Natural Resources Journal

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Front Matter

Natural Resources Journal
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The isolation of scholars in various fields concerned with resources problems continues to be a principal impediment to progress . . . . [R]esources problems are so complex that traditional lines of approach prove inadequate . . . . Rarely do we find the work of the lawyer and the non-lawyer appearing side by side . . . . The primary function of the [new] Journal is to meet this need . . . .

—from the Foreword of Vol. 1, No. 1, 1961

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It is the purpose of this JOURNAL to publish articles of value to members of the legal profession and to individuals active in the resources field. Publication does not indicate adoption by the JOURNAL, its editors, or the advisory council of the views expressed.

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ACKNOWLEDGMENT

On the verge of celebrating 60 years in publication, we would be remiss if we began this edition with anything other than a statement of our great appreciation to all of our readers. Beginning in 1961, when the subscription price of this journal was $5.00, the University of New Mexico School of Law took a stand, finding that it was of vital importance to our legal community, and beyond, to have a journal which would offer its readers interdisciplinary scholarship exploring a broad range of issues in natural resources and environmental law. As a result, the *Natural Resources Journal* became the first legal journal in the State of New Mexico and was publishing articles in the areas of natural resources and environmental law long before the oldest of environmental law reviews in the United States even began publishing. The University of New Mexico School of Law's inspired belief to create this journal has only proven more valuable every year since then. The impact of this journal does not stop at the New Mexico state line. With contributors and readers all over the world, this journal's devotion to the development of policy in the areas of natural resources and environmental law has allowed the *Natural Resources Journal* to reach every part of the academic world. Some of the greatest legal minds in our state, country, and the world have served as staff members and/or editors of this journal. Following this, many went on to serve at every level of our local, federal, and international system as lawyers, judges, legal, and policy makers and beyond. Reading the names of those who came before us as editors is truly inspiring. Carrying on the torch then, we are still here, still publishing, and still intending to publish this journal for decades to come because of all of you who have continued to find that what this journal has to publish is meritorious and critical and only becoming more so with each passing year. As administrations, policies, and precedent come and go, we will work diligently to remain true to our heritage—publishing the best scholarship in natural resources and environmental law in the *Natural Resources Journal*.

To all of our readers, thank you,

Serena R. Wheaton & Jennifer Brannen
Co-Editors-In-Chief

Jonathan H. Adler*

INTRODUCTION: PROPERTY IN ECOLOGY

Are property rights in ecological resources compatible with environmental protection? Might they be essential?

From the late nineteenth century to the present, leading conservationists and environmental thinkers have warned of the threat posed to ecological sustainability by private property rights, particularly where embedded within a system of market exchange.[1] Pervasive ecological interconnection has often been viewed as fundamentally incompatible with the private division and segmentation of the landscape into separately divisible private tracts.[2]

The nation's first national forest reserves were created in 1891 to protect against the threat of market-driven over-consumption.[3] The early push for greater federal ownership and management of resource-abundant lands by the likes of Theodore Roosevelt and Gifford Pinchot was fed by persistent fears of timber shortages due to the rapacious resource consumption of timber companies and private forest owners.[4] At the turn of the last century, President Roosevelt warned: "If the present rate of forest destruction is allowed to continue, with nothing to offset it, a timber famine in the future is inevitable."[5] Pinchot, the father of the United States Forest Service, offered an equally dismal assessment: "The United States has already crossed the verge of a timber famine so severe that its blighting effects will be felt by every household in the land."[6] The answer, for Pinchot, was

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1. *See, e.g.*, Eric T. Freyfogle, *The Problem with Ploughshares*, N.Y. TIMES, Jan. 3, 1992, at A27 ("Environmentalism's essential message is that private ownership rights go too far"); Joseph L. Sax, *Takings, Private Property and Public Rights*, 81 YALE L.J. 149, 150 (1971) (suggesting environmental protection requires "a reconsideration of the notion of property rights"); Rory O'Brien, *Law Property, and the Environment*, *in* THINKING ABOUT THE ENVIRONMENT: READINGS ON POLITICS, PROPERTY AND THE PHYSICAL WORLD 57, 57 (Matthew Alan Cahn & Rory O'Brien eds., 1996) ("Defining property as something that is privately held immediately impacts the environment.").

2. *See, e.g.*, Joseph L. Sax, *The Constitutional Dimensions of Property: A Debate*, 26 LOY. L.A. L. REV. 23, 32 (1992) (noting ecological interconnection presents "the most profound challenge ever presented to established notions of property"); *see also* Eric T. Freyfogle, *Ownership and Ecology*, 43 CASE W. RES. L. REV. 1269 (1993).

3. *See* STEPHEN BUDIANSKY, NATURE'S KEEPERS: THE NEW SCIENCE OF NATURE MANAGEMENT 55 (1995).

4. *See* ROBERT H. NELSON, PUBLIC LANDS AND PRIVATE RIGHTS: THE FAILURE OF SCIENTIFIC MANAGEMENT 51-52 (1995).

5. *See* MICHAEL WILLIAMS, AMERICANS AND THEIR FORESTS: A HISTORICAL GEOGRAPHY 441 (1992) (quoting Roosevelt's address at the 1905 American Forestry Congress).

6. *See* GIFFORD PINCHOT, THE FIGHT FOR CONSERVATION (1910), https://wwnorton.com/college/history/america-essential-learning/docs/GPinchot-Conservation-1910.pdf.

"government control of cutting on all timberland, private as well as public." The private sector could not be trusted. Accordingly, President Roosevelt took aggressive action (often without Congressional support) to expand federal land management in the name of conservation.[7]

As federal land management responsibilities accumulated, expanding beyond forests to include what would become National Parks, "the overriding philosophy was one of saving resources from the rapaciousness of private commercial interests."[8] Due to the perceived threat posed by private consumption, conservation leaders "frequently supported public or social ownership of the environment: the national park idea, for example, and federal control of dams or major rivers."[9] As Pinchot would explain, "[w]e are coming to understand in this country that public action for public benefit has a very much wider field to cover and a much larger part to play than was the case when there were resources enough for everyone."[10] Public ownership and control was prescribed to cure market-driven scarcity.

Skepticism of property rights continued to influence the development of environmental policy throughout much of the Twentieth Century. As governments at all levels adopted more expansive environmental regulatory measures in the 1960s and 1970s, there was a particular focus on the potential threat property rights, and the constitutional protection thereof, could pose to the achievement of environmental goals.[11] As a Presidential Task Force advised in 1973, in order to "protect critical environmental and cultural areas, tough restrictions will have to be placed on the use of privately owned land."[12]

Although many environmental thought leaders have been skeptical of property-based institutions, there is a strong tradition in the United States of utilizing private property for conservation purposes.[13] The same period that saw a

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7. *See* Julia L. Ernst, *The Legacy of Theodore Roosevelt's Approach to Governmental Powers*, 92 N.D. L. REV. 309, 318-20 (2017).

8. *See* BUDIANSKY, *supra* note 3, at 142; *see also* THEODORE ROOSEVELT, THEODORE ROOSEVELT: AN AUTOBIOGRAPHY 422 (1985 ed. 1913) ("The Conservation movement was a direct outgrowth of the forest movement. It was nothing more than the application to our other natural resources of the principles which had been worked out in connection with the forests. Without the basis of public sentiment which had been built up for the protection of the forests, and without the example of public foresight in the protection of this, one of the greatest natural resources, the Conservation movement would have been impossible.").

9. Roderick Frazier Nash, *The Potential of Environmental History*, *in* AMERICAN ENVIRONMENTALISM: READINGS IN CONSERVATION HISTORY 4 (3d ed. 1990).

10. *See* PINCHOT, *supra* note 6 ("We are coming to understand in this country that public action for public benefit has a very much wider field to cover and a much larger part to play than was the case when there were resources enough for every one."); JOHN T. CUMBLER, NORTHEAST AND MIDWEST UNITED STATES: AN ENVIRONMENTAL HISTORY 238 (ABC-CLIO, 2005).

11. *See* Jonathan H. Adler, *Back to the Future of Conservation: Changing Perceptions of Property Rights and Environmental Protection*, 1 N.Y.U. J. L. & LIBERTY 988, 993-1001 (2005).

12. THE USE OF LAND: A CITIZEN'S POLICY GUIDE TO URBAN GROWTH 23 (William K. Reilly ed., 1973).

13. *See* Council on Envtl. Quality, *Special Report: The Public Benefits of Private Conservation*, *in* ENVIRONMENTAL QUALITY 1984 (1984) (surveying history of private conservation in the United States); *see also* Andrew P. Morriss, *Private Conservation Literature: A Survey*, 44 NAT. RESOURCES J. 621 (2004).

Progressive push for greater federal land ownership and resource management was witness to a dramatic expansion of private conservation activity. Roosevelt himself, who was heavily influenced by Pinchot and oversaw the creation of the U.S. Forest Service, had a hand in creating the Boone and Crockett Club in 1887.[14] The first local Audubon Society was founded in 1886, and, in 1905, the National Committee of Audubon Societies (which would eventually become the National Audubon Society) was born.[15] Audubon sought to preserve essential habitat for bird species through direct ownership. This often included targeting lands deemed valueless, or even dangerous, by government experts, such as "swamps."[16]

While Audubon was building its network of reserves, the federal government was subsidizing wetland destruction.[17] Similarly, while the federal government was encouraging the slaughter of buffalo, foresighted conservationists used private ownership as a means to preserve the American bison.[18] As conservationist Valerius Geist observed, "Bison were initially saved by six individuals who either saw business opportunities in the existence of bison or simply wanted to save a vanishing species."[19] Private conservation preserved what government management would have slighted.

The expansion of environmental regulation in the last third of the twentieth century did not diminish the importance of private conservation in America. To the contrary, private conservation has continued to expand, in some cases filling the gaps and interstices left within the regulatory regimes. The American Prairie Reserve is but one example of a non-governmental organization using private ownership to extend conservation beyond governmental efforts.[20] It is now increasingly common for environmental experts to acknowledge the "many exciting possibilities for using property concepts to further the protection of environmental resources."[21]

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14. *See* PAUL RUSSELL CUTRIGHT, THEODORE ROOSEVELT: THE MAKING OF A CONSERVATIONIST 167-69 (1985) (discussing the founding of the Boone & Crockett Club). On Roosevelt's embrace of conservation, *see* ROOSEVELT, *supra* note 8.

15. *See* FRANK GRAHAM JR. & CARL W. BUCHEISTER, THE AUDUBON ARK: A HISTORY OF THE AUDUBON SOCIETY (1st ed. 1990).

16. *See* BUDIANSKY, *supra* note 3, at 28 ("What we today admire as 'wetlands' were once 'swamps,' or even, in the words of the eighteenth-century naturalist Georges Leclerc, the Comte do Buffon, 'putrid and stagnating waters."). As Budiansky notes, eighteenth-century naturalists such as Leclerc often has similarly negative views of forests. *Id.*

17. *See* Jonathan H. Adler, *Wetlands, Waterfowl, and the Menace of Mr. Wilson: Commerce Clause Jurisprudence and the Limits of Federal Wetland Regulation*, 29 ENVTL. L. 1, 19-20 (1999).

18. *See generally* ANDREW C. ISENBERG, THE DESTRUCTION OF THE BISON: AN ENVIRONMENTAL HISTORY 164-92 (2000); Ike C. Sugg, *Why the Buffalo Roam*, COMPETITIVE ENTERPRISE INST. (Jan. 31, 2000), https://cei.org/news-letters-cei-planet/why-buffalo-roam; *see also* STEFAN BECHTEL, MR. HORNADAY'S WAR: HOW A PECULIAR VICTORIAN ZOOKEEPER WAGED A LONELY CRUSADE FOR WILDLIFE THAT CHANGED THE WORLD (2012).

19. Sugg, *supra* note 18.

20. *See* James L. Huffman, *American Prairie Reserve Protecting Wildlife Habitat on a Grand Scale*, 59 NAT. RESOURCES J. 35 (2019).

21. Carol Rose, *Property Rights and Responsibilities*, *in* THINKING ECOLOGICALLY: THE NEXT GENERATION OF ENVIRONMENTAL POLICY 49, 57 (Marian R. Chertow & Daniel C. Esty eds., 1997); *see also* Nancy A. McLaughlin, *The Role of Land Trusts in Biodiversity Conservation on Private Lands*, 38 IDAHO L. REV.. 453, 459 (2002) (noting the "increasing recognition of the need for non-regulatory

Working at the local level, conservationists have often rediscovered Aldo Leopold's counsel that private rights can be more effective than government regulation.[22] Conservation goals have been dramatically enhanced by the growth of land trusts[23] and increasing use of property instruments such as conservation easements.[24] Land ownership in fee simple is one way a conservation organization may protect a particular place, but it is hardly necessary in many contexts. Conservation easements and other partial interests in land are often a highly cost-effective alternative, particularly where conservation is compatible with other land-uses.[25] Over the past several decades, the use of such tools has expanded dramatically, facilitated by legal reforms that have facilitated and encouraged such efforts.[26]

The ecological value of ownership is found not only in land, but in water as well.[27] Western water law traditionally required landowners to make "productive use" of water rights to retain them, such as by diverting water for agriculture or

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approaches to private land conservation"); Federico Cheever, *Property Rights and the Maintenance of Wildlife Habitat: The Case for Conservation Land Transactions*, 38 IDAHO L. REV. 431 (2002) (arguing that "some of the inherent qualities of the legal institutions we call property make that type of institution more suitable for the maintenance of wildlife habitat than the legal institutions we call regulation"); James L. Huffman, *Marketing Biodiversity*, 38 IDAHO L. REV. 421 (2002) ("Only recently have some mainstream environmental groups embraced the idea that property rights and private markets can promote environmental protection.").

22. Aldo Leopold, *Conservation Economics*, *in* THE RIVER OF THE MOTHER OF GOD AND OTHER ESSAYS 193, 193-94 (Susan L. Flader & J. Baird Callicott eds, 1991) ("We tried to get conservation by buying land, by subsidizing desirable changes in land use, and by passing restrictive laws. The last method largely failed; the other two have produced some small samples of success."). Leopold further suggested that private conservation was preferable to government acquisition of land for conservation purposes. *Id.* at 196. ("I do challenge the growing assumption that bigger buying [of public land] is a substitute for private conservation practice."). *Id.*

23. *See generally* Jessica Owley & Adena R. Rissman, *Trends in Private Land Conservation: Increasing Complexity, Shifting Conservation Purposes and Allowable Private Land Uses*, 51 LAND USE POL'Y 76, 76-77 (2016) (discussing growth in land trusts); *see also* RICHARD BREWER, CONSERVANCY: THE LAND TRUST MOVEMENT IN AMERICA (2003).

24. *See* Peter M. Morrisette, *Conservation Easements and the Public Good: Preserving the Environment on Private Lands*, 41 NAT. RESOURCES J. 373 (2001); Gerald Korngold, *Privately Held Conservation Servitudes: A Policy Analysis in the Context of in Gross Real Covenants and Easements*, 63 TEX. L. REV. 433 (1984).

25. *See, e.g.*, Dominic Parker, *Land Trusts and the Choice to Conserve Land with Full Ownership or Conservation Easements*, 44 NAT. RESOURCES J. 483, 516 (2004) (explaining that conservation easements "better facilitate gains from [landowner] specialization" because they can "conserve environmental amenities while continuing to allow landowners the right to produce non-conservation output" and that such arrangements can be "especially cost-effective"). Of course, conservation easements, like any policy tool, are not without their potential drawbacks. *See, e.g.*, Julia D. Mahoney, *The Illusion of Perpetuity and the Preservation of Privately Owned Lands*, 44 NAT. RESOURCE J. 573 (2004) (suggesting that perpetual land preservation could frustrate conservation in the future as environmental priorities change over time); Jamie Sayen, *Limitations of Conservation Easements*, WILD EARTH, Spring 1996, at 77 (suggesting that fee simple ownership provides greater protection for some resources than a conservation easement).

26. *See* Owley & Rissman, *supra* note 23, at 77.

27. *See* Leigh Raymond & Sally K. Fairfax, *The "Shift to Privatization" in Land Conservation: A Cautionary Essay*, 42 NAT. RESOURCES J. 599, 600 (2002) ("[P]roperty rights are being created to address new environmental challenges, like air and water pollution, that previously have been regulated in a less market-based, more command-and-control manner.").

livestock. This requirement was intended to ensure that scarce water was used in (what were historically considered to be) socially beneficial uses.[28] A landowner who left her water in the stream for the benefit of fish or other species risked losing her water rights to those who used water for irrigation or drinking.[29] By limiting the marketability of water, the traditional legal regime diminished the incentives to increase water efficiency and obstructed conservation efforts.[30]

Over the past few decades, however, this has begun to change as states have begun to embrace a broader conception of property in water, and recognize property interests in instream water flows.[31] Oregon, for example, allows individuals to purchase, lease, or donate water rights for instream flows.[32] This enables conservation organizations, such as Oregon's Oregon Water Trust, "to use the marketplace to purchase existing water rights and convert them" for the benefit of fish.[33] The recognition of legally defensible property rights in instream flows means there is a broader market for water, and conservation organizations may negotiate with existing water owners for voluntary transfers, increasing the incentive for more efficient water use.[34] As the use of water rights has expanded, so has the volume of water traded and reallocated to alternative uses.[35] The ability of water markets to facilitate the efficient and relatively rapid reallocation of water in response to changing ecological conditions is also now seen as one way to address some of the likely consequences of climate change.[36]

The rediscovery of the ecological value of property rights should not come as a surprise. As the late Robert Nelson observed, "the great advantage of privatization is that it creates a set of people with strong personal stakes in achieving good results on the land."[37] Wendell Berry, though not a proponent of

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28. *See* Michael C. Blumm, *Unconventional Waters: The Quiet Revolution in Federal and Tribal Minimum Streamflows*, 19 ECOLOGY L.Q. 445, 446 n.1 (1992) ("Limiting water rights to those who could make productive use of the water--and only for as long as they did so (nonuse can lead to loss of the right through abandonment or forfeiture)--was designed to conserve scarce Western water for those who were making productive investments such as irrigation, mining, and stock watering.").

29. *Id.* at 480; *see also* TERRY L. ANDERSON & DONALD R. LEAL, ENVIRO-CAPITALISTS: DOING GOOD BY DOING WELL 105 (1997).

30. *See* Christopher L. Len, *Synthesis - A Brand New Water Law*, 8 U. DENV. WATER L. REV. 55, 64 (2004) (discussing the effects of prior appropriation doctrine on water use); *see also* James L. Huffman, *Water Marketing in Western Prior Appropriation States: A Model for the East*, 21 GA. ST. U. L. REV. 429, 438 (2004).

31. *See* TERRY L. ANDERSON & PAMELA SNYDER, WATER MARKETS: PRIMING THE INVISIBLE PUMP 111-32 (1997); *see also* Andrew P. Morriss, Bruce Yandle & Terry Anderson, *Principles for Water*, 15 TUL. ENVTL. L.J. 335 (2002); Janet Neuman, Anne Squier & Gail Achterman, *Sometimes a Great Notion: Oregon's Instream Flow Experiments*, 36 ENVTL. L. 1125 (2006).

32. Neuman, Squier & Achterman *supra* note 31 (discussing evolution of water law in Oregon).

33. *See* Janet C. Neuman, *The Good, the Bad, and the Ugly: The First Ten Years of the Oregon Water Trust*, 83 NEB. L. REV. 432 (2004) (discussing the work of the Oregon Water Trust and its history).

34. *See* ANDERSON & LEAL, *supra* note 29, at 94-95.

35. *See* Jedidiah Bewer, et al., *Transferring Water in the American West: 1987-2005*, 40 U. MICH. J. L. REFORM 1021, 1042, fig.2 (2007) (documenting increase in water transfers over time).

36. *See* Jonathan H. Adler, *Water Rights, Markets, and Changing Ecological Conditions*, 42 ENVTL L. 93, 106-12 (2012).

37. NELSON, *supra* note 4.

classical liberal values or free market capitalism, nonetheless recognized that "the best conserver of land in use will always be the small owner or operator, farmer or forester or both, who lives within a securely placed family and community, who knows how to use the land in the best way, and who can afford to do so."[38] He similarly counseled that "a large population of small property holders" offers the best hope for "good stewardship of land."[39]

There is significant empirical evidence that greater protection of private property rights correlates with higher levels of environmental quality. Comparative assessments of privately and publicly owned resources, such as oyster beds, tend to find private owners manage resources more efficiently and effectively.[40] Cross-country comparisons find that "environmental quality and economic growth rates are greater in regimes where property rights are well defined than in regimes where property rights are poorly defined."[41] As a general matter, those natural resources subject to property institutions are managed more sustainably and in better condition than those subject to political management or left in open-access commons.

The empirical evidence confirms one of the more important, and often overlooked, insights of Garrett Hardin's seminal essay, "The Tragedy of the Commons."[42] This essay is often remembered for its justification for environmental regulation – what he termed "mutual coercion, mutually agreed upon" (or for Hardin's concerns about population growth).[43] What is too often forgotten was his explanation of how the recognition of property rights in ecological resources facilitates conservation.

In his essay, Hardin described the fate of the "commons," an unowned, open-access pasture used for grazing livestock.[44] As Hardin explained, it is in the self-interest of each livestock owner to maximize her use of the commons, even though doing so may increase the depletion of the underlying resource. Each livestock owner captures that full benefit of putting an additional animal out to graze. The costs to the resource, however, are distributed among all of the users. Put another way, due to the open-access nature of the commons, the benefits of using the pasture are privatized, while the costs are socialized. This dynamic, Hardin explained, "brings ruin to all."[45]

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38. *See* Wendell Berry, *Private Property and the Common Wealth*, *in* ANOTHER TURN OF THE CRANK 59 (1995). It is important to note, however, that Berry does not endorse a classical liberal conception of property. *See* Nathaniel Stewart, *The Tragedy of the Commonwealth and the Vision of Wendell Berry*, 18 GEO. INT'L ENVTL. L. REV. 465 (2006).

39. Berry, *supra* note 38, at 49.

40. *See* Richard J. Agnello & Lawrence P. Donnelly, *Property Rights and Efficiency in the Oyster Industry*, 18 J. L. & ECON. 521 (1975); Richard J. Agnello & Lawrence P. Donnelly, *Prices and Property Rights in the Fisheries*, 42.2 S. ECON. J. 253 (1979). For a survey of other comparative analyses, *see* Louis De Alessi, *Gains from Private Property*, *in* PROPERTY RIGHTS: COOPERATION, CONFLICT, AND LAW 90-111 (Terry L. Anderson & Fred S. McChesney eds., 2003).

41. *See* Seth W. Norton, *Property Rights, the Environment, and Economic Well-Being*, *in* WHO OWNS THE ENVIRONMENT? 51 (Peter J. Hill & Roger E. Meiners eds., 1998).

42. Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243 (1968).

43. *Id.* at 1247.

44. *Id.* at 1244.

45. *Id.*

It's worth reiterating that Hardin was not the first to explain this phenomenon. Fishery economists detailed and documented this precise problem in the marine commons decades earlier.[46] Aristotle also described the general dynamic, as did others in between.[47] Yet Hardin's essay is important because it popularized the idea of the "tragedy of the commons," and helped inform the emerging environmentalist moment in American politics.

Hardin's call for controlling access and limiting the use of common resources – land, water, air – reinforced the push for greater environmental regulation. What is too-often overlooked is that Hardin offered an alternative to prescriptive government regulation: private property. As he explained, the tragedy of the commons "is averted by private property, or something formally like it."[48] Indeed, Hardin suggested this was one of the primary functions of property in land.[49]

As Hardin recognized, where property rights are well-defined and secure, the tragedy of the commons is less likely since each owner has ample incentive to act as a steward, caring for the underlying resource and preventing its overuse which then benefits both the owners as well as others who may value the underlying resource. In this way, the institution of property rights "deters us from exhausting the positive resources of the earth."[50]

Fisheries provide a useful case study of the logic of the commons and the value of property institutions. Following World War II, ecologists began to recognize that the ocean's bounty, once seen as limitless, was under strain. Beginning in the 1950s, fishery economists explained how this was an inevitable consequence of the open-access nature of marine resources. Further, as Hardin would later suggest, they recognized property rights as a solution.[51]

The development of ITQs (for "individual transferable quotas") and other forms of property-based fishery management systems, known as catch shares, many marine fisheries once threatened with collapse are on the road to sustainability.[52] The adoption of such programs has increased fishing industry efficiency, reduced over-capitalization, and lessened the ecological impact of

46. *See, e.g.*, H. Scott Gordon, *The Economic Theory of a Common-Property Resource: The Fishery*, 62(2) J. POL. ECON. 124 (1954); Anthony Scott, *The Fishery: The Objectives of Sole Ownership*, 63(2) J. POL ECON. 116 (1955).

47. *See, e.g.*, ARISTOTLE, THE POLITICS § 1261.b32, at 108 (Trevor J. Saunders ed., T.A. Sinclair trans., Penguin Classics rev. ed. 1981) (c. 384 B.C.E.).

48. Hardin, *supra* note 42, at 1245.

49. *Id.*

50. *Id.*

51. *See* FRANCIS T. CHRISTY, FISHERMEN QUOTAS: A TENTATIVE SUGGESTION FOR DOMESTIC MANAGEMENT (1973). This history is summarized in Ragnar Arnason, *Property Rights in Fisheries: How Much Can Individual Transferable Quotas Accomplish?*, 6(2) REV. ENVTL. ECON. & POL'Y 217 (2012).

52. *See* Christopher Costello, Steven D. Gaines, & John Lynham, *Can Catch Shares Prevent Fisheries Collapse?*, 321 SCI. 1678 (2008) (noting the adoption of catch-share programs "halts, and even reverses, the global trend toward widespread [fisheries] collapse").

fishing operations.[53] Such programs cover only two percent or so of fish stocks around the world, but as of 2010 accounted for approximately twenty-five percent of the volume of fish caught annually worldwide.[54] Another study, surveying over 200 peer-reviewed papers on the environmental effects of ITQ programs, found that the creation of property rights in ocean fisheries encourages greater stewardship among fishery participants, including efforts to maintain and enforce sustainable limits on the total catch.[55] Fishery participants under ITQs often exhibit greater concern for ensuring total catch levels remain sustainable and that applicable limits are enforced than the government officials charged with such obligations.

The experience with fisheries suggests the value of learning how property rights may be extended to threatened ecological resources, particularly those we wish to simultaneously exploit and conserve. The experience also suggests how challenging such efforts can be. Only decades after fishery economists began to identify potential mechanisms for the extension of property rights to fisheries did such reforms begin to get adopted, and only recently – in the past decade or so – has conclusive empirical evidence on the value of these approaches emerged. Following this model for other resources will take no less effort, and the vindication of classical liberal ideas about how to protect other resources is by no means assured.

While Hardin embraced the conservation potential of property rights in principle, he was not altogether sanguine about the potential for property rights to avert the tragedy of the commons across the board. However much property rights led to increased conservation and agricultural productivity on land, Hardin feared that it would be difficult to define and defend property rights in other ecological contexts.[56] It is one thing to post and fence private land. It is quite another to demarcate property rights in air or water or to prevent the overuse of such resources as pollution sinks by ever-growing populations.[57]

Embracing Hardin's analysis does not require embracing his pessimistic outlook. Much has changed in the half-century since Hardin wrote, and there are many reasons to be more bullish about the potential for property in ecology. As the experience with rights in water and fisheries noted above highlights,[58] institutional evolution, aided by technological innovation, can facilitate the recognition and protection of property rights in ecologically important resources and produce conservation benefits.[59]

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53. The relevant literature is summarized in Jonathan H. Adler & Nathaniel Stewart, *Learning How to Fish: Catch Shares and the Future of Fishery Conservation*, 31 UCLA J. ENVTL. L. & POL'Y 150 (2013).

54. *See* Christopher Costello et al., *Economic Incentives and Global Fisheries Sustainability*, 2 ANN. REV. RES. ECON. 299, 302 (2010).

55. Trevor A. Branch, *How Do Individual Transferable Quotas Affect Marine Ecosystems?*, 10 FISH & FISHERIES 39 (2009).

56. *Id.*

57. *Id.*

58. *See infra* notes 59-61 and accompanying text.

59. *See* Bruce Yandle & Andrew P. Morriss, *The Technologies of Property Rights: Choice Among Alternative Solutions to Tragedies of the Commons*, 28 ECOLOGY L.Q. 123, 128-29 (2001) (explaining how changes in technology can facilitate the definition and enforcement of property rights); *see*

Yet Hardin was no doubt correct that the extension of property-based institutions to a wider array of ecological resources is a serious challenge. Demarcating boundaries on land is easier than delineating rights in water. A given parcel can generally be relied upon to remain in place. Living resources, including wildlife, not so much. As a consequence, property rights in ecological resources are incomplete. In some cases, ownership of resources is prohibited by law. In other cases, the transaction costs of extending well defined, defensible, and divestible property rights appear greater than the benefits to be gained.

The papers in this volume explore the further potential for property-based institutions to preserve environmental values and enhance environmental protection. Through case studies, empirical assessments, and consideration of the institutional constraints that may alternatively facilitate or hamper private conservation efforts, these papers deepen our understanding of the institutional context in which conservation occurs and the potential for property-based approaches to supplement, if not supplant, traditional government management of natural resources and environmental regulation. Together, they aim to enhance the conservation potential of property institutions by looking at how such institutions may be extended and defended so as to maximize property's ecological potential.

Government agencies may seem to have a comparative advantage at landscape-scale conservation − perhaps. But the work of the American Prairie Reserve ("APR") might suggest otherwise.[60] Just as the early Audubon Society conserved areas often left unprotected by governments at the time, the APR is well on its way to creating the largest nature reserve in the country by acquiring land from willing sellers. At the same time, APR is modifying the management of federally owned lands by seeking to acquire and retire grazing permits.

One purpose of land conservation is to preserve habitat and intact ecosystems. Another is to provide for recreational opportunities. The latter need not require the acquisition of land in fee-simple, or even the purchase of a permanent conservation easement. The combination of private ownership and modern technology may facilitate temporary leases or access rights so as to enable a "right to roam" across private lands – what some might think of as the environmental equivalent of Airbnb.[61]

Water may be more difficult to own than land, as discussed above. Yet the application of property rights principles to water has produced conservation gains. This is even true where such rights are incomplete or where transaction costs inhibit the transfer of existing rights. The Colorado Water Conservation Board ("CWCB") has been able to work within the existing water right structure to enhance stream protection within the state, even though significant obstacles to water transfers remain.[62]

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generally THE TECHNOLOGY OF PROPERTY RIGHTS (Terry L. Anderson & Peter J. Hill eds., 2001) (same).

60. *See* Huffman, *supra* note 20.

61. *See generally* Donald J. Kochan, *The Market to Roam: Using Shared Economy Platforms for Expanding Roaming Access to Land Resources*, 59 NAT. RESOURCES J. 89 (2019).

62. *See* Steven M. Smith, *Instream Flow Rights within the Prior Appropriation Doctrine: Insights from Colorado*, 59 NAT. RESOURCES J. 181 (2019).

As the activities of the CWCB and APR both demonstrate, private owners are not necessarily the only players within a property rights framework. Government agencies may continue to own ecological resources and use property institutions to advance broader public or political goals. Yet just because lands or waters are characterized as belonging to the state does not make it so and claims of state "ownership" should be approached with caution, not least because of the state's dual role as owner and regulator.[63]

State laws and regulations often determine what sorts of property rights will be recognized and, in particular, whether "non-use" rights in ecological resources are possible. It took decades for such rights in water – instream rights – to obtain legal recognition, and there are still obstacles to the recognition of equivalent rights in other contexts. As a consequence, the limitation on non-use rights in ecological resources remains a major challenge for property-based preservation.[64]

At the same time that recognition of non-use rights is important, so, too, is careful consideration of what uses interfere with the property rights of others. For decades, the dominant environmental paradigm has focused on the idea of "externalities" – the "external" effects one person's use of her property may have on that of another – and the use of government interventions (such as taxes or regulations) to "internalize" such costs. Yet due to pervasive ecological interconnection, the idea of externalities threatens to swallow the very property rights foundation upon which it sits, necessitating a more careful and principled application of this essential concept.[65]

Private property has an essential role to play in environmental conservation. Yet as this essay and the accompanying papers show, there are many areas in which the precise role for property has yet to be defined or may seem out of reach. Important questions remain about the best set of institutional arrangements and legal rules to facilitate the extension and preservation of property rights without compromising efficiency or equity. Such "second generation" questions are an important as ever and command the attention of those interested in property-based environmental protection.[66]

Environmental protection is necessarily a work in progress – as it has always been and always will be. Human civilization inevitably produces untoward environmental consequences. Changes in scientific understanding and social values also change what types and degrees of environmental protection people demand over time. Property rights have an important role to play in this process, and continuing research on property rights questions is necessary if people are to have the opportunity to achieve the types of environmental protection they deserve.

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63. *See* Joseph Regalia & Noah D. Hall, *"Waters of the State"*, 59 NAT. RESOURCES J. 59 (2019).

64. *See* Bryan Leonard & Shawn Regan, *Legal and Institutional Barriers to Establishing Non-Use Rights to Natural Resources*, 59 NAT. RESOURCES J. 135 (2019).

65. *See* Donald J. Boudreaux & Roger Meiners, *Externality: Origins and Classifications*, 59 NAT. RESOURCES J. 1 (2019).

66. *See* Katrina M. Wyman, *Second Generation Property Rights Issues*, 59 NAT. RESOURCES J. 215 (2019).