present, while attempting to preserve the long-term life of the CPR.[44] Hardin imagines that other members of the community who share the woodlands will see this conduct and exploit it.[45] The initial willingness to voluntarily—and sacrificially—curtail resource utilization is quickly undone, and the consideration of the long-term sustainability of the CPR is abandoned.[46]

The above-described system, and resulting tragic overuse, is the "unmanaged commons."[47] Hardin's primary goal is to discredit the idea that an unmanaged commons can result in the long-term sustainability of the resource where it is already scarce.[48] In the next section, I explain why Harold Demsetz is a necessary corollary to Hardin, but Demsetz offers a stronger thesis by advocating for the privatization of commons resources.

B. Demsetz: More Property

Harold Demsetz is one of the most influential economists in the fields of property theory and law and economics.[49] A contemporary of another

38 *Id.* at 310.

39 *Id.*

40 *Id.* (quoting Aristotle, *Discussion of Ideal States*, *in* THE POLITICS AND CONSTITUTION OF ATHENS, bk. II, 33 (Stephen Everson ed., 1996)).

41 *Heritage*, *supra* note 37, at 311.

42 *Id.* at 314.

43 *Id.*

44 *Id.*

45 *Id.*

46 *Id.*

47 *Id.*

48 *Id.* at 313.

49 Am. Econ. Ass'n, *Harold Demsetz Biography*, https://www.aeaweb.org/honors_awards/bios/Harold_Demsetz.php (last visited Nov. 21, 2015) (describing Demsetz as "one of the most creative and deep microeconomists of the 20th century").

iconic law and economics scholar, Ronald Coase, Demsetz's article stands as a primary building block in the law and economics canon—right alongside Coase.[50] Demsetz's most direct contribution to property theory originates in his article, *Toward a Theory of Property Rights*.[51] There, Demsetz sets out the theory that "property rights develop to internalize externalities when the gains of internalization become larger than the cost of internalization."[52] Using anthropological studies of indigenous peoples of North America, Demsetz purports to describe the fur trade on the Labrador Peninsula and the development of property rights among the indigenous groups.[53]

As the fur trade developed and the market price for fur rose, Demsetz theorizes that communally owned property was transformed into privately owned property—either by family or by some smaller subsection of the group.[54] Property rights among these groups were demonstrated by their marking of territories through burning trees and anthropological accounts of retaliation by one family or group against another who violated these boundaries by hunting within them—something a legal scholar would call trespass.[55] Property rights developed, he says, because it became economically beneficial for those affected by externalities to internalize benefits and costs.[56]

Demsetz's theory for why property rights emerge is an extension of Hardin's work on carrying capacity, sustainability, and the commons. Demsetz describes the types of property structures available to address CPRs. He sets forth the standard three-category taxonomy of ownership classes—communal, private, and state.[57] His description of future interests in the CPR is particularly worthy of examination. Demsetz posits that, as between the paradigms of a private landowner and communal land ownership, private land ownership is better able to plan for and consider the claims of future generations.[58] In rough modern parlance, Demsetz is referring to sustainability. He explains:

> In effect, an owner of a private right to use land acts as a broker whose wealth depends on how well he takes into account the competing claims of the present and the future. But with communal rights there is no broker, and the claims of the present generation will be given an uneconomically large weight in determining the intensity with which the land is worked. Future generations might desire to pay present generations enough to change the present intensity

50 Ken Hanly, *The Problems of Social Cost: Coase's Economics Versus Ethics*, 9 J. OF APPLIED PHIL. 77, 77 (1992) (discussing "Coase's now famous paper, '*The Problem of Social Cost*'"); *see generally* Ronald Coase, *The Problem of Social Cost*, J. LAW & ECON., Oct. 1960, at 1 (explaining Ronald Coase's economic theory).

51 Harold Demsetz, Papers and Proceedings, *Toward a Theory of Property Rights*, AM. ECON. REV., May 1967, at 347.

52 *Id.* at 350.

53 *Id.* at 351–53.

54 *Id.*

55 *Id.* at 352–53.

56 *Id.* at 354.

57 *Id.*

58 *Id.* at 355.

> of land usage. But they have no living agent to place their claims on the market. Under a communal property system, should a living person pay others to reduce the rate at which they work the land, he would not gain anything of value for his efforts.[59]

Under a communal system, one member wishing to preserve the CPR for future generations' use faces significant—and perhaps insurmountable—transaction costs of negotiating with all members of the community and paying them to use the resource suboptimally.[60] Lacking the right to exclude, the community member has no incentive to do anything other than fully exploit the land, since if she does not do it, her neighbor will.[61] The right to exclude, Demsetz states, is the basis for incorporating the needs of future generations in the present management of the CPR.[62] This idea—the importance of the right to exclude in the sustainable management of a CPR—is something that runs throughout the thesis presented here.

C. Ostrom: Cooperative Governance of Commons

Elinor Ostrom's work on CPRs is nearly impossible to summarize. A dynamic and interdisciplinary thinker and scholar, the breadth and depth of her work resulted in her receipt of the Nobel Prize in Economics in 2009.[63] Her contributions to commons issues outpace any modern scholar and her influence is unmistakable in all subsequent CPR thinking. She asserted that "[w]hat one can observe in the world . . . is that neither the state nor the market is uniformly successful in enabling individuals to sustain long-term, productive use of natural resource systems."[64] Ostrom provided a level of moderation to the diametrically opposed ends of the spectrum between state ownership and privatization. As an example, she stated that "communities of individuals have relied on institutions resembling neither the state nor the market to govern some resource systems with reasonable degrees of success over long periods of time."[65] In *Governing the Commons*, Ostrom identified three goals: 1) critique policy analysis applied to natural resources, 2) empirically describe successful and unsuccessful efforts to manage CPRs, and 3) commence the work of developing better tools to understand self-governing institutions for regulation of CPRs.[66] Ostrom's first and third goals are the objectives of this Article. Ostrom saw herself as contributing to a better understanding of why commons problems exist and critiquing the

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59 *Id.*

60 *Id.* at 354–56.

61 *Id.* at 354, 356–57.

62 *Id.* at 355.

63 Nobel Foundation, *Elinor Ostrom—Facts*, http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2009/ostrom-facts.html (last visited Nov. 21, 2015).

64 Elinor Ostrom, *Reflections on the Commons*, *in* GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 1 (Cambridge Univ. Press 1990).

65 *Id.*

66 *Id.* at 2.

broad policy statement that unmanaged commons cannot be sustainable.[67] But Ostrom was not simply an academic. She viewed her role as one that included improving models, or developing new ones, to influence policies for sustainable management of CPRs.[68]

Ostrom identifies the three most influential models used as the basis for recommending state or market institutions.[69] Any of these models may form the basis of a policymaker's recommendation to privatize a previously unmanaged commons.[70] One model is familiar, Hardin's tragedy of the commons.[71] Second, the Prisoner's Dilemma game operates to describe the inability of individuals to adequately manage a resource.[72] Ostrom characterizes the Prisoner's Dilemma as a formalization of Hardin's tragedy.[73] The Prisoner's Dilemma presents the paradox of individually rational decisions leading to collectively irrational outcomes.[74] The last model considered by Ostrom is the problem of collective action.[75] In this context, Ostrom frames the problem of collective action as an absence of the right to exclude.[76] In an unmanaged commons, a member of the group "cannot be excluded from obtaining the benefits of a collective good once the good is produced."[77] There is no legal right for anyone to oust another individual.[78] Therefore, there is "little incentive to contribute voluntarily to the provision of that good."[79]

One flaw of using these models as the basis for policy foundations is that they are taken as universal, undeniable, and empirical truths.[80] Ostrom notes that each model has constraints and assumptions, *e.g.*, the prisoners are unable to leave jail or communicate with each other.[81] These constraints need not, and often do not, exist in the real world.

Pursuant to one of her stated goals, Ostrom backs up her skepticism of the state/private solution binary with empirical examples. She describes a small fishery in Turkey with roughly 100 fishermen in small boats using a variety of equipment.[82] Unchecked use of the fishery had led to violence among users, and the competition among users for the most productive locations increased costs.[83] Prior to the fishing season in 1970, members of the local fishing cooperative experimented with a communal system

67 *Id.* at 1–2.
68 *Id.* at 16–17.
69 *Id.* at 2–5.
70 *Id.* at 12.
71 *Id.* at 2.
72 *Id.*
73 *Id.* at 3.
74 *Id.* at 6.
75 *Id.* at 5.
76 *Id.* at 5–6.
77 *Id.* at 6.
78 *Id.*
79 *Id.*
80 *Id.* at 6–7.
81 *Id.* at 7.
82 *Id.* at 18–19.
83 *Id.* at 19.

involving spacing of boats, identification of fishing locations, eligible fisher lists, and revolving locations among fishers.[84] The lowering of costs to identify fishing locations resulted in improved efficiency. Violence decreased, and overuse declined. All users monitored and enforced these processes equally.[85] Ostrom notes that the system did not create property rights, it simply regulated use of the CPR.[86] Nor was this a system orchestrated by a central governmental entity.[87] In essence, this was an example of a local population solving a local problem in the manner that made sense for the community and the locale.

Ostrom provides this empirical analysis to disprove the Hardin/Demsetz thesis that an unmanaged commons cannot sustain a shared resource. Much of Ostrom's work was focused on examining how successful unmanaged commons operate and what principles among them were shared or similar.[88] By doing so, she could develop a model, or set of principles, that would provide a basis for creating institutions that result in sustainable unmanaged commons. Ostrom restates her overarching query as seeking to understand why "some individuals have broken out of the trap inherent in the commons dilemma, whereas others continue remorsefully trapped into destroying their own resources. This leads me to ask what differences exist between those who have broken the shackles of a commons dilemma and those who have not."[89]

Ostrom suggests a possible answer:

> The differences may have to do with factors *internal* to a given group. The participants may simply have no capacity to communicate with one another, no way to develop trust, and no sense that they must share a common future. Alternatively, powerful individuals who stand to gain from the current situation, while others lose, may block efforts by the less powerful to change the rules of the game. Such groups may need some form of external assistance to break out of the perverse logic of their situation.[90]

However, Ostrom recognizes that internal dynamics of the group is only one possible explanation, another rests in external factors:

> Some participants do not have the autonomy to change their own institutional structures and are prevented from making constructive changes by external authorities who are indifferent to the perversities of the commons dilemma, or may even stand to gain from it. . . . Some groups suffer from perverse incentive

84 *Id.*

85 *Id.* at 19–20.

86 *Id.* at 20.

87 *Id.*

88 *See generally, id.* (discussing governance of the commons); ELINOR OSTROM ET AL., RULES, GAMES, AND COMMON-POOL RESOURCES (1994) (analyzing common pool resources through game theory); van Laerhoven & Ostrom, *supra* note 15 (summarizing, comparing, and analyzing the study of the commons generally).

89 Ostrom, *supra* note 64, at 21.

90 *Id.*

> systems that are themselves the results of policies pursued by central authorities.[91]

What the preceding two paragraphs make clear is this: the recommendation of either privatization or centralization of a CPR disregards the nuance and detail found in the CPR itself, the community utilizing the CPR, and the pre-existing institutions and values within the community.[92] Ostrom suggests that centralization proponents expect theory and practice to be the same—assuming the absence of error or malfeasance.[93] The problem, Ostrom suggests, is oversimplification.[94] The same is true for privatization proponents. There is no one-size-fits-all solution to CPRs. While no single model may apply to every CPR, Ostrom did identify eight principles that exist among studied CPRs with long-enduring good institutional designs.[95]

CPR institutions bearing the marks of the seven—or eight—principles are more likely to endure over the long-term and sustain the underlying resource. This discovery was truly groundbreaking. It presented a direct rebuttal to the Hardin/Demsetz blanket claim that CPR institutions cannot ever manage a commons effectively. Ostrom's contribution, and its weight within the field of economic governance, is what earned her the Nobel Prize in Economics in 2009.[96]

D. Rose: The New Law and Economics of Property

In *Left Brain, Right Brain and History in the New Law and Economics of Property*, Carol Rose is one of the first prominent scholars to directly link

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91 *Id.*

92 *Id.* at 21–22.

93 *Id.* at 22.

94 *Id.*

95 *Id.* at 90 ("1. Clearly defined boundaries: Individuals or households who have rights to withdraw resource units from the CPR must be clearly defined, as must the boundaries of the CPR itself. 2. Congruence between appropriation and provision rules and local conditions: Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions and to provision rules requiring labor, material, and/or money. 3. Collective-choice arrangements: Most individuals affected by the operational rules can participate in modifying the operational rules. 4. Monitoring: Monitors, who actively audit CPR conditions and appropriator behavior, are accountable to the appropriators or are the appropriators. 5. Graduated sanctions: Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and context of the offense) by other appropriators, by officials accountable to these appropriators, or by both. 6. Conflict-resolution mechanisms: Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials. 7. Minimal recognition of rights to organize: The rights of appropriators to devise their own institutions are not challenged by external governmental authorities. *For CPRs that are parts of larger systems:* 8. Nested enterprises: Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.").

96 Nobel Foundation, *supra* note 63.

and address the commons and the anticommons.[97] In between the commons (overuse) and the anticommons (underuse), Rose locates property in its various commonplace forms: individually owned property, tenancy in common, family property, church property, CPRs, "liberal commons," and then public parks.[98] It is at a midpoint between commons and anticommons that property is useable while also preserving the right to exclude.[99] She identifies this as good use of property.[100] Rose suggests that the appeal of collective but private property ownership—such as family property, tenancy in common, etc.—has all the hallmarks of individual private property.[101] Therefore, collective property need not be viewed as fundamentally problematic or prone to inefficient use.[102]

Another insight by Rose is particularly important. She discusses the uniquely American conception of property law. Property in America is typically considered only under individual terms. She traces this history back to the first and most important case on American property law—*Johnson v. M'Intosh*.[103] In *Johnson*, a dispute over property ownership, Justice Marshall considered who the good titleholder was between two parties with competing claims. One party obtained title from the Indian tribe then in possession of the land, the other party obtained title via Congress.[104] Marshall selected the party with title from Congress, explaining that Indian tribes lacked the power to convey title because of both their diminished sovereignty and the impossibility of owning property in the collective.[105] It seems that individual ownership of property was engrained early in American legal thought and consciousness.

Rose makes an important distinction between the forms of collective management of CPRs. On the one hand, she notes the well-known lobster fishing community that has institutions which govern the resource in a sustainable manner.[106] However, she notes that the institutions operate via low-level violence.[107] In contrast, she describes the work of Heller and Dagan on the "liberal commons" which preserves the option of exit for members and is structured more like private government.[108] In differentiating among the law's treatment of these institutions—the liberal commons is far preferred—Rose emphasizes, similarly to Ostrom, that there are narratives

97 Rose, *supra* note 1, at 480. Anticommons is a term coined by Michael Heller, discussed *infra* Part E, and refers to a circumstance in which too many owners hold rights of exclusion, resulting in resource underuse. Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621, 624 (1998).

98 Rose, *supra* note 1, at 482–83.

99 *Id.* at 481–82.

100 *See id.* at 482 (explaining that effective ownership—i.e. good use—can be had at the midpoint).

101 *See id.* at 484.

102 *See id.* at 481.

103 21 U.S. (8 Wheaton) 543 (1823); Rose, *supra* note 1, at 485.

104 *Johnson*, 21 U.S. (8 Wheaton) at 555–56, 559–60.

105 *Id.* at 584–85, 587–88; Rose, *supra* note 1, at 485.

106 Rose, *supra* note 1, at 486.

107 *Id.*

108 *Id.* at 484, 486–87.

behind property institutions.[109] The narratives matter and must be explored. Rose states: "We should turn to history, along with self-reflection, to understand the stories that we once used to tell ourselves about property, as well as the ones we are telling ourselves now."[110]

Rose raises essential questions that drive CPR scholarship: Why does cooperation manifest in some situations but not all? Where does our sense of justice come from? And what changes our norms?[111] Rose ends her article by emphasizing the role of history and our long collective memory: "[O]ur attitudes and beliefs have a history, and they take their place within a historical narrative."[112] In addition to these questions, Rose explains the uniquely American obsession with private property and near genetic opposition to forms of common ownership. Finally, her emphasis on detailed understanding of the history of commons resources and the communities that use them is an essential point in developing models for CPR solutions.

E. Heller and the Anticommons

One of Michael Heller's primary contributions to CPR scholarship has already been mentioned—the tragedy of the anticommons. Michael Heller contributed a beautifully simple idea to commons problems while simultaneously setting off a wildfire of scholarship in the anticommons context. In *The Tragedy of the Anticommons*, Heller considered the effects of privatization of the commons.[113] While previous commentators have trumpeted the privatization of commons, Heller examines circumstances where privatization results in critical underuse of the resource, thereby undermining the strength of the general theory advanced by law and economics scholars that communal ownership is inefficient.[114] Heller points out that while there may very well be circumstances where commons resources are inefficiently overused, excessive privatization of a commons resource may result in underuse, which is similarly inefficient.[115]

His most modern example of resource inefficiency through underuse comes from the context of biomedical research:

> Responding to a shift in U.S. government policy in the past two decades, research institutions such as the National Institutes of Health (NIH) and major universities have created technology transfer offices to patent and license their discoveries. . . . Today, upstream research in the biomedical sciences is increasingly likely to be "private" in one or more senses of the term—supported by private funds, carried out in a private institution, or privately appropriated

109 *Id.* at 487–88.
110 *Id.* at 488.
111 *Id.* at 489–91.
112 *Id.* at 492.
113 Heller, *supra* note 97, at 622–24.
114 *Id.* at 624, 675–76, 678–80.
115 *Id.* at 673–76.

> through patents, trade secrecy, or agreements that restrict the use of materials and data.[116]

While patents "fortify incentives to undertake risky research projects and could result in a more equitable distribution of profits across all stages of [research and development]," such privatization "can go astray when too many owners hold rights in previous discoveries that constitute obstacles to future research."[117] The problem is that "[b]y conferring monopolies in discoveries, patents necessarily increase prices and restrict use—a cost society pays to motivate invention."[118] Privatization of biomedical research is more likely to produce an anticommons of underuse given the typically high transaction costs of bargaining and cognitive biases towards continuing entitlements of researchers.[119] Heller states that "[p]rivatization must be more carefully deployed if it is to serve the public goals of biomedical research. . . . Otherwise, more upstream rights may lead paradoxically to fewer useful products for improving human health."[120]

Express in Heller's conclusion is the idea that property should work toward public goals.[121] Another way of phrasing this is that private property should externalize some benefits to the public. Therefore, Heller is by no means a dyed-in-the-wool Chicago School law and economics proponent. While he is an adherent of the law and economics methodology, he simultaneously fits with Ostrom and Rose by recognizing the importance of economic efficiency but situating it within a larger formula for allocating property rights. Heller's unique view nonetheless stems from hornbook principles of law and economics, most notably efficiency. It is possible to characterize Heller as being primarily concerned with use, and maximizing that aspect of property. Rules regarding exclusion should support maximum usage for a designed end that is defined by more than mere allocative economic efficiency. His follow-up article, penned with Hanoch Dagan, presents another significant contribution to CPR scholarship by introducing the model of "the liberal commons."[122]

F. Heller and Dagan: The Liberal Commons

In *The Liberal Commons*, Heller and Dagan seek to demonstrate the benefits of "synthesizing features of existing [property] types, private and commons, to create vigorous hybrids including the liberal commons."[123] The co-authors describe in detail Ostrom's work on commons institutional management, but critique an illiberal aspect of her work—abandonment of

116 Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCI. 641, 698 (1998).

117 *Id.*

118 *Id.* at 699.

119 *Id.* at 701.

120 *Id.*

121 *Id.*

122 Hanoch Dagan & Michael A. Heller, *The Liberal Commons*, 110 YALE L.J. 549, 549 (2001).

123 *Id.* at 559.

the right to exit the commons.[124] Heller and Dagan's goal is simple: "preserving exit while promoting the economic and social gains from cooperation."[125]

Heller and Dagan define the right to exit as "voluntarily leaving the effective jurisdiction of the group."[126] They posit that preserving the right to exit is an essential attribute of a liberal commons and must exist.[127] At a minimum, it must exist as a form of self-defense from harm caused by the group.[128] The other component of their goal is to promote cooperation while maximizing economic gains and recognizing social value.[129] Cooperation can result in benefits of economies of scale and risk-spreading.[130] Economic principles recognize that depending on "whether the resources are common pool or amenable to privatization, particular natural resource configurations, technological constraints, and transactions costs may make common property a superior solution to private property."[131]

In addition, they note that "[c]ooperation . . . is a good, in and of itself, in addition to its importance in facilitating economic success."[132] This is an important point that expands beyond the purely economic considerations of Hardin/Demsetz. "People value interpersonal relationships . . . . We human beings are social creatures, and creatures with values. Among the things that we value are our relations with each other."[133] Finally, Heller and Dagan describe the law as a necessity insofar as it operates as a "safety net" and a "set of background norms" that can "catalyze trust in daily interactions."[134]

Heller and Dagan identify three spheres of influence in a liberal commons. They are as follows: 1) the sphere of individual dominion, 2) the sphere of democratic self-governance, and 3) the sphere of cooperation-enhancing exit.[135] Together, these three spheres allow for the existence of a liberal commons and avoid the tragedy of CPRs. All of these spheres are aimed at facilitating trust and cooperation, and generating maximum economic use.[136] Individual dominion provides "anti-opportunism mechanisms that can yield economic and social gains over private property."[137] Democratic self-governance promotes trust and participation by making a participant's voice effective.[138] Simultaneously, this sphere allows for broad majority rule, which further promotes cooperation and trust.[139]

124 *Id.* at 566.
125 *Id.*
126 *Id.* at 568.
127 *Id.* at 566.
128 *Id.* at 568.
129 *Id.* at 572.
130 *Id.*
131 *Id.*
132 *Id.* at 572–73.
133 *Id.* at 573.
134 *Id.* at 566.
135 *Id.* at 581–82.
136 *Id.* at 582.
137 *Id.* at 602.
138 *Id.*
139 *Id.*

Cooperation-enhancing exit "can build momentum for continuity in a commons while preserving individual autonomy."[140]

Heller and Dagan conclude that as the conception of private property as "'sole and despotic dominion' fades from economic life" the liberal commons are increasing in visibility, prominence, and support.[141] The formula most likely to result in successful use of a CPR, say Heller and Dagan, is the liberal commons.[142]

G. Fennell: Re-Examining Tragedies

Lee Anne Fennell re-examines the theoretical underpinnings of tragedies of the commons and anticommons by providing a taxonomy of "common interest tragedies."[143] She explains that tragedies of the commons involve two types of problems.[144] First is the obvious overuse, described as externalizing costs among the group that outpace the replenishment of the resource.[145] Second, and more interestingly, she notes that there is a problem of under-investment in the CPR.[146] In economic terms, individuals fail to externalize benefits from the CPR.[147] She provides a helpful illustration:

> [C]onsider a dirty carpet in a common room of a group house. The problem could be couched either as "overuse" of the carpet by people with muddy shoes, or as "underinvestment" in mud-avoidance, shoe-cleaning, or carpet-protection activities. Nothing turns on which way a particular commons problem is classified, as long as the dynamic creating the specific problem in question is well-understood.[148]

Fennell notes that these two problems interact with potentially disastrous consequences:

> [O]ne tragic tendency might anticipate and reinforce the other. Knowing that other ranchers will overgraze the field, no rancher has an incentive to irrigate the land to encourage the growth of grass. The anticipation of overuse thus exacerbates the preexisting tendency to underinvest in a resource whose benefits will be shared by others, because it suggests that the investor will receive an even smaller return on her investment as a result of the dissipation generated by later overuse.[149]

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140 *Id.*
141 *Id.* at 623.
142 *Id.*
143 *See* Lee Anne Fennell, *Common Interest Tragedies*, 98 NW. U. L. REV. 907 (2004).
144 *Id.* at 914.
145 *Id.*
146 *Id.*
147 *Id.* at 916–17.
148 *Id.* at 917.
149 *Id.*

Fennell undertakes the task of linking commons and anticommons tragedies and redefines them as "common interest tragedies."[150]

> A careful look at the tragedies of the commons and the anticommons reveals a number of similarities. [They] both arise from the same two conditions: a failure of actors to internalize all costs and benefits associated with a given resource, coupled with a situation in which net gains can be achieved through cooperation.[151]

Fennell suggests that there are many reasons why people make "suboptimal decisions with regard to resources under common or interdependent control."[152] Participants "may lack information or the means to communicate with each other, they may fall prey to cognitive biases or strong emotions, or they may suffer from wealth, liquidity, or power differentials that leave some options unavailable."[153] In addition, she posits that "people often effectively wear blinders in making allocation decisions, insofar as they do not account for positive and negative externalities that their decisions generate."[154] People have an indifference to externalities—they are not the motivating force of behavioral change.[155] "Rational actors make decisions based on the costs and benefits" for them—those that are internalized.[156] In other words, rational actors ignore externalities even if the inclusion of such externalities—positive or negative—would render the individual's conduct efficient or inefficient.

Fennell's contribution to CPR scholarship is substantial for a variety of reasons. First, she demonstrates the inapplicability of externalities in influencing an individual's behavior.[157] Second, she provides a re-orientation of our thinking on CPRs and breaks down the categories of commons and anticommons by demonstrating their shared flaws.[158] Finally, she utilizes game theory and principles of law and economics in a new manner while making exceptions for—and recognizing the existence of—informal norms and commons institutions that may change the structure and analysis of economic principles.[159]

H. Informal Norms

Several of the scholars described here—Ostrom, Rose, and Fennell—recognize and discuss informal norms as they relate to CPRs.[160] However,

150 *Id.* at 933.
151 *Id.* at 934.
152 *Id.* at 941.
153 *Id.*
154 *Id.*
155 *Id.* at 942.
156 *Id.*
157 *Id.*
158 *Id.* at 948.
159 *Id.* at 951.
160 Ostrom, *supra* note 64, at 21; Rose, *supra* note 1, at 492; Fennel, *supra* note 143, at 951.

thus far we have lacked a sophisticated and deep description of informal norms. Informal norms, or private ordering, is a very popular topic among current legal academics.[161] The primary scholar associated with launching the legal examination of private ordering is Robert Ellickson through his groundbreaking work about Shasta County, California, *Order Without Law*.[162] Informal norms are rules generated within communities and not by any defined third party organization or governmental entity.[163]

Ellickson set out to examine how parties resolve disputes.[164] In Shasta County, farmers and ranchers resolve cattle trespass issues among themselves, instead of filing legal actions in court pursuant to formal laws.[165] Ellickson's conclusion that under certain circumstances groups order themselves efficiently without regard to the law mirrors that of Coase—that parties bargain to an efficient result regardless of legal entitlements.[166] Academic fascination with informal norms stems from Hardin's fundamental claim that a commons cannot be managed without private enterprise or the state.[167] Shasta County demonstrates that the norms originating within a community can efficiently manage a CPR.[168] Ellickson's theory revolves around four primary criteria and one baseline rule. The baseline rule is that private property rights—be they communal or individual—should be clear and well-known among community members.[169] The four criteria under Ellickson's theory are that the group be 1) close knit, 2) engage in workaday affairs with each other, 3) have broad knowledge of past and present interactions, and 4) exercise democratized sanctioning authority against one another.[170]

Ellickson can be seen as a rebuttal to the gloom of Hardin and Demsetz. Shasta County is an example of a community resolving disputes about resource mismanagement, and they do so effectively pursuant to their own conceptions of the type of society and community in which they wish to live.[171] There is an appealing degree of autonomy, efficiency, and freedom that is unique to informal norms. Informal norms and private ordering seek to identify circumstances that combine the benefits of the unmanaged commons—freedom—with the benefits of privatization—efficiency.

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161 *See generally* ANTICOMMONS AND COMMONS (ECONOMIC APPROACHES TO THE LAW) (Michael Heller ed., 2009) (compiling over a dozen articles outlining various degrees of acceptance of Hardin's theories).

162 ROBERT C. ELLICKSON, ORDER WITHOUT LAW (1991).

163 *Id.* at 63.

164 *Id.* at 1.

165 *Id.*

166 *Id.* at 52–53; *see also* Coase, *supra* note 50, at 8 (arguing that regardless of legal position, parties will come to an efficient outcome when there are no bargaining costs).

167 *Tragedy*, *supra* note 7, at 1245–46.

168 ELLICKSON, *supra* note 162, at 52–53.

169 *Id.* at 53.

170 *Id.* at 174–82.

171 *Id.* at 52–53 ("Most rural residents [in Shasta County] are consciously committed to an overarching norm of cooperation among neighbors.").

I. CPR Scholarship Conclusions

With the abridged history of CPR scholarship in place, there are gaps in the models described above where they fail to capture the catastrophic consequences of certain types of resource overuse. Three traits clearly exist in any tragedy of the commons: 1) resource scarcity, 2) internalization of benefits, and 3) the externalization of costs.[172] While these three traits all describe commons problems, there is no differentiation among the types of commons problems or their gravity. This model applies equally to a common grazing pasture, a lake fishery, or biomedical patents, but it cannot capture the consequences of the tragedy in a particular context. Under the model, all tragedies are created equal. However, in the real world, they are not. This is why I developed the model of the Vital Commons. CPR theory lacks a method for determining the degree of harm done by resource overuse or underuse.

Ostrom's sea-changing insight was that nuance was a necessary component of any model of CPR institutions. Her goal in recognizing the importance of knowing the details of communities, institutions, and resources was to improve the manner in which we think about solutions to these problems. My theory of the Vital Commons posits that there are certain types of CPRs that are essential to human existence, thereby warranting different solutions than those offered by the theorists described above.

III. THE VITAL COMMONS

With the primary principles of commons scholarship in place, the Vital Commons model can be differentiated from other commons scholarship. The above-mentioned scholars debate the theoretical underpinnings of informal institutions and property structures applied to CPRs. They offer descriptive accounts of an unmanaged commons being ineffective (Hardin/Demsetz)[173] and an unmanaged commons being effective (Ostrom/Rose/Heller).[174] In addition, they identify shared attributes of effective informally managed commons.[175] I offer a different approach. I begin by closely examining the CPR and basing the solution on the unique aspects of the resource and participants. In contrast to my predecessors, I develop a model for a subset of CPRs and offer principles applicable only to that subset—the Vital Commons.

As depicted through the evolution of CPR scholarship, the modern view is that not all CPRs are created equal. In any given CPR, the variety of

172 *Tragedy*, *supra* note 7, at 1244.

173 *See id.* at 1244–45 (discussing the application of the tragedy of the commons to a pasture, natural parks, and pollution); Demsetz, *supra* note 51, at 354–55 (discussing the unmanaged commons with communal land ownership).

174 *See* Ostrom, *supra* note 64 (providing case studies of effective unmanaged commons); Rose, *supra* note 1, at 486; Dagan & Heller, *supra* note 122, at 565–66.

175 Ostrom, *supra* note 64, at 88–102; Dagan & Heller, *supra* note 122, at 564–66.

distinctive traits from scientific, physical, social, legal, and political contexts mandate a unique and tailored analysis. The nuance that exists among CPRs refutes the earlier monolithic solutions that privatization is the only hope for precluding our own destruction. The truly important question is when do we use the tool of privatization? Better yet, what other approaches are included along with privatization in order to use the CPR efficiently and fairly? The pursuit of these questions hopes to yield information that allows academics, policymakers, and stakeholders to better predict which tools to utilize in response to a Vital Commons problem to effect long-term sustainability.

A Vital Commons is defined by the following traits: 1) the benefits of the CPR are internalized by nearly all members of a given massive population; 2) the costs of the CPR's depletion are externalized among nearly all members of that same massive population; 3) augmentation or depletion of the CPR by one party affects the ability to use the CPR by another party within the same massive population; 4) the CPR itself is necessary for sustenance; and 5) damage or depletion of the CPR is non-remediable or extremely difficult to correct.

Generally speaking, Vital Commons problems are new. Globalization coupled with accelerated population growth has shrunk the world, thereby erasing the physical and temporal distance between an act and its consequence. In addition, technological advancements have allowed us to identify overuse of a CPR, and the severity of the corresponding ramifications. Two types of CPRs immediately meet this definition: major groundwater aquifers and the Earth's atmosphere. While groundwater aquifers and the Earth's atmosphere have always been in existence, only recently have we obtained the ability to understand the damage being done to these two CPRs. Thus, while the Vital Commons is not new, our discovery of it certainly is. This Article focuses solely on groundwater aquifers as a Vital Commons.

Water scarcity is an emerging crisis in North America, particularly in the semi-arid and arid western United States.[176] For other areas of the world, water scarcity is not an emerging crisis—it is an old and bloody one. In the Nile River Basin, for example, water scarcity is the centerpiece of ongoing multistate conflict sustained for nearly a century.[177] With water scarcity and its growing severity an emerging and near-immediate threat to lifeways and communities in the western United States,[178] it is all the more imperative that policy change rapidly and succeed in preventing further degradation of groundwater supplies.

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176 Cart, *supra* note 11; Christopher R. Schwalm et al., Opinion, *Hundred-Year Forecast: Drought*, N.Y. TIMES, Aug. 11, 2012, http://www.nytimes.com/2012/08/12/opinion/sunday/extreme-weather-and-drought-are-here-to-stay.html? (last visited Nov. 21, 2015).

177 *See* Ryan B. Stoa, *The United Nations Watercourses Convention on the Dawn of Entry Into Force*, 47 VAND. J. TRANSNAT'L L. 1321, 1353 (2014).

178 Joby Warrick, *West's Historic Drought Stokes Fears of Water Crisis,* WASH. POST, Aug. 17, 2014, https://www.washingtonpost.com/national/health-science/wests-historic-drought-stokes-fears-of-water-crisis/2014/08/17/d5c84934-240c-11e4-958c-268a320a60ce_story.html (last visited Nov. 21, 2015).

As modern CPR scholars have shown, detailed knowledge of the CPR is necessary for any thoughtful insights to emerge.[179] This Article focuses on one state that overlies the Ogallala Aquifer—Texas. This is so because Texas is an outlier among western states in how it treats groundwater, resulting in grave injury to the Ogallala.

A. The Ogallala Aquifer

An aquifer is a layer of rock that is able to transmit and store water for extraction.[180] The Ogallala Aquifer is composed mainly of unconsolidated gravels.[181] Formed through erosion of the Rocky Mountains, the erosive processes deposited porous material that filled with water from rivers and alluvial plains.[182] The depth of the Ogallala varies greatly from place to place, but at some locations, water storage reaches 900 to 1,200 feet.[183] For purposes of this Article, groundwater is defined as water existing between the bottom of the unsaturated zone—where soil is neither continuously saturated nor continuously dry—and the bottom of the saturated zone—where the geologic material and pore spaces are filled with water—also commonly referred to as the water table.[184]

The rate of recharge—the replenishment of the water within an aquifer—can vary greatly from place to place based on a variety of geologic, hydrologic, climactic, and human factors.[185] At this time, the Ogallala relies solely on precipitation as a manner of recharging the water found in the aquifer.[186] The climate in the Ogallala region is semi-arid, and evaporation rates are very high during summer months.[187] Rainfall, which averages an annual twelve inches, compared to thirty-three inches in the eastern United States, is not sufficient to recharge the aquifer in order to meet the water demands of the region.[188] In addition, very little of the water pumped and used for irrigation returns to the aquifer since much of it returns to surface streams.[189] Couple these factors with the sustained drought experienced throughout the High Plains region[190] and the Ogallala is in serious danger. Overdrafting of the aquifer is a present reality, not a coming concern.

179 Ostrom, *supra* note 64, at 183.

180 TIM DAVIE, FUNDAMENTALS OF HYDROLOGY 61 (2d ed. 2008).

181 *Id.*

182 *Id.* at 167.

183 *Id.*; BRIAN RICHTER, CHASING WATER: A GUIDE FOR MOVING FROM SCARCITY TO SUSTAINABILITY 30 (2014).

184 KARRIE L. PENNINGTON & THOMAS V. CECH, INTRODUCTION TO WATER RESOURCES AND ENVIRONMENTAL ISSUES 1732–43 (2010).

185 *Id.*; RICHTER, *supra* note 183, at 175.

186 DAVIE, *supra* note 180, at 167.

187 *Id.*; RICHTER, *supra* note 183, at 32.

188 RICHTER, *supra* note 183, at 31–32.

189 *Id.* at 32.

190 Michael Wines, *Wells Dry, Fertile Plains Turn to Dust*, N.Y. TIMES, May 19, 2013, http://www.nytimes.com/2013/05/20/us/high-plains-aquifer-dwindles-hurting-farmers.html (last visited Nov. 21, 2015).

The Ogallala Aquifer stretches beneath eight states—Texas, Oklahoma, New Mexico, Kansas, Colorado, Nebraska, Wyoming, and South Dakota—and covers roughly 174,000 square miles (451,000 kilometers).[191] Sixty-five percent of the aquifer is located beneath Nebraska, while twelve percent is located beneath Texas.[192] As discussed previously, the aquifer is a longstanding source of drinking water and irrigation in the region. In 1990, as much as ninety-five percent of the water extracted was used for irrigation.[193] Technological advancements after World War II provided more efficient pumps capable of extracting vast quantities of groundwater resulting in water table declines of thirty meters within the past 15 years in parts of Kansas, Texas, and Nebraska.[194] More than a quarter of the irrigated lands in the United States overlie the Ogallala, which constitutes roughly thirty percent of groundwater used for irrigation in the United States.[195] This region contributes significant national and state agricultural staples like corn, wheat, soybeans, and livestock.[196]

The Ogallala Aquifer is currently overdrafted.[197] The rate of recharge is already insufficient to meet the regional water demands, and the sustained and significant drought has made matters much worse regarding recharge. The population continues to grow, and the demand for water by the irrigated agricultural sector and municipalities shows no sign of slowing in the immediate future.[198] In short, this is exactly the tragedy of overuse identified by Hardin and allegedly solved by implementation of private property rights.[199] The next Section explains why privatization has not only failed to render efficient allocation of a CPR, but why privatization exacerbates destruction of the CPR.

B. Texas Water Resources and Law

In 2001, the United Nation held a "World Day for Water" where speakers estimated that freshwater demands outpaced supply by fifteen to twenty percent and that within twenty-five years, two-thirds of the world's population would experience significant water shortages.[200] In 2011, the United Nation Educational, Scientific, and Cultural Organization (UNESCO) estimated that freshwater withdrawals from across the globe had tripled

191 HOEKSTRA, *supra* note 4, at 34; RICHTER, *supra* note 183, at 30.

192 HOEKSTRA, *supra* note 4, at 34.

193 DAVIE, *supra* note 180, at 167.

194 *Id.* at 167– 68; RICHTER, *supra* note 183, at 31.

195 HOEKSTRA, *supra* note 4, at 34.

196 RICHTER, *supra* note 183, at 32.

197 *Id.*

198 TEX. WATER DEV. BD., 2012 STATE WATER PLAN 3 (2012), *available at* http://www.twdb.texas.gov/publications/state_water_plan/2012/2012_SWP.pdf.

199 *See supra* Part II.A.

200 KENNETH N. BROOKS ET AL., HYDROLOGY AND MANAGEMENT OF WATERSHEDS 15 (4th ed. 2013).

over the past fifty years.[201] This substantial increase in demand is due to the increase of irrigated agriculture.[202]

Across the planet, ninety-nine percent of the total freshwater available is found in groundwater.[203] The remaining one percent is found in atmospheric moisture and surface water—lakes, streams, rivers, etc.[204] Over half of the world's population relies upon groundwater for their lives and livelihood.[205] In addition to providing freshwater for usage by individuals and cities, groundwater contributes to thirty percent of the streamflow in the United States.[206] While these percentages may not be intuitive, groundwater's necessary role in sustaining life is clear.

The western United States, in terms of water availability, usage, and legal structure, is very different from the eastern United States. Since this Article focuses on Texas, a summary of Texas water demands, use, and law is necessary. Texas uses about 16 million acre-feet of water per year, with nearly sixty percent coming from groundwater.[207] Almost eighty percent of the groundwater pumped in Texas goes toward irrigation.[208] In addition, municipalities obtain a significant percent of their water from underground sources.[209] In the aftermath of World War II, Texas underwent a major revolution in irrigated agriculture.[210] Pumping of groundwater increased significantly.[211] Prior to this time, groundwater pumping in Texas was not substantial and there was little irrigated agriculture.[212] Groundwater pumping was minimal until the drought of the 1950s.[213] Currently, Texans pump about 10 million acre-feet[214] of groundwater per year.[215]

Over the course of the next fifty years, the population in Texas is expected to increase eighty-two percent, with a commensurate increase in the total water demanded, to an estimated total water demand of twenty-two million acre-feet per year.[216] As expected, municipal water demands are forecasted "to increase from 4.9 million acre-feet in 2010 to 8.4 million acre-

201 *Id.*

202 *Id.*

203 PAUL L. YOUNGER, GROUNDWATER IN THE ENVIRONMENT: AN INTRODUCTION 2 (2006).

204 *Id.*

205 BROOKS ET AL., *supra* note 200, at 173.

206 *Id.*

207 Tex. Almanac, *Aquifers of Texas,* http://www.texasalmanac.com/topics/environment/aquifers-texas (last visited Nov. 21, 2015).

208 *Id.*

209 *Id.*

210 Morris E. Bloodworth & Paul T. Gillett, *Irrigation*, https://tshaonline.org/handbook/online/articles/ahi01 (last visited Nov. 21, 2015).

211 TEX. WATER DEV. BD., *supra* note 198, at 163.

212 P.D. Colaizzi et al., *Irrigation in the Texas High Plains: A Brief History and Potential Reductions in Demand*, 58 IRRIGATION & DRAINAGE 257, 258 (2008).

213 TEX. WATER DEV. BD., *supra* note 198, at 163.

214 An acre-foot of water is the amount of water necessary to cover one acre of land to a depth of one foot. BROOKS ET AL., *supra* note 200, at 513.

215 TEX. WATER DEV. BD., *supra* note 198, at 163.

216 Tex. Water Res. Inst., *Water for Texas 2012*, TX—H_2O, Fall 2011, at 28, *available at* http://twri.tamu.edu/newsletters/txh2o/txh2o-v7n1.pdf.

feet in 2060."[217] As a result, total available water supplies are expected to decrease ten percent over the same period, with groundwater supplies decreasing thirty percent.[218]

Some regions in Texas, especially in the panhandle, have already expended their water resources or are very close to it.[219] Ninety-six percent of the water pumped from the Ogallala aquifer in the Texas panhandle is used for irrigation.[220] Accordingly, the aquifer level has dropped—in some places overlying the Ogallala—up to fifteen feet in the last ten years.[221] The water mining occurring in the Ogallala is primarily a consequence of increased farming productivity, which began with the invention of the center-pivot irrigation device.[222]

For a comprehensive history of Texas water law, there are few better and more current sources than Amy Hardberger's article, *World's Worst Game of Telephone: Attempting to Understand the Conversation Between Texas's Legislature and Courts on Groundwater*.[223] Here, an abridged version is all that is necessary. In Texas, water law initially developed by way of analogy to another resource—oil and gas. In *Houston & Texas Central Railway v. East Houston*,[224] the Texas Supreme Court adopted the rule of capture with respect to extracting groundwater.[225] The rule of capture, from *Pierson v. Post*,[226] establishes a property right, not simply a usufructuary interest, in the resource captured.[227] The Houston Railroad Company utilized large pumps to extract 25,000 gallons of water per day, which caused East's wells to run dry.[228] The Texas Supreme Court found no liability by reasoning that economic development required protection from liability and groundwater was too complex—and "occult"—to regulate in another way.[229] Liability only attached if the pumping were intentionally wasteful or malicious.[230]

In 1999, the Texas Supreme Court directly addressed the viability of the rule of capture for groundwater in *Sipriano v. Great Spring Waters of*

217 *Id.*

218 *Id.*

219 Brian Brown, *The Last Drop: America's Breadbasket Faces Dire Water Crisis*, NBC NEWS, July 6, 2014, http://www.nbcnews.com/news/us-news/last-drop-americas-breadbasket-faces-dire-water-crisis-n146836 (last visited Nov. 21, 2015).

220 Tex. Almanac, *supra* note 207.

221 Dennis Dimick, *If You Think the Water Crisis Can't Get Worse, Wait Until the Aquifers Are Drained*, NAT'L GEOGRAPHIC, Aug. 19, 2014, http://news.nationalgeographic.com/news/2014/08/140819-groundwater-california-drought-aquifers-hidden-crisis (last visited Nov. 21, 2015).

222 Brown, *supra* note 219.

223 Amy Hardberger, *World's Worst Game of Telephone: Attempting to Understand the Conversation Between Texas's Legislature and Courts on Groundwater*, 43 TEX. ENVTL. L.J. 257 (2013).

224 81 S.W. 279 (Tex. 1904).

225 *Id.* at 280.

226 3 Cai. 175 (N.Y. Sup. Ct. 1805).

227 *Id.* at 178.

228 *Houston*, 81 S.W. at 280.

229 *Id.* at 280–81.

230 *Id.* at 281–82.

America (*Sipriano*).[231] *Sipriano* involved Ozarka Natural Spring Water pumping 90,000 gallons of water per day, which caused Sipriano's wells to run dry.[232] The plaintiff directly asked the court to abandon the rule of capture and replace it with the rule of reasonable use.[233] In declining to discard the rule of capture, the court deferred to the legislature's judgment and statutory directives regarding the management of groundwater.[234] The Texas Legislature had recently passed Senate Bill 1, which purported to enhance the regulatory authority of groundwater management districts.[235] Therefore, because the legislature had chosen to address groundwater overpumping via a regulatory administrative system, the court declined to change the law.[236]

In 2012, the Texas Supreme Court published its most recent decision evaluating the rule of capture for groundwater—*Edwards Aquifer Authority v. Day* (*Day*).[237] In *Day*, the Texas Supreme Court not only confirmed the continuation of the rule of capture in Texas, but further strengthened other aspects of a landowner's property right in groundwater.[238] In Texas, groundwater pumping is supposed to be subject to limitation pursuant to a statutory scheme creating localized groundwater management districts tasked with overseeing, monitoring, and regulating groundwater pumping within their jurisdiction.[239] The Edwards Aquifer Authority is one such groundwater conservation district and it sought to limit the groundwater being pumped by the plaintiff.[240] In response to this limitation, which was significant, Day sued the Authority for a regulatory taking and demanded just compensation.[241]

The court had to assess whether the plaintiff had a property right in the groundwater *not yet extracted* from the aquifer.[242] Even under the rule announced in *Pierson v. Post*, there was no property interest until possession or constructive possession.[243] *Day* addressed the issue of whether a property interest exists in something not yet captured.[244] The court determined that a vested property interest does exist in groundwater within an aquifer prior to extraction.[245] After answering this threshold question, it remanded to the trial court to assess whether or not a regulatory taking had

231 1 S.W.3d 75 (Tex. 1999).
232 *Id.* at 76.
233 *Id.*
234 *Id.* at 80.
235 *Id.* at 79–80.
236 *Id.* at 80.
237 369 S.W.3d 814 (Tex. 2012).
238 *Id.* at 832–33 (holding that groundwater rights are property rights protected by the Takings Clause of the Texas Constitution).
239 *Id.* at 835.
240 *Id.* at 820–21.
241 *Id.* at 821.
242 *Id.* at 817.
243 Pierson v. Post, 3 Cai. 175, 177–78 (N.Y. Sup. Ct. 1805).
244 *Day*, 369 S.W.3d at 817.
245 *Id.* at 841.

occurred under Texas law.[246] Subsequent case law, specifically *Edwards Aquifer Authority v. Bragg*,[247] provides strong indications that the ability of groundwater conservation districts to limit pumping is minimal—if it exists at all. It would appear that the "regulatory scheme" in Texas is more scheme and less regulatory.

The western United States is running out of water to sustain the population growth and demands of the irrigated agriculture industry. The statistics cited at the beginning of this section—with irrigated agriculture constituting the largest user of freshwater—are amplified by closer analysis of Texas. Increased population centers further exacerbate the water deficit. Texas is no different. To make matters even worse, the record drought encompassing the western United States, especially Texas, has diminished already insufficient existing water supplies and further hindered aquifer recharge. The Ogallala Aquifer is the poster child for water scarcity and the harm caused by overuse. Small towns all over West Texas and the High Plains are nearing extinction due to water shortages. The legislature is politically unable to make a change. The Texas Supreme Court has recently solidified the existence of near bulletproof property rights in the entitlement to unlimited groundwater extraction. Radical change is necessary, and it must come now.

IV. THE OGALLALA AQUIFER AS VITAL COMMONS

While a number of groundwater aquifers may satisfy the definition for a Vital Commons, the focus here remains on the Ogallala Aquifer and corresponding Texas law regarding groundwater. Every aquifer is different—geologically, chemically, physically—and has distinctive corresponding social, legal, and political circumstances. Some aquifers may qualify as Vital Commons, others may not. Some may be efficiently managed and sustained through pure privatization (Demsetz/Hardin) others may reach sustainable equilibrium through operation of informal norms (Ellickson) and others will likely require a range of management techniques specific to that community in order to redirect the march towards total exhaustion (Ostrom). The Vital Commons provides a model for thinking about solutions to overuse with respect to certain CPRs.

A. Ogallala Aquifer and the Vital Commons Model

Having provided an overview of the scientific, hydrologic, geologic, and social features of the Ogallala Aquifer, this Section applies the model of the Vital Commons to the Ogallala Aquifer. Through this analysis, one can see the value added to the CPR debate pertaining to sustainable management of a vital resource. When the model of the Vital Commons is grounded in a

246 *Id.* at 843.

247 421 S.W.3d 118, 123–24 (Tex. App. 2013) (finding that a limitation on groundwater extraction was a regulatory taking and just compensation was required).

currently stressed CPR relied upon by significant population centers, the deficiencies of the previous CPR theories are readily apparent.

1. The Benefits of the CPR Are Internalized by Nearly All Members of a Given Massive Population.

The internalization of benefits is a standard trait of any CPR, with the modification that a massive population internalizes the benefits of a Vital Commons resource. The benefits of pumping groundwater from the Ogallala Aquifer are plainly realized by a massive population. It is a truism of groundwater extraction that the pumper will necessarily internalize the benefit of the water either through use—domestic, agricultural, etc.—or sale. Critical to this characteristic of the Vital Commons is a massive population's usage of the same resource.

With the Ogallala Aquifer stretching across eight states, it provides water to millions of people and sustains the primary driver of the economy in the region—irrigated agriculture. For example, in recent times the City of Lubbock, Texas obtains nearly all of its municipal water from well fields located on the Ogallala.[248] This is due to the recent drought that has depleted surface water availability, which in 1992 supplied more than seventy percent of the City of Lubbock's municipal water.[249] The recent, significant, and lengthy drought has hit West Texas hard, thereby cementing reliance on groundwater by a massive population. Furthermore, the Texas economy relies on groundwater. "Eighty-five percent of the state's fed beef, 45.8 percent of the wheat, 61.9 percent of the corn, and 23.0 percent of the sorghum are produced in the region."[250] Thus, groundwater is not only essential for municipal uses; the agricultural and livestock industries could not exist without the Ogallala. In turn, the economy of Texas cannot exist without the Ogallala. Therefore, a massive population internalizes the benefits of using the resource.

2. The Costs of the CPR's Depletion Are Externalized Among Nearly All Members of That Same Massive Population.

Externalization of depletion costs is another obvious trait of a commons resource, again with the additional requirement of a massive population to qualify as a Vital Commons. The water table saturated zone of the Ogallala aquifer is dropping.[251] Some regions and locales experience greater rates of depletion than others due to the geologic conditions of the aquifer, the depth of the aquifer, soil conditions, pumping rates, and nearby

248 CITY OF LUBBOCK, STRATEGIC WATER SUPPLY PLAN—FEBRUARY 2013 4-2, 7-14, 7-19 (2013), *available at* http://www.mylubbock.us/docs/default-source/water-department-file-library/2013-strategic-water-supply-plan.pdf?sfvrsn=2.

249 *Id.* at 4-1.

250 Lal K. Almas et al., *Declining Ogallala Aquifer and Texas Panhandle Economy*, at 2, paper prepared for the 2004 annual meeting of S. Agric. Ass'n (Feb. 14-18, 2004) *available at* http://ageconsearch.umn.edu/bitstream/34646/1/sp04al02.pdf.

251 *Id.* at 4.

competing water uses. The negative externality—depletion of the aquifer—is borne by all those in the region. A lowered water table requires bigger pumps which cost more money, or requires that pumps be operated longer than typically necessary, which also costs more money.[252] Like Hardin's mythical example, the costs of usage are borne by the user—at a fraction of the total cost—and subsequently distributed among all others. The aggregation of pumping groundwater from the Ogallala Aquifer across all eight states compounds the negative externalities. However, due to the legal structure of groundwater ownership in Texas, some regions in Texas are being hit much harder than others.

3. Augmentation or Depletion of the CPR by One Party Affects the Ability to Use the CPR by Another Party Within the Same Massive Population.

The fact that augmentation or depletion of a CPR by one party affects the ability of other parties to use the resource was another trait recognized in old commons scholarship. Pumping water from the aquifer means that others in the community are unable to use that same water. In addition, the hydrologic effect of pumping—called a cone of depression—may make pumping groundwater by nearby landowners more difficult and costly.[253] As described in *Sipriano*, substantial groundwater extraction by one entity may cause another nearby landowner's well to dry up because it no longer reaches the water table in the saturated zone where groundwater is stored.[254] The problem in Texas is not merely hydrologic; it is also legal. Since there is no right to exclude, a landowner may pump until the aquifer is dry in that area. No legal or regulatory structure exists to limit that individual's extraction.

4. The CPR Itself is Irreplaceable and Necessary for Sustenance.

The idea that a CPR is irreplaceable and necessary for sustenance is a new characteristic differentiating a Vital Commons from an ordinary CPR. The Ogallala is what drives the Texas economy.[255] It is responsible for a significant percentage of the agricultural and livestock industry and the economy built around them.[256] But a more forceful and initial point must be made. Water is essential to life in a manner that oil and gas, an open cow pasture, and Heller's to-be-researched drug are not. Communities disappear without the Ogallala. In economic terms, the use value of water is at the apex alongside stable and temperate atmospheric conditions and reliable food sources. Water, for a massive population across these eight states, cannot be obtained from somewhere else. The infrastructure does not exist

252 ROGER M. WALLER, U.S. DEP'T OF THE INTERIOR & U.S. GEOLOGICAL SURVEY, GROUNDWATER AND THE RURAL HOMEOWNER 15–16 (2013).

253 Donald O. Whittemore, *The Mechanisms of Groundwater Pollution*, 35 U. KAN. L. REV. 345, 347 (1987) (describing the effects of wells on groundwater flow).

254 *Sipriano*, 1 S.W.3d 75, 83 (Tex. 1999).

255 Almas et al., *supra* note 250, at 2.

256 *Id.* at 3–4.

to transport water.[257] Even if it did, the costs would be so high as to preclude the transfer. Regardless, it is not as if there is a mass of water waiting to be tapped somewhere and shipped in. The entire planet is running on deficient water supplies and no mechanism exists to transplant water resources from water-rich areas to water-poor areas. Plainly put, water from the Ogallala is economically and biologically necessary for sustenance by a massive population and there is no substitute.

5. Damage or Depletion of the CPR is Non-Remediable or Extremely Difficult to Correct.

The damage or depletion of Vital Commons CPRs is difficult or impossible to remediate, which again distinguishes the Vital Commons from other common pool resources. As described, the Ogallala Aquifer recharges at a very slow rate.[258] The sparse rainfall in the High Plains region is unable to effectively recharge the aquifer to keep up with extraction. With rainfall as the sole source of recharge, options for extending the resource are limited, thereby requiring the conclusion that the depletion of the aquifer is very difficult to fix. The limited rainfall and method of recharge are not the only characteristics that make the Ogallala's depletion difficult to remedy. In addition, the sustained drought has further stressed the already insufficient recharge rate.

Nonphysical factors currently impair the ability of the Ogallala to recharge. Texas groundwater law codifies societal expectations and conceptions of property entitlements to groundwater, which, in turn, undermine—and preclude—regulation of groundwater use.[259] Groundwater management districts cannot curtail groundwater use in Texas without triggering regulatory takings litigation, which the management districts are likely to lose.[260] The legal and political characteristics of groundwater ownership in Texas are nearly as damning for the Ogallala's long-term sustainability as the dire physical traits concerning recharge.

6. Summary

The Ogallala Aquifer is a Vital Commons. The following Sections analyze the Ogallala in the context of preceding CPR scholarship and identify some problems, puzzles, and conclusions.

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257 *See* Grace Wyler, *All Around the US, Risks of a Water Crisis Are Much Bigger Than People Realize*, BUS. INSIDER, May 22, 2013, www.businessinsider.com/us-drought-water-scarcity-2013-5 (last visted Nov. 21, 2015) (indicating that the U.S. has made almost no investments in water infrastructure since the Reagan administration).

258 PENNINGTON & CECH, *supra* note 184, at 172–73.

259 Hardberger, *supra* note 223, at 296–98.

260 *See* Dave Owen, *Taking Groundwater*, 91 WASH. U. L. REV. 253, 276–77, 306 (2013).

B. Not Hardin and Not Heller

The primary example provided by Hardin was a common pasture used by nearby individuals.[261] Scholars have previously pointed out that Hardin's example is a type of commons ownership, rather than a circumstance where any individual may access and use the property.[262] Rose famously described commons ownership structures as "commons on the inside" and "[private] property on the outside."[263] Therefore, there is some problem with Hardin's initial example. Nonetheless, the principle remains: unchecked use by significant population without private property rights places the CPR—and the community—on track for certain ruin.

In the context of the Ogallala, the aquifer is definitely on track for certain ruin. The Ogallala is in the worst shape under Texas—which has by far the strongest conception of private property rights in groundwater. This is puzzling since Hardin and Demsetz lay out convincing arguments based on economically rational behavior that private ownership compels individual actors to preserve the resource.[264] No rational legal scholar, lawyer, or layperson would review the Texas Water Code and construe the plain language statement "[t]he legislature recognizes that a landowner owns the groundwater below the surface of the landowner's land as real property"[265] as anything other than expressly recognizing the privatization of the CPR. Nonetheless, ruin is certain. The Hardin/Demsetz theory fails to explain the Ogallala's dire straits.

In the same way that the Hardin/Demsetz approach wrongly predicts the current status of the Ogallala, Heller's theory does not fit either. One of Michael Heller's major contributions to property theory and CPR scholarship started with the identification of the anticommons problem associated with too many property rights in a given scenario.[266] Based on Texas groundwater law, it is clear that strong property rights in groundwater exist.[267] If that is the case, why is there a water scarcity due to overuse rather than a water surplus due to underuse? In other words, why is there no tragedy of the anticommons?

Indeed, if there were a tragedy of the anticommons, it would be welcome. Heller goes so far as to contemplate such an idea and refers to it as a "comedy of the anticommons"—a play on Rose's well-known article.[268]

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261 *Tragedy*, *supra* note 7, at 1244.

262 Lee Anne Fennell, *Ostrom's Law: Property Rights in the Commons*, INT. J. OF THE COMMONS, February 2011, at 12–13, *available at* http://www.thecommonsjournal.org/index.php/ijc/article/view/252/182.

263 Carol M. Rose, *Several Futures of Property: Of Cyberspace and Folk Tales, Emission Trades and Ecosystems*, 83 MINN. L. REV. 129, 155 (1998).

264 *Tragedy*, *supra* note 7, at 1244–46.

265 TEX. WATER CODE ANN. § 36.002 (2015).

266 *See* Heller, *supra* note 97, at 622.

267 *See Day*, 369 S.W.3d 814, 842 (Tex. 2012).

268 MICHAEL HELLER, THE GRIDLOCK ECONOMY: HOW TOO MUCH OWNERSHIP WRECKS MARKETS, STOPS INNOVATION, AND COSTS LIVES 46 (2008). Carol Rose, *The Comedy of the Commons: Custom, Commerce, and Inherently Public Property*, 53 U. CHI. L. REV. 711, 711 (1986) [hereinafter *Comedy*].

Recall, Heller identified the anticommons problem in the context of patents on biomedical research that are necessary for drug testing.[269] The patent-holder's right to exclude research and development on these patents with high-priced licensing fees and infringement suits render the drug testing nonexistent and preclude the drug from reaching the market, thereby resulting in underuse of the property.[270] This underuse is inefficient in the same manner that Hardin's overuse is inefficient.

One important qualification for characterizing Texas groundwater property rights as strong may explain why the Hardin/Demsetz theory has not worked and why the Heller anticommons has not appeared. Most property theory scholarship identifies the right to exclude as the most important stick in the bundle, and the one entitlement that is the *sine qua non* of property ownership.[271] In Texas, groundwater pumpers may not enjoin another's pumping unless it is malicious or intentionally wasteful, even if damage is done to the adjoining landowner due to pumping of groundwater.[272] No liability exists. No trespass has occurred. No conversion claim may lie.

Using terminology from the Cathedral model,[273] every landowner has a co-equal property right to pump groundwater with no limitation under any circumstances. Without the right to exclude, the Hardin/Demsetz approach is inapplicable: individuals in a common pasture would have no basis to preclude other individuals from using the property to graze their cattle. An implicit assumption in Heller's theory is the existence of a very strong right to exclude. Therefore, without the right to exclude, no anticommons problem occurs. Similarly, without the right to exclude, the common pasture remains overused.

However, the Hardin/Demsetz approach and Heller problem are not entirely equal flipsides of the same coin in the context of the Vital Commons. One critical distinction bears directly on the Vital Commons model: the fact that depletion of the CPR is difficult to correct or impossible to remedy. This applies directly to Hardin's tragedy of overuse and Heller's tragedy of underuse. In a Vital Commons, alterations of principles of property law can cure underuse. The right to exclude can be modified or limited under certain criteria. The ability to use patents is dormant but can be rendered active by legal reform. The same might be said for Hardin's tragedy of overuse. However, assuming a pasture is barren due to crowded cattle farming, restoring it is more difficult for a variety of reasons. Once the pasture is destroyed, legal reform of property rules is simply step one in making the pasture active or operational again.

269 *See* discussion *supra* Part II.E.

270 *See* discussion *supra* Parts II.A, II.E.

271 Thomas W. Merrill, *Property and the Right to Exclude*, 77 NEB. L. REV. 730, 730 (1998).

272 *See Houston*, 81 S.W. 279, 280 (Tex. 1904).

273 Under the Cathedral model, conflicts arise over competing "entitlements"—such as the entitlement to use water versus the entitlement to retain it—and the legal system must determine which entitlement is protected by liability and property rules. *See* Aaron Culp, *Water Can Be for Drinking Again: Economic and Collaborative Solutions to a Texas Water Fight*, 45 ST. MARY'S L.J. 103, 120 (2013).

Legal reform by itself does not truck in sod, plant grass seeds, water the soil, and spread fertilizer. Those things take time, money, and labor in order to restore the pasture. Moreover, time marches on, and communities have likely migrated away from relying on the pasture as the source of economy and jobs necessary to sustain a community. There may be no point in returning the pasture to its former status, because no one will be there to use it. Society may have moved on in the same way that former oil boomtowns now lay vacant and ghostly. The significant difficulty in restoring a depleted or ruined CPR makes this problem distinct from actualizing or recapturing the benefit of an underused CPR. The Vital Commons is unique because its restoration is difficult, and its exhaustion is far direr given its essential nature. Overuse leading to depletion is the epitome of apocalypse.

The right to exclude is plainly lacking in Texas groundwater law. For example, imagine a county in Texas without a local groundwater conservation district.[274] Perhaps it is, as many Texas counties are, sustained by an economy centered on cattle and irrigated agriculture industries. Some land is for sale there that overlies the Ogallala Aquifer. A company purchases land there and purchases efficient and powerful drilling equipment, but not for oil and gas, for groundwater mining. The pumps are installed and operational. They pump millions of gallons of water per day and create a cone of depression in the area such that it begins to dry up the wells of nearby landowners.[275] The cone of depression increases in diameter and continues to dry up wells over the coming days, weeks, and months—like a black hole with an ever expanding event horizon.

The groundwater mining company is a valid landowner with strong private property rights. The nearby landowners have zero recourse. They have no basis in law for a remedy because they lack the right to exclude the groundwater mining company from extracting groundwater—whether it rests beneath their land or not.[276] The *absence* of the right to exclude is what allows the tragedy of the "privatized commons" to exist. Without the right to exclude, privatization creates the exact same circumstances as Hardin's tragedy of the commons: overuse is not curtailed by other users and continues unchecked until total exhaustion.

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274 While there are roughly 100 groundwater conservation districts, there are some areas—even portions of aquifers that are in danger of overdraft and depletion in the near-term—where no groundwater conservation exists. *See* Texas Water Dev. Bd., *Groundwater Conservation District Facts*, http://www.twdb.texas.gov/groundwater/conservation_districts/facts.asp (last visited Nov. 21, 2015). One prominent recent case is Briscoe County, Texas. Here there is no regulatory authority to purport to curtail groundwater extraction. Josie Musico, *Briscoe County Landowners Want to Keep Their Rights*, LUBBOCK AVALACHE—J., Apr. 8, 2014, http://lubbockonline.com/local-news/2014-04-08/briscoe-county-landowners-want-keep-water-rights#.VPf0CUL4v8t (last visited Nov. 21, 2015).

275 *See, e.g.*, *Sipriano*, 1 S.W.3d 75, 75 (Tex. 1999) (affirming the "common-law right of a surface owner to take water from a common reservoir"); *Houston*, 81 S.W. 279, 280 (Tex. 1904) (finding that defendant caused plaintiff's well to go dry).

276 *See, e.g.*, *Sipriano*, 1 S.W.3d at 75 (holding that the Texas rule of capture for groundwater precluded granting any remedy to injured surface owner with competing claim to same groundwater); *Houston*, 81 S.W. at 280 (same).

One possible solution, briefly mentioned above, to the problem of overuse of the Ogallala Aquifer is to provide landowners with the right to exclude, thereby intentionally creating a comedy of the anticommons. Competing suits would be brought, and the courts would be consumed with cases by landowners, all of whom have the exact same legal argument. No provision in the Water Code or principle in Texas state common law provides a reasoned basis to decide in favor of one landowner over another. Now, from a purely hydrologic standpoint, this might be preferred. Ceasing all usage of water from the Ogallala might provide a chance at restoration of the aquifer, but even then, the physical challenges to recharge are significant.[277] Practically speaking, ceasing all water usage from the Ogallala is completely impossible—politically, economically, and socially. The entire state of Texas depends upon the industries supported by the Ogallala that are contributing to its rapid depletion. This is not a realistic option. The Hardin/Demsetz approach simply will not work.

This Section examined the role of the right to exclude in the context of CPR scholarship and as applied to Texas groundwater law. Its absence is unique, but its creation would do nothing to sustain or remedy the harm already done to the Vital Commons. The next Section focuses on another property entitlement—the right to compensation in a governmental taking—and the role that it plays in managing the Ogallala Aquifer.

C. Groundwater and Regulatory Takings in Texas

Pursuant to a state's police power, it may regulate land use for the health, welfare, and safety of the public.[278] Obviously, much debate exists as to the extent of the police power and when a regulation "goes too far" and triggers the just compensation requirement by the state for the restrictions on a landowner's property.[279]

In Texas, there is little debate as to the extent of the police power in the context of regulating groundwater. Texas case law all but closes the door on meaningful groundwater extraction regulation.[280] While landowners pumping groundwater have no right to exclude others from pumping groundwater in the same aquifer, they have the right to compensation if a regulatory agency

277 *See* PENNINGTON & CECH, *supra* note 184, at 173–74 (describing the physical process of recharging groundwater).

278 *See* TEX. CONST. art. I, § 17 (2015) (government takings for public use); Mayhew v. Town of Sunnyvale, 964 S.W.2d 922, 932 (Tex. 1998) (stating that when making land use decisions, the government may consider, *inter alia*, "the community, and the welfare of its citizens"); Ross Crow, *Municipal Regulation of Groundwater and Takings*, 44 TEX. ENVTL. L.J. 1, 12–13 (2014) (describing the use of the police power of the state to justify land use decisions).

279 Crow, *supra* note 278, at 12–13; Keith Woffinden, *The Parcel as a Whole: A Presumptive Structural Approach for Determining When the Government Has Gone Too Far*, BYU L. REV. 623, 628–31 (2008); *see also* Jake Rutherford, *Don't Frac This Up: Denton's Frac Ban and the Appropriate Legislative Response*, 47 TEX. TECH L. REV. 843, 888 (2015).

280 *See Sipriano*, 1 S.W.3d at 80 (describing Texas groundwater extraction regulations as being present in statute, but absent in case law).

attempts to limit pumping.[281] This is a curious result. A landowner cannot sue another for trespass or conversion, but a regulatory takings claim is ripe for the picking.[282] The consequences of this curiosity are clear.

Pursuant to *Day*, landowners have an apparently unregulated right to extract groundwater to the potential detriment of nearby landowners.[283] No liability exists. The property right lies with the landowner, even if they are a giant groundwater mining company.[284] In the above example with the groundwater mining company, the groundwater conservation district is completely powerless to curtail pumping. Since the groundwater district cannot curtail pumping, landowners must identify a private right of action to prevent the groundwater mining company from extracting the groundwater. A claim for conversion, based in *Day*'s recognition of a pre-possessory property right to groundwater still in the aquifer, will necessarily fail. While the landowner impaired by the extraction efforts of the groundwater mining company does have a pre-possessory property right under *Day*, they are unable to exclude other overlying users from that property because the right under *Day* is shared by all landowners overlying the aquifer. Therefore, a claim for conversion would only exist against an entity extracting groundwater without an easement, license, lease, or other property interest in land overlying the aquifer. Now, after the enactment of Senate Bill 1 and the creation of the groundwater regulatory scheme,[285] the next thing a landowner will do when her wells begin to run dry is ask why extraction is not regulated. Immediately, the most ardent proponents of private property in groundwater are transformed into "Marxist-statist-regulatory" advocates. Why? For the reasons articulated by Fennell, the externalities of cost have been internalized; they are no longer blind to, or ignorant of, them.

In other words, the advocates now feel the ramifications of the costs imposed on the CPR. Sadly, their cries are unheard in Texas. No port in the storm exists for them. Groundwater districts lack the ability to limit extraction, leaving landowners with land rendered useless by over-pumping.[286] In the next section, I examine groundwater conservation

281 *See Day*, 369 S.W.3d 814, 832–33 (Tex. 2012) (holding that groundwater rights are property rights entitled to constitutional protection from takings, but that such property rights do not entitle owner to prevent drainage); *see also* Edwards Aquifer Auth. v. Bragg, 421 S.W. 3d 118, 146 (Tex. App. 2013) (holding that limitation on pumping a regulatory taking under *Penn Central* factors).

282 *Compare Day*, 369 S.W. 3d at 830 ("Thus, a landowner has a right to exclude others from groundwater beneath his property, but one that cannot be used to prevent ordinary drainage."), *with id.* at 833 ("Groundwater rights are property rights subject to constitutional protection.").

283 *See* Edwards Aquifer Auth. v. Bragg (*Bragg*), 421 S.W.3d 118, 146 (Tex. App. 2013) (limiting or prohibiting water withdrawal by permitting is a regulatory taking).

284 *See, e.g.*, *Sipriano*, 1 S.W.3d 75, 75–76 (Tex. 1999) (groundwater rights lie with bottled water company that owns overlying land).

285 *See* Senate Bill 1, 1997 Tex. Gen. Laws 3610 (codified as amended at TEX. WATER CODE ANN. § 16.051 (West Supp. 2014)).

286 Jim Malewitz, *State Supreme Court Punts on Major Water Case*, TEX. TRIB., May 1, 2015, http://www.texastribune.org/2015/05/01/supreme-court-punts-major-water-case/ (last visited Nov. 21, 2015).

districts in Texas and consider whether they could operate effectively if empowered with stronger regulatory authority.

D. Problem of Local Governmental Regulation

The groundwater regulatory scheme in Texas is localized rather than centralized. There are nearly 100 groundwater conservation districts in Texas taking all shapes, sizes, and jurisdictions.[287] Each may have a different origin, some by statute,[288] others by popular vote and petition by the citizens of a county.[289] The idea behind localized rather than centralized regulation is as follows: each groundwater aquifer and community is different. Local rules should be promulgated because there is no one-size-fits-all solution to the unique issues facing each community. This sounds perfectly reasonable. Indeed, only certain areas are mandated by Texas law to have a groundwater conservation district.[290]

These mandatory areas are called priority groundwater management areas (PGMAs).[291] The Texas water code defines PGMAs as areas that are at risk of depletion within the near-term.[292] In theory, these aquifers are in need of closer monitoring given the weakened state of the aquifer in the area. If no groundwater conservation district exists in a PGMA area, the Texas Commission on Environmental Quality (TCEQ) may do the following: 1) create a district and appoint an initial board of directors, or 2) recommend annexation of the area into another pre-existing district. Pursuant to Texas law, the PGMA *must have* a groundwater conservation district.[293]

Why, then, does Briscoe County, Texas lack a district?[294] It is located in a PGMA.[295] The short answer is that the landowners do not want one.[296] Even if TCEQ unilaterally created a district and appointed the board of directors—all of whom would come from Briscoe County—the board would do the will of the people, which is not to regulate pumping. Furthermore, when a district is created in such a manner, an election is required within one year to elect a new board.[297] If that does not happen, the district dissolves.[298] Then,

287 *See* TEX. WATER DEV. BD. & TEX. COMM'N. ON ENVTL. QUALITY, PRIORITY GROUNDWATER MANAGEMENT AREAS AND GROUNDWATER CONSERVATION DISTRICTS 15 (2015), *available at* https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/053-09.pdf.

288 TEX. WATER CODE ANN. § 36.001 (2015).

289 *Id.* § 36.012.

290 *Id.* § 35.012 (requiring creation of groundwater district when area is designated a priority groundwater management area under TEX. WATER. CODE § 35.007).

291 *Id.* § 36.001(14).

292 *Id.*

293 *Id.* § 36.0151(a).

294 TEX. COMM'N ON ENVTL. QUALITY, BRISCOE, HALE AND SWISHER COUNTY PRIORITY GROUNDWATER MANAGEMENT AREA (2013), *available at* https://www.tceq.texas.gov/assets/public/permitting/watersupply/groundwater/pgma/briscoe_cty_pgma_report.pdf.

295 TEX. WATER DEV. BD., *supra* note 198, at 117.

296 Musico, *supra* note 274.

297 TEX. WATER CODE ANN. § 36.071(a) (2015).

298 *Id.* § 36.071(g).

the region goes back to being formally unregulated as opposed to simply informally unregulated.

The problem with allowing certain areas to be unregulated or lightly regulated is that the Ogallala Aquifer is not susceptible to parceling out differential rules. The aquifer stretches across eight states,[299] so actions in South Dakota or New Mexico may directly or indirectly affect groundwater availability in West Texas. It is even more likely that groundwater pumping in an unregulated Texas county overlying the Ogallala will negatively affect the aquifer underlying the adjacent county. It is the same resource. Conserving water in County A while County B runs the pumps all day and night, year round, is counterproductive. It does nothing to effectively manage the Ogallala. In sum, localized regulation *cannot* sustain the Vital Commons of the Ogallala even if districts had the requisite regulatory power. A partial explanation of this stems from the culture and values of Texas.

E. Societal Expectations

The well-worn Mark Twain quote, "[w]hiskey is for drinking; water is for fighting over," could not be more true in Texas.[300] Another phrase is equally true: "Don't mess with property rights in Texas."[301]

The economic role of groundwater in sustaining the cattle and irrigated agriculture industries partially explains such strong feelings. But, as Rose theorized, there is a culture around private property in Texas that renders modifications to property unimaginable.[302] Rose noted that when individuals grow accustomed to endowments of property they rely on them.[303] These expectations are pervasive in Texas regarding groundwater rights.[304] Societal expectations regarding property and its application to groundwater equates political modifications of groundwater rights with political suicide. As Ostrom described, this is one of the reasons why some institutions are unable to break out of the tragedy of overuse.[305] In Texas, change will not

299 EDWIN D. GUTENTAG ET AL., U.S. GEOLOGICAL SURVEY, PROF'L PAPER 1400-B, GEOHYDROLOGY OF THE HIGH PLAINS AQUIFER IN PARTS OF COLORADO, KANSAS, NEBRASKA, NEW MEXICO, OKLAHOMA, SOUTH DAKOTA, TEXAS, AND WYOMING 1, 10 (1984), *available at* http://pubs.usgs.gov/pp/1400b/report.pdf.

300 *Mark Twain Quotes*, http://www.twainquotes.com/WaterWhiskey.html (last visited Nov. 21, 2015) (cautioning that while this quote is often attributed to Mark Twain, it has not been verified).

301 Timothy Sandefur, *Don't Mess with Property Rights in Texas: How the State Constitution Protects Property Owners in the Wake of* Kelo, 41 REAL PROP. PROB. & TR. J. 227, 230 (2006) ("Texas experience sends a clear message to businesses and governments seeking to use eminent domain to enrich private parties with public power: Don't mess with property rights in Texas."); Texas Ass'n of Bus. v. Tex. Air Control Bd., 852 S.W.2d 440, 452 (Tex. 1993) (Doggett, J., dissenting) (emphasizing that "Don't Mess With Texas" is a "motto that captures the Texas spirit").

302 *See* Rose, *supra* note 1, at 490 ("[C]ulture and beliefs can dislodge peoples' expectations from a norm of equality.").

303 *Id.* at 488–91.

304 Galbraith, *supra* note 2.

305 Ostrom, *supra* note 64, at 52.

occur because of the lack of communal will and the absence of politically driven legal reform.

Related to the problem of localized groundwater regulation, many landowners in Texas are opposed to regulation of groundwater extraction. Any level of government is treated with mistrust and skepticism.[306] This mistrust exists while education and outreach coordinators from the districts attempt to demonstrate the stress on the aquifer, the need for conservation, and the dangers of over-pumping.[307] These things are called externalities because water still flows from their wells, center pivots, and faucets. Only when those run dry will the communities change their perspective and cry for regulation.

Private property occupies a special place in the Texas cultural landscape. This is unsurprising: property is a pillar of the American ideal and a foundation of the Constitution as well as its philosophical precepts. As the next Section describes, this is not necessarily a good thing.

F. Commons and the Property Theory Debate

The commons can be viewed as the epicenter of the property theory debate between Progressivists and Information Theorists.

Some background is necessary to contextualize the commons within the property theory debate. Progressive property theorists—generally marked by Alexander, Singer, and Peñalver—believe that the right to exclude is not the *sine qua non* of property and that property law can be reformed in order to effectuate progressive change by amplifying the public use nature of private property.[308] On the other side of the spectrum are Information Theorists—marked famously by Merrill and Thomas—that seek to implement Coase's theorem to the greatest extent possible by reducing transaction costs, brightening property rules, and reducing fragmentation of property entitlements.[309] Information theorists suggest that property has a purpose that does not include ushering in progressive change.[310] Property's purpose is to protect the rights of the owner, namely, the right to exclude.[311] Information theorists view intrusions into private property, like the recent expansion of the public trust doctrine, as disruptions to the order of society and diminish the institution of property itself.[312]

306 KEN COLLIER ET AL., LONE STAR POLITICS: TRADITION AND TRANSFORMATION IN TEXAS 68 (4th ed. 2015).

307 Kate Galbraith, *Texas Farmers Battle Ogallala Pumping Limits*, TEX. TRIB., Mar. 18, 2012, http://www.texastribune.org/2012/03/18/texas-farmers-regulators-battle-over-ogallala/# (last visited Nov. 21, 2015).

308 *See* John A. Lovett, *Progressive Property in Action: The Land Reform (Scotland) Act 2003*, 89 NEB. L. REV. 739, 743–46 (2011).

309 *See id.* at 746.

310 Ezra Rosser, *The Ambition and Transformative Potential of Progressive Property*, 101 CAL. L. REV. 107, 169 (2013).

311 *Id.* at 145.

312 *Comedy*, *supra* note 268, at 714–15.

Finally, outside of the spectrum is Ezra Rosser.[313] If pushed, he is properly considered a Progressive theorist. Unhappy with the conclusions drawn by his contemporary Progressive peers, Rosser questions the very nature of property and whether it can be reformed to further just change.[314] For Rosser, property is likely nonreformable; the public trust doctrine and other limitations on the right to exclude are fringe modifications that miss the heart of the problem.[315] Property, to Rosser, serves to enhance income disparity, exacerbates economic tensions among individuals, and consolidates power among the one percent.[316] He is pessimistic that progressive change is possible through the institution of property.[317]

The connection between commons scholarship and the property theory debate is readily observable. Hardin and Demsetz advocated for the privatization of the commons because private property creates economic efficiency and long-term sustainability.[318] As I have shown, they are impliedly advocating for a right to exclude, and a strong one. On the other side, Ostrom recognizes that some communities effectively manage CPRs without *any* private property rights.[319] In essence, these CPRs are purely public rights with no right to exclude in existence at all. Therefore, the opposite ends of the Hardin Ostrom spectrum roughly parallel the debate in property theory.

I fall in line with Rosser—especially in the context of Vital Commons. I do so in light of the fact that privatization of groundwater in Texas has proved incapable of sustaining the resource and likely exacerbates the problem by creating a race to the pump. If a landowner opts not to pump groundwater, then her neighbor will do so for her. The exceptions created in private property—whether grounded in the public trust doctrine, prescriptive rights, dedication, or custom—are insufficient to redirect the course of private property. Privatization is a black hole focused solely on centralization of power and economic wealth without regard to the sustainability of an essential resource or the communities that depend upon its continued existence. There is big money to be made in marketing water. It is a commodity and treated as such without regard to sustainable use by the communities that have defined the West Texas region.

The reality of the Ogallala Aquifer confirms the error of privatization. As discussed above, the Progressives laud the expansion of the public trust doctrine and describe its just re-allocation of rights among non-property owners,[320] while Information Theorists rail against its interference with the orderly system of property rights.[321] In my view, even if the public trust doctrine were to apply to groundwater in Texas, it would not be *enough* of

313 *See generally* Rosser, *supra* note 310.

314 Timothy Mulvaney, *Progressive Property Moving Forward*, 5 CAL. L. REV. 349, 350 (2014).

315 Rosser, *supra* note 310, at 156–57.

316 *See id.* at 133, 134, 138–39.

317 Mulvaney, *supra* note 314, at 358.

318 Daniel H. Cole, *New Forms of Private Property: Property Rights in Environmental Goods, in* PROPERTY LAW AND ECONOMICS 232 (Boudewijn Bouckaert ed., 2d ed. 2010).

319 Ostrom, *supra* note 64, at 60–61.

320 *See supra* text accompanying notes 313–316.

321 *See supra* text accompanying notes 309–312.

an interruption. It does not dismantle the institution of property, which is what is necessary in order to possibly salvage the Vital Commons.

G. Recommendation

While the primary purpose of this Article is not to solve the tragedy of the Vital Commons, two principles are clear. First, a federal law is needed that creates and funds an Ogallala Aquifer Commission with significant and broad authority. Fundamentally, that federal law must make clear that groundwater located within or pumped from the Ogallala Aquifer is not private property—whether it is not yet extracted or already extracted. Second, the law must fund monitoring and modeling of groundwater resources and invest in efficiency enhancing infrastructure on both a large and small scale. Technology will not solve the problem, but it should be employed to mitigate and conserve every drop.

Beyond those core principles, a variety of strategies and policies can emerge by incorporating the analysis in the Section above. However, the primary evil undone by such a federal law is the dismantling of private property in groundwater. As the quote from Carol Rose at the start of this article reminds us, "We should turn to history, along with self-reflection, to understand the stories that we once used to tell ourselves about property, as well as the ones we are telling ourselves now."[322]

V. CONCLUSION

A specter is haunting the United States: the specter of privatization. When Karl Marx uttered similar words in his Communist Manifesto, he was referring to the fear among capitalist elites, institutions, and governments that a communist revolution would grow and overtake entire European countries.[323] Our ghost is different. The specter that haunts the United States, at least in the context of Vital Commons, is private property.

Long heralded as a panacea for poverty and inefficiency, privatization has been our maxim—the goal that policy and objectives have been designed around. It echoes in the halls of Congress and every state legislature regardless of the subject matter of the debate. Born by Locke[324] and implemented by Chief Justice John Marshall,[325] private property—and individual ownership specifically—runs throughout the DNA of this Nation. This is the problem described by Ostrom and Rose. Ostrom warns against using broad platitudes to describe human conduct, motivation, and psychology regardless of whether the policy advocated for is socialist, communist, anarchist, or capitalist.

322 Rose, *supra* note 1, at 488.

323 MARX & ENGELS, MANIFESTO OF THE COMMUNIST PARTY 11 (1906).

324 JOHN LOCKE, THE SECOND TREATISE OF GOVERNMENT 18–19 (C.B. Macpherson ed., 1980) (1690).

325 Johnson v. M'Intosh, 21 U.S. (8 Wheat.) 543, 584–85 (1823) (holding that the United States inherited the British right of preemption over Native American lands).

Adherence to these platitudes overlooks the contours of communities and the range of motivations behind an individual's conduct. Rose explored the American legal culture's deeply ingrained skepticism of collective ownership of property and the marginalization of community property forms.[326] In light of CPR scholarship, it is clear that the traits of understanding nuance and the pursuit of facts are necessary prerequisites for understanding the appropriate institutions to effectively manage a CPR—not platitudes and history. Understanding nuance and pursuing facts are characteristics as scarce as groundwater in the Ogallala Aquifer among most political leaders. The current circumstance of the Ogallala Aquifer confirms this claim.

The political situation in Texas precludes meaningful legal reform. The Texas state legislature will not enact a bill that removes the property right to groundwater stored beneath a landowner's property. The Texas Supreme Court appears unconvinced that the rule of capture needs alteration. Landowners will not, of their own accord, cease extracting groundwater at high rates without compensation, in part due to the long-standing settled expectation that they may pump groundwater at whatever rate they so choose. Negative externalities on the Vital Commons are ignored until those costs are internalized. If ever there were a time to panic for the massive population dependent upon the Ogallala Aquifer, that time is now.

The Ogallala Aquifer is too big a CPR to function simply by employing the commons institutions identified by Ostrom as long-enduring. Ostrom's model of eight principles is not wrong. Indeed, her principles prove correct precisely because the Ogallala Aquifer cannot be so managed. It is too big, nonrenewable, and scattered with thousands of individual pockets of communities that use the common resource of the Ogallala. There is no communication among farmers in southwestern Kansas, vineyard owners in West Texas, and ranchers in the panhandle of Oklahoma. Ostrom's model works under certain conditions—typically small CPRs—but the Ogallala is not among them.

Similarly, Ellickson's informal norms are ill-suited to function effectively, for the same reasons that Ostrom's principles prove unavailing. There is no close-knit group among Ogallala Aquifer users. There are no shared workaday affairs, there is no iterated Prisoner's Dilemma, and the population of users is too large to enable each to sanction the other. The Hardin/Demsetz model of truly privatizing the Ogallala is unrealistic and does nothing to ensure long-term sustainability of the Ogallala. The current level of privatization has done nothing to sustain the resource and has likely expedited its destruction. What is left? Admit that the collective ruin of communities and economies of eight states is certain? If this *fait accompli* is to be avoided, drastic change is necessary.

I am neither an anarchist or libertarian desiring to eschew the involvement of the state, nor am I a capitalist who kneels at the altar of privatized goods. In this context, our Leviathan is a necessary component of

326 Rose, *supra* note 1, at 479, 485.

our survival if it is to be had. Localized regulation, like that throughout Texas, is ineffective and does absolutely nothing to enact real change in groundwater consumption. Big government is needed, as are scientists and educators to inform individuals and communities of the dire circumstances now surrounding us. The course we have chartered upon which we now walk will end in ruin. Action is needed now if our premature demise is to be avoided.