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Law for the Ecological Age

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It is revolting to have no better reason for a rule of law than that so it was laid down in the time of Henry IV.

Oliver Wendell Holmes, Jr. (1897)¹

A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community.

Aldo Leopold (1949)²

Introduction

Nothing is more important to human beings than an ecologically functioning, life sustaining biosphere on the Earth. It is the only habitable place we know of in a forbidding universe. We all depend on it to live and we are compelled to share it; it is our only home. As the summary of the United Nation's 2005 Millennium Ecosystem Assessment Synthesis begins: "Everyone in the world depends completely on Earth's ecosystems and the services they provide, such as food, water, disease management, climate regulation, spiritual fulfillment, and aesthetic enjoyment."³

The economic value of these services as calculated by economists is stunning, and yet dollar values barely begin to describe the Earth's full worth to us.⁴ Many deep physical and psychological aspects of our human nature dovetail with the attributes of the Earth, often in ways that we perceive only dimly, if at all.⁵ The Earth's biosphere seems almost magically suited to human beings, and indeed it is, for we evolved through eons of intimate immersion within it. Many of us are animated by moral and religious impulses to treasure and respect the creation that sustains us. We cannot live long or well without a functioning biosphere, and so it is worth everything we have.

But the growing human enterprise now threatens to overwhelm the ecological viability of the Earth. We suddenly see that the biosphere has a shockingly small physical size, that many important resources are finite, and that

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¹ Oliver Wendell Holmes, Jr., *The Path of the Law*, 10 HARV. L. REV. 457, 469 (1897).

² ALDO LEOPOLD, *A SAND COUNTY ALMANAC* 224–25 (Oxford University Press 1968) (1949).

³ MILLENNIUM ECOSYSTEM ASSESSMENT, *ECOSYSTEMS AND HUMAN WELL-BEING: SYNTHESIS 1* (2005), available at <http://www.millenniumassessment.org/documents/document.356.aspx.pdf>. The Millennium Ecosystem Assessment was an evaluation of the world's ecosystems and human well-being carried out between 2001 and 2005 under the auspices of the United Nations by over 2000 people, including 1360 experts from ninety-five nations. *Id.* at ii–ix.

⁴ See generally J.B. Ruhl, *Ecosystem Services and the Common Law of "The Fragile Land System,"* 20 NAT. RES. & ENV'T 3 (2005), available at <http://www.law.fsu.edu/faculty/profiles/ruhl/2005-FragileLandSystem20NREFall.pdf> (compiling literature on ecosystem services); Douglas A. Kysar, *Sustainability, Distribution and the Macroeconomic Analysis of Law* 42–45 (2001), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=268949 (discussing valuation of ecosystem services).

⁵ See EDWARD O. WILSON, *THE CREATION: AN APPEAL TO SAVE LIFE ON EARTH* 26–36, 62–69 (2006) (discussing the vital connection between the earth and the human race).

the Earth has a limited capacity to assimilate environmental damage. Our myriad and ever-multiplying increments of damage do not occur in isolation, but form a networked web of assaults each compounding the effects of the others, accumulating in both space and time.

Repeated reports from the broad scientific community have documented the mounting scale of our cumulative impacts on the global environment. They demonstrate that “global ecosystem services . . . are being degraded or used unsustainably.”⁶ They indicate that sustained human activities are now crossing thresholds of sudden irreversible changes. By some detailed estimates, humanity is overusing the ecological resources of the Earth and this overshoot is causing mounting ecological degradation.

And yet, we are torn over how we wish to live on the Earth. In part, we have a strong impulse to preserve and share it. As Roman law declared in 535 A.D.: “By the law of nature these things are common to mankind—the air, running water, the sea and consequently the shores of the sea.”⁷ But people also seek material wealth, and the right of individuals to own property has been enshrined as a universal right under the United Nations 1948 Declaration of Universal Human Rights.⁸ Competing for wealth, individuals and nations have long fought for possession and domination of the Earth. Some societies have learned to live on the land for extended periods, while others have not, instead collapsing with the loss of entire civilizations.⁹ As Aldo Leopold put it: “the oldest task in human history [is] to live on a piece of land without spoiling it.”¹⁰

In America, we feel these same warring impulses. Some of our institutions reflect our desire to preserve the Earth for all, such as our extensive public lands, the public trust doctrine of the common law, public ownership of wildlife, state constitutions that guarantee rights to a clean environment, the open access we still permit to many resources, and government environmental legislation. But we also have a strong tradition of private ownership of land, and we lionize the private accumulation of wealth derived from its exploitation and degradation.

The way we accommodate these competing interests is embodied in our law, especially the law of property. Through our property laws we specify both the rights of landowners to use their land for private purposes and their obligations to the community. Property laws (broadly defined to encompass all laws affecting how we live on the Earth, including liability and environmental law) provide powerful incentives and disincentives that shape how landowners and other economic actors behave toward each other, the public, and the land. To reshape how our society lives on the Earth, we will have to alter the laws of property and the system of incentives they provide.

Thinking through the structure of our property laws raises essential questions of law and government: what is the proper scope of private rights in land; what is the responsibility of private landowners to manage their lands for the good of the community; when should landowners be liable for damage they externalize to others; what responsibility do we each have to avoid actions that taken alone would cause no harm but contribute to a global ecological crisis; what is the proper role of government in regulating private behavior toward the Earth; is government the best steward of nature,

⁶ MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 3, at 1.

⁷ J. INST. 2.1.1, available at <http://www.fordham.edu/halsall/basis/535institutes.html>.

⁸ Universal Declaration of Human Rights, G.A. Res. 217A, art. 17, U.N. GAOR, 3d Sess., 1st plen. mtg., U.N. Doc A/810 (Dec. 12, 1948), available at <http://www.un.org/Overview/rights.html>.

⁹ See generally JARED DIAMOND, *COLLAPSE: HOW SOCIETIES CHOOSE TO FAIL OR SUCCEED* 18–19 (2005) (discussing “the comparative method to understand societal collapses to which environmental problems contribute”).

¹⁰ ALDO LEOPOLD, *Engineering and Conservation* [1938], in *THE RIVER OF THE MOTHER OF GOD AND OTHER ESSAYS BY ALDO LEOPOLD* 249, 254 (Susan L. Flader & J. Baird Callicott eds., 1991).

or are private owners more effective as they obey the dictates of the market in seeking private gain; and finally, to what extent are we, the living, responsible for the well-being of future generations?

The answers to these questions are not fixed under American government and law, for the Constitution neither defines nor guarantees any particular structure of property rights. Legal historians have shown that property rights have never been set in stone, and it can be surprising to realize just how malleable they have been over time. In fact, they have been continuously and sometimes dramatically modified through the centuries as our circumstances and social objectives have changed.

The starting premise of this Article is that under our system of democratic government through the rule of law, property law must serve the public welfare, and it is up to each generation to define that law for itself. When the nation was founded, property rights emphasized the obligation of landowners to do no harm to others, which served the public welfare by promoting a stable agrarian economy. But this system of property rights, suited to a pre-industrial age, was transformed during the nineteenth and twentieth centuries specifically and intentionally to promote the Industrial Revolution. The new structure of property law was grounded in a new vision of the public welfare, which presumed that industrial growth provided a net benefit to society even if it caused damage that would not have been permitted under the old law. This new structure of property rights for the industrial age established a preference for economic activity, and permitted environmental damage unless plaintiffs could show it was “unreasonable” in view of society’s desire for economic growth.

As we will see, the resulting legal structure, still with us today, envisions not only that the economy can grow forever, but also that the total scale of legally-justified damage to the Earth can grow forever as well. It was invented when the American continent seemed “empty.” Pollution sinks and resources were boundless, the atmosphere seemed infinite, and there always was another forest, another river, another fishery that could be sacrificed to the social priority of economic growth. This is the essential environmental problem with our modern property law: it promotes an economy that is permitted to inflict damage to the Earth, while containing no means of constraining cumulative environmental damage to a scale that is ecologically sustainable.

This problem infects our legal system’s two principal sources of evolving law: the common law, created by judges as they resolve private disputes; and legislative law. Throughout most of our history the common law has been the nation’s major source of property law. Indeed, the common law spearheaded the nineteenth-century transformation of our legal system, and its modern doctrines of negligence and nuisance established general principles of property law that remain widely applicable today. More recently, in response to the common law’s failure to address environmental destruction unleashed by the Industrial Revolution, government, especially the federal government, has enacted the modern environmental statutes. Even so, as we will see, most of this legislation was built around the same core structure as the modern common law. It generally harbors the same core presumption that economic activity provides a net social benefit, places the same burdens on efforts to control that activity, and is incapable of restraining the economy’s cumulative ecological damage to a sustainable scale.

Some federal laws and recent state and local laws take a more progressive approach by adopting environmental or health objectives uncompromised by immediate economic interests, restricting development in ecologically sensitive areas, and implementing the precautionary principle. However, it is socially corrosive for the political branches of government to attempt to implement a substantially different balance of social interests than does the common law. The U.S. Supreme Court’s takings jurisprudence has inflamed this divide by questioning legislation that creates more restrictions on landowners than those imposed by common law. This has encouraged property owners to view environmental legislation as invasions of their common law property rights—as efforts by government to take their property and give it to the public. This divide fuels the call for government to compensate property owners whenever

legislation diminishes the value of their property under existing property laws or imposes costs not required by those laws. Thus, our entire legal system, including both legislation and the common law, must be transformed to channel our economy into a new, ecologically-sustainable path.

My purpose here is to propose a specific new principle of law that would promote the social imperative of maintaining an ecologically-healthy, self-sustaining, and self-renewing biosphere. The essential step is to incorporate into the law a clear response to an inescapable fact of our current circumstances: the Earth has a finite capacity to sustain ecological damage, and by exceeding this capacity we diminish the welfare of both present and future generations. The law must incorporate new structures designed to restrain the total scale of ecological damage.

The specific new rule I propose is one of common law. I focus on the common law in part because it is of general and broad applicability and still constitutes society's most comprehensive expression of the proper resolution of property conflicts. The common law provides a straightforward way to identify the core structure that defines how we resolve these conflicts today, to understand the overarching system of economic incentives and disincentives generated by that structure, and then to specify how that structure must be altered to prioritize ecological interests. But my intent is that the principle embodied in this new rule be incorporated into legislation as well.

The realignment of property rights represented by this proposed new legal principle would be profound. Its effects would be equal in scope to the realignment that occurred in the nineteenth century, and equally wrenching to existing property owners. To justify and explain this new transformation, this Article proceeds as follows. Parts I through III are designed to accomplish three preliminary tasks. Part I explains the basis of my starting premise that under the American form of democratic government, each generation has the power and responsibility to restructure property rights so as best to further the public welfare. Part II examines briefly the structure of property rights during the pre-industrial age, comparing it with our current law to reveal just how adaptive property law has been in the past, and can yet be today. Part III examines in much more detail the structure of property rights of the industrial age to reveal specifically how it promotes economic activity and why it leads to environmental destruction.

Then, Part IV sets out the tort of "ecological degradation." This proposed new rule of property law represents an effort to build concretely on the work of many others who have proposed that the common law should place greater value on environmental interests. Part IV.B sets out the actual language of this new tort, including a definition of conduct that should be deemed unreasonable in view of our current circumstances. This new tort places the burden of proof on those whose conduct may contribute to ecological degradation and it specifies who should have standing to bring an action. Finally, it defines what is perhaps the key element for making this legal rule practicable: an affirmative defense to liability. This defense would be available to those who have no less damaging alternatives to their conduct and are vigorously seeking such alternatives.

It may be ambitious to think that a judge at common law might soon adopt the law exactly in the form I here propose. And yet, in our new circumstances, when the mounting scale of environmental damage has become ecologically unsustainable, we are going to need laws something like this tort of ecological degradation to live long and prosper on the Earth. My purpose is to explore the past evolution of law and our ability to reshape it again today, and to provide specific proposals that I hope will advance the development of a new law for the ecological age.

I. Under the American System of Government, Property Rights Must Promote the Public Welfare

This Part briefly discusses some principles of American property law, including its sources, its purpose, its relationship to the economy, and how it evolves. These principles inform and underpin the analysis in the following parts. A full discussion of these underlying principles is beyond the scope of this Article, but it will be helpful for the reader to see my starting premises.

Law in the New World was strongly influenced by English law and legal history, in which the crown, church, and parliament struggled for control of the law.¹¹ But when the United States was founded as an independent constitutional democracy of self-governing people, American law and government embarked on a new course, with an independent life and tradition of their own. American law became subject to democratic control and derived from the expressed will of the people.

Three American institutions specify the law: state and federal constitutions; state and federal legislation created by the political branches of government (and their implementing regulations); and state and federal common law created by judges as they resolve private disputes.¹² The founding document of the United States, the Constitution, sets forth the public purpose of American government:

We the People of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defense, *promote the general Welfare*, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America.¹³

Similar purposes to promote the public welfare animate the state governments under express provisions of state constitutions.¹⁴ And the driving force behind the common law is and has always been “*salus populi suprema lex est*: ‘the good of the people is the supreme law.’”¹⁵ Thus, American law is infused at all levels with the essential purpose of furthering the people’s welfare, and is answerable always to the democracy.¹⁶

¹¹ For a discussion of the history of English and early American property law, see JAMES W. ELY, JR., *THE GUARDIAN OF EVERY OTHER RIGHT: A CONSTITUTIONAL HISTORY OF PROPERTY RIGHTS* 10–25 (3rd ed. 2008); ERIC T. FREYFOGLE, *THE LAND WE SHARE: PRIVATE PROPERTY AND THE COMMON GOOD* 3–6, 45–63, 108–24 (2003).

¹² See, e.g., Justice Evelyn Keyes, *The Literary Judge: The Judge as Novelist and Critic*, 44 HOUS. L. REV. 679, 686 n.14 (2007) (discussing positive legal principles which include “the Constitution, statutes, rules, and case law”).

¹³ U.S. CONST. pmbl (emphasis added).

¹⁴ See, e.g., PA. CONST. art. 1, § 27 (“Pennsylvania’s public natural resources are the common property of all the people, including generations yet to come.”); see also Oliver A. Pollard, III, Note, *A Promise Unfulfilled: Environmental Provisions in State Constitutions and the Self-Execution Question*, 5 VA. J. NAT. RES. L. 351, 351 (1986) (“[S]tates have adopted broad constitutional provisions addressing environmental concerns.”).

¹⁵ See discussions of the historical role of this maxim in American law in FREYFOGLE, *supra* note 11, at 79–83; and in WILLIAM J. NOVAK, *THE PEOPLE’S WELFARE: LAW & REGULATION IN NINETEENTH-CENTURY AMERICA* 9–10, 35–50 (1996).

¹⁶ The American democracy exerts ultimate control over all three of the nation’s sources of law. The legislative and executive branches are subject to direct democratic control through the electoral process. The judiciary is either elected directly or appointed by the elected branches. Except for judicial interpretation of a constitution, the elected branches with legislation can overrule judicial decisions, including principles of common law. Even judicial interpretations of constitutions are ultimately subject to the democracy’s control over judicial elections and appointments, and the democracy can alter both the state and federal constitutions (though sometimes requiring a supermajority). Finally, within the federal government’s constitutionally enumerated powers, the Supremacy Clause, U.S. CONST. art. VI, cl. 2, permits the democratic will of the United States, as a whole, to preempt state laws. See Alexandra B. Klass, *Common Law and Federalism in the Age of the Regulatory State*, 92 IOWA L. REV. 545, 548, 566–79 (2007) (discussing

This same purpose underpins all American property law, including environmental and liability law.¹⁷ Historically, the right to private property has been justified by various theories rooted in ancient struggles for power between the church, the people, and their kings.¹⁸ In the United States, however, property is solely a creature of law. Property rights represent a grant to some people of wealth and power over others, and their enforcement requires the use of public power. Private property rights have long been viewed in the United States as a fundamental underpinning of liberty, and rightly so.¹⁹ But they have never been absolute, and comprise one interest that must be balanced with others. They exist subject to the needs of the whole community and solely according to law,²⁰ which must be grounded in the people's consent. As Professor Eric Freyfogle explains, under our democratic government, private property can be legitimately justified only as one component of a system conceived to advance the common good:

Property draws its philosophic justification from the common good, which means that the common good should supply the polestar for crafting property law. Individual liberty, vital and necessary though it is, enters the picture only to the extent that its recognition promotes the good of people generally.²¹

United States courts have recognized this principle since the beginning of the nation. In 1837, United States Supreme Court Chief Justice Roger Taney wrote for the Court: “While the rights of private property are sacredly guarded, we must not forget, that the community also have rights, and that the happiness and well-being of every citizen depends on their faithful preservation.”²² This was more fully explained in a famous opinion in 1851 by Lemuel Shaw, Chief Justice of the Supreme Judicial Court of Massachusetts, in upholding the power of Massachusetts to limit how far a private property owner could extend a pier into Boston Harbor:

We think it is a settled principle, growing out of the nature of well ordered civil society, that every holder of property, however absolute and unqualified may be his title, holds it under the implied liability that his use of it may be so regulated, that it shall not be injurious to the equal enjoyment of others having an equal right to the enjoyment of their property, nor injurious to the rights of the community. All property in this commonwealth . . . is derived directly or indirectly from the government, and held subject to those general regulations, which are necessary to the common good and general welfare.²³

environmental law and its relationship between federal and state law and between legislation and common law). Thus, there is no source of legal power in the United States that can permanently frustrate the democratic will of the people, as our system is intended to operate. *Id.*

¹⁷ For purposes of this Article, “property laws” include traditional rules governing ownership of property but also common law liability doctrines such as negligence and nuisance, state and federal environmental statutes, regulations and tax laws, and constitutional environmental rights, because all these laws together determine how we resolve conflicts between property and other interests and, ultimately, how we live on the land. *See generally* DANIEL H. COLE., *POLLUTION & PROPERTY: COMPARING OWNERSHIP INSTITUTIONS FOR ENVIRONMENTAL PROTECTION* 1–19 (2002) (outlining the relationship between environmental protection and property law, and discussing the complex typology of property regimes).

¹⁸ ELY, *supra* note 11; FREYFOGLE, *supra* note 11, at 4–5, 106–34, 204–07.

¹⁹ ELY, *supra* note 11, at 3–4, 26, 43.

²⁰ *Id.* at 4–9, 17–25, 33–41, 59–66; NOVAK, *supra* note 15, at 19–50.

²¹ FREYFOGLE, *supra* note 11, at 208; *see also* ELY, *supra* note 11, at 4, 25, 33 (discussing private property subject to the public good).

²² *Charles River Bridge v. Warren Bridge*, 36 U.S. (11 Pet.) 420, 548 (1837) (upholding a legislative charter for a new toll bridge over the objection of the owner of a pre-existing state-chartered bridge who claimed the competition from new bridge would reduce the value of his charter).

²³ *Commonwealth v. Alger*, 61 Mass. (7 Cush.) 53, 84–85 (1851); *see also* NOVAK, *supra* note 15, at 21 (showing that this famous passage was “firmly entrenched in the intellectual, political, and legal traditions of nineteenth-century America”); ELY, *supra* note 11, at 61 (explaining that few jurists questioned this power of the states to regulate property in the interests of the community).

James Kent, Chancellor of New York, viewed by some as one of the most “comprehensive American legal minds” and a staunch defender of private property, put it succinctly in 1826: “Private [property] interest[s] must be made subservient to the general interest of the community.”²⁴

The history of American property law reflects our judges’ abiding concern with the people’s welfare. It also reveals profound historical changes in their conception of how best to promote that welfare. This history reveals not just how we came to have the laws we have, but also just how malleable property laws have been over time. Recognizing this helps us to set ourselves free to imagine the legal institutions we need in our current circumstances, including those of the common law. Oliver Wendell Holmes, Jr. in 1897 urged judges and the people to embrace this freedom and responsibility:

It is revolting to have no better reason for a rule of law than that so it was laid down in the time of Henry IV. It is still more revolting if the grounds upon which it was laid down have vanished long since, and the rule simply persists from blind imitation of the past.²⁵

Another of our greatest justices, Benjamin Cardozo, similarly viewed the evolution of the law, including the common law, as a continual, experimental search for pragmatic rules that serve justice and the public welfare in view of changing circumstances.²⁶ Cardozo observed that property may be regulated for the common good, and that each generation must “work out for itself” what that regulation shall be: “new times and new manners may call for new standards and new rules.”²⁷

The views shared by Holmes and Cardozo also are shared by judges today, including current U.S. Supreme Court Justice Antonin Scalia. Justice Scalia acknowledges that common law judges are understood to “make” law rather than “discover” it as a somehow preexisting body of rules.²⁸ The job of common law judges, like the “great judges” (as he called Holmes and Cardozo), is to devise the “best rule of law,” the “laws that ought to govern mankind.”²⁹ Most fields of common law, including property and liability law, remain open to this judicial lawmaking, perhaps even more today than ever in Scalia’s estimation.³⁰ Is Justice Scalia troubled by this? Far from it: “I am content to leave the common law, and the process of developing the common law, where it is. It has proven to be a good method of developing the law in many fields—and perhaps the very best method.”³¹

As we consider the “best” rules of property for our circumstances, the U.S. Constitution provides us with no guidance as to what those rules should be. While the Constitution contains several provisions relating to property and economic concerns, including the Commerce Clause,³² the Contract Clause,³³ and the Fifth Amendment’s Takings

²⁴ NOVAK, *supra* note 15, at 9 (quoting and discussing JAMES KENT, COMMENTARIES ON AMERICAN LAW, 265 (New York, 1826)); *see also id.* at 50 (James Kent’s writings quoted and discussed); ELY, *supra* note 11, at 33 (“To newly independent Americans, respect for economic rights did not encompass unfettered liberty to use property in any manner. [The theory of republican government justified] subordinating private interests to the pursuit of public welfare.”).

²⁵ Holmes, *supra* note 1.

²⁶ BENJAMIN N. CARDOZO, THE NATURE OF THE JUDICIAL PROCESS 21–32, 112–19 (Yale University Press 1949) (1921).

²⁷ *Id.* at 87–88.

²⁸ ANTONIN SCALIA, A MATTER OF INTERPRETATION: FEDERAL COURTS AND THE LAW 10 (1997).

²⁹ *Id.* at 7, 9.

³⁰ *Id.* at 12.

³¹ *Id.*

³² U.S. CONST. art. I, § 8, cl. 1.

³³ *Id.* art. I, § 10, cl. 2.

Clause,³⁴ it does not define property and does not establish any general right to any particular property interest.³⁵ Just as the Constitution neither creates nor protects any particular property right, as it does so many other rights, it does not provide any particular vision of what structure of property rights would best serve the public welfare. It does not allocate property rights between public and private ownership. It sets forth no particular way to balance property rights with other important competing components of the public welfare. It does not prioritize private property in relation to public health or the environment. Those decisions are left to Congress and, most importantly, the States, the common law, and ultimately, democracy. Under the Constitution, then, it falls to each generation of Americans to define democratically the public welfare and develop a structure of property laws that will best serve it.

In thinking through our property laws, we must recognize that law is *antecedent* to the economy.³⁶ Law does not spring from the economy itself. Rather, law, especially property law, forms the foundation of the economy, the infrastructure within which economic actors operate.³⁷ By prioritizing various interests and specifying how conflicts between them should be resolved, law provides a system of incentives and disincentives, the rules of competition, that shape what economic actors do as they maximize their own gain.³⁸ Viewing property laws as restraints on liberty is nearly always an incomplete and one-sided view, for even as they restrain one interest, they simultaneously liberate another. Liberty is implicated on both sides of all property laws.³⁹ To take one example, just as pollution control laws restrain industry from externalizing pollution, they liberate polluted communities from its unwanted burdens.⁴⁰

By changing the system of economic incentives and disincentives, new legal rules can change what the economy determines is best to produce and how to produce it. But whether such changes are good or bad must be determined from a perspective outside the economy itself—from a perspective rooted in ethics, social justice, our current reality, and a vision of how the general welfare is best promoted.⁴¹

Some economists and lawyers insist otherwise, starting with the existing market and then judging proposed new property rules by calculating whether they would produce net economic benefits. Lawyers from the school of “law and economics” even seek to explain property laws including liability rules as following from the dictates of economic

³⁴ *Id.* amend. V (barring the federal government from taking private property for a public use without just compensation); *id.* amend. XIV, § 1 (applying the Fifth Amendment to the states: “nor shall any State deprive any person of life, liberty, or property, without due process of law”).

³⁵ See ELY, *supra* note 11, at 42–58 (describing generally procedural constitutional provisions relating to property). While it is clear that property interests are created only by sources of law other than the Constitution, some commentators find merit in the notion that the U.S. Supreme Court should develop a “patterning definition” of what attributes a right must have to qualify as a property right for purposes of the Fifth Amendment’s Takings Clause, but even this the Court has not done. See DAVID A. DANA & THOMAS W. MERRILL, PROPERTY: TAKINGS 58–85 (2002).

³⁶ This discussion relies heavily on the work of economist Daniel W. Bromley, who has discussed in depth the pervasive role of legal and other social institutions (especially including property rights) in shaping the market economy (even supposedly “free markets”), challenged the characterization of laws as “constraints,” and shown how transformation of law results from political and legal processes that are grounded in human values and concerns that are outside of market-guided economic behavior. See DANIEL W. BROMLEY, SUFFICIENT REASON: VOLITIONAL PRAGMATISM AND THE MEANING OF ECONOMIC INSTITUTIONS 3–84 (2006); see also TOM BETHELL, THE NOBLEST TRIUMPH: PROPERTY AND PROSPERITY THROUGH THE AGES 3, 13, 314, 319–20 (1998) (concluding that law is “antecedent to economy” and determines economic behavior).

³⁷ *Id.*

³⁸ *Id.*

³⁹ DANIEL W. BROMLEY, *supra* note 36, at 31–34, 37–38, 54–62, 75–76, 80–83.

⁴⁰ *Id.* at 12, 59, 65–66.

⁴¹ *Id.* at 34–41, 119–21.

efficiency.⁴² The central flaw in this approach to law is that what the existing economy calculates to be “economically efficient” to produce is determined always by reference to the rules that already exist.⁴³ Granting such an initial preference to the existing market economy can only result in justifying the very economic behavior that is already being judged economically efficient according to existing institutions. Defining the “best” laws as those that maximize the existing economy is an exercise in circular reasoning that can only validate and enhance the power of the status quo, and that indeed is its likely purpose.⁴⁴

Thus, we cannot look to the existing economy to generate on its own new principles for prioritizing interests or resolving conflicts between them. Abolition of slavery and child labor, for example, obviously threatened established economic interests. The nation was driven to take those steps not to make the economy more efficient, but to further an evolving national vision of social justice.

Some progressive economists have decried the excessive ecological destruction being wrought by our current economy and suggested concepts for its restructuring. For example, Herman Daly has urged that we must incorporate into our economy some means for containing the scale of “throughput” and for more equitably distributing its benefits.⁴⁵ Paul Hawken, Amory Lovins, and L. Hunter Lovins have proposed new principles of “Natural Capitalism” for treating nature as a form of capital that is finite, valuable, and irreplaceable, recognizing that not all resources are substitutable by the accumulation of other forms of wealth, and preserving and investing in such natural capital.⁴⁶ Thomas Princen has suggested that we reorganize our economic activity around the principle of “sufficiency,” whereby we accept the benefits that the Earth can provide us over the long-term as sufficient for us to live on.⁴⁷

But principles of behavior such as these are not going to arise out of the economy. If we wish to align our economic behavior with the Earth’s ecological realities, we must explicitly adopt this social goal and then restructure our property laws so that they will provide economic actors with the incentives to behave as we wish them to. Individuals are sometimes able to resist the economic incentives provided by the law and to adopt their own ethical relationships with the land. But if we wish to reshape how our entire society lives on the Earth, we will have to alter our laws of property.

When the legal system alters property rights, the social transformations are wrenching for those caught up in them. Though many gain when laws are altered for the common good, some lose vast property rights in the process. Slave owners lost “property” when slavery was abolished, men lost property rights in their wives’ estates as the status of women changed, and others experienced profound losses when “the states abolished feudal tenures, abrogated primogeniture and entails, ended imprisonment for debt,” and reduced other traditional and ancient rights.⁴⁸ Many Americans lost extensive property rights as nineteenth-century common law altered liability rules to accommodate the industrialization of the nation.⁴⁹

⁴² See, e.g., WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF TORT LAW* 1 (1987) (explaining that tort law illustrates effort by judges to promote economic efficiency).

⁴³ BROMLEY, *supra* note 36, at 44–50, 54–66, 67–71, 199–211.

⁴⁴ *Id.* at 10–13; see also BETHELL, *supra* note 36, at 314, 319–20 (criticizing the law-and-economics view that economic efficiency can drive creation of just rules of property).

⁴⁵ HERMAN E. DALY, *BEYOND GROWTH* 32 (1996); see also Kysar, *supra* note 4, at 20–51 (reviewing calls in literature for constraints on scale, redistribution, and other principles of ecological economics).

⁴⁶ PAUL HAWKEN ET AL., *NATURAL CAPITALISM* (1999).

⁴⁷ THOMAS PRINCEN, *THE LOGIC OF SUFFICIENCY* (2005).

⁴⁸ Joseph L. Sax, *Property Rights and the Economy of Nature: Understanding Lucas v. South Carolina Coastal Council*, 45 *STAN. L. REV.* 1433, 1447–48 (1993).

⁴⁹ See *infra* Part III.A.

Though some may feel such losses are unjust and more than they should rightly bear, our general rule has been that such losses do not generate a right of compensation, and must be borne as society readjusts the balance of interests in pursuit of the public welfare.⁵⁰ Accordingly, we recognize no property right in any particular rule of the common law that could serve as the basis of a claim for compensation when that law is changed.⁵¹ We do not compensate losses caused by legislation, unless they amount to a taking under the Constitution's Fifth Amendment.⁵² As the U.S. Supreme Court put it:

Under our system of government, one of the State's primary ways of preserving the public weal is restricting the uses individuals can make of their property. While each of us is burdened somewhat by such restrictions, we, in turn, benefit greatly from the restrictions that are placed on others. These restrictions are "properly treated as part of the burden of common citizenship." Long ago it was recognized that "all property in this country is held under the implied obligation that the owner's use of it shall not be injurious to the community," and the Takings Clause did not transform that principle to one that requires compensation whenever the State asserts its power to enforce it.⁵³

Recognizing all such claims whenever the law is altered would impede the development of the law, including the common law, in its effort to serve the people's welfare and respond to the evolving understanding of justice. It would reduce the incentives for people to look ahead of the law and adapt to changing circumstances. It would lock our society into the structure of a fixed time and circumstances and defeat the very evolution our legal system is designed to undergo.⁵⁴

With these principles of American government and law in mind, let us turn to American property law as it was structured when the United States was founded. As Part II shows, early American property law was suited to a pre-industrial society in which population was low and the Earth's resources were plentiful.

II. Property Rights and the Public Welfare in the Pre-Industrial Age

When the Constitution was ratified in 1789, the United States was a country of less than four million people with an essentially agrarian economy. To Americans, the new continent seemed boundless. Thomas Jefferson and many others advocated widespread land ownership to promote individual economic independence and civic order, and believed that states should grant land to all citizens who were thought to have a right to acquire property.⁵⁵ As Jefferson saw it, "The earth is given as a common stock for man to labour and live on."⁵⁶ North America's vast expanses of pristine forest, prairies, wetlands, and mountains, though long inhabited and lived upon, were regarded widely by society and by the courts as a wilderness full of "vacant" and "worthless" lands that cried out to be "settled," "cultivated," "subdued," and

⁵⁰ See, e.g., Sax, *supra* note 48, at 1449–51 (discussing the general rule that loss of property rights due to legal evolution does not generate a right to compensation).

⁵¹ *Munn v. Illinois*, 94 U.S. 113, 134 (1877) ("A person has no property, no vested interest, in any rule of the common law.").

⁵² U.S. CONST. amend. V, amend. XIV, § 1.

⁵³ *Keystone Bituminous Coal Ass'n v. DeBenedictis*, 480 U.S. 470, 491–92 (1987) (citations omitted); see also *id.* at 488 n.18 (summarizing 100 years of case law and concluding "the Court has repeatedly upheld regulations that destroy or adversely affect real property interests").

⁵⁴ See Sax, *supra* note 48, at 1449–51 (discussing reasons for the general rule that loss of property rights due to legal change does not generate a right to compensation).

⁵⁵ See generally Stanley N. Katz, *Thomas Jefferson and the Right to Property in Revolutionary America*, 19 J.L. & ECON. 467, 469–70 (1976).

⁵⁶ *Id.* at 480 (quoting Jefferson letter dated Oct. 28, 1785).

“improved.”⁵⁷ American policy was to transfer this government-claimed wilderness to private owners who would make it useful.⁵⁸ And so, Americans hungry for land set out to settle the territory claimed (whether legitimately or not) by the new nation.

Property laws reflected these circumstances and social outlook. Early American law protected the right of landowners to be personally secure from invasions; to use their land economically; to clear and cultivate it; and to otherwise put it to what was considered its ordinary, natural, and primarily agrarian use.⁵⁹ The social commitment to the use of land led to legal restrictions on aggregation by speculators of undeveloped land and to laws designed to force landowners who did not cultivate their lands to relinquish them to the state.⁶⁰ The law permitted the public to use privately owned lands for subsistence if the lands were unenclosed and uncultivated.⁶¹ As long as they did not interfere with the owner’s actual use, the public could freely enter private land to hunt, fish in navigable waters, trap, and forage for lumber, berries, fruit, flowers, nuts, and herbs.⁶² As the South Carolina Supreme Court explained in 1818, even if privately owned, “[t]he forest was regarded as a common” that hunters were privileged to enter at their pleasure and need not depart even if asked to do so by the owner.⁶³ Similarly, the public retained certain rights in navigation, fishing, and recreation along the seashore and in tidal and running waters that were protected from undue interference by private landowners by common law courts under the public trust doctrine.⁶⁴

Despite America’s abundance of land, small population, and low-impact economy, conflicts between private rights and the public interest did arise. From the beginning, American government had the power to regulate private land uses in the public interest, and it did so frequently.⁶⁵ But the most important institution for resolving property conflicts was the common law. For centuries in both England and America, the core legal structure defining the contours of private property rights was the frequently invoked common law maxim, “*sic utere tuo ut alienum non laedas*” (“use

⁵⁷ John G. Sprankling, *The Antiwilderness Bias in American Property Law*, 63 U. CHI. L. REV. 519, 530–32 (1996) (documenting the widespread view of both state and federal judges at the turn of the nineteenth century that wilderness was essentially valueless land that should be brought under cultivation).

⁵⁸ *Id.* at 529–30.

⁵⁹ *Id.* at 521–56 (describing early American common law and alterations from traditional English law designed to promote exploitation of wilderness); ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 62–66 (5th ed. 2006) (describing early common law); MORTON J. HORWITZ, THE TRANSFORMATION OF AMERICAN LAW 1780–1860, at 31–34 (1977).

⁶⁰ ELY, *supra* note 11, at 17–18; see FREYFOGLE, *supra* note 11, at 52–55 (explaining how the idea that all citizens have “the right to acquire land on reasonable terms” underlies early anti-hoarding laws in New York, Virginia, and North Carolina).

⁶¹ For a discussion of early public rights in private land, see FREYFOGLE, *supra* note 11, at 22–24, 255–56.

⁶² *Id.*

⁶³ See FREYFOGLE, *supra* note 11, at 255 (quoting and discussing *M’Conico v. Singleton*, 9 S.C.L. (2 Mill) 244 (S.C. 1818)); see also Sprankling, *supra* note 57, at 553 n.183 (compiling hunting cases).

⁶⁴ Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471, 475–90 (1970).

⁶⁵ See *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1056–60 (1992) (Blackmun, J., dissenting) (compiling references demonstrating extensive early American land use regulation). Scholars have extensively documented what often seems to us today to be a surprising amount of early American land use and economic regulation designed to both prevent harm and promote social objectives in land management. See ELY, *supra* note 11, at 17–25; FREYFOGLE, *supra* note 11, at 58–63 (explaining how the idea that “an owner’s right to use land and the corresponding power of government to control that use” led to “a vigorous tradition of regulating land uses in the public interest”). See generally John F. Hart, *Colonial Land Use Law and Its Significance for Modern Takings Doctrine*, 109 HARV. L. REV. 1252 (1996) (“[C]olonial legislators believed that it was a legitimate use of government power to promote the public good by restricting the right of private landowners to use their land as they saw fit.”).

your own so as not to injure another”).⁶⁶ As the eighteenth-century legal commentator William Blackstone put it, a neighbor was expected not to interfere with another’s quiet enjoyment of his or her land because “it is incumbent on [a neighboring owner] to find some other place to do that act, where it will be less offensive.”⁶⁷

The principle of *sic utere tuo* imposed a rule of strict liability without regard to the social utility of the interfering activity or whether the actor was somehow at fault.⁶⁸ None of this was relevant, as the New York Court of Appeals explained in 1849 in a case where the defendants damaged a home while building a nearby canal:

If the plaintiff’s [damage occurred], the inconvenience to him would be the same whether the [damage was] by accident or design, with an intent to injure him or from an anxious wish to preserve his property. The actual damage to the plaintiff would be the same whatever might be the motive for the act which caused it.

How the defendants performed their work was in this view of no consequence: what they did to the plaintiff’s injury was the sole question.⁶⁹

Thus, the liability rule of *sic utere tuo* was built on the core presumption that damage to property was highly undesirable and should be discouraged. It was a legal rule that strongly motivated economic actors to avoid projects that would damage their neighbors, for the law left little doubt that they would be held liable for that damage. Though this rule restrained landowners from undertaking damaging projects, it was also a source of property rights that freed landowners from the burden of being damaged by others and ensured all landowners the right of private enjoyment of their land without interference. The balance of interests struck by *sic utere tuo*, a guiding principle of the economy, was one of comity and of justice, well-suited to the priorities of ensuring individual privacy and stabilizing the economy by protecting settled agrarian land uses from disruption.⁷⁰ The principle of *sic utere tuo* functioned as the law’s essential principle for adjudicating liability and, together with the law’s overarching goal of *salus populi suprema lex est* (“the welfare of the people is the supreme law”), formed the common law’s “blueprint,” its fundamental property rights structure for governing the pre-industrial economy.⁷¹

However, while it restrained landowners from altering nature in ways that would damage neighbors, *sic utere tuo* was concerned essentially with people’s direct effects on each other and did not protect the environment for its own sake. Indeed, when transplanted to America, the strict liability imposed by *sic utere tuo* encouraged people to seek out, as

⁶⁶ HORWITZ, *supra* note 59, at 32; NOVAK, *supra* note 15, at 42–50 (explaining the broad applicability of *sic utere tuo*); FREYFOGLE, *supra* note 11, at 67–69 (noting the importance of *sic utere tuo* as reflected in a New York case from 1805 where the majority observed “that the ‘no harm’ rule was ‘a familiar maxim’ of property law”). The common law did contain many procedural formalities and a variety of other complex property rules, but these were of comparatively narrow applicability. See Sprankling, *supra* note 57, *passim* (discussing waste, adverse possession, possession as notice to purchaser, and good faith improver doctrines); HORWITZ, *supra* note 59, at 32–74 (discussing prescription, waste, and just compensation); W. PAGE KEETON ET AL., PROSSER AND KEETON ON TORTS §§ 6, 28, 86 (West 5th ed. 1984) (outlining historical procedures and forms of action).

⁶⁷ SIR WILLIAM BLACKSTONE, 3 COMMENTARIES ON THE LAWS OF ENGLAND 217–18 (Univ. of Chicago Press 1978) (1768).

⁶⁸ HORWITZ, *supra* note 59, at 70, 85; FREYFOGLE, *supra* note 11, at 69–70.

⁶⁹ *Tremain v. Cohoes Co.*, 2 N.Y. 163, 164 (1849); see *Hays v. Cohoes Co.*, 2 N.Y. 159, 162 (1849) (stating additional facts); see also *Susquehanna Fertilizer Co. v. Malone*, 20 A. 900, 902 (Md. 1890) (holding that the fertilizer company must pay damages for air pollution because “[t]he neighboring owner is entitled to the reasonable and comfortable enjoyment of his property, and, if his rights in this respect are invaded, he is entitled to the protection of the law, let the consequences be what they may”).

⁷⁰ HORWITZ, *supra* note 59, at 31–32, 70 (identifying cases and discussing the broad economic impact of *sic utere tuo*).

⁷¹ *Id.*; NOVAK, *supra* note 15, at 42–50 (explaining how *sic utere tuo* and *salus populi* governed the preindustrial economy).

Blackstone recommended, distant and unsettled wilderness territory where they could more freely work their land and subdue nature without troubling any neighbors.⁷²

As settlers moved into the nation's seemingly boundless lands, their goal was to cultivate the wilderness, and the law encouraged and enabled them to do so. We look back and see that "pioneer settlers destroyed forests, denuded prairies, drained wetlands, and plowed deserts as the centuries proceeded," resulting in the destruction of most of America's original "wilderness lands."⁷³ But we can also understand the settlers' behavior as reflecting a pre-industrial conception of how s in any way that caused damage to their neighbors or interfered with public rights to navigation and fishing, and they were required to make their unused best to use the Earth. While land was made available to private owners for their dominion, landowners were forbidden from using their land lands openly available to the public for subsistence.

In the industrial age to come, however, land uses would intensify, and conflicts would mount between neighbors as well as between private property owners and the public interest. The traditional legal principle of *sic utere tuo* would be rethought and, in the end, all but swept away.

III. Property Rights and the Public Welfare in the Industrial Age

The rise of the Industrial Revolution as a dominating social force in the eighteenth and nineteenth centuries brought with it the new idea that the public welfare could best be promoted by encouraging industrial growth. This resulted in a profound restructuring of our property law and the system of economic incentives and disincentives it provides.

This part examines in detail how American property laws were altered to promote economic growth, why the modern structure of the law is leading inexorably to the cumulative environmental destruction we see all around us, and why it is no longer appropriate in view of our current circumstances. Part III.A first examines the structure of the core liability doctrines of the common law, negligence and nuisance, and traces three major implications of that structure. The Article then examines how many of the federal environmental laws mirror the structure of these common law doctrines (Part III.B), shows how the failure of the common law to evolve is impeding legislatures from adopting more progressive legislation (Part III.C), and, finally, considers the claims of property rights activists that the solution to our environmental problems lies in altering who owns the land (Part III.D). Then, Part IV will propose a new principle of law for the ecological age, embodied in the tort of ecological degradation.

A. The Pro-Economic-Growth Structure of the Modern Common Law

The Industrial Revolution's dams, mills, factories, and canals used land with increasing intensity, causing damage that more and more frequently extended to neighboring, increasingly populated lands. Sometimes things went wrong, causing fires, floods and explosions, while pollution and other kinds of damage were inherent in the activities themselves. The pre-industrial common law imposed strict liability for many of these impacts, and the cost of this liability threatened many of the new industries that were arising.⁷⁴ As these conflicts reached the courts, judges began to struggle with the idea that perhaps this disruptive industrial activity was nevertheless desirable, and it might promote the public good even though it damaged the lands of neighbors.

⁷² BLACKSTONE, *supra* note 67, at 217–18; *see also* Sprankling, *supra* note 57, at 555–56 ("American courts often refused injunctive protection for wilderness lands, reasoning that they were essentially valueless."); HORWITZ, *supra* note 59, at 75.

⁷³ Sprankling, *supra* note 57, at 530. Only 10%–20% of America's original wilderness lands remain. *Id.* at 559–63.

⁷⁴ HORWITZ, *supra* note 59, at 67–71, 74–75, 85, 101–02.

Historians identify *Palmer v. Mulligan* as the first American case to openly promote this radical new way to think about liability.⁷⁵ The 1805 case arose when the defendants built a new sawmill on the Hudson River that altered the river's flow and otherwise complicated the operation of the plaintiffs' sawmill, which had been in place 200 yards downriver for several decades.⁷⁶ The two dissenting justices found the case an easy one under the prevailing law:

The defendants have clearly . . . no right to obstruct the plaintiffs in the enjoyment of the water. They have an equal right to build a mill on their soil, but they must so use the water, and so construct their dam, as not to annoy their neighbor below in the enjoyment of the same water.⁷⁷

But the three-judge majority was not so sure. Justice Brockholst Livingston acknowledged for the majority that application of the “familiar maxim” of *sic utere tuo* would indeed protect the downriver mill and probably eliminate the upriver mill.⁷⁸ He was concerned, however, that this would effectively grant the first mill owner an exclusive right to a large portion of the Hudson and deprive the public of the “benefit which always attends rivalry and competition.”⁷⁹ Justice Livingston sought instead to take into account the rights of all landowners, not just the first, to use their property and also the wider public's economic interest in having all landowners use their land productively.⁸⁰ He concluded that society would be best served if the downstream mill owners suffered the damage, articulating a new legal standard for liability: “the maxim *sic utere tuo ut alienum non laedas* should be limited to such cases only where a manifest and serious damage is the result of such use or enjoyment.”⁸¹

This decision is considered the first time the American legal system allowed an enterprise to damage a neighboring landowner without paying compensation based on an explicit consideration of the relative economic efficiencies of competing uses of land.⁸² However, the problem of exactly how to balance the interests, of defining a new legal test to determine when landowners should be liable for damage they did, was difficult and would remain unsettled for many years. The test articulated by Justice Livingston was a simplistic one that focused only on whether the damage was “manifest and serious” without explicitly articulating or balancing the interests Livingston was concerned with, and could not be applied in a principled or predictable way. Many courts refused to follow *Palmer v. Mulligan*, and even decades later prominent commentators and judges found it “manifestly unjust” and “certainly contrary” to established law.⁸³ Not until after the Civil War would many judges begin to seriously consider whether the benefits of a defendant's actions should excuse liability.⁸⁴

Scholars have tracked the long, convoluted, and uneven path by which the common law incorporated a balancing of economic interests into its liability.⁸⁵ The transformation was not complete until well into the twentieth

⁷⁵ FREYFOGLE, *supra* note 11, at 66–69 (discussing the importance of the case); HORWITZ, *supra* note 59, at 2–3, 37–38; *see also* *Palmer v. Mulligan*, 3 Cai. 307, 307 (N.Y. Sup. Ct. 1805) (allowing detriment to a downstream saw mill).

⁷⁶ *Palmer*, 3 Cai. at 307.

⁷⁷ *Id.* at 320.

⁷⁸ *Id.* at 313–14.

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ *Id.* at 314.

⁸² HORWITZ, *supra* note 59, at 38.

⁸³ *Id.*

⁸⁴ *Id.* at 37–40, 85–108.

⁸⁵ *See id.* at 63–108 (recounting the history of the transformation from *sic utere tuo* to modern negligence and nuisance law); FREYFOGLE, *supra* note 11, at 65–77; RESTATEMENT (SECOND) OF TORTS § 822 cmt. b (1965) (summarizing historical development of

century, more than one hundred years after *Palmer v. Mulligan*. The resulting modern common law, in the core doctrines of negligence and nuisance, has almost completely abandoned the old principle of strict liability.⁸⁶ Following the lead of *Palmer v. Mulligan*, the new law now permits landowners not only to degrade their own lands, but often also to externalize the consequences of their activities by damaging neighboring lands.

The most crucial step in this transformation was that judges came widely to accept Justice Livingston's belief that industrial activity generally produces a net social benefit despite the damage it causes⁸⁷ and further, society would be better off if everyone tolerated this damage rather than remain mutually undisturbed in the quiet enjoyment of their land. Judges did not reach this conclusion about economics and the social good through detailed calculation of all the social costs and benefits or quantitative economic analysis of any kind.⁸⁸ They simply adopted the passionate belief in industrialization that was widespread in American society. The optimism of the times was expressed in 1873 by the New York State Court of Appeals in a case holding that the defendants were not liable for damage their exploding boiler caused to a neighbor's property:

The general rules that I may have the exclusive and undisturbed use and possession of my real estate, and that I must so use my real estate as not to injure my neighbor, are much modified by the exigencies of the social state. We must have factories, machinery, dams, canals and railroads. They are demanded by the manifold wants of mankind, and lay at the basis of all our civilization. [The damaged neighbor] receives his compensation . . . by the general good, in which he shares, and the right which he has to place the same things upon his lands.⁸⁹

In *Pennsylvania Coal Co. v. Sanderson*, the Pennsylvania Supreme Court expressed a similar concern with the traditional common law liability rules when it decided to allow a coal mine to pollute a stream, thereby rendering it unfit for use by a downstream property owner for fresh water, fish, ice, and other domestic purposes.⁹⁰ The court did not allow Mrs. Sanderson to recover money damages, fearing that if all similarly injured landowners were able to recover damages and perhaps injunctions, the state's coal industry would not survive, to the wider public's detriment.⁹¹ In the court's view, the better law was that "the rightful use of one's own land may cause damage to another without any legal wrong"⁹² and the better policy was that "[t]o encourage the development of the great natural resources of a country trifling inconveniences to particular persons must sometimes give way to the necessities of a great community."⁹³

Responding to this ascendant view of the social value of economic growth, judges developed new legal rules that would promote industrialization rather than impede it. They formally replaced the core presumption implemented by *sic utere tuo*, that defendants should pay for the damage they do, with a new core presumption that was precisely its opposite: that defendants should not pay compensation for damage they do to others. In his famous 1881 treatise, *The*

nuisance law); Sprankling, *supra* note 57, at 521 (discussing how American alternation in common law doctrines of adverse possession, waste, good-faith improver, and trespass also contributed to wilderness destruction).

⁸⁶ See John C. P. Goldberg & Benjamin C. Zipursky, *The Moral of Macpherson*, 146 U. PA. L. REV. 1733, 1754 (1998) (discussing how Holmes "argued that modern common law generally rejected strict liability").

⁸⁷ See, e.g., *Platt v. Johnson & Root*, 15 Johns. 213 (N.Y. Sup. Ct. 1818) (citing Justice Livingston).

⁸⁸ *Id.*

⁸⁹ *Losee v. Buchanan*, 51 N.Y. 476, 484–85 (1873).

⁹⁰ *Pa. Coal Co. v. Sanderson*, 6 A. 453, 462–65 (Pa. 1886).

⁹¹ *Id.* at 455–56.

⁹² *Id.* at 457.

⁹³ *Id.* at 459.

Common Law, Oliver Wendell Holmes, Jr., concisely explained both the new confidence in economic activity and the rationale for a legal rule insulating it from liability:

A man need not, it is true, do this or that act—the term *act* implies a choice—but he must act somehow. Furthermore, the public generally profits by individual activity. As action cannot be avoided, and tends to the public good, there is obviously no policy in throwing the hazard of what is at once desirable and inevitable upon the actor.⁹⁴

Judges still faced the difficult task of developing a new test for when a defendant would be liable. The test needed to be more workable than Justice Livingston’s and effectively balance the various competing interests. They focused not simply on the severity of damage, as had Justice Livingston, but on defining when the defendant could be said to be at “fault.”⁹⁵ The general concept of “fault” had long been known in the law. But in the nineteenth and twentieth centuries, judges developed a detailed concept of fault-based liability that now lies at the core of the common law.⁹⁶

Under the modern common law’s central liability doctrine, defendants are now liable only when they are “negligent.”⁹⁷ Negligence is defined as conduct that creates an “unreasonable” risk of harm.⁹⁸ “Unreasonable” is defined not in ethical or moral terms, but explicitly as a cost–benefit principle:

Where an act is one which a reasonable man would recognize as involving a risk of harm to another, *the risk is unreasonable and the act is negligent if the risk is of such magnitude as to outweigh what the law regards as the utility of the act* or of the particular manner in which it is done.⁹⁹

This rule is worthy of close examination, for within its structure can be found the balance of social interests that the law seeks to implement. The key elements are: (1) who bears the burden of proof, (2) the facts that the party bearing the burden of proof must establish, and (3) the certainty with which those facts must be established. Defendants are presumed not liable, and plaintiffs carry the burden of proof to show that defendants were negligent.¹⁰⁰ To carry this burden, damaged plaintiffs must generally prove that the defendant could have taken a step to prevent the damage that was “reasonable” under a cost–benefit analysis.¹⁰¹ To do this, plaintiffs usually must identify the cost-effective measure that the

⁹⁴ OLIVER W. HOLMES, JR., *THE COMMON LAW* 95 (Dover Publications 1991) (1881).

⁹⁵ See *id.* at 77–129 (discussing the history of liability based on fault and strict liability); cf. HORWITZ, *supra* note 59, at 85–108 (explaining that before the nineteenth century, fault was used in relatively few and limited causes of action, and calling its detailed elaboration as the central principle of modern liability law the “triumph of negligence”).

⁹⁶ HORWITZ, *supra* note 59, at 85–108.

⁹⁷ RESTATEMENT (SECOND) OF TORTS § 281 (1965) (providing a typical statement of the rule of negligence that now applies in all fifty states).

⁹⁸ *Id.* § 282; see also KEETON ET AL., *supra* note 66, § 30, at 164–65 (noting that negligence requires failure to protect against “unreasonable risks”).

⁹⁹ RESTATEMENT (SECOND) OF TORTS § 291 (emphasis added); KEETON ET AL., *supra* note 66, at 173 (“[T]he standard of conduct which is the basis of the law of negligence is usually determined upon a risk-benefit form of analysis: by balancing the risk, in the light of the social value of the interest threatened, and the probability and extent of the harm, against the value of the interest which the actor is seeking to protect, and the expedience of the course pursued.”).

¹⁰⁰ RESTATEMENT (SECOND) OF TORTS § 382A, cmt. a (stating that in a negligence action a plaintiff carries the burden of proof by preponderance of the evidence).

¹⁰¹ KEETON ET AL., *supra* note 66, at 173.

defendant should have adopted, such as installing a guardrail or scrubbing a waste stream. Plaintiffs must establish these facts by a preponderance of the evidence, meaning that plaintiffs must show they are more likely true than not.¹⁰²

In addition to revising the law of negligence, judges also altered the law of “nuisance.” This is the core environmental tort, the common law’s central doctrine for recognizing people’s rights to enjoyment and use of land, including economic, aesthetic, and recreational uses.¹⁰³ Nuisance is the common law’s primary vehicle for addressing virtually all environmental issues, including land uses as well as air, water, land, and groundwater pollution. Modern nuisance places the burden of proof on plaintiffs—who must have a recognized interest in the land—to prove by a preponderance of the evidence that the defendant’s intentional acts are “unreasonable.”¹⁰⁴ As in negligence, “unreasonable” is defined explicitly by a cost–benefit test:

[a]n intentional invasion of another’s interest in the use and enjoyment of land is *unreasonable* [and therefore a nuisance] if

(a) *the gravity of the harm outweighs the utility of the actor’s conduct . . .*¹⁰⁵

Thus, the central liability doctrines of the modern common law harbor at their core the presumption that economic activity provides a net benefit to society, and impose liability only where damaged plaintiffs can prove this presumption false by showing that the costs of a particular action outweigh its benefits. This structure does not just allow defendants to avoid liability by proving that their conduct provides a net public benefit. It installs the presumption of net benefit as the starting point of the law, and requires plaintiffs to prove it false before the law will act of their behalf.

Judges did not stop there, but elaborated many other provisions in transforming the liability rules of the common law. Indeed, the law of negligence and nuisance now constitutes a substantial intellectual edifice defining what it means to be at “fault.”¹⁰⁶ Many of these provisions impose substantial additional legal burdens on plaintiffs, which serves to further insulate economic actors from liability. These include requiring proof that a defendant had a legal “duty” to protect the plaintiff from unreasonable risk, that the harm was reasonably “foreseeable” at the time of the defendant’s

¹⁰² RESTATEMENT (SECOND) OF TORTS § 328A (1965).

¹⁰³ GERALD W. BOSTON & M. STUART MADDEN, LAW OF ENVIRONMENTAL AND TOXIC TORTS 38 (1994).

¹⁰⁴ See RESTATEMENT (SECOND) OF TORTS § 822(b) (1965) (explaining that nuisance liability can also be imposed for “unintentional” conduct, but only where it also falls under other common law rules imposing liability for negligence, reckless conduct, or abnormally dangerous activities). Thus, nuisance liability for “unintentional” conduct is essentially liability under these other common law doctrines, where an interest in land is involved. Accordingly, herein, “nuisance” refers to intentional nuisances, which are not fundamentally grounded in those other provisions of tort law.

¹⁰⁵ *Id.* § 826(a) (emphasis added). Section 826(b) provides a rarely used second test whereby “unreasonableness” can be found if the harm is “serious” and the defendant can afford to pay compensation. This second test would authorize an imposition of liability even if the defendant’s actions have a net social utility, but only if the enterprise would remain economically viable. Even so, very few courts have adopted the principle of section 826(b) and others have explicitly rejected it. See PERCIVAL ET AL., *supra* note 59, at 69–73; LANDES & POSNER, *supra* note 42, at 49; BOSTON & MADDEN, *supra* note 103, at 68–73, 93–96. While the balancing test of nuisance is not identical to that of negligence, the essential point is that in all American jurisdictions today, nuisance law places the burden of proof on damaged plaintiffs and requires a balancing of the interests of the person harmed, of the actor and of the community. See RESTATEMENT (SECOND) OF TORTS § 826, cmt. c (1965); KEETON ET AL., *supra* note 66, at 629–32.

¹⁰⁶ RESTATEMENT (SECOND) OF TORTS §§ 281–503 (1965). The statement of the fundamental rules of negligence by the Restatement (Second) of Torts comprises over 250 sections of law (§§ 281–503) and nearly 600 pages of law and explanatory commentary. RESTATEMENT (SECOND) OF TORTS, Pamphlet 2, 1–593 (1965). The law of nuisance comprises another thirty-one sections of law (§§ 821A–840E) and nearly 100 pages of law and explanatory commentary. RESTATEMENT (SECOND) OF TORTS, 83–179 (1965).

conduct, and that the harm was “proximately” caused by the defendant's conduct.¹⁰⁷ Liability can even be apportioned between the defendant and the plaintiff if both are negligent.¹⁰⁸ Private nuisance has been further curtailed by the requirement that the harm be “significant,” and public nuisance by the “special injury/different in kind” rule, which precludes private plaintiffs from seeking redress for damage inflicted on the general public unless they have suffered physical harm or economic loss that differs from that suffered by the public generally.¹⁰⁹ Additional burdens on plaintiffs have gained attention recently, such as judicial demands for “sound science” that disfavor new understandings of health and ecological impacts, secret settlements that conceal problems from the public, and corporate financial influence over science and the judiciary.¹¹⁰

The common law retains some doctrines that more readily impose liability. Remnants of strict liability continue in the doctrines of trespass and “abnormally dangerous” and “ultrahazardous” activities.¹¹¹ But courts have narrowly circumscribed the ability of these doctrines to significantly redress environmental harm, and the prevailing structure of the modern common law is one that protects and promotes economic activity using the presumption of net benefit.

The modern doctrines of negligence and nuisance are effective as rules of law because they do much more than simply state a policy preference for industrial growth that courts must then somehow accommodate. They specify rules of decision that tell courts how to resolve specific disputes that come before them. The preference for economic growth over other interests is automatically implemented every time these rules are applied because that preference is embedded within their structure. Courts need not explicitly reaffirm the policy goal in their decisions or even take note of it; the goal is furthered simply by application of the law's decision-making rules.

These legal doctrines broadly govern the economy, and have not, by and large been displaced by the modern environmental statutes.¹¹² The common law rules form the structural backbone of many of the nation's more recent environmental laws, and they continue to provide “background” laws that apply wherever gaps in legislation remain.¹¹³ These legal doctrines constitute fundamental principles of American property law, and exert a profound influence on the ongoing development of our economy.

As time has passed, the full implications for the Earth of the legal doctrines enshrined in the modern common law have become ever more clear. To three of these I now turn.

1. Because Plaintiffs Bear the Burden of Proof in Practice, the Law Permits Conduct That Does Not Have a Net Social Benefit

As we have seen, the common law intentionally allows damage to lie where it falls whenever the defendant's conduct produces a net social benefit. In theory the economic actors should incur liability for damage whenever their

¹⁰⁷ See KEETON ET AL., *supra* note 66, at 263–300, 356–59 (discussing proximate cause, foreseeability, and duty).

¹⁰⁸ *Id.* at 451–53.

¹⁰⁹ RESTATEMENT (SECOND) OF TORTS §§ 821C, 821F (1965) (discussing the requirement of “significant” harm and the special injury rule); Denise E. Antolini, *Modernizing Public Nuisance: Solving the Paradox of the Special Injury Rule*, 38 *ECOLOGY L.Q.* 755–894 (2001) (discussing the history of the “special injury rule”).

¹¹⁰ See Carolyn Raffensperger & Nancy Myers, *Shifting Burdens: A Proposal for Tort Reform*, in *PRECAUTIONARY TOOLS FOR RESHAPING ENVIRONMENTAL POLICY* 299, 299–317 (Nancy Myers & Carolyn Raffensperger eds., 2006).

¹¹¹ See BOSTON & MADDEN, *supra* note 103, at 21–26, 106–18 (discussing limitations of trespass and strict liability under “abnormally dangerous” and “ultra hazardous” theories).

¹¹² Klass, *supra* note 16, at 547–51.

¹¹³ *Id.* at 557–64.

activities fail to produce this benefit. In practice, however, the law often fails to impose liability when it should. This happens because the burden of proof is placed on the plaintiff rather than on the defendant.

In reality, it is not always possible to determine whether a particular activity provides a net benefit. Often plaintiffs cannot obtain the evidence they need either because it does not exist or because they do not have the resources they need to develop it. When a claim cannot be established, or even brought to court, courts defer to the default state established by the allocation of the burden of proof. Because the law must decide cases, in cases of doubt the allocation of the burden of proof determines the outcome. Thus, by placing the burden of proof on plaintiffs, the law intentionally chooses to err on the side of economic growth.

As can be seen in the historic cases, when judges developed these rules of common law, they had a certain kind of industrial damage before them: fires, explosions, floods, collisions, and other such discrete events.¹¹⁴ Plaintiffs often are able to carry their burden of proof in such cases, even when it involves damage to human health or the environment. The common law has historically been able to redress environmental damage caused by such discrete events, including acute forms of water pollution, air pollution, and damage to agricultural lands.¹¹⁵ Courts have even enjoined substantial enterprises because of the environmental damage they were causing.¹¹⁶

But in the context of modern environmental problems, the common law's burdens are accentuated and made far more difficult for plaintiffs to carry. Today, environmental damage often involves the cumulative incremental actions of many different actors, sometimes with substantial lags in time between action and effect.¹¹⁷ The intricate interconnections and interdependence of nature's elements make it impossible to achieve any real understanding of many adverse impacts on the environment and human health. Pervasive gaps persist in our understanding of the impacts of pollution and other forms of environmental damage on ecosystems and on individual species, including ourselves.¹¹⁸ Since market prices are not available for many attributes of the environment and human health, damage to them is often difficult to value and compare to more concrete and immediate economic benefits. When damage is diffuse and affects a large number of dispersed people, victims often have difficulty working together to seek redress through the judicial system.¹¹⁹ Individuals and communities often have difficulty mustering the resources they need to confront the economic and political power of those causing environmental damage.

For all these reasons, environmental plaintiffs struggle especially hard to prove that damage is "unreasonable," that causation was "proximate," and damage was "foreseeable" and "substantial." Whenever they cannot do so, the law defaults to its preference for economic growth and allows the defendant to continue its activity. The law's allocation of the burden of proof confers on economic activity the status of being society's preferred interest. No wonder scholars conclude:

There is wide agreement that private nuisance actions alone are grossly inadequate for resolving the more typical pollution problems faced by modern industrialized societies . . . [and that] even in cases of public nuisance, the common law has proved to be a crude mechanism at best for controlling the onslaught of modern-day pollution.¹²⁰

¹¹⁴ See PERCIVAL ET AL., *supra* note 60, at 61–87.

¹¹⁵ *Id.*

¹¹⁶ *Id.*

¹¹⁷ See generally Wendy Wagner, *Common Ignorance: The Failure of Environmental Law to Produce Needed Information on Health and the Environment*, 53 DUKE L.J. 1619 (2004).

¹¹⁸ *Id.*

¹¹⁹ David A. Dana, *Setting Environmental Priorities: The Promise of Bureaucratic Solution*, 74 B.U.L. REV. 365, 376 (1994).

¹²⁰ PERCIVAL ET AL., *supra* note 60, at 75, 87.

2. The Change in Liability Rules Constituted an Uncompensated Transfer of Valuable Property Rights to Industrial Interests

The law's abandonment of *sic utere tuo* in favor of modern negligence and nuisance law represented an historic shift in property rights. No compensation was paid to those who lost their rights and began to bear the burdens of externalized environmental damage—the farmers whose fields were burned by stray sparks or flooded when dams broke and the fishers whose waters were polluted—except perhaps to the extent they shared in the “general good” of economic development, as the New York Court of Appeals once put it.¹²¹

Does the struggle over possession of such property rights really matter? Some economists assert that the structure of property rights does not matter very much at all. The famous Coase Theorem, named after Nobel Prize winning economist Ronald Coase, holds that in a certain idealized world (where there are zero transaction costs, perfect information, and flawless markets so that prices reflect all true costs), optimal environmental protection will occur regardless of how property rights are allocated.¹²² The classic hypothetical situation in Coase's idealized world is a factory polluting a neighborhood. If the law allows the factory to pollute and if prevention is of sufficient value to them, the neighborhood will have the ability to buy out this right and prevent the pollution. Conversely, if the neighborhood has the legal right to prevent the pollution, then the factory can buy out this right, if it so desires. Either way, the correct (meaning most cost-effective) amount of environmental protection will be achieved. Under this theory we should eliminate government regulation, which will only serve to create inefficiency and distort the proper economic resolution of these conflicts. Instead, we can simply rely on existing property law with no need to be concerned with its particular structure.

In the real world, the structure of the law has a profound impact on the resolution of these types of conflicts and is not one of zero transaction costs. Douglass C. North, another Nobel Prize winning economist, has calculated that 45% of the U.S. economy in 1970 was devoted to “the transaction sector.”¹²³ In addition, the real world does not have perfect information or perfect markets. Information imperfections, externalities, absence of prices for environmental attributes, and other market failures are pervasive in the U.S. economy.¹²⁴ These market imperfections systematically prevent people from being able to negotiate the socially efficient solutions that economists envision. This is true regardless of who initially holds the property rights. Transaction costs make the state that is established as preferred by the property rights regime difficult to dislodge, even to achieve a socially optimal result.

An example illustrates the scale and impact of this problem under the current common law. The Clean Air Act amendments of 1990 constituted a massive revision of the Act. Industry mightily resisted the amendments, convinced that it would impose enormous costs for allegedly dubious benefits. Yet, when the White House Office of Management and Budget evaluated costs and benefits of many of the specific regulations promulgated as a result of this legislation in 2005, it concluded that the social health benefits outweighed the costs, sometimes by ten or twenty-fold.¹²⁵ The

¹²¹ *Losee v. Buchanan*, 51 N.Y. 476, 485 (1873); see also Sax, *supra* note 48, at 1449.

¹²² COLE, *supra* note 17, at 3–4.

¹²³ Douglass C. North, *Economic Performance Through Time*, Nobel Lecture, in NOBEL LECTURES: ECONOMIC SCIENCES, 1991–1995, at 112, 113 (Torsten Persson ed., 1997), available at http://nobelprize.org/nobel_prizes/economics/laureates/1993/north-lecture.html.

¹²⁴ See E. HERMAN DALY & JOSHUA FARLEY, *ECOLOGICAL ECONOMICS* 157–220 (2004) (discussing pervasive market failures in the U.S. economy, including many relating to the environment); Joseph E. Stiglitz & Carl E. Walsh, *Introduction to Imperfect Markets*, in *PRINCIPLES OF MICROECONOMICS* 227–39 (2002).

¹²⁵ OFFICE OF INFO. & REGULATORY AFF., OFFICE OF MGMT. & BUDGET, *VALIDATING REGULATORY ANALYSIS: 2005 REPORT TO CONGRESS ON THE COSTS AND BENEFITS OF FEDERAL REGULATIONS AND UNFUNDED MANDATES ON STATE, LOCAL, AND TRIBAL ENTITIES* 8 (2005), available at http://www.whitehouse.gov/omb/assets/omb/infoREG/2005_cb/final_2005_cb_report.pdf. For example:

communities, or at least those suffering health impacts, should theoretically have been able to achieve these results under the common law according to classical economic theory. Failure to install the pollution control equipment was “unreasonable” under the modern law of negligence. However, the burdens of proof imposed on plaintiffs and the real world transaction costs make such a suit virtually impossible.

More importantly, and leaving aside the problem of transaction costs, the structure of the property rights regime represents the allocation of vast wealth to the recipients of property rights. For example, even in a Coasian perfect world, both the neighborhood and the factory would desire the power to control the right to pollute. Neighborhoods do not want to pay polluters to stop pollution that involuntarily harms them, and polluters do not want to pay communities for the right to pollute. This is not how either side wishes to spend its limited resources, even if economists say society would benefit overall they did. The law’s distribution of wealth through the allocation of property rights is a fundamental issue of social justice.

The nineteenth-century transformation of the common law entailed a massive redistribution of wealth as the burden caused by economic development was shifted away from industrial interests and onto the less powerful people in our society. This transformation in liability law is viewed by some historians as the leading means by which the less powerful elements of society have “subsidized” the nation’s economic growth in the name of public welfare.¹²⁶ It was an uncompensated transfer of wealth, one that was and continues to be painful for those on the losing end of the new law, but one that judges implemented in order to serve their assumption that economic growth generally benefits society.¹²⁷

3. The Existing Common Law Cannot Restrain the Total Scale of Damage to the Earth

Finally, we now reach the essential problem with the structure of the common law, the problem that makes it unsuitable for our times. The issue is *scale*.

As we have seen, the common law intentionally allows all conduct unless that conduct is shown to fail a social cost–benefit test. The law functions by evaluating the unreasonableness of each specific challenged act, which comprises comparing the costs and benefits that flow from that act. This means that the cost–benefit justification of each increment of damage to the Earth is evaluated separately, each on a case-by-case basis. As the economy grows under the guidance of this legal structure, total economic activity and the accumulation of damage that the law permits grow together. Under this structure, the economy may grow forever, but so may the total scale of the accompanying environmental damage. This structure remains in place no matter how large the cumulative ecological damage to the Earth becomes. The law is structured solely around the concept of net economic benefit and contains no independent mechanism for constraining the total scale of cost–benefit justified ecological damage we inflict on the Earth.

This legal structure was designed in a time when the world was viewed as “empty,” and when the total human impact on the environment was small compared to the resources and assimilative capacity of the nation or the Earth as a

[EPA’s] final rule limiting emissions of air pollution from nonroad diesel engines [generated] \$28.6 billion in annual benefits and \$1.3 billion in annual costs, and the final rule implementing National Emission Standards for Hazardous Air Pollutants from . . . boilers and process heaters [generated] \$17 billion in annual benefits and \$900 million in annual costs.

Id. at 7.

¹²⁶ See HORWITZ, *supra* note 59, at xv–xvi, 63–108 (outlining other nineteenth-century changes in the law but emphasizing changes in liability laws); FREYFOGLE, *supra* note 11, at 73–75 (“Even substantial harm was now allowed . . . when it predictably flowed from an economically important enterprise.”).

¹²⁷ Sax, *supra* note 48, at 1447–51.

whole. Judges of the nineteenth century, surely thinking in terms of such an empty world, could have foreseen no reason to be concerned with the total scale of the human enterprise. Indeed, they set out to make it grow as rapidly as possible.

The global economy, especially the American economy, has seen astonishing growth during the last two centuries. While global population has risen almost seven-fold from 1 billion to 6.5 billion since 1800, global Gross Domestic Product (GDP) has grown even faster, rising fifty-fold in the 180 years from 1820 to 1998.¹²⁸ The U.S. economy has far outstripped the global economy, rising over 600-fold between 1820 and 1998,¹²⁹ while the American population grew roughly 28-fold (from about 10 million to about 280 million).¹³⁰

In the neoclassical economics that dominates public policy today, no theoretical limit exists on the potential growth of GDP, and further growth is commonly hoped to be the solution to global poverty.¹³¹ A typical growth rate of 3% per year, if extended for decades, translates to a doubling roughly every twenty-five years. Indeed, the World Bank projects that total world income will quadruple (i.e., two doublings) by 2050.¹³² Can the U.S. and world GDP continue to grow at this rate, which would mean expanding by at least another fifty-fold (equivalent to five to six more doublings) in the next 180 years, just as they did in the last? Our current political economy, driven by an insatiable consumer culture, the desperate needs of the poor, and resistance to significant redistribution between rich and poor, seems bound and determined to try.

The obsessive commitment to this permanent GDP growth is grounded in the belief that GDP measures human welfare. Reflecting an abiding faith in the net social benefit of economic activity, GDP measures only the total dollar value of all goods and services sold each year and incorporates no deduction for depletion of natural resources or damage to human health, the environment, or many other components of any true vision of human welfare.¹³³ It counts liquidation of resource stocks such as oil, forests, and fisheries solely as positive contributions to GDP.¹³⁴ Even defensive expenditures such as environmental remediation and medical costs for industrially caused disease are recorded as positive contributions to GDP, with no debit for the underlying damage.¹³⁵

By failing to include these losses in GDP accounting, we are deluded into accepting environmental degradation because it seems to be justified by net benefits. Because of our incomplete accounting, however, we do not know which economic activity actually provides a net benefit to society, not for the economy as a whole, to any particular industry, or even to any particular enterprise. In fact, all we really know is that the owners of each enterprise believe they can make a profit for themselves under our current legal institutions and the market incentives they provide.

¹²⁸ ANGUS MADDISON, ORG. FOR ECON. CO-OPERATION AND DEV., *THE WORLD ECONOMY: A MILLENNIAL PERSPECTIVE* 261 (2001), available at <http://www.theworldeconomy.org>.

¹²⁹ *Id.*

¹³⁰ U.S. DEP'T OF COMMERCE, *HISTORICAL STATISTICS OF THE UNITED STATES, COLONIAL TIMES TO 1970, PART 1*, at 8 (1975), available at <http://www2.census.gov/prod2/statcomp/documents/CT1970p1-01.pdf>; U.S. CENSUS BUREAU, *U.S. SUMMARY: 2000*, at 2 (2002), available at <http://www.census.gov/prod/2002pubs/c2kprof00-us.pdf>.

¹³¹ See THE WORLD BANK, *ECONOMIC PROSPECTS, OVERVIEW AND GLOBAL OUTLOOK—MANAGING THE NEXT WAVE OF GLOBALIZATION* (2007), available at http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=469372&piPK=64165421&menuPK=64166093&entityID=000333037_20080912025354.

¹³² THE WORLD BANK, *RESPONSIBLE GROWTH FOR THE NEW MILLENNIUM—INTEGRATING SOCIETY, ECOLOGY, AND THE ECONOMY 1* (2004).

¹³³ DALY & FARLEY, *supra* note 124, at 228.

¹³⁴ *Id.* at 233.

¹³⁵ *Id.* at 223–44 (discussing how GDP calculations leave out many critical components of human welfare).

The human enterprise has grown dramatically over the last two centuries, and it has come to be understood that we no longer live in an empty world. Today, the biosphere suddenly appears as a thin film on the surface of the Earth. Many resources that we depend on for survival, such as arable land, fresh water, and stocks of fish have become finite and exhaustible. Perhaps even more importantly, the biosphere has a limited capacity to assimilate our environmental damage and still sustain life. Three attributes of the biosphere itself seem to conspire against us. First, it has a finite physical size. This finite size means both that resource stocks are limited and that our pollution and environmental damage become concentrated as they accumulate within the biosphere. Second, the various components of the biosphere, both living and nonliving, are deeply interdependent and interconnected. Thus, various forms of damage do not occur in isolation, but form a networked web of assaults, each compounding the effects of the others. Finally, the time scale on which the land evolves is immense when compared to the human time frame. When we deplete the Earth of its species and ecosystems, the lost richness is not recoverable in any time frame that is relevant to us.

Global warming is painfully typical: each small increment of greenhouse gas emissions would be literally harmless if there were no other emissions; today's emissions will persist for centuries, compounding those of the past and future; the impact of climate change is magnified by its interplay with other ecological assaults. As a result, the ecological damage we do is cumulative, not just in space but also in time, as the generations pass. The Earth and its interdependent ecosystems can assimilate on a permanent basis only a maximum rate of ecological damage without becoming biotically impoverished, with decreased ability to sustain life, including us. Once we overshoot this ecologically sustainable assimilative capacity, we must inexorably diminish and eventually devastate the biosphere. We can foresee that under conditions of overshoot, the Earth's decreasing assimilative capacities, in a vicious feedback loop, will accelerate the biosphere's decline.

Have we already surpassed the Earth's ecologically sustainable assimilative limits? In 2005, a report compiled by over 2000 scientists from ninety-five countries concluded that 60% of global ecosystem services were "being degraded or used unsustainably," including fresh water, capture fisheries, air and water purification, and the regulation of natural hazards and pests.¹³⁶ In its most recent report, involving over 400 scientists and policymakers, the U.N. Environment Programme (UNEP) concluded that current environmental trends threaten human development and imperil our overall wellbeing.¹³⁷ Previously sustained human activities are now crossing thresholds of sudden irreversible change, causing the collapse of fisheries, dead zones in the sea, regional climate change, and loss of species, and it is difficult to know exactly where other thresholds may lie or when they may come upon us.¹³⁸ By some detailed estimates, humanity reached and surpassed the Earth's sustainable biocapacity in the 1980s.¹³⁹ The UNEP report concluded that humanity is overusing the ecological resources of the Earth and therefore degrading many elements of the environment.¹⁴⁰ Similar extensive degradation of ecosystems across the United States has been documented as well.¹⁴¹

As a matter of simple logic, as GDP grows in a finite biosphere, the accompanying damage that the legal system views as cost-benefit justified must inevitably reach and then surpass the amount of ecological damage that the Earth can

¹³⁶ MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 3, at 2.

¹³⁷ UNEP, GLOBAL ENVIRONMENT OUTLOOK—ENVIRONMENT FOR DEVELOPMENT GEO-4, at 6 (2007), available at <http://www.unep.org/geo>.

¹³⁸ *Id.* at 362–63.

¹³⁹ WORLD WILDLIFE FUND, LIVING PLANET REPORT 2006, at 2 (2006), http://assets.panda.org/downloads/living_planet_report.pdf.

¹⁴⁰ UNEP, *supra* note 137, at 202 box 6.1.

¹⁴¹ See REED F. NOSS ET AL., ENDANGERED ECOSYSTEMS OF THE UNITED STATES: A PRELIMINARY ASSESSMENT OF LOSS AND DEGRADATION (1995) (unpaginated document), available at <http://biology.usgs.gov/pubs/ecosys.htm> (reporting "more than 30 critically endangered, 58 endangered, and more than 38 threatened ecosystems").

assimilate. Beyond the Earth's assimilative limits, each additional increment of environmental damage will have had an adverse effect on the environment far greater than the effect it would have on an empty world. Eventually further GDP growth accompanied by environmental damage will actually become "anti-economic," decreasing rather than increasing human welfare.¹⁴²

Some believe we long ago surpassed the point at which further economic growth increased the public welfare. Others calculate that we likely reached and surpassed this point more recently.¹⁴³ Still others, sequestered in privileged refuges, will find the damage to the Earth acceptable until the last tree is felled. We do not know how far down this path we will go or how profound our losses will be. But this much is clear: exceeding the ecologically sustainable assimilative capacity of the Earth is the inevitable result of the economic path on which the common law has set us on. Neither the current law nor, the market it shapes, contain any way to stop it.

The central presumption of the common law that pollution can be economically justified can be true only so long as the world is "empty." It becomes false when the world is "full," and the cumulative environmental damage produced by economic activity exceeds the capacity of the Earth to assimilate. Thus, the belief of Justices Livingston and Holmes that economic activity tends to benefit the public will not always be true. Once we overshoot the Earth's assimilative capacity, and begin to devastate the ecological systems on which we depend, the law can no longer justify a starting presumption that economic activity furthers the public welfare even where it causes ecological damage.

Moreover, under these conditions, cost-benefit analysis can no longer be justified as a tool for evaluating the reasonableness of individual increments of environmental damage. Each incremental impact, if taken alone, might have caused little or even no harm at all in an empty world. But under conditions of ecological overshoot each increment of damage contributes to an immeasurable, indeed infinite, loss. This infinite loss cannot be meaningfully allocated among the various increments of damage. Once we are degrading the environment at an unsustainable rate, attempting to justify increments of damage using cost-benefit principles is profoundly misguided and represents a denial of the biological realities of life on the Earth. Under conditions of ecological overshoot, the core structure of the modern common law cannot be justified as one that furthers the public welfare. At that point, it is no longer legitimate as an American rule of law.

Common law courts have considered damage resulting from cumulative harmless acts by multiple defendants as, for example, where a stream is polluted by numerous parties.¹⁴⁴ Under the old principle of *sic utere tuo*, prevention of the damage was not as difficult as it is today. Defendants could be enjoined from contributing to damage even if their contribution was slight.¹⁴⁵ Similarly, whenever a right is strongly protected by the common law, such as the public's right to navigate waterways, defendants can be enjoined from small contributions to an invasion of that right.¹⁴⁶

¹⁴² Kysar, *supra* note 4, at 41 (discussing "anti-economic" growth).

¹⁴³ See, e.g., JOHN TALBERT ET AL., THE GENUINE PROGRESS INDICATOR 2006 A TOOL FOR SUSTAINABLE DEVELOPMENT 19 (2006), available at <http://www.rprogress.org/publications/2007/gpi2006.pdf> (concluding that the U.S. economy has been stagnant since the 1970s if environment and social determinants are considered); DALY & FARLEY, *supra* note 124, at 233-44 (compiling studies showing the importance of full-cost accounting); Kysar, *supra* note 4, at 33-41 (discussing alternative measures of economy showing growth in true welfare may have ceased); MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 3, at 9 (accounting for depletion of forest and energy resources and damage from carbon emissions caused eight developing countries to have negative rather than positive net savings in 2001).

¹⁴⁴ *Woodyear v. Schaefer*, 40 Am. Rep. 419 (1881).

¹⁴⁵ See *id.* at 5, 7 (noting that contributor to polluted stream must be restrained, even if contribution "might amount to little or nothing," for the defendant "and those situated like him, must learn to act upon the maxim: *sic utere tuo ut alienum non laedas*"); *United States v. Luce*, 141 F. 385, 415 (C.C.D. Del. 1905) ("The principal question after all is whether the defendants . . . [a]re . . . duly observing the precept, *sic utere tuo ut alienum non laedas*?").

¹⁴⁶ See *People v. Gold Run Ditch & Mining Co.*, 4 P. 1152, 1155-56 (Cal. 1884) (enjoining defendant from dumping mining

Under the modern doctrines of negligence and nuisance, however, the law's focus on the "fault" of defendants has made prevention of cumulative damage more difficult. Torts commentator Dean Prosser found such situations to be "very troublesome" since no defendant's conduct is unreasonable, no defendant is at fault, and there is "no negligence, and no nuisance" even though plaintiffs may be seriously damaged.¹⁴⁷ Indeed, proponents of an economics-based structure in the common law openly admit that modern nuisance law fails to prevent cumulative impacts, and go so far as to call this problem "insoluble in common law theory."¹⁴⁸

Modern courts have struggled to develop a doctrinal basis for preventing cumulative impacts despite the structure of fault-based liability, but their efforts have been woefully inadequate. In an important 1973 case, the Northern District of Illinois admirably enjoined defendants' sewage discharges because they constituted "a significant portion of the total discharge" into Lake Michigan, even though taken alone they may not have caused the eutrophication of the lake.¹⁴⁹ Finding that there was "not much authority squarely on point" for its decision, the court nevertheless rejected the defendants' contention that individual causation was required. The court found that such a rule would make it "impossible to impose liability on any polluter."¹⁵⁰

Despite *Illinois v. City of Milwaukee*, common law doctrine on cumulative impacts remains nascent at best and does not yet provide a useful tool for constraining cumulative environmental damage. One recent example is illustrative. In *California v. General Motors Corp.*, California's Attorney General sued six automakers on the theory that the greenhouse gas emissions from their cars created a nuisance by contributing to global warming.¹⁵¹ The Northern District of California dismissed the case on jurisdictional grounds based in part on a finding that the common law could not resolve the cumulative impacts problem. The court stated that the law left it

without guidance in determining what is an unreasonable contribution to the sum of carbon dioxide in the Earth's atmosphere, or in determining who should bear the costs associated with the global climate change that admittedly result from multiple sources around the globe. Plaintiff has failed to provide convincing legal authority to support its proposition that the legal framework for assessing global warming nuisance damages is well-established.¹⁵²

Some courts have recognized that the common law needs to develop an entirely new structure in view of our changing circumstances, as we will see in more detail in subsequent parts. For example, the Wisconsin Supreme

debris into American and Sacramento Rivers despite allegation that defendant's 600,000 cubic yards per year of debris alone would not impair navigation, explaining that "all unauthorized intrusions upon a water highway . . . are nuisances"); *The Lockwood Co. v. Lawrence*, 77 Me. 297, 309–10 (1885) (enjoining each contribution of waste into river by three upstream sawmills as unreasonable in view of cumulative interference with downriver mill's right to use river).

¹⁴⁷ See KEETON ET AL., *supra* note 66, at 354–55. This treatise cites several authorities for the proposition that a contributor of a harmless impact might nevertheless be held liable if he or she knew or should have known that others had created a situation where any additional impact would result in unreasonable damage. *Id.*; see also RESTATEMENT (SECOND) OF TORTS § 840E, cmt. b (1965) (citing same proposition). Unfortunately, the cases cited date mostly from the turn of the twentieth century or earlier, and many sound clearly in *sic utere tuo* rather than modern negligence and nuisance. KEETON ET AL., *supra* note 66, at 354–55 (citing *Woodyear*, 40 Am. Rep. 419; *United States v. Luce*, 141 F. 385 (C.C.D. Del. 1905)).

¹⁴⁸ See LANDES & POSNER, *supra* note 42, at 52.

¹⁴⁹ *Illinois v. City of Milwaukee*, 1973 U.S. Dist. LEXIS 15607, *20–22 (D. Ill. 1973), *rev'd on other grounds*, 599 F.2d 151 (7th Cir. 1979), *vacated*, 451 U.S. 304 (1981).

¹⁵⁰ *Id.* at *21–22.

¹⁵¹ *California v. Gen. Motors Corp.*, No. C06-05755 (MJJ), 2007 U.S. Dist. LEXIS 68547, at *46 (N.D. Cal. 2007).

¹⁵² *Id.*

Court has observed: “The policy of favoring unhindered private development in an expanding economy is no longer in harmony with the realities of our society.”¹⁵³

But in general, common law courts have been reluctant to fully embrace this task. Some judges have even disclaimed responsibility for doing so, believing instead that any new balance of priorities is for legislatures to establish. New York State’s highest court took this position in a 1970 case in which it decided not to enjoin a cement plant that was damaging neighboring property along the Hudson River not too far from the site of the conflict between two sawmills that was adjudicated in *Palmer v. Mulligan* in 1805. Instead of considering how the law should guide the economy in view of current circumstances, as Justice Livingston did two centuries earlier, this time the New York court cautiously observed that the problem of air pollution was widespread, technical, and would require “a carefully balanced consideration of the economic impact”¹⁵⁴ and concluded:

A court should not try to do this on its own as a by-product of private litigation and it seems manifest that the judicial establishment is neither equipped in the limited nature of any judgment it can pronounce nor prepared to lay down and implement an effective policy for the elimination of air pollution. This is an area beyond the circumference of one private lawsuit. It is a direct responsibility for government and should not thus be undertaken as an incident to solving a dispute between property owners and a single cement plant—one of many—in the Hudson River valley.¹⁵⁵

This hesitance, which contrasts so deeply with the attitudes of the judges who created the modern common law, is found in many of our contemporary judges. It is reflected in *Connecticut v. American Electric Power Co.*, a 2005 decision on a suit brought by six state attorneys general alleging that power companies’ carbon dioxide emissions contributed to global warming and constituted a nuisance.¹⁵⁶ There could hardly be a more important issue regarding the proper balance of property rights in today’s world. And yet, the court dismissed the case on jurisdictional grounds, finding that resolution of the issues “requires identification and balancing of economic, environmental, foreign policy, and national security interests” that courts should not undertake at common law.¹⁵⁷

While the common law has hesitated to address the modern consequences of its own rules, government has stepped in. State legislatures and Congress have begun to exercise their inherent power to restructure property rights and to overrule the common law according to democratic will. As we turn now to government regulation, however, we will see that many of the new federal statutes are patterned on the common law.

B. Many Modern Environmental Statutes Mirror the Structure of the Modern Common Law

American legislatures have the independent power to regulate private property to further the public welfare and, like common law judges, have used this power differently in a variety of ways throughout our history. From the founding of the nation, American statutes have addressed environmental problems like waste, smoke, and contamination

¹⁵³ *Prah v. Maretti*, 321 N.W.2d 182, 190 (Wis. 1982).

¹⁵⁴ *Boomer v. Atlantic Cement Co.*, 257 N.E.2d 870, 871 (N.Y. 1970); *see also* *Save Sand Key v. U.S. Steel Corp.*, 303 So. 2d 9, 13 (Fla. 1974) (reversing a lower court that had abandoned the “special injury rule” (which limits the law of nuisance) as outdated in view of modern environmental problems, choosing instead to “adhere resolutely” to precedent); *Antolini*, *supra* note 109, at 781–84 (discussing the special injury rule and the *Save Sand Key* case).

¹⁵⁵ *Boomer*, 303 N.E.2d. at 871.

¹⁵⁶ *Connecticut v. Am. Elec. Power Co.*, 406 F. Supp. 2d 265 (S.D.N.Y. 2005).

¹⁵⁷ *Id.* at 241; *see also* *California v. Gen. Motors Corp.*, 2007 U.S. Dist. Lexis 68547, at *9–*16 (taking same position in global warming public nuisance suit against auto manufacturers).

of drinking water.¹⁵⁸ As the nineteenth century progressed, legislatures directed their efforts more frequently to rapid development of resources, ratifying and reinforcing the common law's new goal of promoting economic development.¹⁵⁹ Eventually, because the modern common law failed to control mounting environmental problems, state and federal governments intervened to protect the environment. Government began designating land as protected public property and slowed its transfer to private ownership. Today about forty percent of the area of the United States is owned by federal, state, and local governments.¹⁶⁰ Conservation legislation in the late nineteenth and early twentieth centuries promoted preservation on these mostly distant public lands, addressing issues like migratory birds, eagles, water conservation, and management of wilderness and wildlife refuges.¹⁶¹ By the middle of the twentieth century, federal and state governments also were compelled to address the widespread pollution and other environmental damage being externalized by industry operating on private property.¹⁶²

These efforts culminated in the landmark federal environmental laws of the 1970s.¹⁶³ What is striking about these laws, however, is the degree to which many of them incorporate the same structure as the modern common law, reflecting the same balance of interests that had been so carefully defined in that law. Many of these statutes have the same presumption of net benefit and the same allocation of the burden of proof as the common law. They do not provide administrative agencies with blanket authority to prevent damage to public health and the environment. Instead, with some exception, the statutes define a balancing of interests, providing only the authority to implement “reasonable” or “cost-justified” regulations.¹⁶⁴ The Toxic Substances Control Act of 1976 (TSCA) provides a case in point.¹⁶⁵ In order to regulate a commercial chemical under TSCA, the burden of proof is on the Environmental Protection Agency (EPA) to provide “substantial evidence” that (1) the chemical presents or will present an “unreasonable” risk to health and the environment, (2) the benefits of regulation outweigh both the costs to industry of the regulation and the lost economic and social value of the product, and (3) the EPA has chosen the least burdensome way to eliminate only the unreasonable risk.¹⁶⁶ Both TSCA itself and the courts are clear that economic and social factors must be considered as well as environmental and human health effects when the EPA determines whether a risk is “unreasonable” under TSCA.¹⁶⁷

If all federal environmental statutes are not as clear as TSCA in requiring regulations to be cost–benefit justified, Executive Order 12866 removes all doubt as to how they must be interpreted by federal agencies.¹⁶⁸ That Presidential

¹⁵⁸ See *supra* notes 22–24, 65 and accompanying text for discussion of early American regulation of property rights.

¹⁵⁹ See PERCIVAL ET AL., *supra* note 59, at 88–89 (discussing late nineteenth-century regulations); FREYFOGLE, *supra* note 11, at 75–77 (“[L]egislatures [did] their part to use statutory law and public funds to promote economic growth.”).

¹⁶⁰ See Sprankling, *supra* note 57, at 559–60 (outlining history of transfers of public land to private hands); RUBEN N. LUBOWSKI ET AL., U.S. DEP’T OF AGRIC., MAJOR USES OF LAND IN THE UNITED STATES, 2002, at 35 (2006), available at <http://www.ers.usda.gov/publications/EIB14> (citing current land ownership statistics).

¹⁶¹ See PERCIVAL ET AL., *supra* note 59, at 88 (summarizing early conservation laws); RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW 47–50 (2004).

¹⁶² PERCIVAL ET AL., *supra* note 59, at 90.

¹⁶³ See *id.* at 90–92 (discussing the rise of the modern environmental movement and related federal regulation).

¹⁶⁴ See, e.g., *id.* at 344–45 & fig.4.1 (outlining burdens of proof of twelve federal law provisions).

¹⁶⁵ Toxic Substances Control Act, 15 U.S.C. §§ 2601–2629 (2000).

¹⁶⁶ 15 U.S.C. §§ 2618(c)(B), 2605(a).

¹⁶⁷ 15 U.S.C. § 2605(a), (c); see also *Corrosion Proof Fittings v. Env’tl. Prot. Agency*, 947 F.2d 1201 (5th Cir. 1991) (analyzing TSCA burdens of proof). For discussion of TSCA and its various burdens of proof, see Joseph H. Guth et al., *Require Comprehensive Safety Data For All Chemicals*, 17 NEW SOLUTIONS 3, 233–58 (2007), an earlier version of which is available at <http://www.louisvillecharter.org/paper.safetydata.shtml>.

¹⁶⁸ See Exec. Order No. 12,866, 3 C.F.R. 638 (2007), available at <http://www.archives.gov/federal-register/executive-orders/pdf/12866.pdf> (stating that “each agency shall . . . propose or adopt a regulation only upon a reasoned determination that the benefits

Executive Order commands all federal agencies to propose or adopt a regulation only if the benefits justify the costs (unless a particular statute requires otherwise). The White House Office of Management and Budget (OMB) actively enforces E.O. 12866, which gives that document a central role in shaping all federal environmental regulations.¹⁶⁹

This approach to implementing the nation's environmental laws, commonly promoted under the rubric of "reasonable regulation," means that federal agencies cannot act to protect public health and the environment unless they prove their measures are cost-effective. Regulations failing that test are deemed "unreasonable," even if those causing the damage could afford to prevent the costs. Under this test, the measuring rod for the unreasonableness of costs is the value of the benefits, not the ability of the enterprise causing the damage to bear them. Thus, a very large and wealthy industry need not avoid externalizing costs onto society, even if it can afford to do so with resources deriving from the very activity that is externalizing the costs, if the cost of prevention outweighs the benefits. This structure, like that of the common law, is grounded, almost invisibly, on the presumption that economic activity is likely to provide a net benefit to society even if it causes health and environmental damage. It is designed to ensure that such activity will not be interfered with except by specific, narrowly tailored cost-benefit justified measures.

These statutes, which generally supplement rather than displace the common law,¹⁷⁰ have enabled improved environmental protection despite harboring that law's same basic structure. They have done this partly by deploying the resources of government to meet the agencies' burdens of proof on the cost-benefit determinations. Federal agencies are able to address issues such as environmental and health impacts, economic costs, and causation on an industry-wide, nationwide, and population-wide basis rather than in the narrower context of a tort suit between specific plaintiffs and defendants. Also, because these statutes generally regulate future environmental damage and do not attempt to impose liability for past environmental damage (except for a few statutes relating to hazardous waste cleanup), they avoid some of a plaintiff's additional burdens at common law such as specific causation of particular plaintiffs' injuries, whether the damage was "foreseeable," whether defendants have a "duty" to the plaintiffs, and whether plaintiffs themselves were at fault.

However, the burden of proof remains, as under the common law, on those seeking to protect the environment. Uncertainty, lack of information, inability to track the chains of causation, and lack of market values for health and the environment all work against the government in its efforts to prove regulations are "reasonable." The struggle to carry this burden of proof draws government, environmentalists, and industry into bitter conflict over the value-laden assumptions inevitably involved in such cost-benefit issues as discounting, data gaps, interpretation of emerging science, monetization of human lives, and the monetary valuation of portions of the Earth.¹⁷¹ The burden of proof on

of the intended regulation justify its costs"). See generally OFFICE OF MGMT. & BUDGET, CIRCULAR A-4, CIRCULAR TO THE HEADS OF EXECUTIVE AGENCIES AND ESTABLISHMENTS (2003), available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf> (providing detailed OMB guidance to all federal agencies on conduct of regulatory cost-benefit analysis under E.O. 12866).

¹⁶⁹ OMB's extensive evaluation of regulations under E.O. 12,866 before promulgation and after issuance is reflected in its Annual Reports to Congress on the Costs and Benefits of Federal Regulations, available at <http://www.whitehouse.gov/omb/legislative/index.html> (last visited Feb. 16, 2008).

¹⁷⁰ The federal statutes for the most part do not preempt the common law. See PERCIVAL ET AL., *supra* note 59, at 98-101 (outlining a general pattern of coexistence of common law and federal environmental statutes); KLASS, *supra* note 16, at 570 n.143 (identifying savings clauses in numerous environmental statutes and concluding that "the broad savings clauses in most federal statutes have left ample room for state common law to be a major player in environmental-protection efforts").

¹⁷¹ See generally FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING 36 (2004) ("Even when the methods [of cost-benefit analysis] are applied in good faith by neutral or environmental investigators . . . the results tilt strongly toward business as usual, and rejection of health and environmental protection."); THOMAS O. GARTY ET AL., SOPHISTICATED SABOTAGE: THE INTELLECTUAL GAMES USED TO SUBVERT RESPONSIBLE REGULATION (2004) (providing extensive discussions on how the tools of cost-benefit analysis systematically undervalue health and environmental impacts to prevent regulation).

government remains substantial, and may result in judicial rejection of regulations even when an agency has created a massive supporting record.¹⁷²

Most importantly, however, these laws, like the common law, are unable to address the cumulative scale of the ecological damage we are doing to the Earth. Agencies must develop their regulations medium-by-medium, chemical-by-chemical, industry-by-industry, each according to the dictates of the applicable governing statute and E.O. 12,866,¹⁷³ and each in isolation from the others. In each such regulatory cost–benefit calculation, an increment of economic costs is monetized and then traded off dollar-for-dollar against health and environmental benefits, which are usually monetized as well.¹⁷⁴ The monetized cost of regulations can even be converted to a number of “statistical lives” (based on the argument that each \$7–15 million of regulatory expenditures reduces society’s wealth, and therefore health, enough to cause loss of one statistical “life”).¹⁷⁵ Saving and losing “lives” thus appears, or seems to appear, on both sides of all regulatory proposals, even that of no regulation. This makes the efforts of environmental and health advocates to avoid cost–benefit analysis and instead prioritize the goal of avoiding damage, appear unscientific and unreasonable and even to “paralyze” our ability to take any action at all.¹⁷⁶ These laws seem to give us no choice but to maximize monetized net benefits and statistical lives in each regulation, one regulation at a time.

But this apparent constraint is actually just an artifact of the overarching structure of these federal laws. That legal structure does not permit regulators to lift their heads to take account of what is happening to the world around them, for it was created when the world seemed empty and scale seemed not to matter. That structure has spawned a corps of cost–benefit experts who claim the mantle of science. However, it is profoundly unscientific because it ignores, and even prevents us from considering, what is of truly historic importance in our current circumstances—the science demonstrating our overshoot of the Earth’s ecological capacities. Instead, it is grounded in a demonstrably false core assumption—that cost–benefit justified damage to the Earth may increase without limit. It is a legal structure that allows the Earth to die a death of a thousand cuts, ignoring the cumulative impacts while we busily justify each cut as if it alone was inflicted.

Thus, like the modern common law, many of the federal environmental statutes, especially when implemented under E.O. 12866, simply cannot respond to the reality of what we are doing to the Earth as a whole, a reality that so plainly requires us to restrain the total scale of cumulative ecological damage to the Earth’s assimilative limits. American government can take stronger steps to protect the environment, and has done so in some instances. The next subpart turns to those stronger steps and the corrosive consequences of their divergence from the common law.

¹⁷² For example, the EPA’s comprehensive asbestos rule governing all aspects of asbestos use in the United States, which had taken ten years to develop and was based on a monumental public record, was challenged by industry and then struck down in large part by the Court of Appeals for the Fifth Circuit. *Corrosion Proof Fittings v. Env’tl. Prot. Agency*, 947 F.2d 1201, 1227–28 (5th Cir. 1991) (concluding that the EPA had not provided substantial evidence to support most of the regulation); *see also* U.S. GEN. ACCOUNTING OFFICE, CHEMICAL REGULATION: OPTIONS EXIST TO IMPROVE EPA’S ABILITY TO ASSESS HEALTH RISKS AND MANAGE ITS CHEMICAL REVIEW PROGRAM 28–29 (2005) (discussing the Fifth Circuit’s ruling); U.S. GEN. ACCOUNTING OFFICE, TOXIC SUBSTANCES CONTROL ACT: LEGISLATIVE CHANGES COULD MAKE THE ACT MORE EFFECTIVE 3 (1994) (arguing that the EPA met its evidentiary burden). To this day, the U.S. has not fully banned asbestos despite such action in numerous countries around the world.

¹⁷³ Exec. Order No. 12, 866, 3 C.F.R. 638.

¹⁷⁴ *See generally* OFFICE OF MGMT. & BUDGET, *supra* note 168, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf> (providing detailed guidance to all federal agencies on conduct of regulatory cost–benefit analysis under E.O. 12,866).

¹⁷⁵ *See* ACKERMAN & HEINZERLING, *supra* note 171, at 61–90 (putting the value on one human life at \$6.1 million); Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1027–28 (2003) (compiling references and discussing the theory that an “expensive regulation can have adverse effects on life and health,” including the possibility of death).

C. More Progressive Government Environmental Laws Open up a Divide with the Lagging Common Law

Stronger steps taken by the federal government include: the “fishable” and “swimmable” water quality goals and wetlands protection provisions of the Clean Water Act;¹⁷⁷ the health-based standards for certain pollutants under the Clean Air Act;¹⁷⁸ the “reasonable certainty of no harm” standard for pesticide food tolerances under the Food Quality Protection Act;¹⁷⁹ protections for endangered species under the Endangered Species Act;¹⁸⁰ the Clean Air Act’s cap-and-trade system for sulfur dioxide;¹⁸¹ and recent legislative proposals for regulating carbon dioxide emissions.¹⁸² These and other progressive laws diverge from the common law structure by fixing specific standards of human health and environmental quality without specifically balancing countervailing economic interests. States, counties, and cities have also implemented stronger steps, such as the adoption of precautionary laws that are focused on avoiding harm to human health and the environment and searching for less damaging alternatives.¹⁸³ These laws do not yet constitute a comprehensive effort to control the total scale of our environmental damage, and yet the bitter criticism that the industry reserves for them reflects their divergence from the prevailing structure of our law.

This divergence has opened up a divide between progressive environmental legislation and the common law.¹⁸⁴ This divide sets up property owners to view environmental laws not as a legitimate democratic expression of the proper structure of property rights in our current circumstances, but as invasions of their rights, as efforts by government to take their property and give it to the public. The change exposes environmental laws to the charge of being impositions of a repressive and authoritarian government. It allows conflicts over property rights to be characterized as the heroic struggle of private individuals for freedom from government. This divide fuels calls by property owners for legislatures to adhere to the rights embodied in the common law and spawns legislative measures, such as Oregon’s Measure 37, under which society must compensate private interests when environmental legislation reduces the market value of those rights.¹⁸⁵

This legal divide has thus brought into prominence the Takings Clause of the Fifth Amendment. This constitutional provision traditionally required compensation for outright government appropriation of property or permanent physical occupation, but did not historically require compensation when government regulated land use to prevent harm to the community.¹⁸⁶ Not until 1922 did the U.S. Supreme Court find that a mere regulation of land use

¹⁷⁶ See Sunstein, *supra* note 175, at 1028 (discussing the idea that the precautionary principle can “paralyze” regulatory action).

¹⁷⁷ Clean Water Act, 33 U.S.C. §§ 1251–1387 (2000).

¹⁷⁸ Clean Air Act, 42 U.S.C. §§ 7401–7671(q) (2000).

¹⁷⁹ Food Quality Protection Act, Pub. L. No. 104-170, 110 Stat. 1489 (codified as amended in scattered sections of 7 U.S.C. and 21 U.S.C.).

¹⁸⁰ Endangered Species Act, 16 U.S.C. §§ 1531–1544 (2000).

¹⁸¹ 42 U.S.C. § 7651(a)–(e).

¹⁸² See, e.g., McCain-Lieberman Climate Stewardship and Innovation Act of 2005, S. 1151, 109th Cong.; PEW CTR. ON GLOBAL CLIMATE CHANGE, SUMMARY OF MCCAIN-LIEBERMAN CLIMATE STEWARDSHIP AND INNOVATION ACT OF 2005, available at http://www.pewclimate.org/policy_center/analyses/s_1151_summary.cfm.

¹⁸³ See BE SAFE, Center for Health, Environment and Justice, Precautionary Policy Clearinghouse, http://www.besafenet.com/ppc/archives/environmental_precaution/index.html (last visited Feb. 11, 2008) (compiling laws, ordinances, and policies reflecting the precautionary principle).

¹⁸⁴ This section draws heavily from the work of Professor Eric Freyfogle, who has written about the profound significance of this divide between the common law and environmental laws. See FREYFOGLE, *supra* note 11, at 79–84 (“[T]he mere fact that legal rhetoric divided the private and public realms represented a critical shift in reasoning, a shift that would have far-ranging implications up to our day.”).

¹⁸⁵ OR. REV. STAT. ANN. § 197.352 (West 2005) (amended 2007).

could amount to a taking.¹⁸⁷ Thirty-five years after the Pennsylvania Supreme Court made clear in *Pennsylvania Coal Co. v. Sanderson* that the state's common law would not prevent the coal industry from polluting Mrs. Sanderson's stream,¹⁸⁸ the Pennsylvania legislature tried to prohibit that industry from causing subsidence of surface land.¹⁸⁹ But in *Pennsylvania Coal Co. v. Mahon*, the Court found that Pennsylvania had gone "too far" in restricting Pennsylvania Coal's use of its private property, the underground coal, and that the state law was an unconstitutional taking.¹⁹⁰ While the Court has struggled ever since to define exactly when government regulation goes "too far" under the Fifth Amendment, it has recently articulated a clear resistance to government property restrictions that go substantially beyond those that inhere in the common law.¹⁹¹

In the landmark case *Lucas v. South Carolina Coastal Council*, a South Carolina law to preserve fragile beachfront, barred a landowner from building houses on his land.¹⁹² The landowner claimed this law affected a taking of his property and that he was owed compensation. Justice Scalia's opinion for the 6–3 Court held that when legislation denies an owner of "all economically beneficial or productive use of land,"¹⁹³ the Fifth Amendment requires compensation if the legislation creates more restrictions than "background principles of the State's law of property and nuisance already place upon land ownership."¹⁹⁴ Thus, said the Court, the central question is whether the new government restrictions were "part of [the landowner's] title to begin with."¹⁹⁵ The Court warned that while new "background principles" may evolve with time, they may not be "newly legislated or decreed (without compensation)" in the very action challenged.¹⁹⁶ Remanding the case on this issue, the Court voiced suspicion that the South Carolina statute could be in accord with the State's background principles, claiming that it "seems unlikely that common-law principles would have prevented the erection of any habitable or productive improvements on [Lucas's] land."¹⁹⁷

After *Lucas* nearly every case in which property owners challenge legislation as a taking raises as a threshold issue whether the legislation accords with preexisting background principles of nuisance and property law.¹⁹⁸ Much

¹⁸⁶ See *Mugler v. Kansas*, 123 U.S. 623, 668–69 (1887) ("A prohibition simply upon the use of property for the purposes that are declared, by valid legislation, to be injurious to the health, morals, or safety of the community, cannot, in any just sense, be deemed a taking or an appropriation of the property for the public benefit."); *Keystone Bituminous Coal Assn. v. DeBenedictis*, 480 U.S. 470, 491 (1987) ("[N]o individual has a right to use his property to create a nuisance or otherwise harm others . . .").

¹⁸⁷ *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 421 (1922).

¹⁸⁸ *Pennsylvania Coal Co. v. Sanderson*, 6 A. 453 (Pa. 1886).

¹⁸⁹ *Mahon*, 260 U.S. at 421.

¹⁹⁰ *Id.* at 415–16.

¹⁹¹ *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1020 (1992) (stating that government regulation that leaves a landowner with "no economically viable use" can be considered a taking).

¹⁹² *Id.*; see Michael C. Blumm & Lucas Ritchie, *Lucas's Unlikely Legacy: The Rise of Background Principles as Categorical Takings Defenses*, 29 HARV. ENVTL. L. REV. 321 (2005) (discussing *Lucas* and its progeny).

¹⁹³ *Lucas*, 505 U.S. at 1015; see DANA & MERRILL, *supra* note 35, at 103–04. The Court assumed that the land had no value because of the procedural posture of the case, even though it is very likely to have had some remaining market value. Thus, the total economic wipeout rule of *Lucas* arguably may apply whenever development is prohibited, even if some value remains.

¹⁹⁴ *Lucas*, 505 U.S. at 1029.

¹⁹⁵ *Id.* at 1027.

¹⁹⁶ *Id.* at 1029.

¹⁹⁷ *Id.* at 1031.

¹⁹⁸ Exactly which laws constitute such pre-existing "background principles" is still being developed by the Court. Justice Scalia's opinion made clear that background principles may not include such common law maxims as "*sic utere tuo ut alienum non laedas*" but must comprise specific modern rules of nuisance and property law. *Lucas*, 505 U.S. at 1026. Nevertheless, these laws are thought to include, besides the state's common law of nuisance, many pre-existing principles of state property law including the public

environmental legislation has survived these challenges because courts have found that it either does not depart significantly from existing “background principles” or that it does not eliminate all economically productive uses of land.¹⁹⁹ But what about more far-reaching efforts, efforts to prevent damage to the environment without subjecting the decision to a cost–benefit balancing test? What about legislation more like that at issue in *Lucas* itself—legislation that regulates land uses on an ecosystem scale, puts the health of ecosystems foremost, and requires landowners to preserve or even restore natural services that their lands provide to the community? Courts are clear that such regulations, particularly those protecting wetlands and coastal areas from development, will be held invalid if they exceed applicable state “background principles.”²⁰⁰ As legislatures and the people consider stronger steps to protect the Earth, now they must always be aware of the potential consequences if such legislation turns out to fall afoul of *Lucas*.

Lucas is a clear expression of the Supreme Court’s discomfort with an emerging ecological view of property law. It expresses the Court’s view that, subject to today’s property and nuisance law, landowners have a constitutionally protected expectation that they can put their land to some economically viable use.²⁰¹ The decision is grounded in the Court’s conception of today’s property and nuisance law as an established and stable structure of property rights. As Professor Joseph Sax put it:

Lucas represents the Court’s rejection of pleas to engraft the values of the economy of nature onto traditional notions of the rights of land ownership. Justice Scalia assumes that redefinition of property rights to accommodate ecosystem demands is not possible. The Court treats claims that land be left in its natural condition as unacceptable impositions on landowners.²⁰²

Lucas also makes clear what the Supreme Court believes should happen when legislation goes too far in valuing ecological interests: “[w]hen . . . a regulation that declares ‘off limits’ all economically productive or beneficial uses of land goes beyond what the relevant background principles would dictate, compensation must be paid to sustain it.”²⁰³

Lucas is contrary to so much of our legal history. It is ironic that the property system the Supreme Court now regards as a preferred system is the “product of a modern economy that itself destroyed common rights in property because such rights were no longer functional in a capitalist society.”²⁰⁴ Our current property rights arose out of an evolutionary process that did not require compensation to those who lost rights, and that same process should be permitted to continue. The Court’s elevation of the existing common law as a preferred standard of property rights, even though legislatures find it antiquated and common law courts are urging legislative action to remedy that law’s shortcomings, is simply unwarranted and perhaps even “revolting,” to use Justice Holmes’s term.²⁰⁵ Justice Kennedy, who

trust doctrine, the natural use doctrine, customary rights, water rights, the wildlife trust, Indian treaty rights, and state statutes and regulations. See Blumm & Ritchie, *supra* note 192, at 341–60 (“Lower courts have upheld several doctrines of property law as background principles to defeat takings challenges at the threshold level.”).

¹⁹⁹ Blumm & Ritchie, *supra* note 192, at 321.

²⁰⁰ See Blumm & Ritchie, *supra* note 192, at 336 n.93, 337 n.94 (citing cases overturning environmental laws); *Heaphy v. Dep’t of Env’tl. Quality*, No. 257941, 2006 Mich. App. LEXIS 1192 (Mich. Ct. App. Apr. 18, 2006) (affirming owner of three lakeshore lots was entitled to \$1.7 million in compensation and could also retain ownership of the lots where Michigan’s Sand Dune Protection and Management Act banned home construction).

²⁰¹ *Lucas*, 505 U.S. at 1027–28 (1992); see Craig Anthony Arnold, *The Reconstitution of Property: Property as a Web of Interests*, 26 HARV. ENVTL. L. REV. 281, 317, 328–29 (2002) (discussing the *Lucas* majority’s view of historical property expectations).

²⁰² Sax, *supra* note 48, at 1446.

²⁰³ *Lucas*, 505 U.S. at 1030.

²⁰⁴ Sax, *supra* note 48, at 1449.

²⁰⁵ Holmes, *supra* note 1.

concurrent with the result in *Lucas*, but disagreed with much of the reasoning of Justice Scalia's opinion, was surely correct in questioning its preference for the existing common law:

The common law of nuisance is too narrow a confine for the exercise of regulatory power in a complex and interdependent society. The State should not be prevented from enacting new regulatory initiatives in response to changing conditions, and courts must consider all reasonable expectations whatever their sources.²⁰⁶

Nevertheless, *Lucas* is the law. As the common law continues to stagnate, *Lucas*'s takings doctrine ultimately constrains truly ecological legislation. Two other lurking constitutional doctrines also threaten federal legislation that diverges too far from the common law. One is the doctrine of standing. A thorough discussion of federal standing doctrine is not necessary here, except to note that while the Supreme Court requires that to sue in federal court "a plaintiff must allege personal injury fairly traceable to the defendant's allegedly unlawful conduct and likely to be redressed by the requested relief."²⁰⁷ There are now four Justices with a very narrow view of what kind of injury that is, a view that is very hostile to ecologically-oriented environmental claims. In the recent case of *Massachusetts v. EPA*, Chief Justice Roberts concluded in a dissent joined by Justices Scalia, Thomas, and Alito that global warming does not cause the kinds of injuries that confer standing on a state to challenge the EPA's failure to regulate greenhouse gases under the Clean Air Act.²⁰⁸ One more Justice holding these views would have a devastating impact not just on global warming law but on federal environmental law generally.

A second additional lurking constitutional issue is the scope of the federal government's power to regulate the environment under the Commerce Clause. I wish only to note that the scope of the federal Commerce Clause power, which has been the basis of most of the federal environmental laws, has been questioned by conservative Justices more in the past few years than it was for many previous decades. Substantial narrowing of the Commerce Clause power would pose a threat to significant portions of current federal environmental legislation.²⁰⁹

At root, these three constitutional threats to progressive environmental legislation are manifestations of the discomfort and confusion caused by the emerging divergence of goals between two significant components of the nation's legal system, the "private" common law and the "public" environmental laws. The common law thus retains a central role in America's democratic effort to live by the rule of law. It may not suddenly stand in place, fixing in time a particular structure of "private" law, leaving the legislative branches to try to develop property rights on their own. Common law judges are simply not free to follow the advice of the court in *Boomer v. Atlantic Cement Co.*,²¹⁰ as they unfortunately did in the recent New York and California global warming cases, and forego their independent responsibility to develop the law as needed to further the public welfare.²¹¹ For under our system of law, abdication of this responsibility forces

²⁰⁶ *Lucas*, 505 U.S. at 1035 (Kennedy, J., concurring opinion) (citations omitted); *see also id.* at 1047–61 (Blackmun, J., dissenting opinion) (recounting long history of power of legislatures to regulate property in interest of public safety even if all value is lost, as well as transformation of common law property rights during nation's history).

²⁰⁷ *Allen v. Wright*, 487 U.S. 737, 738 (1984).

²⁰⁸ *Massachusetts v. Env'tl. Prot. Agency*, 127 S. Ct. 1438, 1463–78 (2007) (Roberts, C.J., dissenting).

²⁰⁹ *See Klass*, *supra* note 16, at 576–79 (suggesting greater reliance on state common law in view of potential impact on federal legislation of recent Commerce Clause cases).

²¹⁰ *Boomer v. Atlantic Cement Co.*, 257 N.E.2d 870, 874–75 (N.Y. 1970) (holding that a cement plant producing air pollutants should pay damages instead of being subject to an injunction).

²¹¹ *Connecticut v. Am. Elec. Power Co.*, 406 F. Supp. 2d 265. (S.D.N.Y. 2005); *California v. Gen. Motors Corp.*, 2007 U.S. Dist. Lexis 68547, at *9–16.

democratic government to assume centralized control over the environment and simultaneously, under *Lucas*, fosters doubt about the legitimacy of those efforts and engenders social turmoil and resistance to democratic government.²¹²

D. Are Private or Public Landowners the Best Inherent Stewards of the Land—or Does That Question Even Matter?

American society continues to be roiled over whether private owners, governments, or the public are the best stewards of nature.²¹³ Because the issue of ownership is often portrayed as the essential issue of environmental protection, this article considers this one last issue before turning to the design of a new rule of law for the ecological age. As this subpart will conclude, the question of whether private parties or the public control the Earth is not what really matters. What matters most is the structure of the laws that govern the behavior of landowners, whether public or private, and the interests those rules protect and promote.

A common starting point in the ownership debates is Professor Garrett Hardin's famous *Science* paper of 1968, in which he described the "tragedy of the commons" that results when a valuable depletable resource is owned by no one.²¹⁴ In a hypothetical example, Hardin explored how the incentives created by unconstrained open access to a common pasture lead each rancher to rationally continue increasing his own herd even after the combined herds of all ranchers grow beyond the carrying capacity of the pasture:

Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited. Ruin 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.²¹⁵

Hardin concluded that while government could manage resources through coercion, a better solution is to divide resources into private parcels so that each owner would be motivated by his or her interest to use the land wisely.²¹⁶ This suggests that more privatization of the Earth, not less, is the solution to environmental degradation. Hardin was not the first to make these arguments, but his article crystallized the ideological ownership debate.²¹⁷

The argument for private ownership rests in part on a belief that government is incapable of managing resources for the long-term benefit of the public. Government is said to centralize power and make one-size-fits-all decisions, which is inappropriate because ecological realities are supposedly localized and decentralized.²¹⁸ Government is said to operate according to "public choice theory," under which it does nothing more than serve special interest groups, causing

²¹² See Arnold, *supra* note 201, at 352–53 (highlighting the importance of establishing duties of stewardship with common law property rules to avoid excessive government control).

²¹³ For an exhaustive analysis of environmental protection as a function of private, public, and mixed ownership regimes, see generally COLE, *supra* note 17.

²¹⁴ Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1243–48 (1968), available at <http://www.sciencemag.org/sciext/sotp/pdfs/162-3859-1243.pdf>.

²¹⁵ *Id.* at 1244.

²¹⁶ *Id.*

²¹⁷ See FREYFOGLE, *supra* note 11, at 157–78 (discussing the influence and implications of Hardin's article).

²¹⁸ TERRY ANDERSON & DONALD LEAL, FREE MARKET ENVIRONMENTALISM 14–24 (2001) (discussing the theory of free market environmentalism and the failure of political decision making in relation to resource management).

politicians to manage resources for short-term electoral benefits rather than to preserve long-term value: “there is no ‘voice of the future’ in government equivalent to the rising market price of an increasingly valuable resource.”²¹⁹

In contrast, private property advocates hold, the discipline of the market makes private owners seeking their own self-interest the best inherent stewards of nature:

The current market price reflects the present, discounted value of all future revenue flows that are expected to stem from the asset. The ability to capitalize future value into an asset’s present value induces property owners to consider long-term implications of their asset-use decisions. It creates a strong incentive for owners to consider fully the effects of deferring consumption of their asset returns. Furthermore, it implies that property owners will be responsible to future users. Any activity that reduces the future benefits or increases the future costs stemming from an asset results in a reduction of that asset’s current value. As soon as an appraiser or potential buyer anticipates future problems, his assessment of a property’s value falls, and the owner’s wealth declines immediately.²²⁰

Private owners are sometimes capable of admirable stewardship efforts, like those of the Nature Conservancy and other land trusts that set aside millions of acres of lands for conservation. Other private interests are leading the way in developing sustainable agriculture, renewable energy, and many other green practices and technologies.²²¹ And yet private owners are also capable of extensive depredation of the Earth. In the nineteenth century, private owners in the United States clearcut vast areas of forest cover and then discarded them as useless land. In the 1930s, private farmers created the great Dust Bowl trying to get rich through plainly inappropriate land use practices.²²² In the 1990s, timber owners in the Pacific Northwest liquidated ancient redwood forests to pay off loans they secured in order to buy the forests in hostile takeovers.²²³ Many wildlife species have long since gone extinct in England, where wildlife is mostly privately owned.²²⁴

These depredations happen for a reason. While private owners will preserve resources, if private economic gain is their only goal, economists expect them to liquidate all resources, renewable as well as nonrenewable, whenever: (a) an immediate profit can be made from harvesting the resource, which can then be reinvested elsewhere, and (b) the interest rate paid for capital in the human economy exceeds the productivity of the resource.²²⁵ In other words, private owners maximize their own gain by harvesting resources and selling them for cash whenever the cash can be invested for a higher rate of return than that provided by the resource itself. Essentially, the market subjects all privately-owned resources to the test of whether they can deliver the same rate of return as capital in the human economy.

²¹⁹ COLE, *supra* note 17, at 90 (quoting RICHARD L. STROUP & JOHN A. BADEN, *NATURAL RESOURCES: BUREAUCRATIC MYTHS AND ENVIRONMENTAL MANAGEMENT* 24 (1983); *see also id.* at 87–93 (discussing free-market environmentalist critique of government).

²²⁰ *Id.* at 94 (quoting Richard L. Stroup & Sandra L. Goodman, *Property Rights, Environmental Resources and the Future*, 15 HARV. J.L. & PUB. POL’Y 427, 427–41 (1992)).

²²¹ Green technology is drawing more investment than ever. *See The Going Green 100 Winners*, ALWAYS ON: THE INSIDER’S NETWORK, Sept. 4, 2007, <http://alwayson.goingon.com/permalink/post/18632> (honoring private companies said to be “transforming the global energy, water, agriculture, transportation, construction, manufacturing, and resource recovery establishments . . .”).

²²² *See* FREYFOGLE, *supra* note 11, at 165–67 (discussing the Dust Bowl); COLE, *supra* note 17, at 16 (discussing the creation of the Dust Bowl as the result of private entrepreneurship).

²²³ COLE, *supra* note 17, at 16 (discussing the liquidation of redwoods in the Pacific Northwest).

²²⁴ *Id.* at 97; *see also id.* at 25–27 (discussing ownership of wildlife in the United Kingdom).

²²⁵ *Id.* at 16, 96–99 (discussing economic incentives governing private liquidation of resources).

Here then lies the crux of the limitations of private ownership. Private owners value resources based on the prices they can obtain in the market, and this market is shaped by the prevailing structure of property rights. Private owners recognize no value for what economists call “public goods” or “public services,” resources that are valuable only to the larger public, including future generations, but not to the private owners themselves. For example, even if a tract of forest plays an important ecological role in moderating climate, controlling runoff in a watershed, or providing habitat for wildlife, the owner of the tract cannot practically derive any income from that value and therefore has no economic incentive to preserve it. Because, as we have seen, our property law imposes no affirmative obligation to provide such public goods or services, private owners are free to destroy or degrade resources based on a market value that does not account for any value to the broader society. Whenever the law permits such environmental losses their value is not reflected in the market price of the goods and services produced, and the resulting markets can only encourage private owners to inflict ever more such losses on society.²²⁶

Thus, our current property rights structure motivates private owners to preserve only the most financially productive resources, while steadily liquidating our stores of natural capital and steadily eroding the biosphere. They are doing what seems economically sensible, but that is only because our law fails to account for so much of the true value of the Earth to the public welfare. Under the structure of our current property law, private interests in land are simply not adequately aligned with the public welfare in our current circumstances.

This problem is made more acute, not less, by the division of the land among many private owners, a problem that Professor Eric Freyfogle has called the “tragedy of fragmentation.”²²⁷ Millions of fragmentary private owners cannot individually achieve ecological preservation, and it is nearly impossible for them to voluntarily cooperate on an ecological scale. Each owner has great freedom both to externalize ecological damage and to disrupt the ecological benefits that their lands confer on adjacent lands and waters. Those who refrain from disrupting the land are at a disadvantage when they must compete economically with those who do disrupt it. Our law motivates the multitude of competing private owners to impose externalities each upon the other and provides those who choose to preserve the Earth with little recourse against neighbors who do not.

Professor Craig Anthony Arnold has shown how the law’s common conceptualization of property ownership as a bundle of separately tradable rights further fragments the land.²²⁸ The bundle-of-rights concept masks the true nature of property as a web of interconnecting interests in which people are linked together into a community. It both leaves out the responsibilities of landowners to the community and, by promoting the fragmentation of rights and duties among many different people, encourages unethical behavior toward the land as a whole.²²⁹

Recall Garrett Hardin’s conclusion in his analysis of commons resources: “Freedom in a commons brings ruin to all.”²³⁰ But notice Hardin’s ranchers are not really free. Indeed, “each man is locked into a system that compels him” to destroy the commons.²³¹ What is it that “compels” these supposedly “free” ranchers to unethical self-destruction? It is the burdens they each impose on the others as they compete, the cumulative, externalized burdens of their own acts. And these burdens grow steadily more acute as the scale of the human enterprise encroaches ever further upon the carrying

²²⁶ See *id.* at 85–109 (discussing theory and limitations of free-market environmentalism).

²²⁷ FREYFOGLE, *supra* note 11, at 177–78; see also Sax, *supra* note 48, at 1445–46 (showing that modern legal structure fails to recognize biological interconnections of land).

²²⁸ See generally Arnold, *supra* note 201.

²²⁹ *Id.* at 305–06, 349–59.

²³⁰ Hardin, *supra* note 214.

²³¹ *Id.*

capacity of the Earth. Fragmentary private ownership governed by our current property law does not solve this problem. Today's fragmentary private owners in competition with each other are no more free to preserve the environment than are Hardin's ranchers with no property rights at all.

Private property advocates recognize that the current market causes excessive destruction of valuable resources when those resources are public goods. Their solution is to create private property rights in all resources of the Earth that need to be preserved.²³² They further advocate the transfer to private ownership of public lands and waters and the elimination of most if not all government environmental regulations.²³³ This transfer of rights must result in the specification of private property rights in all valuable resources of the biosphere. Or, as one writer put it, "the whole world will have to be privatized" in order to save it.²³⁴ The idea is that all the private owners of nature would maintain the value of their property by using their property rights to prevent damage to the land, air, water, and wildlife that they own. Thus, free-market environmentalists envision a system of complete specification of private property rights in the Earth enforced and maintained by the common law.²³⁵

This scheme raises, of course, numerous practical problems. It is doubtful that private property rights could ever be specified and allocated in many important resources because they are fugitive and dispersed, such as the atmosphere and, presumably, every species in the web of life. Private property advocates claim that this is really just a matter of cost and that when a resource becomes valuable enough, its privatization will become feasible (though even this assumes we can determine the value of every component of the biosphere before it is depleted).²³⁶ One can also question whether government's role in the specification, distribution, and enforcement of the new property rights would really require less government effort, competence and good faith than would direct regulation.

But the more important concern resides in the structure of the common law that would police the conflicts between all the private owners of the Earth. As we have seen, the common law does not regard property rights as absolute, for they inevitably come into conflict, but rather prioritizes and balances interests so as best to serve its conception of the overall public welfare.²³⁷ The problem we face is not that people have no common law rights in their health and in the environment, but that the current structure of the law makes them difficult to vindicate. People affected by air pollution, for example, can already assert a right to be free of such harm, though they carry many heavy burdens under the laws of negligence and nuisance. In a lawsuit under the common law, they would gain nothing by owning the air as well because the current law would do no more than implement its existing core judgment as to how to best balance their interests with those of economic growth.²³⁸

²³² ANDERSON & LEAL, *supra* note 218, at 4–8.

²³³ *Id.*

²³⁴ BETHELL, *supra* note 36, at 18.

²³⁵ ANDERSON & LEAL, *supra* note 218, at 4–26; COLE, *supra* note 17, at 93–95.

²³⁶ ANDERSON & LEAL, *supra* note 218, at 4–8, 23.

²³⁷ *See* Hardin, *supra* note 214.

²³⁸ Free market environmentalists seem to recognize the difficulty the existing common law poses for their proposal. Sometimes they call for some kind of "strict liability" to vindicate the new property rights they seek, but without articulating how conflicts between all the rights would be resolved or recognizing how rare strict liability actually is in our current property law. *See* ANDERSON & LEAL, *supra* note 218, at 5, 8. Sometimes they acknowledge that legal remedies other than the common law may be necessary, particularly where the environment is damaged by cumulative small impacts. *See* BRUCE YANDLE, COMMON SENSE AND COMMON LAW FOR THE ENVIRONMENT—CREATING WEALTH IN HUMMINGBIRD ECONOMIES 115 (1997). At other times they urge revisionist defenses of the historical effectiveness of the common law in protecting the environment. *See, e.g.*, ANDREW P. MORRIS & ROGER E. MEINERS, THE COMMON LAW AND THE ENVIRONMENT: RETHINKING THE STATUTORY BASIS FOR MODERN ENVIRONMENTAL LAW (Roger E. Meiners & Andrew P. Morriss eds., 2000).

Private ownership of the Earth might sometimes result in better stewardship than open access. But under the current structure of the common law, more private property rights would not lead to the kind of ecological protection called for by our current circumstances. It would only take us further down the road we are already on, placing ever more of the Earth into private hands while leaving in place the common law's core conception that the public welfare is best promoted by encouraging economic growth.

Supporters of government ownership and regulation urge that government is uniquely capable of a broad view of the public interest in the Earth, including both long time horizons (extending even to future generations) and broad geographical scope (extending to the whole nation and even beyond). Government has stepped in to prevent the predations of private interests under the common law, by retaining and conserving extensive public lands and more recently by implementing the environmental laws that industrial interests resist so bitterly.

On the other hand, private property advocates can cite many dispiriting examples of poor environmental stewardship by government (often resulting from flaws in the democratic process that allow private interests to obtain gains for themselves), including poor compliance records of government industrial and military facilities, grants of below-market grazing and mineral rights, timber sales, irrigation projects, environmentally destructive dams, poorly constructed laws that create perverse incentives, and laws whose costs are argued to vastly exceed the benefits.²³⁹ The poor environmental records of communist East European nations also raise questions about the effectiveness of complete government ownership of property.²⁴⁰

Leaving aside this ideological debate, however, the stewardship records of both government and private owners as they actually function in the real world are decidedly mixed, and neither is satisfactory. Perhaps the best lesson is that any landowner, whether private or governmental, charged with both environmental protection and other goals such as economic gain or national defense, will find difficulty in prioritizing consistent, long-term ecological preservation.²⁴¹ Thus, as scholars from Professor Morris Cohen in 1927²⁴² through Professor Eric Freyfogle today²⁴³ have long argued, the real issue is not who owns the Earth. What governs how we live on the land is the way that the law prioritizes the manifold human interests in property and resolves conflicts between those interests.

Under the rule of law in the United States, all landowners, whether public or private, are subject to the laws of property, and they pursue their interests according to the incentives those laws provide.²⁴⁴ We cannot solve our

²³⁹ See COLE, *supra* note 17, at 90–93.

²⁴⁰ *Id.* at 105–07.

²⁴¹ See *id.* (using Poland to exemplify the conflict European communist countries experienced between economic development and environmental protection).

²⁴² As soon as the *Pennsylvania Coal Co. v. Mahon* regulatory takings case was decided in 1922, the scholar Morris Cohen stressed that the real issue in property law is “not the maintenance or abolition of private property, but the determination of the precise lines along which private enterprise must be given free scope and where it must be restricted in the interests of the common good.” Morris R. Cohen, *Property and Sovereignty*, 13 CORNELL L.Q. 8, 21 (1927). For further discussion of this prophetic article, see FREYFOGLE, *supra* note 11, at 89–90.

²⁴³ Eric T. Freyfogle, *Goodbye to the Public-Private Divide*, 36 ENVTL. L. 7 (2006).

²⁴⁴ Writer Peter Barnes has made the very interesting proposal that government should place property rights in commons resources under the control of trusts that would be insulated from democratic political pressures, deploy the assets in the common interest and derive income from them to be passed on to members of the public. PETER BARNES, WHO OWNS THE SKY? (2001); PETER BARNES, CAPITALISM 3.0 (2006). Leaving aside the very difficult issues relating to the accountability of such trusts within our constitutional democracy, this novel structure of ownership and control (like other proposals to alter ownership of the earth) would not by itself resolve the essential question we are addressing herein—how best to balance our interests in the earth. This yet-to-be-defined balance would have to be specified in the laws creating the trust. How else would the trustees resolve the conflicts of interest

environmental problems by adjusting who owns the land. What we must do instead is focus on restructuring our property laws so that they will define the rights and responsibilities of all landowners, both public and private, so as best to serve the public welfare in the full world we face today.

IV. Property Rights and the Public Welfare in the Ecological Age

We are called on to develop a property law suited to our own time, when our growing cumulative impacts threaten the ecological viability of the Earth. We must develop a rule of law that requires us to constrain our cumulative environmental damage to an ecologically sustainable scale.

A constraint on the scale of ecological damage would constitute a new overarching principle of economic behavior. It would reinforce the growing social norm of environmental responsibility. It would reshape the rules of economic competition by removing the law's current incentives for economic actors to compete by externalizing environmental impacts onto others and replacing them with incentives to avoid ecological damage. It would be intended to relieve society of the burdens imposed by those who cause ecological degradation.

This legal principle would be intended to redirect the economy onto ecologically sustainable paths by creating a legal preference for economic development that does not contribute to ecological degradation. This new legal structure would intentionally avoid the cost–benefit structure of the current law, and prioritize the avoidance of ecological damage because it alone, unlike any other form of costs or benefits, must be capped. Cost–benefit analysis might help us choose among alternatives as we develop a less damaging economy. But we could no longer justify each increment of environmental damage as we do under our current law, by monetizing it and trading it for economic benefits. Under an enforceable constraint on scale, we would be motivated perpetually to reduce environmental damage per unit of output so that our economy could continue to develop within the ecological reality imposed by the Earth. This principle would permit and indeed encourage use of resources whose supplies are not limited and that can be obtained without contributing to ecological degradation. We may even be able to increase true human welfare indefinitely, as long as we are inventive enough.

This legal structure would be intended to provide the foundation for the economic restructuring advocated by progressive economists. It would encourage us to preserve natural capital (as suggested by Hawken et al.²⁴⁵) and to reorganize our economic activity around the principle that the capacities of the Earth are sufficient for us to live within (as suggested by Princen).²⁴⁶ It would be similar to the independent constraint on the scale of economic throughput (as suggested by Daly), though it is intended to allow the economy to develop and grow in any and all ways that are consistent with maintaining the ecological integrity of the Earth.²⁴⁷ It would be responding to the call for legal scholars to take account of the issue of scale in legal decision making (as suggested by Kysar).²⁴⁸

between, for example, preserving clean air and licensing pollution to obtain trust income? And just as importantly, unless the nation's property laws were restructured, trust property would be subject to being damaged by externalities just as it is today.

²⁴⁵ HAWKEN ET AL., *supra* note 46.

²⁴⁶ PRINCEN, *supra* note 47.

²⁴⁷ See DALY, *supra* note 45, at 31–60 (distinguishing economic “development” (quality improvement and fixed scale) from economic “growth” (quantitative increase in scale of throughput)). Using this terminology, some forms of economic growth would implicate ecological degradation, while other forms may not if they utilize resources that are plentiful and can be obtained without causing ecological degradation (such as renewable energy). *Id.*

²⁴⁸ Kysar, *supra* note 4, at 7–9, 75–77.

A. Legal Scholars Have Begun to Develop New Legal Rules Placing Greater Value on Ecological Interests

For decades, legal scholars have urged that the law should place a higher value on the ecological integrity of the Earth. They have made progress that is worth reviewing, for I propose to build on it in proposing a new rule of law.

Some scholars have focused on working within the current structure of the law but strengthening its ability to recognize economic value of ecological services. Others have urged substantive transformation of the legal rules themselves. For example, scholars have urged that the law should impose a new duty of stewardship that would require landowners to maintain the ecological value of their lands for the benefit of the community and avoid projecting ecological harm onto their neighbors.²⁴⁹ They have also highlighted the need for the common law to account for the total scale of damage, the effects of many small cumulative impacts, the carrying capacity of the land, and the preservation of ecosystem integrity.²⁵⁰ They have proposed that our right to live on the land be only in the nature of usufruct (i.e., a right to use the land only so long it is not diminished for future generations).²⁵¹ They have urged that doctrines such as the public trust doctrine, the natural use doctrine, strict liability, and public ownership of wildlife be expanded to further the interests of ecological protection.²⁵² And they have urged the amendment of state and federal constitutions to include expressions of environmental rights.²⁵³

²⁴⁹ See Ruhl, *supra* note 4, at 7 (proposing an intensive effort to monetize the value to people of ecosystem services, which would more frequently enable plaintiffs to carry their burden to prove that damage to the ecological natural capital necessary to provide such services is “unreasonable” under current legal standards). Monetizing ecosystem services values is critical for achieving greater ecological protection to the extent possible without restructuring the common law. *Id.* This approach will have difficulty in the all-important circumstances where “degradation of natural capital often is caused by the cumulative effects of dispersed and diverse actions, and the resulting depletion of ecosystem services may be distant in time or location” and values are not readily monetizable. *Id.* at 10; see also Klass, *supra* note 16, at 556–60 (stating that common law should assimilate new federal and state environmental laws by defining new forms of *per se* negligence and nuisance, and to better employ the vast body of information and expertise the administrative agencies have developed to identify and quantify harm to public health and the environment); Science & Environmental Health Network, Ethical Economics, True Cost Clearinghouse, <http://www.sehn.org/tcc.html> (last visited Apr. 19, 2008) (documenting the economic, health, and social costs of pollution, worker exposures, and resource exploitations, as well as the underreported benefits of remediation and precautionary policies).

²⁵⁰ See, e.g., FREYFOGLE, *supra* note 11, at 203–27, 229–30 (calling for the development of a new “Private Property for an Ecological Age,” where the common law would require landowners to take account of today’s values and variety of harms; natural variations in the land; a better balancing of conservation needs with economic needs; and revision of the harm-benefit test in a takings analysis); David S. Wilgus, Comment, *The Nature of Nuisance: Judicial Environmental Ethics and Landowner Stewardship in the Age of Ecology*, 33 MCGEORGE L. REV. 99, 125–29 (2001) (noting that property rights are subject to the public good; common law should recognize interconnectedness of nature and that we are reaching the carrying capacity of the land; nuisance law should be guided by principles of ecology, ecological preservation, maintaining the land as shared heritage of all and the greater public good when evaluating reasonableness landowners’ externalities); Lynda L. Butler, *The Pathology of Property Norms: Living Within Nature’s Boundaries*, 73 S. CAL. L. REV. 927, 1001–04 (2000) (describing how common law can be used to redefine property rights to restrict private land uses according to their cumulative impact on natural systems); David B. Hunter, *An Ecological Perspective on Property: A Call for Judicial Protection of the Public’s Interest in Environmentally Critical Interests*, 12 HARV. L. REV. 311 (1988) (calling for law to recognize the ecological value of lands in the public interest).

²⁵¹ FREYFOGLE, *supra* note 11, at 230–53 (arguing that public rights in water, wildlife, and soil should be reclaimed, with private owners having only use rights in all ecologically important resources and development rights only as necessary to promote the public good); Sax, *supra* note 48, at 1452 (stating that common law should accommodate “the economy of nature” by redefining land ownership in terms of usufructuary rights, in which a landowner “does not have exclusive dominion of her land; rather, she only has a right to uses compatible with the community’s dependence on the property as a resource”).

²⁵² See, e.g., Arnold, *supra* note 201, at 349–59 (noting that common law doctrines of public trust, natural use, nuisance, and wildlife governance should evolve and establish landowner responsibility to maintain and contribute to ecological integrity and duty of care toward the natural and human environments beyond an owner’s property lines); Sax, *supra* note 64 (arguing common law should expand the public trust doctrine beyond traditional focus on fishing, navigation, and commerce in tidelands and navigable waters into a comprehensive tool for natural resource management and environmental protection); see also BOSTON & MADDEN, *supra* note, at 103 (reviewing literature calling for the expansion of the strict liability doctrine to protect the environment).

²⁵³ See, e.g., Dan L. Gildor, *Preserving the Priceless: A Constitutional Amendment to Empower Congress to Preserve, Protect, and Promote the Environment*, 32 ECOLOGY L.Q. 821 (2005) (advocating for an environmental rights amendment to the U.S. Constitution).

However, stringent assertions of a value or a right cannot be implemented literally as practical rules of law. They inevitably come into conflict with other human interests and rights, and then judges are left to decide how best to accommodate the conflicting interests. Recall the difficulty the common law had in implementing even Justice Livingston's proposal to only impose liability for damage that was "manifest and serious."²⁵⁴ Even constitutional expressions of environmental rights, like virtually all other human rights, are difficult for courts to implement literally to their full extent. Illustrative is a recent case in which the Pennsylvania Supreme Court considered the environmental rights enshrined in the Pennsylvania Constitution.²⁵⁵ The state constitution could not more clearly express Pennsylvanians' rights to a healthy environment, the importance of future generations, and the state's public trust obligations.²⁵⁶ The court, however, was unwilling to fully enforce even such clear, strongly articulated rights, and instead balanced them with other interests. As the court said:

[T]he responsibility of government to protect the environment from private injury is . . . clear. PA. CONST. Art. I, § 10 provides that:

The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.

*In this case, we are required to weigh the governmental obligation to protect the environment against the individual right to do as one wishes with property one owns.*²⁵⁷

Nor would expanding the scope of many existing common law doctrines as they are currently structured necessarily accomplish all we might hope for. Consider, for example, the idea of expanding the public trust doctrine substantially beyond its historical concern with public rights in navigation, fishing, and recreation along the seashore and in running waters. It is surely true that, in principle, our state and federal governments hold the Earth in trust for current and future generations and are obligated to deploy it for the public welfare. And yet this begs the question of how this trust should be managed. Should every resource of the Earth be protected, or may some be used to meet current needs? Is our priority economic growth or ecological preservation? The answers, of course, depend entirely on one's conception of the general welfare under the prevailing circumstances. This is why Professor Joseph Sax, while urging expansion of the public trust doctrine in his seminal article of 1970, also characterized it as lacking intrinsic substantive content and as functioning primarily as a device for courts to ensure that the democratic process works properly in determining what the public interest actually is.²⁵⁸ The law's current conception of how to promote the public welfare therefore lies at the root of why the public trust doctrine has been used to promote economic expansion as often as it has resource protection.²⁵⁹

²⁵⁴ See *supra* notes 55–58 and accompanying text.

²⁵⁵ *Machipongo Land & Coal Co. v. Commonwealth*, 799 A.2d 751 (Pa. 2002).

²⁵⁶ *Id.*

²⁵⁷ *Id.* at 754–55 (emphasis added).

²⁵⁸ Sax, *supra* note 64, at 521 ("The 'public trust' has no life of its own and no intrinsic content. It is no more—and no less—than a name courts give to their concerns about the insufficiencies of the public process.").

²⁵⁹ See Richard J. Lazarus, *Changing Conceptions of Property and Sovereignty in Natural Resources: Questioning the Public Trust Doctrine*, 71 IOWA L. REV. 631, 641 (1986) ("[T]he traditional trust doctrine concept in the United States became as much a legal basis for economic expansion as for resource protection."); Ruhl, *supra* note 4, at 6 (finding that while the public trust doctrine holds theoretical promise, it has not been widely embraced by common law courts or expanded significantly beyond its traditional

We need specific rules of law that do more than strongly state a right, policy preference, or general objective that is then left to courts to somehow accommodate in cases that come before them. We need new laws that, like the modern doctrines of negligence and nuisance, actually specify rules of decision that courts must use in resolving concrete disputes. These new rules of decision should, like the modern common law rules, contain within their structure an embedded policy objective. But this time the goal should be promoting an ecologically viable biosphere.

While having long made general calls for reform, property scholars are just beginning to develop such practicable rules of law.²⁶⁰ For example, Professor Denise Antolini has called for the common law to permit public nuisance actions where the plaintiffs suffer the same harm as the community and not just when they suffer a “special injury.” She proposes “[a] new ‘actual community injury’ test, which would require a plaintiff in public nuisance cases to show shared, not unique, injury.”²⁶¹ Professor John Sprankling has urged the common law to recognize wilderness as a separate category of specially protected real property. In doing so, he has proposed specific modifications to the doctrines of waste, good-faith improver, adverse possession, trespass, and even nuisance (to define environmental damage in wilderness explicitly as a factor militating *in favor of*, rather than *against*, finding a nuisance).²⁶²

Some scholars have also begun to more directly confront the legal structure that lies at the core of our law. Professor Eric Freyfogle has proposed a revival of *sic utere tuo* as the guiding principle of land ownership, this time with harm defined in the context of our new circumstances.²⁶³ Armed with these doctrines, he has argued, common law judges could ban harm producing practices such as “destroying wetlands, allowing soil to erode, and draining aquifers.”²⁶⁴

Commentator James M. Olson has urged that the key step in reforming negligence and nuisance law is to reallocate the burden of proof.²⁶⁵ He has proposed that the common law should require those who have impaired or are seeking to impair any aspect of the global commons that is critical to human needs and ecological sustainability, to bear the burden of proof to justify their conduct. This would establish as the status quo the natural and self-sustaining limits of the Earth in its unpolluted or less polluted state.²⁶⁶

Finally, Professor Bruce Parady, Law Professor at Queens University in Canada, has gone further by focusing directly on the issue of scale.²⁶⁷ Focusing on legislation rather than common law, he has proposed a statutory structure that would define a limit to a society’s total ecological impact and then “proscribe individual behavior” that, if extended to all people in society, would exceed that ecological limit.²⁶⁸ This is the kind of law we need—a specific rule addressing the issue

applications); Blumm & Ritchie, *supra* note 192, at 341–46 (explaining that the public trust and natural use doctrines have not been widely adopted or applied by common law courts, but remain viable background principles in some jurisdictions).

²⁶⁰ See Arnold, *supra* note 201, at 320–21 (observing that nature-oriented property scholarship lacks specific detailed proposals for property doctrines, citing work of John Sprankling as a “rare example” of what is needed).

²⁶¹ Antolini, *supra* note 109, at 892.

²⁶² Sprankling, *supra* note 57, at 521.

²⁶³ FREYFOGLE, *supra* note 11, at 262.

²⁶⁴ *Id.* at 262–63.

²⁶⁵ James M. Olson, *Shifting the Burden of Proof: How The Common Law Can Safeguard Nature and Promote an Earth Ethic*, 20 ENVTL. L. 891, 900 (1990).

²⁶⁶ *Id.*

²⁶⁷ Bruce Parady, *In Search of the Holy Grail of Environmental Law: A Rule to Solve the Problem*, 1 MCGILL INT’L J. SUST. DEV. L. & POL’Y 29 (2005).

²⁶⁸ Olson, *supra* note 265, at 900. The Science & Environmental Health Network’s proposal of a new model National Environmental Protection Act (NEPA) focuses on the burden of proof and cumulative impacts, which places the burden of proof on proponents of a project to demonstrate that their project will not contribute to ecological degradation or unfair treatment of people. Joseph H. Guth, Model State Environmental Quality Act of 2007, <http://www.sehn.org/lawpdf/ModelStateEQA2007.pdf>.

of scale. Given the current structure of American common law and the Supreme Court's takings doctrine under *Lucas*, we might expect the United States to experience difficulty implementing such a far-reaching statute without some movement in the common law.²⁶⁹ Moreover, this particular approach to constraining scale may be too restrictive. We are going to need cooperative strategies, like cap and trade systems, whereby people can work together to limit their total ecological impacts and then allocate the allowed impacts to some members of society rather than equally distribute them to everyone.

B. The Tort of Ecological Degradation

As the central liability rules of our society, negligence and nuisance may very well remain sensible for most situations, such as accidents, medical malpractice, noisy or otherwise inappropriate neighbors, and even many invasions of interests in land that do not threaten the Earth's ecological integrity. I propose to leave these doctrines as they are for most situations and to define a new, additional property law for the specific purpose of limiting the total scale of ecological degradation.

Other forms of law, including legislation, should adopt this same goal as well. But under our legal system and current Constitutional takings doctrine, legislation alone cannot fully transform our property rights leaving the common law behind pursuing outdated goals. The common law must also evolve so as to avoid the legal system's partition into two spheres, each pursuing different visions of the public welfare. We need the common law, in the course of resolving private, essentially local disputes, to evolve into a tool by which communities and neighbors can work together to liberate themselves from the burdens of ecological degradation. Thus, I propose a new common law rule, but believe that its central principle should be incorporated into all our law.

Set out below is a proposal for a tort of "ecological degradation." The parts that follow explore the structure and key provisions of this new tort.

ECOLOGICAL DEGRADATION

- Sec. 1. A person is subject to liability for ecological degradation if his or her conduct is a legal cause of an unreasonable ecological threat.
- Sec. 2. An ecological threat is any effect on the natural world that may contribute to ecological degradation.
- Sec. 3. An ecological threat is unreasonable unless the person whose conduct is a legal cause of the threat, demonstrates by a preponderance of evidence that the threat does not contribute to ecological degradation.
- Sec. 4. A person whose conduct is a legal cause of an unreasonable ecological threat may be relieved of some or all liability for ecological degradation if the person demonstrates by a preponderance of the evidence that:
 - (a) The person has no feasible alternative to the conduct that is likely to contribute less to ecological degradation; and
 - (b) The person is conducting a vigorous program to develop a feasible alternative to the conduct that is likely to substantially lessen the ecological degradation.
- Sec. 5. Any member of a community that may be affected by an ecological threat may bring an action for ecological degradation.

²⁶⁹ *Lucas v. S.C. Coastal Council*, 505 U.S. 1003 (1992).

1. Contributing to Ecological Degradation

Many have suggested imposing strict liability for environmental impacts. But such a rule, if literally implemented, would very likely make it impossible for people to live on the Earth. We cannot exist without having some effects on the world around us. We should tie potential liability more closely and specifically to what is damaging the public welfare.

Thus, this tort aims not to prevent all environmental impacts, only ecological degradation. By “ecological degradation,” I mean to refer to the concepts used by scientists when they describe the decline of the Earth’s biosphere. For example, Noss and others have described the ongoing biotic impoverishment of ecosystems in the United States in terms of the “degradation in the structure, function or composition of an ecosystem.”²⁷⁰ UNEP’s 2007 *GEO-4 Report* frequently uses the term “degraded” to describe the state of many elements of the environment.²⁷¹ The United Nations 2005 *Millennium Ecosystem Assessment* describes global ecosystem services as being “degraded” or used unsustainably.²⁷² The Swedish government has defined sixteen environmental quality goals and numerous environmental quality indicators that are intended to describe the quality and state of the environment that should be achieved and maintained over the long term.²⁷³ Aldo Leopold defined “land health” as the “capacity for self-renewal in the soils, waters, plants, and animals that collectively comprise the land.”²⁷⁴ To Leopold, “a thing is right when it tends to preserve the integrity, stability and beauty of the biotic community.”²⁷⁵ Wendell Berry has taught that “land health” is the “one value” that upholds the entire web of life, that human well-being is linked to land health; and that a property rights system intended to promote the public welfare must discourage land uses that threaten land health.²⁷⁶

Thus, “ecological degradation” is intended to mean the biotic impoverishment and decline in the self-sustaining and self-renewing capacity of the biosphere. While there may be a better term, what matters most is that the law supplies this substantive content to whatever term is used. For global ecological degradation is what threatens the long-term public welfare and must be prevented.

This proposed law recognizes that ecological degradation often results from the cumulative effect of many smaller impacts that would not cause ecological degradation by themselves. There is but one way to respond to this reality: when ecological degradation is threatened or is actually occurring, we must all be responsible for each of our acts that *contributes* to it. Accordingly, under this proposed law, any effect on the natural world that may contribute to ecological degradation is subject to potential liability.

This test is at once both broader and narrower than the old common law rule of *sic utere tuo*. It is broader because it explicitly addresses small impacts that taken alone may do no harm. Also, it addresses not just harm landowners inflict on the land of others, but harm they do to their own property including damage that withdraws ecological benefits from the larger community. It is narrower because it focuses specifically on effects that contribute to ecological degradation, and not on anything that affects people’s quiet enjoyment of their land.

²⁷⁰ See NOSS ET AL., *supra* note 141.

²⁷¹ UNEP, *supra* note 137, *passim*.

²⁷² MILLENNIUM ECOSYSTEM ASSESSMENT, *supra* note 3, at 6–11.

²⁷³ See Envtl. Objectives Secretariat, Swedish Envtl. Prot. Agency, Environmental Objectives Portal, <http://www.miljomal.nu/english/about.php>.

²⁷⁴ LEOPOLD, *Conservation: In Whole or in Part?* [1944], in *THE RIVER OF THE MOTHER OF GODS*, *supra* note 10, at 318.

²⁷⁵ LEOPOLD, *supra* note 2.

²⁷⁶ See FREYFOGLE, *supra* note 11, at 151–56 (discussing Wendell Berry’s ideas and advocacy).

This legal test is intended to allow us to find ways to live on and alter the Earth as we inevitably must, but it proscribes undermining the ecological systems we need to survive. By focusing directly on the ecological integrity of the land, it imposes a broad duty of ecological stewardship on each of us. It is also intended to motivate us to work together to achieve stewardship goals. Whenever people jointly constrain the cumulative effects of their actions (as, for example, where all those sharing a watershed or fishery work cooperatively to avoid its degradation), then individual acts permitted by such an agreement ought not to be subject to this tort (at least to the extent they affect the watershed or fishery).

The law must also define the causal nexus between a defendant's acts and an "effect on the natural world that contributes to ecological degradation."²⁷⁷ Emission of pollution from a factory could certainly be a legal cause of such an effect. But what about supplying the materials that the factory uses in generating pollution, or the purchase by consumers of the factory's products? The question of "legal cause" can be a difficult one, but it is one that the common law has developed in the context of other rules of law. This working proposal does not resolve this issue, but simply acknowledges it by creating potential liability only if "conduct is a legal cause" of an unreasonable ecological threat.

For the law to sanction effects on the natural world that contribute to ecological degradation would surely constitute a significant evolution in the common law. And yet, courts have sometimes made suggestions, if not holdings, along these lines that may be useful to advocates urging adoption of this principle. For example, courts have recognized the importance of adjusting our activities to accommodate the land's natural capacities.²⁷⁸ They have expressed concern with mounting ecological degradation and suggested an evolution in judicial conceptions of the public welfare.²⁷⁹ They have even recognized the importance of avoiding small impacts, now that cumulative effects have become so significant.²⁸⁰

Governments have also taken small, though helpful, steps that would help to ratify this new legal definition of unreasonable acts. As mentioned earlier, some federal legislation has diverged from the common law structure by fixing specific standards of human health and environmental quality. Some local governments have also implemented stronger steps, such as the adoption of precautionary laws that are focused on avoiding harm to human health and the environment and searching for less damaging alternatives.²⁸¹ More specifically, however, state and federal governments have also begun to recognize the importance of cumulative impacts. For example, the United States EPA has developed a

²⁷⁷ *Supra* Part IV.B (section 2 of the proposed tort of ecological degradation).

²⁷⁸ *See Prah v. Maretti*, 321 N.W.2d 182, 190 (Wis. 1982) (reasoning that "the policy of favoring unhindered private development in an expanding economy is no longer in harmony with the realities of our society"); *Just v. Marinette County*, 201 N.W.2d 761, 768 (Wis. 1972) ("An owner of land has no absolute and unlimited right to change the essential natural character of his land."); *Barrett v. State*, 116 N.E. 99 (N.Y. 1917) (upholding state law stocking and protecting public beaver populations over large area on lands of many private landowners); *Cawsey v. Brickley*, 144 P. 938 (Wash. 1914) (upholding law distinguishing land based on inherent features, and banning hunting on those lands where hunting is not suitable). For further discussion of significance of these cases, *see FREYFOGLE, supra* note 11, at 30–33 (*Barrett*); 35–36 (*Cawsey*); 94–95 (*Just*); 97–98 (*Prah*).

²⁷⁹ *See, e.g., Machipongo Land & Coal Co., Inc. v. Commonwealth*, 799 A.2d 751, 772–73 (Pa. 2002) (explaining that a land owner's expectation of being able to mine coal despite adversely affecting the watershed of a stream that is a source of drinking water is no longer reasonable); *R & Y, Inc. v. Municipality of Anchorage*, 34 P.3d 289, 298 (Alaska 2001) (pointing to "the unique ecological and economic value that wetlands provide in protecting water quality, regulating local hydrology, preventing flooding, and preventing erosion" and finding that regulations protecting such wetlands "provide ecological and economic value to the landowners whose surrounding commercially-developed land is directly and especially benefited").

²⁸⁰ *See Illinois v. City of Milwaukee*, 1973 U.S. Dist. LEXIS 15607, *20–22 (D. Ill. 1973), *rev'd on other grounds*, 599 F.2d 151 (7th Cir. 1979), *vacated*, 451 U.S. 304 (1981); *see also supra* note 149 and accompanying text; *Grant's Farm Assocs., Inc. v. Town of Kittery*, 554 A.2d 799, 801–02 (Me. 1989) (upholding that a permit was properly denied because a ten percent worsening of traffic was "causation" of detriment to environmental and community interests); *Gardner v. N.J. Pinelands Comm'n*, 593 A.2d 251, 258 (N.J. 1991) (upholding state statute protecting New Jersey Pinelands, which furthered legitimate government purpose because even if plaintiff's impact was small, cumulative small impacts can be detrimental to environment).

²⁸¹ *See BE SAFE, supra* note 183.

framework for assessing cumulative impacts where this is required under particular laws, and is charged with developing specific methodologies for assessing multiple chemical exposures.²⁸² The White House Council on Environmental Quality has begun to develop methods for evaluating cumulative impacts in Environmental Impact Statements and Environmental Assessments of government actions under the National Environmental Policy Act of 1969 (NEPA).²⁸³ The California Environmental Protection Agency is developing “guidance on conduct of cumulative impacts” analysis as a critical component of its implementation of California’s Environmental Justice legislation.²⁸⁴

2. Allocating the Burden of Proof to Defendants

A critical question is how to allocate the burden of proof. Should a plaintiff have to prove a defendant’s act contributes to ecological degradation for the law to intercede, or should a defendant have to prove his or her acts do not contribute to ecological degradation? In section 3 of the proposed tort, the burden of proof is allocated to defendants. Thus, a person’s conduct that is a legal cause of an ecological threat (i.e., any effect on the natural world that may contribute to ecological degradation) is deemed unreasonable unless that person demonstrates the effect is not likely to contribute to ecological degradation.

A recent statutory case from the Court of Appeals for the Ninth Circuit illustrates the overarching importance of this structural element of the law.²⁸⁵ In *Earth Island Institute v. Hogarth*, Congress prohibited labeling cans of tuna as “dolphin safe,” if the tuna was caught using “purse-seine” nets.²⁸⁶ Congress believed that such nets were not safe for dolphins.²⁸⁷ Congress allowed this restriction to be relaxed, however, if the Secretary of Commerce found that scientific studies demonstrated that purse-seine nets could be used without harming dolphin populations.²⁸⁸ Consequently, those who wished to use the nets had the burden of proving that they did not harm dolphin populations.²⁸⁹ When the case came to court, the scientists did not know whether the nets were harming dolphin populations or not—the evidence was inconclusive.²⁹⁰ Nevertheless, the Secretary of Commerce argued he could change the dolphin-safe labeling requirement.²⁹¹ The Court disagreed and required the Secretary to meet the burden of proof that the law imposed:

²⁸² See U.S. ENVTL. PROT. AGENCY, FRAMEWORK FOR CUMULATIVE RISK ASSESSMENT, EPA/630/P-02/001F (2003) (discussing the EPA’s newly developed framework for cumulative risk assessment); NAT’L CTR. FOR ENVTL. ASSESSMENT, U.S. E.P.A., CONSIDERATIONS FOR DEVELOPING ALTERNATIVE HEALTH RISK ASSESSMENT APPROACHES FOR ADDRESSING MULTIPLE CHEMICALS, EXPOSURES AND EFFECTS (EXTERNAL REVIEW DRAFT) 1–2 (2006) (explaining that “[t]he purpose of [the] report is to describe information and risk assessment approaches that can be used to implement the basic cumulative risk concepts” set out in other EPA reports).

²⁸³ See COUNCIL ON ENVTL. QUALITY, CONSIDERING CUMULATIVE EFFECTS UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT 49–57 (1997) (setting forth methods for evaluating cumulative impacts), available at <http://www.nepa.gov/nepa/ccenepa/sec5.pdf>; see also 40 C.F.R. § 1508.7 (2007) (explaining that CEQ regulations define cumulative effects as impact on environment resulting from past, present, and future incremental impacts).

²⁸⁴ See CAL. ENVTL. PROT. AGENCY, ENVIRONMENTAL JUSTICE ACTION PLAN 4 (2004), available at <http://www.calepa.ca.gov/EnvJustice/ActionPlan/Documents/October2004/ActionPlan.pdf> (developing guidance on cumulative impacts).

²⁸⁵ *Earth Island Inst. v. Hogarth*, 484 F.3d 1123 (9th Cir. 2007); see also Joseph H. Guth, *How Dolphins Got the Benefit of the Doubt and Why It Matters*, RACHEL’S DEMOCRACY & HEALTH NEWS, May 03, 2007, available at <http://www.sehn.org/lawpdf/DolphinSafeBOP.pdf> (discussing the *Earth Island Institute* case and the issue of the allocation of burden of proof).

²⁸⁶ *Earth Island Inst.*, 484 F.3d at 1127.

²⁸⁷ *Id.*

²⁸⁸ *Id.*

²⁸⁹ *Id.*

²⁹⁰ *Id.* at 1128.

²⁹¹ *Id.* at 1133–34.

The Secretary then points to the inconclusive nature of all the agency's studies and claims that the absence of evidence allows him to make a change in dolphin-safe labeling requirements. This court already rejected such reasoning . . . when it held that there is no basis on which to change the status quo if all of the evidence is inconclusive.²⁹²

Therefore, because this Act allocates the burden of proof to economic actors, the inconclusive nature of the science meant that the Secretary could not authorize steps that would increase the risk to dolphins. Dolphins had the benefit of the doubt, and the law protected them.

We have seen how the allocation of the burden of proof defines the condition that the law prefers, the condition that it protects in cases of doubt. We have also seen how environmental claims have become especially hard to prove, and may become harder even as ecological degradation mounts.²⁹³ Because the legal system must decide cases, it is not a question of whether the law should prefer one interest or another when the facts are inconclusive, but which interest. The law must decide what it values most in cases of doubt. Under our current circumstances, in cases involving conflicts between economic and ecological interests, in cases of doubt the law should prefer the health of the land to unimpeded economic activity.

Allocation of the burden of proof also reflects what we intrinsically believe is most likely to be happening when we can't be sure, in cases of doubt. As we have seen, when nineteenth century judges placed the burden of proof on plaintiffs in negligence and nuisance, they simply believed that industrial activity was likely to create a net benefit even where it also caused damage. Thus, they built into the law the presumption that accorded with what they thought was the most likely reality. But now, the only reasonable presumption in the ecological age is that industrial effects on the natural world are likely to be contributing to ecological degradation.

Other factors inform the allocation of the burden of proof as well. It should reflect which party is in the best position to bring forward information the court needs to resolve disputes, and which party is in the best position to take steps to avoid the harm the law seeks to prevent.²⁹⁴ Courts should be cognizant of imbalances of power and resources that systematically impede vindication of particular interests. Also, because the rules of the common law establish and reinforce social norms, the allocation of the burden of proof should reflect the duty the law believes we each have to the community. For example, if the burden of proof in this tort were allocated to plaintiffs, the social norm reinforced by the law would be: "I am free to act unless someone can prove I am contributing to ecological degradation." But if the burden of proof were placed on defendants, the reinforced norm would be: "I am free to act only if I can demonstrate my acts are not likely to be contributing to ecological degradation."

Considering many of these factors, commentator James Olson has urged that the common law place the burden of proof on those whose actions create an ecological threat in view of the global nature of environmental problems; the interconnectedness of nature and our impacts on it; the limited capacity of the Earth to assimilate environmental damage; the current risks to the Earth's life-sustaining systems; and the difficulties in proving causation of environmental damage.²⁹⁵ He has also noted the imbalances of economic power, knowledge, and control between average citizens who

²⁹² *Id.*

²⁹³ See Peter Montague, *Human Ignorance is Growing*, RACHEL'S DEMOCRACY & HEALTH NEWS, Apr. 26, 2007, http://www.precaution.org/lib/07/prm_editorial.070426.htm (arguing that the ongoing disruption of ecological systems presents ecological scientists with a moving target as an object of study, thereby causing uncertainty about our impacts on the Earth may now be increasing with time).

²⁹⁴ See KEETON ET AL., *supra* note 66, §§ 38–40, at 238–42 (discussing burden of proof and presumptions).

²⁹⁵ See generally Olson, *supra* note 302 (arguing how the burden of proof should be shifted to "the party whose actions threaten environmental values").

are harmed by environmental damage and industrial interests causing the damage, and that these imbalances make critical environmental interests difficult to vindicate under the current structure of the law. As he put it:

When conduct is proposed that would alter ecological relationships, those seeking to alter, or who have altered, this ecological system should have the burden of proof. The party seeking to alter the natural order or introduce chemicals into the environment should have to establish that such alteration would not impair or destroy the underlying, self-sustaining characteristics of nature to justify their conduct. This would put the burden upon those initiating change; those who have the economic incentive and information—those in control—would have the burden of proof, internalizing costs in the process.²⁹⁶

Two additional structural issues arise once the burden of proof is placed on defendants. One is to define the evidentiary standard that applies; such as “preponderance of the evidence,” “clear and convincing evidence,” “beyond a reasonable doubt” or perhaps some other standard. The importance of this standard to the outcome of legal disputes is second only to the allocation of the burden of proof. Obviously, the higher the evidentiary standard, the more difficult it would be for the defendant to carry the burden of proof and the more protective of the environment the tort would be. For this working proposal, I have simply chosen the typical common law civil standard: the “preponderance of the evidence.”

A second structural issue is to define the scope of the acts that will be subject to liability if the defendant does not meet his or her burden of proof. It would be impractical if we all had to prove in court that everything we do does not contribute to ecological degradation. The more likely it is that the acts subject to potential liability contribute to ecological degradation, the more powerful the rationale for allocating the burden of proof to defendants. On the other hand, the tort would be eviscerated if so few acts were subject to potential liability that it could not control the total scale of ecological damage.

The current common law of nuisance employs such a gate-keeping function by requiring plaintiffs to show they have suffered a “significant” harm before imposing liability for a nuisance. “Significant” harm is defined as “harm of importance, involving more than slight inconvenience or petty annoyance.”²⁹⁷ In nuisance, “[t]he law does not concern itself with trifles . . .”²⁹⁸ This test would be too stringent for the new law because its very intent is to prevent the cumulative impact of acts that may not by themselves be “significant.” Also, establishing too high an initial burden on plaintiffs would undermine many of the policy goals of placing the ultimate burden of proof on defendants.

This gate-keeping test should be grounded in the goal of preventing ecological degradation. Obviously, some kinds of effects on the natural world raise greater potential for contributing to ecological degradation than others. Drawing this distinction will not always be a simple task, but we should not be deterred. For example, ecologists and ecological economists have identified forms of “critical natural capital” whose ecological function cannot be replaced by other forms of capital.²⁹⁹ Professor J.B. Ruhl has suggested focusing on damage to such capital in nuisance cases.³⁰⁰ Perhaps a judge might apply this new tort to threats to critical natural capital, with the gate-keeping function designed to focus the law on such resources.

²⁹⁶ *Id.* at 900.

²⁹⁷ RESTATEMENT (SECOND) OF TORTS § 821F cmt. c (1965).

²⁹⁸ *Id.*

²⁹⁹ The Sustainable Scale Project, Critical Natural Capital, <http://www.sustainablescale.org/ConceptualFramework/UnderstandingScale/MeasuringScale/CriticalNaturalCapital.aspx> (last visited Feb. 28, 2008); J.B. Ruhl, *Making Nuisance Ecological* 17–18 (Fla. St. U. College of Law, Public Law Research Paper No. 216, 2006), available at <http://ssrn.com/abstract=931248>.

³⁰⁰ Ruhl, *supra* note 299.

This working proposal offers as a starting point the simple idea that the burden of proof should be placed on defendants whenever their conduct is the legal cause of an “ecological threat.” An “ecological threat” is defined as “any effect on the natural world that may contribute to ecological degradation.” Thus, for a defendant’s conduct to be subject to potential liability under this tort, a plaintiff must demonstrate that it causes an effect on the natural world. The plaintiff must produce evidence rising above the level of pure speculation. This evidence must show that the defendant’s conduct may contribute to ecological degradation. The ultimate burden of proof would then shift to defendants to prove that the effect of their conduct is not likely to contribute to ecological degradation.

Placing this burden on defendants would unquestionably constitute a dramatic evolution in the law. However the current law is not monolithic; it allocates the burden of proof to defendants and economic actors in some circumstances that may form useful precedential building blocks for judges to build on. For example, the Federal Food Drug and Cosmetic Act requires prescription pharmaceutical manufacturers to demonstrate that a new drug is safe and effective before it may be marketed.³⁰¹ Under the Food Quality Protection Act, pesticide manufacturers must demonstrate that there is a “reasonable certainty that no harm will result” from exposure to a pesticide in food before it may be marketed.³⁰² And, as we have seen, the federal Dolphin Protection Consumer Information Act (1990) requires the Secretary of Commerce and tuna producers to show certain types of fishing are safe for dolphin populations before allowing labeling standards to be changed.³⁰³

At times the common law places the burden of proof on defendants. For example, carriers bear the burden to show that they are not negligent when goods or passengers are injured.³⁰⁴ Some states will shift the burden to defendants to prove they are not negligent under the doctrine of *res ipsa loquitur* (meaning, “the thing speaks for itself”).³⁰⁵ The burden can also be placed on defendants in alternative liability cases when the negligent conduct of two or more defendants (such as shooting guns across a highway, or causing a “chain collision” of automobiles) has injured a plaintiff. In this situation, many jurisdictions place the burden on defendants to establish which of them is liable.³⁰⁶ A similar situation arises in products liability cases in which multiple defendants make an identical product, such as a drug, and the injured plaintiff cannot identify which manufacturer’s product was actually used.³⁰⁷ Some courts will apportion liability among the manufacturers and place the burden on them to show that they could not have made the product that damaged the plaintiff.³⁰⁸ The common law also places the burden on defendants to establish affirmative defenses that can relieve them of liability for otherwise negligent conduct, including the defenses of contributory negligence, comparative negligence, and assumption of the risk.³⁰⁹

³⁰¹ Federal Food, Drug and Cosmetic Act, 21 U.S.C. § 355 (2000).

³⁰² Food Quality Protection Act, Pub. L. No. 104-170, 110 Stat. 1489 (codified as amended in scattered sections of 7 U.S.C. and 21 U.S.C.).

³⁰³ *Earth Island Inst. v. Hogarth*, 484 F.3d 1123 (9th Cir. 2007).

³⁰⁴ *KEETON ET AL.*, *supra* note 66, § 38, at 239–40.

³⁰⁵ *See id.* §§ 39, 40, at 242–62. Courts sometimes invoke this doctrine when a particular event can be deemed unlikely to have occurred unless there was negligence (such as brinks falling from the windows. While most jurisdictions applying *res ipsa loquitur* simply permit negligence to be inferred from the fact that the event has occurred while leaving the burden of proof on plaintiffs, a few states go further to switch the burden of proof to defendants requiring them to introduce evidence of greater weight that the plaintiffs in order to prevail. *Id.* at 258–59.

³⁰⁶ *Id.* § 41, at 270–71.

³⁰⁷ *See id.* § 41, at 271–72, 350–52.

³⁰⁸ *Id.*

³⁰⁹ *Id.* §§ 65–68, at 451–98.

Finally, our courts might consider what is perhaps the most significant environmental law passed in the world in the last few years, the European Union's regulation known as REACH.³¹⁰ That law constitutes a new chemicals policy that will apply to about 30,000 chemicals manufactured in or imported into the European Union.³¹¹ Under REACH, the burden of proof has been placed on industry, as a condition for keeping or placing several classes of hazardous chemicals on the market. Defendants must prove that the socioeconomic benefits of each use of the chemicals outweigh their risks and that there are no suitable alternatives.³¹²

3. The Affirmative Defense of Ecological Stewardship

A new rule of law holding acts unreasonable if they contribute to ecological degradation would establish a powerful duty of ecological stewardship. It will be a significant human achievement if we someday learn to live on the Earth according to this duty.

We have to recognize that immediate introduction of this rule of law into our current society would be wrenching. Nearly all of us are immersed in a complex integrated industrial economy and entrenched in land use practices that constitute a juggernaut of ongoing ecological degradation. Much of what we do as a society contributes to ecological degradation. If we had been wiser, we might have avoided creating such an economy. But at this point, we are dug in quite deep.

Such a transition in the structure of property rights, even if justified by the public welfare, would raise legitimate concerns. As Professor Carol Rose has pointed out, property rights transitions should be managed fairly because they implicate individual economic welfare, the integrity of society's investments in economic development, and social stability.³¹³ Resistance to new property laws by private property owners is particularly acute if legal changes are perceived to be unfair or fall disproportionately on just some owners.³¹⁴ Concern over disrupting the expectations of private property owners and selectively appropriating property for the public is a key element of the Supreme Court's takings jurisprudence.³¹⁵ Reactive property rights legislation can be used not only to impede environmental statutes that stray too far from the common law,³¹⁶ but to overrule the common law if it diverges too far from the democratic will.

Responding to these concerns, legislatures and courts have developed a variety of tools to ease property rights transitions, including grandfathering existing uses, phase-in periods and many others.³¹⁷ Professor Eric Freyfogle, while advocating profound alterations in our property law, has proposed that private property owners be granted a set of rights or protections to ensure that they are treated fairly as property rights are altered.³¹⁸

³¹⁰ EUR. COMM'N, ENV'T DIRECTORATE GENERAL, REACH IN BRIEF 3–5 (2007), available at http://ec.europa.eu/environment/chemicals/reach/pdf/2007_02_reach_in_brief.pdf.

³¹¹ *Id.* at 15.

³¹² European Parliament and Council, Regulation 1907/2006, art. 60(4), 2006 O.J. (L 396) 150 (EU).

³¹³ Carol Rose, *Property Rights and Responsibilities*, in THINKING ECOLOGICALLY—THE NEXT GENERATION OF ENVIRONMENTAL POLICY 49, 57 (Marian Chertow & Daniel Esty eds., 1997) (“Owners . . . are entitled to expect fair *transitions* to new ways of managing environmental resources; but no one can expect that existing property uses will forever remain the same.”).

³¹⁴ Univ. of Missouri-Kansas City School of Law, The Fifth Amendment and Takings of Private Property, <http://www.law.umkc.edu/faculty/projects/ftrials/conlaw/takings.htm> (last visited Apr. 18, 2008).

³¹⁵ *Lucas v. S.C. Coastal Council*, 505 U.S. 1003, 1018–19 (1992).

³¹⁶ See discussion *supra* Part III.C.

³¹⁷ Rose, *supra* note 313, at 55–56.

³¹⁸ Eric T. Freyfogle, *What is Land? A Broad Look at Private Rights and Public Power*, 58 PLAN. & ENVTL. L. 3, 3–9 (2006).

The tort of ecological degradation addresses this issue in section 4 by outlining an affirmative defense to liability for causing an unreasonable ecological threat. Considering our current circumstances perhaps the real tort, the truly unreasonable act that harms the community and is worthy of legal sanction, is for people to continue business as usual without responding to society's need for stewardship. What we need most is for everyone to take meaningful and immediate steps to reduce their contributions to ecological degradation.

The key to reducing environmental impacts until we learn to live within the ecological limits of the Earth is to embark on the course of continually searching for and adopting alternative, less damaging practices. An earlier part of this Article described how the commitment to an ecologically sustainable economy would place our economy on the path of continuing to develop while staying within the ecological capacities of the Earth. This is the path of continually adopting less damaging alternatives. This is why the search for alternatives rather than cost-benefit justification of our existing practices is an emerging hallmark of environmental decision-making designed to protect the Earth and public health.³¹⁹

Accordingly, this affirmative defense focuses on whether a defendant has taken her stewardship obligations seriously, by actively seeking less damaging alternatives. Under section 4, to gain relief from liability for causing an unreasonable ecological threat, a defendant would have to prove that (a) she has no feasible alternative to the conduct that is likely to contribute less to ecological degradation; and (b) she is conducting a vigorous program to develop such a feasible alternative. Relief could be tailored to the particular circumstances, and could include contingent injunctions, reduced damages or contingent damages.

Carefully defining the terms of this defense will be necessary to ensure that it does not eviscerate the tort. Additional elements could make the defense more stringent. For example, we may need seriously to examine the social value of the products we create. While judging qualitative value is surely difficult, we all know that many of the products produced by our society are of little social worth. If we are going to be serious about constraining our scale of ecological damage, we may wish to determine which products actually benefit us and forego the rest. The affirmative defense could include an element requiring that the defendant's conduct be necessary to produce a product or service that is of significant social value.

This affirmative defense would require the law to become much more involved than it is today in analyzing alternative economic conduct. And yet, the law already recognizes the importance of alternatives.³²⁰ A famous case illustrates the ability of courts, including the United States Supreme Court, to inquire into alternatives, examine the defendant's development efforts, and force improvements. In the *Madison v. Ducktown Sulphur* case of 1904, the Tennessee Supreme Court was convinced that there were no alternatives to the defendant's methods of smelting copper.³²¹ It held that the plaintiffs were entitled to damages for nuisance but refused to order an injunction, primarily due to the great value of defendant's business. The court also found:

³¹⁹ See MARY O'BRIEN, MAKING BETTER ENVIRONMENTAL DECISIONS—AN ALTERNATIVE TO RISK ASSESSMENT (2000) (describing alternatives analysis in detail); Nancy J. Myers, *The Checklist at Work*, in PRECAUTIONARY TOOLS FOR RESHAPING ENVIRONMENTAL POLICY, *supra* note 110, at 93, 93–105 (identifying factors to consider in evaluating alternatives); European Parliament & Council, Regulation 1907/2006, art. 60(4), 2006 O.J. (L 396) 150 (EU), available at <http://europa.eu.int> (discussing the alternatives analysis under REACH).

³²⁰ National Environmental Policy Act, 42 U.S.C. § 4332(C)(iii) (2000) (requiring federal agencies to examine alternatives to proposed actions). The common law also can consider alternatives in evaluating negligence and nuisance. See RESTATEMENT (SECOND) OF TORTS § 828(c) (1965) (identifying practicality of preventing or avoiding defendant's harmful conduct as element of its utility); RESTATEMENT (SECOND) OF TORTS § 292 cmt. c (identifying practicality of preventing or avoiding defendant's negligence as element of its utility).

³²¹ *Madison v. Ducktown Sulphur, Copper & Iron Co.*, 83 S.W. 658, 660 (Tenn. 1904).

[Defendants] have been and are pursuing the only known method by which these plants can be operated and their business successfully carried on; that the open-air roast heap is the only method known to the business or to science by means of which copper ore of the character mined by the defendants can be reduced; that the defendants have made every effort to get rid of the smoke and noxious vapors, one of the defendants having spent \$200,000 in experiments to this end, but without result.³²²

A few years later, in another nuisance suit involving the identical plant, the U.S. Supreme Court itself examined the alternative technologies.³²³ The Court was not so sure that there was only one way to do things, and imposed monitored emissions limits that eventually resulted in development of new methods and dramatic reductions in emissions.³²⁴

What about the cumulative body burden of toxic chemicals from multiple sources, which creates far greater damage or risk in the exposed people than would any individual exposure. Why should the common law not impose liability for any exposure that contributed to a dangerous cumulative body burden?

Or consider the Gulf of Mexico Dead Zone off the Louisiana continental shelf, which results from nutrient runoff from a multitude of human sources into the Mississippi River watershed. The Dead Zone can only be addressed by reducing each and every incremental contribution to the excessive nutrient load from the entire watershed. Is it not reasonable for neighbors and communities who use the watershed and the Gulf to expect the common law to require greater stewardship of all those who are causing this Dead Zone?

Finally, consider global warming, perhaps our largest single ecological problem. It would seem that every release of carbon dioxide now contributes to ecological degradation and is therefore presumptively unreasonable. Should neighbors and communities be entitled to seek the assistance of the courts to prevent carbon pollution caused by industry? Once most members of society respond to global warming, would they not expect the common law courts to enforce the new social norms?

4. Standing

We now come to the question of standing: who should common law courts allow to defend ecological interests by bringing suit under this tort? Today's common law does not allow private persons to assert purely public nuisances.³²⁵ It allows individuals to recover only if they suffer a "special injury" that is "different in kind" from those suffered by the general public.³²⁶ The current common law expects injury to the community as a whole to be addressed only by the government.

Professor Denise Antolini has argued forcefully that any member of a harmed or threatened community should be able to bring suit on behalf of the community.³²⁷ She has proposed that the "special injury rule" be replaced by a "community injury rule" allowing individual community members to defend the public interest, particularly in environmental cases.³²⁸ Professor Antolini has also demonstrated that traditional objections to broadening access to the courts are no longer tenable, including arguments that only the state should assert public nuisances, that a multiplicity

³²² *Id.*

³²³ *Georgia v. Tennessee Copper Co.*, 206 U.S. 230 (1970).

³²⁴ *Id.*; see also PERCIVAL ET AL., *supra* note 59, at 82–84 (discussing *Georgia v. Tennessee Copper* and subsequent history).

³²⁵ RESTATEMENT (SECOND) OF TORTS § 821C (1965).

³²⁶ *Id.*; see also Antolini, *supra* note 109 (discussing of the special injury rule for public nuisance).

³²⁷ Antolini, *supra* note 109, at 862–63.

³²⁸ *Id.* at 764.

of suits would burden the courts, and that the courts would become clogged with trivial suits. The substantial benefits society has obtained under the broad citizen suit provisions of the federal environmental laws provide support for Professor Antolini's arguments.³²⁹ Indeed, the Hawaii Supreme Court has abandoned the traditional special injury rule for public nuisance actions.³³⁰

In this working proposal, standing is granted to each member of a community that may be affected by an ecological threat. Courts should adopt a broad view of the types of effects on a community that may be prevented. The need for this law is driven by the interconnectedness and interdependence of nature's elements, by the cumulative impact of many incremental effects that are distant in time and space, and by the deep interconnections between human welfare and the Earth. If the law is too focused on direct and monetizable human interests, it encourages us to do damage in remote areas where fewer people are affected. However, in our current situation, we need less populated, more ecologically intact lands to be protected from ecological degradation because all our lands are connected. The public welfare is also affected by the health of these more distant lands and people care about them even if they cannot demonstrate a specific concrete connection to them.³³¹ Common law courts should accept these human, ethical and moral concerns, for they lie at the root of the need for this rule of law.³³²

5. Future Generations

This new rule of law is not limited to ecological degradation occurring in the present, but also regards as unreasonable conduct contributing to future ecological degradation. The limits to the Earth's capacity to assimilate environmental damage are in part physical, rooted in the finite physical size of the Earth's biosphere, and in part biological, rooted in the intricate interconnections and interdependence of the land community. But the most difficult dimension of the accumulation of impacts for us to perceive and to respond to is that of time. Many of the ecological losses we suffer are essentially permanent because of the vastness of evolutionary time as compared to the span of our own history. The damage we do in our own generation affects not just ourselves but adds to the cumulative ecological degradation that must be borne by all future generations. We externalize our damage not just onto each other, but onto future generations as well. Thus, the future is the true locus of the full effects of cumulative impacts.

This issue was recognized in the first federal environmental law of the 1970's, the National Environmental Policy Act. This statute calls on the federal government to work to fulfill the needs of future generations of Americans.³³³ Since then, the long-term impact of accumulating ecological damage has become more apparent, the wisdom of anticipating the consequences of our actions more certain, and the need to establish the principle of intergenerational equity more acute.³³⁴

³²⁹ *Id.* at 886–92.

³³⁰ *Akau v. Olohana Corp.*, 652 P.2d 1130, 1134 (Haw. 1982); see Antolini, *supra* note 109, at 784–86 (discussing *Akau*).

³³¹ See, e.g., *Deforestation and the Greenhouse Effect*, BBC.COM, Mar. 4, 2005, <http://www.bbc.co.uk/dna/h2g2/A3556848> (describing the effects of deforestation on other parts on the world).

³³² Federal standing doctrine, which governs access to the federal courts, has a more limited view of standing, and requires plaintiffs to allege “personal injury fairly traceable to the defendant’s allegedly unlawful conduct and likely to be redressed by the requested relief.” See *supra* note 208 and accompanying text. Because each state has the power to determine the rules governing access to its own courts, the rules of standing vary among the states. The common law courts of each state should grant standing to sue under this tort to the maximum extent possible under controlling state law.

³³³ National Environmental Policy Act, 42 U.S.C. §§ 4331, 4332 (2000).

³³⁴ See, e.g., EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY (Richard Falk ed., 1989) (demonstrating that there is current inequity between generations in the use of natural resources).

One idea for taking responsibility of the long-term consequences of our actions is to establish rights in future generations to an ecologically healthy Earth, and appoint “guardians” with the specific responsibility of enforcing those rights.³³⁵ Courts, which have the power to appoint special masters and scientific advisors to assist with difficult issues they encounter, could also consider appointing such guardians of future generations. These guardians could assist them with the difficult issues and uncertainties of long-term ecological science and also to provide advice, insight, and perspective on the interests of future generations as they adjudicate claims under this new tort of ecological degradation.

Conclusion

If we are ever to develop an ecologically sustainable economy, we must free ourselves from the existing system of legal incentives that is compelling us to destroy the Earth. Our law must enforce a limit to the scale of environmental damage that we are collectively permitted to impose on the Earth. This would represent a transformation in the law’s understanding of the public welfare and a dramatic evolution in the structure of property law. And yet, we have changed our laws of property before. While we may feel locked in our own place and time, the historical record proves that in fact we are not.

The common law took well over one hundred years to develop the modern rules of negligence and nuisance with which we are struggling today. It will take time to develop the new laws we need. But, we need a goal, a target to which those seeking to protect the Earth and promote a comprehensive vision of human welfare might aspire.

This article outlines a tort of ecological degradation that is intended to implement the constraint on the cumulative scale of environmental destruction that we need. It may be difficult to adopt all at once, but its various elements could be implemented step-by-step, case by case. Critical terms of this specific proposal need greater, more concrete elaboration: “ecological degradation,” “contribute,” “legal cause,” “feasible alternative,” “vigorous program,” and “affected.” Remedies would need careful thought. Indeed, an entire body of law would have to be developed. Today’s doctrines of negligence and nuisance are the result of a long-term, comprehensive effort to define unreasonable acts in terms of net social benefit. We owe ourselves, and future generations, no less an effort to define unreasonable acts in terms of their contribution to ecological degradation.

I have suggested that judges must transform the common law. But it is lawyers who must convince those judges that new rules will further the public welfare while trying to win cases for their clients. Lawyers need to take on this mission, and call on the law to account for the public welfare in the ecological age. As they do this, we can hope that the desire to preserve the ecological integrity of the Earth will evoke the same passion that courts displayed when they sought to promote “progress” a century ago.

Finally, the most important reason to implement this principle of law is that we must. While we can call the principle laid down in the tort of ecological degradation a rule of law, it is actually a rule of biology. That no species can live for long beyond the land’s ecological capacities is a rule that governs life on the Earth. It is a rule by which we must learn to live if we are to accomplish that oldest of human tasks, to live on the land without spoiling it.

³³⁵ See Carolyn Raffensperger, Science and Environmental Health Network, *Guardians of Future Generations*, NETWORKER, Sept. 2006, available at http://www.sehn.org/Volume_11-5.html; Carolyn Raffensperger & Nancy Myers, Science and Environmental Health Network, *Becoming Guardians—Some Thoughts on How to Move Forward*, NETWORKER, Sept. 2006, available at http://www.sehn.org/Volume_11-5.html; and *The Bemidji Statement on Seventh Generation Guardianship*, NETWORKER, Sept. 2006, available at http://www.sehn.org/Volume_11-5.html#a3; see also Guardians of the Future Homepage, <http://www.guardiansofthefuture.org> (last visited Feb. 11, 2008) (providing an interactive site for developing the idea of future generation guardianship).