IS A SUBSTANTIVE, NON-POSITIVIST UNITED STATES ENVIRONMENTAL LAW POSSIBLE?

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U.S. environmental law is almost exclusively positive and procedural. The foundation is the pollution control and biodiversity conservation statutes enacted primarily between 1969–1980 and judicial decisions interpreting them. This law has created detailed processes for making decisions but has produced few substantive constraints on private and public decisions which impair the environment. Several substantive candidates have been proposed, such as the common law, a constitutional right to a healthy environment, the public trust, and the extension of rights to fauna and flora. However, these candidates have not produced the hoped for substantive law. Many argue that a substantive U.S. environmental law is not possible because the law can only serve to establish rational processes for resolving deep and bitter resource use conflicts. This Article argues that international environmental law can serve as a source of mixed procedural-substantive principles because it has taken a much more holistic view of the environment, developed a set of overarching norms—soft as they are—that apply to almost all environmental problems, and has done a better job of linking procedure with substance in order to constrain decisions that adversely impact human and ecosystem "health." The Article offers three proposed principles to strengthen the unfulfilled project of environmental protection. First, procedural duties must be linked to the implementation of substantive outcomes. Second, incomplete information must be a basis for regulatory actions, provided that a minimal scientific threshold of risk is established, processes are in place to acquire additional information, and the decision maker can adjust to changed circumstances. Third, decisions should exhibit planetary stewardship by applying the best available technology, utilizing the polluter pays principle, promoting an accepted standard of sustainable development, adopting the least intrusive resource use option with adaptive feedback, and restoring degraded ecosystems.

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INTRODUCTION

Have four plus decades of environmental regulation produced a "real" U.S. environmental law?[1] I define "real" law as a body of law with an abstract set of core background, substantive principles that either constrain

1. This Article extends an earlier effort to grapple with the question of whether a "real" environmental law exists. A. Dan Tarlock, *Is There a There There in Environmental Law?*, 19 J. LAND USE & ENVTL. L. 213 (2003).

inconsistent state behavior or mandate a relatively stable set of socially desired outcomes by the private sector. The current answer is no. There is no substantive, non-positivist U.S. environmental law. The reasons lie in the history of the development of environmental law. Environmental law is a product of federal legislation passed between 1969 and 1980. This legislation and resulting judicial opinions created new procedures and standards for decisions about the use of our air, land and water endowments, ensuring that more weight is given to environmental considerations. However, this legacy has also created formidable, perhaps insurmountable, barriers to the creation of a non-positivist environmental law. The lack of a substantive, non-positivist environmental law is important because the scientific conclusions about adverse consequences of the ways in which we exploit and use the Earth's resources[2] and waste assimilative capacity[3] require that the legal system must make it *more difficult* (but not impossible) to marginalize efforts to change the status quo by addressing these problems. A "real" environmental law must *limit* public and private power to trade off environmental protection for other objectives.

The problem is that environmental protection goes against the whole religious and secular Western tradition from the Greeks forward.[4] And, because it is the product of majoritarian consensus,[5] environmental law is neither primarily concerned with the protection of constitutional liberties

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2. *See* Note, *Uncommon Goods on Environmental Virtues and Voluntary Carbon Offsets*, 123 HARV. L. REV. 2065 (2010) (arguing that environmentalism encompasses the virtue of avoiding wastefulness).

3. For example, the assimilative capacity of a body of water is its ability "to cleanse itself; its capacity to receive waste waters or toxic materials without deleterious effects and without damage to aquatic life or humans who consume the water." JASPER WOMACH, CONG. RESEARCH SERV., RL 97905, AGRICULTURE: A GLOSSARY OF TERMS, PROGRAMS, AND LAWS 22 (2005), *available at* http://www.cnie.org/NLE/CRSreports/05jun/97-905.pdf.

4. Law takes its cues from underlying societal values; thus, law has served as an instrument of the human domination of nature. There is a lively intellectual debate about whom to blame—the Hebrews, the Greeks or the Christians. *See* J. DONALD HUGHES, PAN'S TRAVAIL: ENVIRONMENTAL PROBLEMS OF ANCIENT GREEKS AND ROMANS (1994) (arguing that the decline of ancient civilizations is partially due to environmental exploitation); JOHN PASSMORE, MAN'S RESPONSIBILITY FOR NATURE (1974) (coming down on the side of primarily blaming the Greeks and the Christians).

5. Almost ten years ago, Professor Richard Lazarus noted that the "republican moment" that produced the statutory foundation of environmental law had disappeared sometime in the 1980s. Richard J. Lazarus, *A Different Kind of "Republican Moment" in Environmental Law*, 87 MINN. L. REV. 999 (2003). Things have only gotten worse since the article was published, as illustrated by the failure of Congress and the Executive to pass legislation to respond to global climate change. The idea of environmental protection is currently under direct attack by the Republican Party, which wants to roll back "excessive" protection levels and curtail the authority and budget of the Democrat-infested Environmental Protection Agency (EPA).

from legislative abuse[6] nor is it an integral component of the Western project of human dignity.[7] As such, it lacks a compelling constitutional narrative rooted in Western values.[8] Various substantive principles for environmental law have been offered by academics, but none are entirely workable, nor have they gained much traction.

This Article suggests that the emerging field of international environmental law, soft and weak as it is, may provide foundational domestic principles because it has had to take a more holistic view of the scale and complexity of environmental threats, has responded more directly to the imperatives of science, and has linked procedure and substance in ways that better advance the project of environmental protection than current, positive U.S. environmental law.[9]

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6. Few students of environmental law would agree with Justice Scalia's amazing characterization of the purpose of the Endangered Species Act's (ESA) requirement that Biological Opinions be prepared for actions that may jeopardize the existence of a species: "While this no doubt serves to advance the ESA's overall goal of species preservation, we think it readily apparent that another objective (*if not the primary one*) is to avoid needless economic dislocation produced by agency officials zealously but unintelligently pursuing their environmental objectives." Bennett v. Spear, 520 U.S. 154, 176–77 (1997) (emphasis added); *cf.* Endangered Species Act of 1973, 16 U.S.C. § 1536(c)(1) (2006). That said, of course environmental regulation is not immune from constitutional constraints such as takings, due process, and the need for constitutional bases for federal regulation.

7. Pollution control law does have roots in the human dignity tradition because it has been expressly linked to the protection of property and human rights. *E.g.*, Ostra v. Spain, 303 Eur. Ct. H.R. (ser. A.) 38 (1994). There is an ongoing effort to recognize environmental protection entitlements as human rights. *E.g.*, EDITH BROWN WEISS ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 429–39 (2d ed. 2007); BURNS H. WESTON & TRACY BACH, RECALIBRATING THE LAW OF HUMANS WITH THE LAW OF NATURE: CLIMATE CHANGE, HUMAN RIGHTS AND INTERGENERATIONAL JUSTICE (2009), *available at* http://www.vermontlaw.edu/Documents/CLI%20Policy%20Paper/CLI_Policy_Paper.pdf; Symposium, *International Human Rights and Climate Change*, 38 GA. J. INT'L & COMP. L. 511 (2010). However, the nature of environmental protection is relative compared to more absolute, non-contextual, universal human rights. The goals of much of our efforts to control pollution are alien to the common law. Pollution control is less concerned with redressing manifest injuries to existing persons, property owners, and ecosystems than with the protections of future generations from public health risks. *See* Daniel A. Farber, *Playing the Baseline: Civil Rights, Environmental Law, and Statutory Interpretation*, 91 COLUM. L. REV. 676, 683–91 (1991).

8. *Cf.* Jedediah Purdy, *The Politics of Nature: Climate Change, Environmental Law, and Democracy*, 119 YALE L.J. 1122, 1130 (2010) ("Other major areas of public law, such as constitutional law . . . are studied and taught as parts of the ongoing self-definition of the political community. Nothing commensurate has developed in environmental law.").

9. For an example of the benefits of this cosmopolitan approach to environmental law, see Oliver A. Houck, *Light from the Trees: The Stories of Minors Oposa and the Russian Forest Cases*, 19 GEO. INT'L ENVTL. L. REV. 321 (2007).

I. A SHORT HISTORY OF U.S. ENVIRONMENTAL LAW: THE ORIGINS OF AN INCOMPLETE BODY OF LAW

Everything about environmental law is contested, but all systems have to start off from a base principle. Mine is that the law should take its cues from environmentalism. Environmentalism generally refers to a paradigm shift in the human-nature dynamic from domination to stewardship that stresses the maintenance of natural system functions and the minimization of the health, and other, risks of modern technology.[10]

Although the radical nature of environmental law and environmentalism have been consistently downplayed,[11] environmentalism's primary objective is radically transformational. It seeks no less than to replace the traditional view that the Earth "is . . . a biophysical system which embraces the human economy and makes it possible"[12] with a science-based stewardship norm.[13] The late geographer Gilbert White, an early advocate of fundamentally changing resource-use policies, optimistically concluded that we have come to "recognize a commitment to care for [the Earth] in perpetuity [and to] accept reluctantly the obligation to come to terms with problems posed by growth in numbers and appetites."[14]

Environmentalism began as an effort to switch the paradigm of resource use from rapid exploitation to stewardship. Initially, environmental protection was seen as a rational extension of the Progressive Conservation Movement,[15] but it was soon overtaken by two developments: (1) the rise of

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10. *See* Lester Milbrath, *The World is Relearning Its Story About How the World Works*, *in* ENVIRONMENTAL POLITICS IN THE INTERNATIONAL ARENA 21 (S. Kamienski ed., 1993); PASSMORE, *supra* note 4.

11. Mainstream environmental thinking has viewed environmental protection as a necessary limitation on private property and individual liberty, but has sought the least invasive solutions. *See generally* Geoffrey Wandesforde-Smith, *Learning from Experience, Planning for the Future: Beyond the Parable (and Paradox?) of Environmentalists As Pin-Striped Pantheists*, 13 ECOLOGY L.Q. 715 (1986); David A. Westbrook, *Liberal Environmental Jurisprudence*, 27 U.C. DAVIS L. REV. 619 (1994).

12. DONALD HUGHES, AN ENVIRONMENTAL HISTORY OF THE WORLD: HUMANKIND'S CHANGING ROLE IN THE COMMUNITY OF LIFE 209 (2001).

13. *See infra* notes 222–227 and accompanying text. *But see* MARK SAGOFF, THE ECONOMY OF THE EARTH: PHILOSOPHY, LAW, AND THE ENVIRONMENT 208 (2d ed. 2008) (arguing that U.S. environmentalism is grounded in our historical and religious experience and reliance on science is "self-defeating").

14. Gilbert F. White, *Reflections on Changing Perceptions of the Earth*, 19 ANN. REV. ENERGY & ENV'T 1, 9 (1994).

15. The Progressive Conservation Movement arose in the late nineteenth century, as the frontier era was drawing to a close. It responded to fears that resources such as timber were being exhausted and the growing taste among upper class Americans for the preservation of scenic wonders. There were two strains to the movement. Proponents of rational resource management argued that public resources should be managed efficiently using scientific principles, rather than given away. The other strain argued that areas of awesome

guerilla lawsuits and (2) the extraordinarily rapid Congressional and Executive responses to political environmentalism between 1970 and 1973.[16] A holistic perspective was lost in the need to respond quickly to a number of media-specific problems that scientists and economists identified. The variety of legal responses that these problems generated did not support a holistic perspective either.

Environmental law developed with two core characteristics that make it increasingly problematic and unresponsive to the lessons about environmental protection that we have learned in the past four decades. First, from the passage of the National Environmental Policy Act (NEPA) in 1969 and the pollution control statutes that soon followed,[17] environmental law developed almost exclusively as positive, statutory law. Congress enacted a series of media-specific programmatic statutes to reduce a wide, but by no means complete, range of discrete human insults to the biosphere (primarily air and water pollution) as well as to supplement earlier laws that walled off scenic fragments of undisturbed "nature" from intensive human use.[18] But

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nature should be withdrawn from all development and preserved in perpetuity. The movement thrived during the first two decades of the twentieth century and then again in the 1930s during the New Deal. *See* RICHARD L. ANDREWS, MANAGING THE ENVIRONMENT, MANAGING OURSELVES: A HISTORY OF AMERICAN ENVIRONMENTAL POLICY 136–153 (1999).

16. Political environmentalism drew from the civil rights and anti-Vietnam War movements, but it enjoyed a much broader base of support because there was no serious opposition to changing the status quo of pollution and ecosystem disruption. The Council on Environmental Quality noted that "[t]he environmental outlook, with its opposition to careless impersonal use of technology in a way that destroys life . . . , had strong spiritual ties with the peace movement and the ethical climate of the 1960s." COUNCIL ON ENVTL. QUALITY, ENVIRONMENTAL QUALITY: THE TENTH ANNUAL REPORT OF THE COUNCIL ON ENVIRONMENTAL QUALITY 10 (1979), *available at* http://slideshare.net/whitehouse/august-1979-the-tenth-annual-report-of-the-council-on-environmental-quality.

17. For a general overview, see RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW (2004), which recounts the standard history of modern environmental law. There is also a long and rich pre-history of modern environmental law. *See, e.g.*, DOUGLAS BRINKLEY, THE WILDERNESS WARRIOR: THEODORE ROOSEVELT AND THE CRUSADE FOR AMERICA (2009) (tracing Theodore Roosevelt's interest in science and the beauty of nature, and its influence on his public land withdrawal decisions); KARL BOYD BROOKS, THE ORIGINS OF AMERICAN ENVIRONMENTAL LAW (2009) (describing the influence of pollution laws enacted in the 1940s and 1950s and anti-dam campaigns on modern environmental law); FDR AND THE ENVIRONMENT (Henry L. Henderson & David B. Woolner eds., 2005) (examining FDR's deep interest in the balance between humans and nature, and the legacy of New Deal natural resource planning and land policy). However, modern environmental law did not develop as a distinct body of law capable of supporting specialized law school courses and a specialized practice until 1970.

18. Two important precursor statutes, the Wilderness Act of 1964, 16 U.S.C. §§ 1331–1336 (2006) and the Wild and Scenic Rivers Act of 1968, 16 U.S.C. §§ 1271–1287 (2006), were important inroads into the idea of multiple use (i.e., intensive development of public lands and waters).

these statutes never produced a holistic approach to what came to be called "the environment."[19] They were seldom read against a common law or constitutional base or taken as a source of new general principles.[20]

Much of the blame can be placed on the Supreme Court. It has treated environmental law as just a branch of administrative law and statutory interpretation. And the Court's well-documented hostility, or at best indifference, towards the project[21] has stifled the development of any core principles.[22]

The second problematic characteristic of U.S. environmental law is that it is primarily procedural rather than substantive. The statutes have created powerful processes for making science-based decisions,[23] have profoundly

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19. Writing about the rise of environmentalism in the 1950s and 1960s, Richard N. L. Andrews observed, "[t]he most revolutionary element of the new public consciousness was the powerful new awareness of the environment as a living system—a 'web of life' or ecosystem—rather than just a storehouse of commodities to be extracted or a chemical machine to be manipulated." ANDREWS, *supra* note 15, at 202.

20. *E.g.*, David Markell & J.B. Ruhl, *An Empirical Survey of Climate Change Litigation in the United States*, 40 Envtl. L. Rep. (Envtl. Law Inst.) 10,644, 10,647 (July 2010) (finding most climate change lawsuits are based on statutory, not common law or constitutional, claims).

21. The leading article is Richard J. Lazarus, *Restoring What's Environmental About Environmental Law in the Supreme Court*, 47 UCLA L. REV. 703 (2000). Nothing has changed since this article was published.

22. The closest the Court came is in Justice Marshall's dissent in *Kleppe v. Sierra Club*, 427 U.S. 390, 415 (1976). The majority held that the Department of Interior did not have to prepare a regional impact statement for the Northern Great Plains coal region before they could issue individual coal leases. The Department had at various times identified the region as the suitable scale for coordinated energy impacts assessment, but the majority held that there was no proposed regional plan of development and thus there was no "federal action" on a regional scale that triggered NEPA. *Id.* at 414. In a partial dissent, Justice Marshall disagreed with the majority's conclusion that a court may not remedy a NEPA violation "no matter how blatant—until it is too late for an adequate remedy to be formulated." *Id.* at 415 (Marshall, J., dissenting). He argued that the impact statement requirement "seems designed as no more than to serve as a catalyst for the development of a 'common law' of NEPA." *Id.*

23. Every word in the above sentence has been contested by environmental law scholars and others. At one extreme are those who claim that "good" science is the *only* basis for environmental protection decisions since science has defined the problems that we consider environmental. *See, e.g.*, Deborah M. Brosnan & Martha J. Groom, *The Integration of Conservation Science and Policy: The Pursuit of Knowledge Meets the Use of Knowledge*, *in* 3 PRINCIPLES OF CONSERVATION BIOLOGY 625, 625 (Martha J. Groom et al. eds., 2006) ("[C]onservation science [must be] a central component of environmental decisions, policies, and laws.") (citation omitted); Dan J. Rohlf, *Science, Law, and Policy in Managing Natural Resources: Toward a Sound Mix Rather than a Sound Bite*, *in* FOREST FUTURES 127, 129 (Karen Arabas & Joe Bowersox eds., 2004) ("[S]uccessful management strategies must rest on . . . policy decisions informed . . . by a clear science process . . . . "). At the other extreme are those who claim that all decisions are effectively value judgments, and thus value trump science. *See, e.g.*, SAGOFF, *supra* note 13. This Article takes the middle position that while environmental decisions must be grounded in science, science can never fully answer the questions posed for regulators. Thus, value judgments are always necessary to make

changed the way that we use air, water and public and private land, and have increased the level of public health protection that we provide our citizens by substantially reducing the discharge of untreated waste streams[24] and the use of many chemicals that pose serious public health risks. But process has become an end in and of itself; the link between process and substance has not developed as hoped.

A. Environmental Protection Develops as a Logical Extension of the Benign, Expert New Deal State

What we now call "environmental law" did not exist prior to 1965. The term "environmental protection" slowly emerged in the 1960s among policy elites, but the public discourse centered on "nature protection" and "resource conservation."[25] The seminal idea of respecting nature first appeared on the political agenda during the Theodore Roosevelt administration (1901–1909).[26] The first decade of the twentieth century was the zenith of the Progressive Conservation Movement. Roosevelt's commitment to conservation embraced preservation of scenic wonders and other public lands, which served to support what we now call biodiversity, and public ownership of the land, which served efficient, science-based management and exploitation.

Conservation's appeal faded during the rapacious and corrupt 1920s.[27] The movement had a rebirth in the 1930s during the New Deal,[28] but by the 1950s it had again lost its widespread appeal. However, bitter regional

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decisions in the face of scientific uncertainty. *See* Holly Doremus & A. Dan Tarlock, *Science, Judgment, and Controversy in Natural Resources Regulation*, 26 PUB. LAND & RESOURCES L. REV. 1 (2005).

24. No comprehensive evaluation of the effects of the Clean Air Act and Clean Water Act exists, but the various proxy measures demonstrate major improvements over the 1970 baseline, although many problems such as nutrient loading and combined sanitary sewer and storm water overflows remain. Robert L. Glicksman & Matthew R. Batzel, *Science, Politics, Law, and the Arc of the Clean Water Act: The Role of Assumptions in the Adoption of a Pollution Control Landmark*, 32 WASH. U. J.L. & PUB. POL'Y 99, 130 (2010) ("By all accounts, the CWA has made significant inroads into the nation's water pollution problems."). The EPA estimates that the Clean Air Act will produce $2 trillion in benefits by 2020. EPA, OFFICE OF AIR & RADIATION, THE BENEFITS AND COSTS OF THE CLEAN AIR ACT FROM 1990 TO 2020, at 7-3 (2011), *available at* http://www.epa.gov/oar/sect812/feb11/fullreport.pdf.

25. The modern environmental movement's strategy of defining a problem as "environmental," crafting a technical solution, and selling it to legislatures is questioned in a much discussed memo by Michael Shellenberger and Ted Nordhaus, THE DEATH OF ENVIRONMENTALISM: GLOBAL WARMING POLITICS IN A POST-ENVIRONMENTAL WORLD (2004).

26. BRINKLEY, *supra* note 17.

27. *See* J. LEONARD BATES, THE ORIGINS OF TEAPOT DOME, PROGRESSIVES, PARTIES AND PETROLEUM: 1909–1921, at 200 (1963).

28. FDR AND THE ENVIRONMENT, *supra* note 17.

political fights over public lands issues, such as grazing fees and the damming of scenic canyons, occasionally attracted national attention[29] and laid the groundwork for the modern environmental movement.

Modern environmentalism emerged in the 1960s and has been explained as the product of both post-World War II affluence, which gave the U.S. public a taste for beauty and recreation,[30] and anxiety arising from the Cold War's reliance on atomic weapons.[31] The loss of open space around urban areas, fears about radiation exposure, the linkage of visible pollution (smog) to the internal combustion engine, the suspected health and ecosystem harm caused by synthetic chemicals such as DDT, and the 1969 Santa Barbara oil spill all suggested that public health and ecosystem disasters caused by inadequately regulated technology and applied science would only increase.[32] Rachel Carson's *Silent Spring*[33] alerted the public to the dangers of uncontrolled chemical use. The book resonated with many people who were already concerned about the adverse effects of radiation from the construction of nuclear power plants. Aldo Leopold's earlier *A Sand County Almanac*[34] became the environmentalists' scripture; its call for a land ethic resonated with affluent post-World War II suburbanites witnessing the disappearance of open space and possessing the resources to enjoy wilderness.

In the Kennedy and Johnson administrations (1960–1968), environmental protection was a rational dialogue between a few cabinet officials, legislators (and their staffs), and representatives of the old-line conservation groups. Rational environmentalism was the last burst of faith in the expert administrative state's ability to advance the public good. The dominant liberal view was that the problems of governance were technical rather than ideological. Environmental policy was seen as a new government effort to unify the diffuse demands for more open space for recreation, a more beautiful landscape, less visible pollution, and better control of science and technology. The dedicated creators of early modern environmental policy saw environmental protection as an extension of the New

29. BROOKS, *supra* note 17 *passim*.

30. Many historians emphasize the post-World War II roots of modern environmentalism, such as leisure and the dissemination of information about the negative effects of the fruits of World War II research: pesticides and atomic power. *See, e.g.*, ANDREWS, *supra* note 15, at 201–02; SAMUEL P. HAYS, BEAUTY, HEALTH AND PERMANENCE: ENVIRONMENTAL POLITICS IN THE UNITED STATES, 1955–1985, at 3 (1987).

31. ANDREWS, *supra* note 15, at 212–13.

32. JAMES E. KRIER & EDMUND URSIN, POLLUTION & POLICY: A CASE ESSAY ON CALIFORNIA AND FEDERAL EXPERIENCE WITH MOTOR VEHICLE AIR POLLUTION, 1945–1975, at 263–77 (1977) (discussing the relationship between pollution crises and new pollution control legislation).

33. RACHEL CARSON, SILENT SPRING (1962).

34. ALDO LEOPOLD, A SAND COUNTY ALMANAC (1949).

Deal state.[35] The main players were to be Congress and reformed "expert agencies."[36]

However, the intellectual groundwork for the ensuing environmental decade (1969–1980) can be traced to this period. Visionary government leaders like Secretary of the Interior Stewart Udall, Senator Henry Jackson of Washington, and Senator Gaylord Nelson of Wisconsin began to adapt the Progressive and New Deal conservation traditions to the challenges posed by Carson and Leopold.[37] Secretary Udall (1960–1968) played a key role in replacing preservation with the new construct of environmental protection. He built on the conservationist legacy, but also recognized the fundamental paradigm shift that environmentalism posed. For example, he wrote that *Silent Spring* "spurred new lines of thought about resources and the limits of technology that began to alter the thinking of my generation."[38] Secretary Udall, and others, came to realize that new federal legislation was needed to make it difficult for agencies to argue that they had no authority to protect the environment, to control all major sources of air and water pollution, or to evaluate the health and environmental risks posed by the use of synthetic organic pesticides. This realization culminated in NEPA.

B. Environmental Law Becomes a Legal Guerilla Movement

Today, environmental protection is deeply embedded in U.S. law; it is a recognized practice area and has been embraced by the academy.[39] However, its establishment trappings belie the guerilla origins of the subject. These origins continue to shape the law today, even though it is almost entirely statutory.

The post-New Deal rationalists were caught off-guard when environmentalism briefly erupted into a mass movement driven by fear of imminent

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35. *See generally* LAZARUS, *supra* note 17; A. Dan Tarlock, *Environmental Law: Then and Now*, 32 WASH. U. J.L. & POL'Y 1 (2010).

36. For example, Professor L.K. Caldwell, the father of NEPA's "action-forcing" environmental impact statement requirement, "clearly contemplated an important oversight role for the Bureau of the Budget." RICHARD A. LIROFF, A NATIONAL POLICY FOR THE ENVIRONMENT: NEPA AND ITS AFTERMATH 16 (1976).

37. STEWART L. UDALL, THE QUIET CRISIS AND THE NEXT GENERATION 195 (1988).

38. *Id*. Udall defended *Silent Spring* in the 1964 *Saturday Review of Literature* at a time when the chemical industry was spending large amounts of money to discredit the book. Secretary Udall, among others, imported Carson's basic lessons into the legislative history of NEPA.

39. The editors of the *Land Use & Environment Law Review*, which reprints the best ten to eleven articles in these two related fields chosen by two tiers of peer screening, reported in 2010 that they started with a list of 300 plus articles. LAND USE & ENVIRONMENT LAW REVIEW, at v (A. Dan Tarlock & David L. Callies eds., 2010/2011 ed. 2010).

threats to public health, concerns about the "destruction" of nature, and a deepening rejection of the expert state, the legitimacy of which had been perhaps fatally weakened by the Vietnam War. Lawyers were influenced by the movement and soon became frustrated with what they perceived as unresponsive, hostile, and narrow-mission federal agencies and the New Deal administrative law premised on deference to these agencies.[40] Lawyers began to create environmental law out of whole cloth by following the civil rights model. They turned to the suddenly "wiser" courts for relief from an unresponsive political system.[41]

The challenge was formidable. There was no constitutional basis on which to litigate,[42] the common law was not considered up to the task of controlling persistent pollution,[43] and such scattered conservation legislation that existed conferred virtually unreviewable discretion on agencies and departments.[44] Occasionally the government had to defend a preservation decision in court,[45] but the idea that a non-governmental organization could

40. The New Deal State was based on the ability of experts to articulate the public interest. This ability came under heavy assault from various sources. Public Choice Theory, which originated with ANTHONY DOWNS, AN ECONOMIC THEORY OF DEMOCRACY (1957) and JAMES M. BUCHANAN & GORDON TULLOCK, THE CALCULUS OF CONSENT: LOGICAL FOUNDATIONS OF CONSTITUTIONAL DEMOCRACY (1962), totally rejected the idea of a public interest. *See also* MANCUR OLSON JR., THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS (1965) (another important work in Public Choice Theory that rejects the idea of public interest). MARVER BERNSTEIN, REGULATING BUSINESS BY INDEPENDENT COMMISSION (1955) popularized the notion of regulatory capture. Regulatory capture posits that the industry regulated by an agency will use its political and economic power to use the agency for its own benefit, including the suppression of competition. Professor Richard Stewart synthesized these theories and argued that the role of courts was not to shield agencies from political influence, as New Deal theorists posited, but to ensure that the agencies' decisions adequately considered all relevant interests. Richard B. Stewart, *The Reformation of American Administrative Law*, 88 HARV. L. REV. 1667, 1799 (1975).

41. David Sive, *Some Thoughts of an Environmental Lawyer in the Wilderness of Administrative Law*, 70 COLUM. L. REV. 612, 618 (1970).

42. Describing the state of the law in the 1970s, Professor William Rodgers wrote that "a faithful reporter might be drawn to the conclusion: not then, not now, not ever. The early 1970s saw a number of failed attempts to place recognition of environmental values in the U.S. Constitution." WILLIAM H. RODGERS, JR., ENVIRONMENTAL LAW 63–64 (2d ed. 1994).

43. In his pioneering environmental law casebook, ENVIRONMENTAL LAW AND POLICY, now University of Michigan Professor James E. Krier observed, "[i]t should be clear from the materials considered . . . that effective pollution control is impossible without some form of government intervention, and that intervention through the judicial system alone is not enough." JAMES E. KRIER, ENVIRONMENTAL LAW AND POLICY 293 (1971).

44. Charles A. Reich, *The Public and the Nation's Forests*, 50 CALIF. L. REV. 381, 393 (1962).

45. *E.g.*, Namekagon Hydro Co. v. Fed. Power Comm'n, 216 F.2d 509, 512 (7th Cir. 1954) (finding that the Federal Power Commission has authority to deny federal power license to preserve free-flowing rivers).

challenge a decision not to preserve a resource was almost unthinkable because it was so at variance with the New Deal vision that courts should defer to agency expertise except for in the case of a clear violation of a procedural or substantive right. Standing seemed limited to those with a common law or statutory right to sue, although the Supreme Court was expanding the ability of competitors to assert an interest in unfavorable administrative decisions.[46]

Lawyers followed the great common law tradition left open to socially marginal groups and pursued a "rule of law litigation" strategy. New Deal expert agencies were reclassified as ossified, concrete-pouring mission agencies. To rein in these agencies, lawyers created the fiction that the recognition of new environmental protection duties merely required courts to perform their traditional and constitutionally legitimate function of applying and enforcing—rather than creating—clear, pre-existing rules.[47] They also convinced courts, and ultimately Congress, that environmental enforcement had to be shared between the agencies and citizens operating through non-governmental organizations.[48]

This legal guerillaism began in 1965 when the Second Circuit decided the first true environmental law case. In *Scenic Hudson Preservation Conference v. Federal Power Commission*, Scenic Hudson challenged a Federal Power Commission (FPC) license for a pump storage project at scenic and iconic Storm King Mountain on the Hudson River in New York State. It was a classic elite challenge to an act of aesthetic desecration. In an unprecedented decision, plaintiffs convinced the Second Circuit to remand the license for further proceedings.[49] The court essentially endorsed citizen standing to represent non-economic, aesthetic interests. On the merits, the court read a broad regulatory statute, the Federal Power Act, which at best conferred discretion on the agency to consider aesthetic values (a then much contested idea), to impose mandatory duties on an agency to consider these and other environmental values and to more fully justify decisions not to protect those values.[50] However, after new hearings, the FPC reissued

46. Ass'n of Data Processing Serv. Orgs. v. Camp, 397 U.S. 150, 156–58 (1970).

47. *See, e.g.*, Parker v. United States, 309 F. Supp. 593, 601 (D. Colo. 1970) (suggesting that the Forest Service had a mandatory duty to recommend to the President and Congress that an area of a national forest should be included in the National Wilderness Preservation System).

48. I have developed this idea at greater length in A. Dan Tarlock, *The Future of Environmental "Rule of Law" Litigation*, 19 PACE ENVTL. L. REV. 575 (2002). To convince a court to enjoin or remand an action, lawyers argued that the agency had violated a specific procedural or substantive provision of a statute. Thus, courts were applying, not making, law.

49. Scenic Hudson Preservation Conference v. FPC, 354 F.2d 608, 625 (2d Cir. 1965), *cert. denied*, 384 U.S. 941 (1966).

50. The plaintiffs were aided by the fact that, a decade earlier, the Commission had successfully defended its authority to deny a license to protect a free-flowing river.

the license and the Second Circuit refused to second guess the remanded decision.[51]

Scenic Hudson encouraged lawyers on the frontline of environmental law to turn the then-dominant legal process school[52] on its head by positing that courts, not legislatures, were the best fora in which to resolve value-laden "polycentric" resource use disputes.[53] But most lawyers assumed that the best the courts could do was order, in Joseph Sax's words, either a legislative or an administrative remand.[54] Thus, *Scenic Hudson*, innovative as it was, cast environmental law as primarily procedural. Litigation became a tactic to delay undesired projects and regulatory decisions—giving opponents the opportunity to mobilize political support against these projects—rather than a means to obtain a final adjudication of a legal issue on the merits.

Professor Sax's remand theory proved to be extremely prescient. The combination of NEPA and the suite of pollution control and natural resources management laws that followed, reinforced by judicial receptivity to non-governmental organization "hard look" suits[55] challenging the agencies' failure to follow either the letter or spirit of these laws, created the field of environmental law as a negative body of law based on finding fault with a decision-making process, much as earlier lawyers picked apart writ pleading.

Environmental advocates and lawyers did not remain legally or politically marginalized for long, although, in many ways, they never shed the outsider role. After environmentalism emerged as a powerful political force in 1969,[56] Congress immediately responded by federalizing many aspects of

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Namekagon Hydro Co., 216 F.2d at 513; *see also* A. Dan Tarlock et al., *Environmental Regulation of Power Plant Siting: Existing and Proposed Institutions*, 45 S. CAL. L. REV. 502, 514–23 (1972).

51. Scenic Hudson Preservation Conference v. Fed. Power Comm'n, 453 F.2d 463, 481–82 (2d Cir. 1971).

52. HENRY M. HART, JR. & ALBERT M. SACHS, THE LEGAL PROCESS (1958).

53. Sive, *supra* note 41, at 629.

54. JOSEPH L. SAX, DEFENDING THE ENVIRONMENT: A STRATEGY FOR CITIZEN ACTION 175–92 (1971). For another version of this theory, see CASS R. SUNSTEIN, ONE CASE AT A TIME: JUDICIAL MINIMALISM ON THE SUPREME COURT 27 (1999).

55. *See, e.g.*, Citizens to Pres. Overton Park v. Volpe, 401 U.S. 402, 415–16 (1971) ("[T]he court must consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment. Although this inquiry into facts is to be searching and careful, the ultimate standard of review is a narrow one.") (citations omitted). The phrase "hard look" was actually coined by Judge Harold Leventhal in several cases, most importantly in *Greater Bos. Television Corp. v. Fed. Commc'ns Comm'n*, 444 F.2d 841 (D.C. Cir. 1970).

56. ANDREWS, *supra* note 15, at 224–26. The term "environment" is widely used in domestic and international law, but no consensus about its meaning exists. It is also often equated with "ecosystem." *E.g.*, Oposa v. Factoran, G.R. No. 101083 (S.C., July 30, 1993) (Phil.), *reprinted in* 33 I.L.M. 174, 187 (1994) (granting standing to the children of a Filipino

environmental protection, from pollution control to what we now call biodiversity conservation.[57] Environmental protection became a widely accepted goal of both the modern and the post-modern (minimal) regulatory state. Modern environmental law quickly followed. The statutes contained positive, substantive standards. As this Article illustrates, however, courts accepted the substantive standards, but concentrated on the processes and procedures by which these standards were adopted and applied.

In retrospect, the rapid rise of environmentalism had unintended adverse consequences because the perceived need for urgent action gave no time to debate and reflect on what the long-run objectives of environmental law should be. The immediate objective seemed obvious: reverse the status quo of resource use and "abuse."[58] Lawyers trying to prevent pollution and ecosystem impairment quickly went from having no law available to having too much law and judicial interpretation, all of which had to be mastered and applied.[59]

As a result of this rapid transformation, environmental law has, for all of its density, two linked fundamental weaknesses: it does not sufficiently constrain enough human behavior to compel consistent outcomes that can be classified as environmental,[60] and it remains highly vulnerable to political shifts. In the face of pressure, decision makers can trim their sails relatively easily by trading off environmental protection against other objectives, even though it is now harder to do this than it was before the 1970s.

I do not argue that the fairness, rationality, transparency, and democratic legitimacy of all laws, and the processes that they create, are unimportant. The evidence is strong that environmental protection is still better in democratic than in autocratic countries.[61] I also do not argue that

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citizen to challenge logging permits, and speaking of the "right to a healthful ecology" and to a "sound environment").

57. Congress had begun the process in the 1950s, but did not mandate that pollution emissions be reduced until the Clean Air Act of 1970. *See* LAZARUS, *supra* note 17.

58. ANDREWS, *supra* note 15, at 229.

59. J.B. Ruhl & James Salzman, *Mozart and the Red Queen: The Problem of Statutory Accretion in the Administrative State*, 91 GEO. L.J. 757 (2003).

60. There has been surprisingly little discussion of what makes a problem "environmental." The leading environmental law scholar Richard Lazarus has argued that the primary factor is ecological injury, which has six features: (1) irreversibility, (2) injuries physically distant from the source of a discharge, (3) temporally distant (non-imminent) injuries, (4) uncertainty and risk, (5) multiple causes, and (6) noneconomic and nonhuman injuries. Lazarus, *supra* note 21, at 745–48. Risk and uncertainty are closely related, but risk refers to quantifiable probabilities, while uncertainty refers to probabilities that are unquantifiable. Most environmental issues, from the impacts of climate change to the reduction of cancer and other toxic harms, are true uncertainty problems. *See* Daniel A. Farber, *Uncertainty*, 99 GEO. L.J. 901 (2011).

61. JARED DIAMOND, COLLAPSE: HOW SOCIETIES CHOOSE TO FAIL OR SUCCEED (2005); Margrethe Winslow, *Is Democracy Good for the Environment?*, 48 J. ENVTL. PLAN. & MGMT. 771 (2005) (finding that more democracy leads to less pollution).

environmental values, however defined, should prevail in every instance. I make the "softer" argument that if concerns such as biodiversity[62] loss, the adverse impacts of climate change, and the long-term risks of exposure to toxic substances are valid, the law must go beyond designing fair processes because the fragile nature of positive environmental law subordinates substantive outcomes to process.[63] In addition to better procedures, we need to ensure that decisions more consistently adhere to protection norms, at least in ways that preserve options as better information emerges.

The primary message of environmentalism, demonized as it is as a false, doomsday one,[64] remains that we are running an uncontrolled experiment with the ability of the planet to absorb numerous anthropogenic shocks to evolved planetary life support systems. The main conclusion that I draw from this message[65] is that the margin of error for "bad" environmental decisions is smaller than for almost any other area of law.

Climate change, or "climate disruption," is perhaps the best example. To realize the benefits of industrial development, humans have altered historic climate cycles both on land and in the oceans.[66] We are acidifying the oceans as they warm,[67] as well as insulting them in other ways.[68]

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62. I do not underestimate the difficulties of turning broad scientific "teachings" into law. The history of the biodiversity construct is detailed in DAVID TAKACS, THE IDEA OF BIODIVERSITY: PHILOSOPHIES OF PARADISE (1996). For an excellent analysis of the difficulty of developing a law of biodiversity conservation, see Fred Bosselman, *A Dozen Biodiversity Puzzles*, 12 N.Y.U. ENVTL. L.J. 364 (2004).

63. Elizabeth Garrett, *The Story of* TVA v. Hill*: Congress Has the Last Word* (Univ. of S. Cal. Legal Studies Working Paper Series, Working Paper No. 54, 2009), *available at* http://law.bepress.com/usclwps/lss/art54 (suggesting that the case establishing the Endangered Species Act as a substantive mandate to protect listed species regardless of opportunity costs of protection actually illustrates that Congress can easily override a statute by "passing a clearly worded provision within the text of annual appropriations bills").

64. The leading exponent of the theory that problems such as overpopulation and resource destruction are not serious is Bjørn Lomborg. *See* BJØRN LOMBORG, THE SKEPTICAL ENVIRONMENTALIST (2001). However, he now argues that climate change is real and we must adapt in a "smart" manner. BJØRN LOMBORG, SMART SOLUTIONS TO CLIMATE CHANGE (2010). Needless to say, Lomborg remains extremely controversial. *See* HOWARD FRIEL, THE LOMBORG DECEPTION: SETTING THE RECORD STRAIGHT ABOUT GLOBAL WARMING (2010).

65. *See infra* note 73.

66. *E.g.*, BILL MCKIBBEN, EAARTH: MAKING A LIFE ON A TOUGH NEW PLANET (2010).

67. *See* S. Levitus et al., *Global Ocean Heat Content 1955–2008 in Light of Recently Revealed Instrumentation Problems*, 36 GEOPHYS. RES. LETTERS L07608 (2009). Oceans have absorbed about eighty percent of the heat added to the climate system since 1955. MICHELLE ALLSOPP ET AL., STATE OF THE WORLD'S OCEANS 159 (2009). The impact of this temperature increase includes coral bleaching and a thinning Arctic ice cap. *Id.* at 161–70.

68. Other insults include the destruction of coral reefs, overfishing, the introduction of dangerous amounts of debris, the loss of biodiversity, and the creation of nutrient-rich dead zones. See ALLSOPP, *supra* note 67.

Climate change aside, we continue to destroy biodiversity at a rapid rate.[69] And we have endangered human and ecosystem health through massive nitrogen loading.[70] The long-term impacts of disasters such as the 2010 Gulf of Mexico oil spill are more ambiguous.[71] The spill both caused immediate damage and exacerbated an already stressed ecosystem. The question of exactly how big a margin of error we have, given the resilience of many ecosystems, remains open.[72]

The basic point is that the fragility of environmental law increases the risk that we will exceed available margins of error. Law contributes to the thin margin of error once a trade-off or a decision not to address an environmental issue is made because the legal basis for a mid-course correction may be lacking. Positive environmental law is fragile because it is highly vulnerable to shifts in political opinion and electoral swings. Environmental protection has survived two roll-back efforts—the first Reagan administration and the George W. Bush administration pursued aggressive, pro-industry, deregulatory agendas[73]—and is now facing a third.[74] The

69. *See* Stuart H. Butchart et al., *Global Biodiversity: Indicators of Recent Declines*, 328 SCIENCE, Apr. 26, 2010, at 1164, 1165, *available at* http://www.sciencemag.org/science/118752v1? ("Our analyses suggest that biodiversity has continued to decline over the last four decades . . . .").

70. UNITED NATIONS ENV'T PROGRAMME, GLOBAL ENVIRONMENT OUTLOOK 2000, AT 27–29 (1999), *available at* http://www.unep.org/Geo2000/english/index.htm.

71. NAT'L COMM'N ON THE BP DEEPWATER HORIZON OIL SPILL & OFFSHORE DRILLING, DEEP WATER: THE GULF OIL SPILL AND THE FUTURE OF OFFSHORE DRILLING REPORT TO THE PRESIDENT 178–85 (2011), *available at* http://www.oilspillcommission.gov/final-report. The difficulties of assessing the sea floor, as opposed to surface damages, are discussed in Mark Schrope, *Deep Wounds*, NATURE, Apr. 14, 2011, at 152.

72. The heroic efforts to save the California condor are another example of the fragility, interconnectedness and uncertainty that surround ecosystem conservation. Condors are nesting in Big Sur, but their eggs are weak because they may be feeding on sea lions tainted by a DDT hot spot from the 1950s and 1960s off the coast of Los Angeles. John Moir, *New Hurdle for California Condors May Be DDT From Years Ago*, N.Y. TIMES, November 16, 2010, at D3.

73. *See* Amanda Little, *The Rollback Machine: Keeping Tabs on the Bush Administration's Environmental Record*, GRIST (Sept. 4, 2003, 9:00 AM), http://www.grist.org/article/rollback; *see also* John D. Leshy, *Natural Resources Policy in the Bush (II) Administration: An Outsider's Somewhat Jaundiced Assessment*, 14 DUKE ENVTL. L. & POL'Y F. 347 (2004) (discussing the George W. Bush administration's rollback of existing regulations protecting public lands and resources); John M. Carter et al., *Cutting Science, Ecology, and Transparency Out of National Forest Management: How the Bush Administration Uses the Judicial System to Weaken Environmental Laws*, 33 Envtl. L. Rep. (Envtl. Law Inst.) 10,959, 10,960 (Dec. 2003) (pointing out systematic deregulation of protections for national forests); Joel A. Mintz, *'Treading Water': A Preliminary Assessment of EPA Enforcement During the Bush II Administration*, 34 Envtl. L. Rep. (Envtl. Law Inst.) 10,912 (2004) (describing the George W. Bush administration's failure to enforce environmental laws governing water pollution).

74. Suzanne Goldenberg, *Republicans Attack Obama's Environmental Protection From All Sides*, GUARDIAN (UK) (March 4, 2011, 3:05 PM), http://www.guardian.co.uk/world/2011/mar/04/republicans-attack-obamas-environmental-protection.

current wave of anti-environmental legislative proposals, budget riders, and oversight hearings represents the most ambitious rollback since the environmental decade, the 1970s.

Environmentalism's survival may be a hollow victory. Until the twenty-first century, very few public officials or members of the "regulated community" wanted to be formally identified as anti-environmental, but this is no longer the case.[75] The very idea of environmental regulation is

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75. Upon receiving Harvard Medical School's Global Environment Citizen Award in 2004, Bill Moyers made the following remarks:

> One of the biggest changes in politics in my lifetime is that the delusional is no longer marginal . . . . For the first time in our history, ideology and theology hold a monopoly of power in Washington. Theology asserts propositions that cannot be proven true; ideologues hold stoutly to a world view despite being contradicted by what is generally accepted as reality. When ideology and theology couple, their offspring are not always bad but they are always blind. And there is the danger: voters and politicians alike, oblivious to the facts.
>
> Remember James Watt, President Reagan's first secretary [sic] of the Interior? My favorite online environmental journal, the ever-engaging Grist, reminded us recently of how James Watt told the U.S. Congress that protecting natural resources was unimportant in light of the imminent return of Jesus Christ. In public testimony he said, "after the last tree is felled, Christ will come back."
>
> . . . .
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> A 2002 Time/CNN poll found that 59 percent of Americans believe that the prophecies found in the book of Revelations [sic] are going to come true. Nearly one-quarter think the Bible predicted the 9/11 attacks. Drive across the country with your radio tuned to the more than 1,600 Christian radio stations . . . and you can hear some of this end-time gospel. And you will come to understand why people under the spell of such potent prophecies cannot be expected, as Grist puts it, "to worry about the environment. Why care about the earth, when the droughts, floods, famine and pestilence brought by ecological collapse are signs of the apocalypse foretold in the bible? Why care about global climate change when you and yours will be rescued in the rapture? And why care about converting from oil to solar when the same god who performed the miracle of the loaves and fishes can whip up a few billion barrels of light crude with a word?"

Bill Moyers, *Battlefield Earth*, ALTERNET (Dec. 8, 2004), http://www.alternet.org/story/20666.

Although the Evangelical Christian community remains divided over environmentalism, the strain that sees environmental protection as unnecessary seems dominant. *See, e.g.*, *'The Planet Won't Be Destroyed by Global Warming Because God Promised Noah,' Says Politician Bidding to Chair U.S. Energy Committee*, DAILY MAIL (UK) (Nov. 10, 2010, 12:31 PM), http://www.dailymail.co.uk/news/article-1328366/John-Shimkus-Global-warming-wont-destroy-planet-God-promised-Noah.html#ixzz1G1sRNRky. The current view is that God will somehow protect the planet from climate disruption. See *id.* for a discussion of Republican Representative John Shimkus's speech before the House Energy Subcommittee he was hoping to chair in which he insisted we should not be concerned about the planet being destroyed because God promised Noah it would not happen again after the great flood: "As long as the earth endures, seed time and harvest, cold and heat, summer and winter, day and night, will never cease." *Id.* (quoting *Genesis* 8:22).

now being questioned. Its positive nature gives Congress complete discretion to roll back or eliminate the substantive core that has held constant since 1970, even as new problems, such as climate change or biodiversity loss, present greater challenges.[76]

II. OBJECTIONS TO THE QUEST FOR A SUBSTANTIVE ENVIRONMENTAL LAW

> *Fortune is guiding our affairs better than we ourselves could have wished. Do you see over yonder, friend Sancho, thirty or forty hulking giants? I intend to do battle with them and slay them. With their spoils we shall begin to be rich for this is a righteous war and the removal of so foul a brood from off the face of the earth is a service God will bless.*[77]
>
> — *Miguel de Cervantes Saavedra*

The most basic objection to my thesis is that a quest for a substantive, non-positivist environmental law is, pure and simple, a quixotic exercise in windmill tilting because environmental law is inherently procedural.

All that we can expect from the law is a structure to resolve resource conflicts that gives some weight to environmental protection. As Rodgers and Hammerstein wrote in *Oklahoma!*, "Ev'rythin's up to date in Kansas City; They've gone about as fur as they c'n go!"[78] One can derive a set of procedural principles from this positivist base and the "reasoned," "principled" judicial gloss on environmental statutes,[79] but the end product will

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The Montana State Legislature is considering legislation to reverse the funding of studies that conclude the arid state faces many adverse consequences of global climate disruption. David Sirota, *Mad Scientists in the Labs of Democracy*, S.F. CHRON., Mar. 18, 2011, at A12, *available at* http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2011/03/18/EDF31IE2FP.DTL. The bill, as proposed, "would declare that 'global warming [would be] beneficial to . . . Montana.' " *Id.*

76. For an excellent articulation of the challenges that climate change poses for law, see J.B. Ruhl & James Salzman, *Climate Change, Dead Zones, and Massive Problems in the Administrative State: A Guide for Whittling Away*, 98 CALIF. L. REV. 59 (2010).

77. MIGUEL DE CERVANTES SAAVEDRA, THE INGENIOUS GENTLEMAN DON QUIXOTE OF LA MANCHA ch. 8 (Walter Starkie trans., 1964) (1605).

78. Richard Rogers & Oscar Hammerstein II, *Kansas City, on* OKLAHOMA! (1943).

79. The path-breaking decision in *Calvert Cliffs Coordinating Commission, Inc. v. U.S. Atomic Energy Commission*, 449 F.2d 1109 (D.C. Cir. 1971) to engage in an in-depth review of environmental impact established the idea that courts had a large role in determining the scope of legislatively-mandated procedures. *See* A. Dan Tarlock, *The Story of* Calvert Cliffs*: The Court Construes the National Environmental Policy Act to Create A Powerful Cause of Action*, *in* ENVIRONMENTAL LAW STORIES 77 (Richard J. Lazarus & Oliver A. Houck, eds., 2005). The Supreme Court subsequently reduced the scope of Environmental Impact Statements

inevitably be an environmentally agnostic method of making decisions. This objection has both the merits of positivism and of tradition. It describes the way in which environmental law has developed.[80] It also fits with the tradition of the great schools of U.S. jurisprudence: legal realism, the legal process school, law and society, and critical legal studies are all concerned primarily with method rather than with substance.[81] In the language of non-equilibrium ecology, environmental law has reached its successive climax stage and cannot evolve beyond its current state.[82]

This view has been articulated by Professor Todd Aagaard in his criticism of my argument, advanced in an earlier article,[83] that the primary measure of the effectiveness of environmental law is whether it advances the project of environmental protection.[84] He admits that the field of environmental law exists, but he asserts that any effort to chart the contours of the field and define a conceptual core in a unitary fashion is futile because it obscures "many of the most vexing tradeoffs facing environmental decision makers."[85]

To Professor Aagaard, the distinctive features of environmental law are the mediation of conflicts between private and public use of shared resources from watersheds to public lands, the interrelatedness of the external costs of human consumption and resource use, the spatial and temporal disjunction between cause and effect, and the ever-wicked problem of scientific uncertainty.[86] Thus, it is immune to overarching general principles. "[E]nvironmental law is better understood as a field in which the goal of environmental protection sits in a position of constant tension with countervailing interests and values"[87] because a wide variety of trade-offs and value conflicts are inevitable. Any search for the type of coherent doctrine that characterizes most established fields of law is impossible.[88]

(EISs) in *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council*, 435 U.S. 519, 558 (1978), but the rule of strict compliance with procedural duties has endured.

80. *See supra* text accompanying notes 59–60.

81. This point is fully developed in NEIL DUXBURY, PATTERNS OF AMERICAN JURISPRUDENCE (1995).

82. At the beginning of the environmental decade, ecology was based on the equilibrium paradigm. Natural systems evolved toward a steady state or permanent climax stage. FREDERIC E. CLEMENTS, PLANT SUCCESSION: AN ANALYSIS OF THE DEVELOPMENT OF VEGETATION (1916).

83. Tarlock, *supra* note 1.

84. Todd S. Aagaard, *Environmental Law as a Legal Field: An Inquiry in Legal Taxonomy*, 95 CORNELL L. REV. 221, 252–59 (2010).

85. *Id.* at 257.

86. The first two characteristics are described as primary and the second two as secondary. *Id.* at 264–73.

87. *Id.* at 263.

88. *Id.* at 277–78.

As a descriptive matter, Professor Aagaard is right to characterize environmental law as, at best, an organizational framework for the resolution of conflicts characterized by both scientific uncertainty and deep value cleavages. As a normative matter, he may also have the better of both the realpolitik and jurisprudential arguments. There is considerable support for the proposition that procedural guidelines for the legitimacy of complex decisions are all that we can expect from a legal system.[89] As one who began to study environmental law before it existed as a discrete area of law, I do not underestimate the wonder at the extent to which modern environmental law has changed the processes by which public and private environmental decisions are made in ways that were unthinkable forty years ago. Still, I remain uneasy with this constrained definition of environmental law. Too often we assemble mountains of data and worry about what they may be telling us while continuing to use natural resources in unsustainable ways and continuing to create questionable public health and ecosystem risks.[90]

We need to transcend the history of environmental law. Yet no compelling non-positive basis for environmental law has emerged because it falls outside the Western legal tradition. Environmental law is positive, procedural law for three primary reasons. First, much environmental law involves the review of prior agency decisions, and separation of powers principles confine the courts to reviewing process rather than substance.[91] As the

89. Professor Lon Fuller developed a set of criteria for a just or legitimate law, which he described as "a procedural version of natural law." LON FULLER, THE MORALITY OF LAW 96 (1969).

90. My conclusion is shaped by years of serving on National Research Council committees reviewing the Glen Canyon Dam environmental studies program. Glen Canyon Dam impounds the Colorado River above the Grand Canyon. JAMES FARMER, GLEN CANYON DAMMED: INVENTING LAKE POWELL & THE CANYON COUNTY (1999). The dam discharges colder water at different rates compared to pre-dam flows. The post-dam discharges impact endangered species, the ecology of the riparian zone adjacent to the river, and recreational experiences. The Bureau of Reclamation has invested millions in scientific studies, but the resulting mountain of studies has not produced "a vision for the future state of the Grand Canyon ecosystem." NAT'L RESEARCH COUNCIL, DOWNSTREAM: ADAPTIVE MANAGEMENT OF GLEN CANYON DAM AND THE COLORADO RIVER ECOSYSTEM 7 (1999). The program and the continuing search for a coherent management plan are detailed in Lawrence Susskind et al., *Collaborative Planning and Adaptive Management in Glen Canyon: A Cautionary Tale*, 35 COLUM. J. ENVTL. L. 1 (2010). I do not underestimate the problems of making more sustainable, environmentally suitable choices. As the historian J. Donald Hughes has observed, we have yet to come to grips with the need to moderate the accelerating modification of the planet's evolved life support systems. HUGHES, *supra* note 12.

91. Of course, courts sometimes reach the merits of a case in the guise of procedural review. *See, e.g.*, Defenders of Wildlife v. Babbitt, 958 F. Supp. 670 (D.D.C. 1997) (setting aside the Secretary of Interior's decision refusing to list the Canadian Lynx as threatened or endangered under the Endangered Species Act after intensive factual review under the arbitrary and capricious standard).

Tenth Circuit put it, "the arbitrary and capricious standard focuses on the rationality of an agency's decision making [sic] process rather than the rationality of the actual decision."[92] Second, environmental problems are not as simple as they seemed in the heady early days of the 1970s. They are much more wickedly complex due to the scientific uncertainty and opportunity costs of environmental protection. They cannot be solved by broad, crude scientific or ethical principles. Third, unlike the human rights-based critique of the military's use of torture and the extreme deprivation of human dignity, there is no compelling, alternative legal-environmental narrative to counter the constant pressure to marginalize environmental protection.[93] The Harvard biologist Edward O. Wilson[94] created the concept of biophilia, which has theoretical appeal as a suitable candidate for a compelling legal-environmental narrative. He argued that "[h]umanity is exalted not because we are so far above other living creatures, but because knowing them well elevates the very concept of life."[95] Thus, it should follow that we are emotionally compelled to protect the environment and all forms of life and biodiversity. It is a beautiful idea, but it has no legal or substantial popular resonance.

III. A SUBSTANTIVE BASIS FOR ENVIRONMENTAL LAW: THE CANDIDATES

Environmental academics have long been dissatisfied with the limitations of procedural environmental law. They have sought to establish various substantive principles to make it harder for legislatures, administrative agencies, and private parties to marginalize environmental considerations. Various substantive candidates have been proposed. The most frequent are:

1. A constitutional or common law right to a healthy environment or to one free of "serious" human health risks.

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92. Colo. Wild v. U.S. Forest Serv., 435 F.3d 1204, 1213 (10th Cir. 2006). The U.S. Supreme Court confirmed this view when it held that NEPA review is confined to the adequacy of an environmental impact statement (EIS) rather than the substance of the underlying decision. Strycker's Bay Neighborhood Council, Inc. v. Karlen, 444 U.S. 223, 227 (1980).

93. *See* Alyson C. Flournoy, *Building an Environmental Ethic From the Ground Up*, 37 U.C. DAVIS L. REV. 53, 58 (2003) ("[W]e may have little idea as to what values we are protecting through our laws, and our rationale for doing so."). *But see* RICHARD P. HISKES, THE HUMAN RIGHT TO A GREEN FUTURE: ENVIRONMENTAL RIGHTS AND INTERGENERATIONAL JUSTICE (2009) (arguing for environmentalism to be a part of human rights).

94. Edward O. Wilson influenced the emergence of biodiversity as a construct and a justification for much of environmental protection. *See* EDWARD O. WILSON, THE DIVERSITY OF LIFE (1992).

95. EDWARD O. WILSON, BIOPHILIA 22 (1984).

2. The imposition of a public trust in all public resources, which requires that environmental values be given substantial consideration, at least, in all resource allocation and management decisions.

3. The replacement (or supplementing) of the Lockean idea of private property as an exclusive, individual entitlement with one that situates land in the larger landscape and imposes biodiversity conservation duties on entitlement holders.

4. A mixed scientific-ethical imperative that extends legal personality to ecosystems, individual species, or "nature" generally, so that society has a right to the maintenance and restoration of pre-human intervention, "background" conditions that include close to zero exposure to pollutants and toxic chemicals.

These solutions require either a common law or constitutional basis (or substitutes that reject the Western philosophical and liberal traditions) but neither have emerged. The first three solutions are off the table, but the fourth has some currency.

A. The Constitution and the Common Law

1. The Constitution

Encouraged by the Supreme Court's early standing decision in *Sierra Club v. Morton*, there have been efforts to ground environmental rights in the U.S. Constitution.[96] A constitutional right to minimum environmental risk and a healthy environment faces two problems. The first is that our constitutional jurisprudence imposes few affirmative duties on the government. The second is the failure of the environmental ethics project. No consensus substantive right has emerged for the Court to incorporate into the constitutional framework of human dignity, such as it now is.

The Constitution has not emerged as a source of environmental values because it is primarily a charter of negative liberties and thus imposes no affirmative duties on the state except to treat citizens fairly and with some dignity.[97] Even if this hurdle can be overcome, the content of the potential

96. Robert Percival, *Greening the Constitution—Harmonizing Environmental and Constitutional Values*, 32 ENVTL. L. 809, 828–29 (2002).

97. Ely v. Velde, 451 F.2d 1130, 1139 (4th Cir. 1971) (finding that there is no constitutional text or precedent conferring a right). For a dramatic example of the application of the negative-affirmative distinction, see *Mazibuko v. City of Johannesburg* 2010 (4) SA 1 (CC) (S. Afr.). The South African Constitutional Court refused to invalidate Johannesburg's decision to use pre-paid water meters in parts of Soweto, an impoverished area, and post-use billing in the wealthy parts of the city. The court found that limited balancing is permitted for negative rights that constrain the state, but affirmative human social and economic rights

environmental right (or rights) is too contingent compared to other rights to be characterized as fundamental. Once one concedes that citizens have no right to a zero risk environment, it is not possible to specify with any level of confidence the content of a potential right.[98] Standards such as a right to a healthy, clean, minimal risk environment, although found in many constitutions throughout the world, are hopelessly vague.[99] For example, DNA research has shown that susceptibility to cancer arises from an unknown mix of environmental and genetic factors, adding more complications to any effort to recognize a public health-based right.[100] The problems are magnified when one turns from health to the conservation of the physical environment. Not surprisingly, courts have shown almost no interest in developing a right to a minimum level of "nature," or ecosystem, conservation.[101] *Massachusetts v. EPA*[102] is the closest the Supreme Court has come to such a case,[103] but the decision is not a foundation on which a Constitution-based environmental law can be built.[104]

2. The Common Law

Positive law generally builds off of the common law. Thus, the common law has long been proposed as a source of substantive environmental law.

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require a balance between human dignity and the availability of public resources to fulfill them. *Id*.

98. Professor Cass Sunstein made this point in his book, AFTER THE RIGHTS REVOLUTION: RECONCEIVING THE REGULATORY STATE 90 (1990). For an early articulation of this view, see Ronald E. Klipsch, *Aspects of a Constitutional Right to a Habitable Environment: Toward An Environmental Due Process*, 49 IND. L.J. 204 (1974). *See also* J.B. Ruhl, *The Metrics of Constitutional Amendments and Why Proposed Environmental Quality Amendments Don't Measure Up*, 74 NOTRE DAME L. REV. 245 (1999) (arguing that constitutional environmental rights are not desirable).

99. This conclusion continues to be challenged. Victor B. Flatt, *This Land is Your Land (Our Right to the Environment)*, 107 W. VA. L. REV. 1 (2004) argues that the common law tradition of the protection of the person can evolve to encompass an individual right to a clean and safe environment that constrains societal efficiency trade-offs.

100. *See, e.g.*, Jamie A. Grodsky, *Genetics and Environmental Law: Redefining Public Health*, 93 CALIF. L. REV. 171, 184 (2005).

101. Environmentalists hoped that the public trust doctrine would create such rights, but outside of a few water cases in California and Hawaii, courts have not used it to do so. *See infra* text accompanying notes 120–129.

102. 549 U.S. 497 (2007).

103. Jonathan Z. Cannon has characterized the case as "as close as we will come" to a "*Brown v. Board of Education* for the environment." Jonathan Z. Cannon, Essay, *The Significance of* Massachusetts v. EPA, 93 VA. L. REV. IN BRIEF 53 (2007), *available at* http://www.virginialawreview.org/inbrief/2007/05/21/cannon.pdf.

104. *See* Jody Freeman & Adrian Vermeule, Massachusetts v. EPA*: From Politics to Expertise*, 2007 SUP. CT. REV. 51, 52 (describing the case as not "so much . . . an environmental case" as an administrative law case asserting that agency expertise should not be made subordinate to presidential political interference).

However, a distinctive quasi-common law of environmental protection has not emerged. The pollution control branch of environmental law has roots in the Western legal, philosophical, and religious tradition, but they are shallow. Environmental law is in the Western legal tradition but not of it.[105] That is, environmental law follows the forms of Western legal thinking, but it does not fully share the experience or the values of this tradition and therefore the tradition does not provide a firm basis for an environmental common law.

There are two great sources of law: the practical and the higher (or divine). Environmental law does not fit well with either.[106] Environmental law did not grow out of long practical experience adjusting human affairs, as did Roman law.[107] Nor does environmental law share the Western tradition's preoccupation with limiting the power of the state. Instead, despite market and libertarian strains, mainstream environmentalism has always relied on a strong state to modify established patterns of behavior.

Rather than arising from the common law, the distinctive feature of environmental law has been the enactment of legislation to overcome the unresponsiveness of the common law. Statutes such as the Endangered Species Act[108] and those basing pollution levels or product entry requirements on risk assessments[109] are a sharp break with the Western legal tradition and move the law into uncharted waters. The Endangered Species Act extends a level of legal protection to species and their habitats that was unknown at common law or in the major Western religious and philosophical traditions.[110] Risk-based standards are equally a major expansion of the

105. The concept of being in but not of the world is central to Christian theology and means that there is a higher world than the one in which we find ourselves. *E.g.*, *John* 2:15–17 ("Love not the world, neither the things that are in the world. If any man love the world, the love of the Father is not in him. For all that is in the world . . . is not of the Father, but is of the world . . . .").

106. Of course, this sentence does not do justice to the sweep of Western legal theory from the Greeks to the present, but it is nonetheless my attempt to capture the tension between law as experience and law as the expression of transcendent norms. *See* FRANCIS FUKUYAMA, THE ORIGINS OF POLITICAL ORDER (2011) (asserting that rule of law developed from eleventh-century canon law); J.M. KELLY, A SHORT HISTORY OF WESTERN LEGAL THEORY (1992) (a complete history of Western legal theory).

107. KELLY, *supra* note 106, at 60–61.

108. 16 U.S.C. §§ 1531–1544 (2006).

109. *E.g.*, Toxic Substances Control Act, 15 U.S.C. § 2601(a)(2) (2006); Safe Drinking Water Act, 42 U.S.C. § 300g-1(b)(1)(A)(iii) (2006).

110. "Our received ways of defining and handling legal and moral problems grew out of relationships among ordinary normal persons living in a collective society." CHRISTOPHER D. STONE, EARTH AND OTHER ETHICS: THE CASE FOR MORAL PLURALISM 20 (1987). Legal history provides a few examples of the recognition of a legal personality for "nonpersons," but it was the environmental movement that tried to extend legal personality to all flora and fauna, as did Christopher D. Stone in his famous article, *Should Trees Have*

Enlightenment project of protecting human dignity. They essentially protect future generations of "statistical people."[111] Forcing technology had some common law roots and fit with the post-World War II generation's faith in technological progress, but the government's decision to mandate immediate progress was unprecedented. Environmental law is inherently visionary, although it appears in formal, tactical guises; it seeks to do no less than to replace aspects of the common law that supported centuries of abuse of the natural world.

Ironically, the environmental movement's early successes using the common law created the conditions for its marginalization. In the late 1960s, environmentalists toyed with the use of the common law of nuisance to force polluters to install the necessary pollution reduction technology.[112] After a leading New York Court of Appeals case balanced the equities and required polluters to pay damages instead of issuing a technology-forcing injunction,[113] and after courts generally adhered to the traditional distinction between demonstrable damages and speculative risks,[114] the action turned to legislatures to cure these defects through "comprehensive" legislation.

The resulting legislation need not have choked off the common law, but it did add to its marginalization as a source of substantive environmental principles. Inevitably, there are insufficiently addressed issues and new problems that the legislation did not contemplate, such as climate change or

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Standing?, 45 S. CAL. L. REV. 450 (1972), and later book, SHOULD TREES HAVE STANDING?—TOWARDS LEGAL RIGHTS FOR NATURAL OBJECTS (1974).

111. The moral basis for this decision is under sustained attack by advocates of cost-benefit analysis who argue that the relatively immediate and quantifiable benefits of regulation must always exceed the costs. Others criticize the use of cost-benefit analysis to undermine risk-based regulation intended to protect future generations. *See* FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING (2004). The Western legal tradition has generally used the common law to compensate only those actually injured by an activity. Legislatures can estimate the likelihood of future harms and can regulate without proving that the absence of regulation will actually cause the harms that a statute tries to prevent. However, legislation usually deals with demonstrated impacts rather than highly abstract risks, and the beneficiaries of the legislation are primarily assumed to be the living. The difficulty of addressing climate change, where neither of these conditions is present, illustrates the influence of this tradition. In *American Electric Power Institute v. Connecticut*, 131 S. Ct. 2527 (2011), the Court's dismissal of a federal common law action challenging CO_2 emissions on the ground that the Clean Air Act preempted such actions is a perfect illustration of the difficulty of using the common law to prevent future injuries rather than to redress those that have occurred or are imminent.

112. WILLIAM RODGERS, ENVIRONMENTAL LAW § 2.1, at 113–14 (2d ed. 1994).

113. Boomer v. Atlantic Cement Co., 257 N.E.2d 870 (N.Y. 1970).

114. *See, e.g.*, Brown v. Monsanto Co. (*In re* Paoli R.R. Yard PCB Litigation), 916 F.2d 829, 850–53 (3d Cir. 1990); *In re* "Agent Orange" Prod. Liab. Litig., 597 F. Supp. 740 (E.D.N.Y. 1984), *aff'd*, 818 F.2d 145 (2d Cir. 1987).

the introduction of exotic species into aquatic ecosystems.[115] Building on Justice Holmes's visionary opinion in *Georgia v. Tennessee Copper Co.*,[116] a robust federal common law of nuisance could have emerged.[117] However, the Supreme Court, taking environmentalists at their word, embraced the fiction that the regulatory programs are comprehensive, and thus perfect. The result is that almost all federal common law actions are preempted.[118] Another reason for the common law's limited role is that the federal legislation imposes duties that go far beyond those that existed at common law and has shifted regulation from proof of cause-in-fact to risk assessment.[119]

B. The Public Trust

The common law did help to legitimize pollution control, but no analogous common law basis for nature preservation or biodiversity protection existed. Litigators secured some early successes in remanding public decisions that would destroy wetlands or degrade landscapes,[120] but no constitutional or common law doctrine mandated the preservation of nature. The leading academic of the founding generation of environmental law, Professor Joseph L. Sax, offered a candidate judicial doctrine.[121] He turned to the ancient doctrine that "great" rivers are subject to public rights, and constructed a general theory of the public trust that could apply to all resource use choices.[122]

The classic public trust doctrine subjects the state and federal owners of the beds of navigable rivers and lakes to judicial constraints when the beds and waters are transferred to private ownership or historic public

115. Christopher Grubb, *Worthy of Their Name: Addressing Aquatic Nuisance Species with Common Law Public Nuisance*, CHI.-KENT L. REV. (forthcoming 2011) (on file with author).

116. 206 U.S. 230 (1907).

117. Justice Douglas suggested as much in *Illinois v. Milwaukee*, 406 U.S. 91, 105–07 (1972), but then went on to lay the foundation for the Court's subsequent preemption jurisprudence.

118. City of Milwaukee v. Ill., 451 U.S. 304, 317–19 (1981); *see also* Grubb, *supra* note 115.

119. See Albert C. Lin, *Unifying Harm in Environmental Law*, 2006 WIS. L. REV. 987, 908, 910–11. *But see* NOGA MORAG LEVINE, CHASING THE WIND: REGULATING AIR POLLUTION IN THE COMMON LAW STATE (2003) (suggesting that air pollution regulation is in keeping with the common law tradition). Nuisance law played a very positive role in allowing legislatures to enact stringent pollution control legislation with little fear that courts would find it to be a taking without due process of law. *See* Lin, *supra*, at 911–12. If federal pollution regulation is held unconstitutional, it will be as an unwarranted exercise of the commerce power, not as a taking of common law property rights.

120. Sax, *supra* note 54, at 159, 217.

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

122. *Id.* at 556–62.

rights are otherwise impaired.[123] Professor Sax argued that the public trust was both a substantive doctrine, which limited the beds of navigable waters to trust purposes, and a procedural one, which forced legislatures and executives to make more deliberate decisions when environmental values were compromised.[124] When a decision gave insufficient attention to the public interest in maintaining the environmental integrity of a trust resource, a court could remand the decision for further administrative or legislative deliberation.[125]

Sax's public trust doctrine can be described as a quasi-substantive one. Environmental trust values were not per se superior to other uses of the resource in question. But the objective of judicial scrutiny and the threat of a remand was to force agencies and legislatures to limit the intensive exploitation of a wide range of resources. The extension of the public trust to all public resources excited environmental lawyers in the United States, and later lawyers throughout the world, because it could evolve into a law of substantive rights. But it remains a promise unfulfilled.

In contrast to the nineteenth and early twentieth centuries, when much land was severed from the trust, transferred to private ownership, and filled, the revived public trust doctrine has strengthened state control of tidelands and the beds of navigable waters.[126] A few scattered precedents have applied the doctrine to parks.[127] However, courts have not developed a public trust law that effectively prevents the disturbance of the status quo outside of the water area.[128] Beyond water cases, the doctrine offers little

123. The leading case is *Illinois Central Railroad Co. v. Illinois*, 146 U.S. 387 (1892). Citing almost no precedent, the Supreme Court held that Illinois could constitutionally revoke a previous legislative grant of prime Chicago lakefront to the railroad. "A grant of all lands under the navigable waters of a State has never been adjudged to be within the legislative power; and any attempted grant of the kind would be held, if not absolutely void on its face, as subject to revocation." *Id.* at 453.

124. Sax, *supra* note 121 at 556–62.

125. Sax, *supra* note 54, at 163–74.

126. *E.g.*, Moot v. Dept. of Envtl. Prot., 161 N.E.2d 410, 418 (Mass. 2007) (holding that the Department had not been delegated the authority to exempt developers of multiple use project on trust tidelands from statute requiring license to alter navigable water because "department has no authority to forego its responsibility to protect the public's rights in tidelands").

127. *E.g.*, Paepke v. Pub. Bldg. Comm'n, 263 N.E.2d 11 (Ill. 1970). After a federal court held that the National Park Service had a duty to acquire the necessary lands to buffer Redwood National Park, Sierra Club v. Dep't of Interior, 398 F.Supp. 284, 293–94 (N.D. Cal. 1975), courts have refused to extend the public trust to federal public lands.

128. Academics have provided courts with a variety of justifications for the extension of the public trust. This literature is summarized in Robin Kundis Craig, *A Comparative Guide to the Western States' Public Trust Doctrines: Public Values, Private Rights, and the Evolution Toward an Ecological Public Trust*, 37 ECOLOGY L.Q. 53, 71–80 (2010). The highwater mark of the doctrine is the California Supreme Court's use of it to induce the reallocation of water from consumptive to *in situ* environmental uses. Nat'l Audubon Soc'y v. Super. Ct., 658 P.2d

more than a vague idea that the use of "inherently" common resources should always be in the public interest.[129]

C. Green Property

Environmental law is sometimes divided into brown (pollution control) and green (biodiversity protection) branches.[130] As previously mentioned, the common law of nuisance has immunized almost all pollution control legislation from attack as unconstitutional takings.[131] Biodiversity protection is different because it often requires private property owners to forego development or denies a historic privilege to use public lands and waters. Thus, environmental land use regulation is much more vulnerable to takings challenges. To blunt Fifth Amendment challenges to the regulation of environmentally sensitive lands, such as wetlands and wildlife habitat, a

709 (Cal. 1983), *cert. denied* 464 U.S. 977 (1983). Los Angeles' diversions from Mono Lake's tributary streams were tipping the lake's ecosystem toward collapse. The California Supreme Court held that the trust applied to long-held state appropriation permits in navigable waters and that the state had a duty to balance environmental uses against other uses. *Id*. at 721. A settlement, induced by a $50 million appropriation to finance replacement water for Los Angeles, has stabilized the lake. The settlement is described in Leigh A. Jewell & Craig Anthony (Tony) Arnold, *The Real Public Trust Doctrine: The Aftermath of the Mono Lake Case*, *in* BEYOND LITIGATION: CASE STUDIES IN WATER RIGHTS DISPUTES 155, 176–180 (Craig Anthony (Tony) Arnold & Leigh A. Jewell eds., 2002).

Hawaii's Supreme Court has applied the Mono Lake decision to require *some* level of ecosystem restoration when prior water rights are reallocated and trans-watershed diversions pose a substantial threat to the maintenance of instream flows. Hawaii has applied the public trust doctrine to subordinate municipal claims to instream flow needs, *In re* Water Use Permit Applications, 9 P.3d 409, 432–33 (Haw. 2000), and native Hawaiian rights. *In re* Water Use Permit Application Filed by Kukui Molokai, Inc., 174 P.3d 320, 330 (Haw. 2007); *In re* Waiola O Molokai, Inc., 83 P.3d 664, 692 (Haw. 2004); *see also* David L. Callies & Calvert G. Chipchase, *Water Regulation, Land Use, and the Environment*, 30 HAW. L. REV. 49, 94 (2007) (criticizing those decisions).

129. Joseph Kearney and Thomas Merrill argue that Professor Sax incorrectly concluded that the case stands for the proposition that there was no public interest in the legislation. Joseph Kearney & Thomas Merrill, *The Origins of the American Public Trust Doctrine: What Really Happened in Illinois Central?*, 71 U. CHI. L. REV. 799 (2004). The harbor, railroad and depot developed on the public trust land were in the public interest. Thus, although the case stands for a powerful principle, it is too crude to use the case as an exemplar of the public/private imbalance analysis that its supporters advocate. *E.g.*, James L. Huffman, *Speaking of Inconvenient Truths: A History of the Public Trust Doctrine*, 18 DUKE ENVTL. L. & POL'Y F. 1 (2007) (providing the most stark articulation of this argument).

130. Compare Robert Glicksman et al., ENVIRONMENTAL PROTECTION: ENVIRONMENTAL POLICY 3 (6th ed. 2011), which proposes a three-fold division between pollution reduction, the protection of the public from long-term toxic risks, and biodiversity conservation. I have collapsed the first two categories since they both deal with reducing exposure to various discharges and substances.

131. *See supra* note 119.

theory of "green property" has been proposed.[132] The goal is to incorporate a broadly-defined duty to conserve into classic Blackstonian, liberal property rights. The argument is that the natural interconnectedness of land, despite arbitrary property divisions produced by the common law, justifies more stringent limitations on individual parcel use to protect the integrity of remnant ecosystems. The model is a mix of the public trust doctrine and ecology.[133] Joseph Sax, for example, criticized the Supreme Court's *Lucas* decision[134] for failing to recognize that property should be defined by reference to larger ecological communities. He, and others, argued either that courts should redefine property to include an ecosystem dimension, or that the courts should accept the principle that harm to an ecosystem should be considered a modern nuisance. "Viewing property through the lens of nature's economy reduces the significance of property lines."[135] The rationale is that property has always involved the adjustment of individual use to social mores or values, without compensation, and that environmentalism requires a similar revision.

A more modest theory of green property has emerged incrementally as a result of Justice Scalia's opinion in *Lucas*. Justice Scalia acknowledged that community or societal duties can be a "background" principle to an otherwise exclusive property right,[136] an idea that has a long pedigree in U.S. legal history.[137] The *Lucas* majority offered two justifications for regulation that substantially deprives an owner of the value of his or her property, one narrow and the other broad. Most of the attention has been focused on Justice Scalia's holding that a landowner has no right to compensation if "the prescribed use interests were not part of the title to begin with." His

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132. The best exposition remains that of Joseph L. Sax in *Property Rights and the Economy of Nature: Understanding* Lucas v. South Carolina Coastal Council, 45 STAN. L. REV. 1433 (1993) [hereinafter Sax, *Property Rights and the Economy of Nature*]. *See also* Craig Anthony (Tony) Arnold, *The Reconstitution of Property: Property as a Web of Interests*, 26 HARV. ENVTL. L. REV. 281 (2002); Robert J. Goldstein, *Green Wood in the Bundle of Sticks: Fitting Environmental Ethics and Ecology into Real Property Law*, 25 B.C. ENVTL. AFF. L. REV. 347 (1998). Aldo Leopold's land ethic, *supra* note 34 at 201–26, is often cited as a source of green property theory. "Saint" Aldo seems to have intended his land ethic to be a call for private landowners to internalize conservation practices. *See* Eric T. Freyfogle, *The Land Ethic and Pilgrim Leopold*, 61 U. COLO. L. REV. 217, 236 (1990). However, Professor Sax and many environmental organizations have endorsed discretionary compensation for land owners who bear disproportionate conservation burdens. Joseph L. Sax, *Land Use Regulation: Time to Think About Fairness*, 50 NAT. RESOURCES J. 455, 467–69 (2010).

133. *See infra* text accompanying notes 156–162 (discussing Leopold's influence on a new model of environmental ethics).

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

135. Sax, *Property Rights and the Economy of Nature*, *supra* note 132, at 1445.

136. Lucas, 505 U.S. at 1030–31.

137. *E.g.*, John F. Hart, *Colonial Land Use Law and Its Significance for Modern Takings Doctrine*, 109 HARV. L. REV. 1252 (1996).

opinion limited this exception to "background principles of the State's law of property and nuisance already applicable to land ownership."[138] In his concurring opinion, Justice Kennedy offered a second rationale for title limitations; he argued that Justice Scalia's background principles test was a very narrow, backwards-looking one grounded in the Blackstonian vision of the common law, which imposes minimal restraints on land development, and unjustifiably excluded contemporary biodiversity regulation. Justice Kennedy would allow the state to set background principles through legislation.[139]

The problem of adequate notice remains, but the background principles test may be broader than Justice Scalia envisioned. There are many common law doctrines that limit legitimate investment-backed expectations.[140] For example, wildlife habitat protection was a landowner obligation for centuries in England.[141] "A landowner . . . might develop his property, but he was required to retain adequate vegetation for wildlife forage and cover."[142] The regulation of water use to preserve endangered species is much easier to justify under *Lucas*. Water rights are inherently limited by the requirement that the use be beneficial, as well as by the public trust doctrine.[143]

The Supreme Court has rejected the idea that a statutory, regulatory scheme alone puts a property owner on notice that entitlements will no longer be recognized,[144] but it has opened the door to a theory that allows the state to "green" property by lowering the expectations of unfettered discretion to develop. Justice O'Connor's concurring opinion in *Palazzolo v. Rhode Island* posited that the existence of a statutory, regulatory scheme was

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138. 505 U.S. at 1004.

139. 505 U.S. at 1035 (Kennedy J., concurring).

140. There is a vast literature on the scope of background limitations as a basis for environmental regulation. The case for a narrow reading of the *Lucas* exception has been articulated by Professor James Huffman. James L. Huffman, *Background Principles and the Rule of Law: Fifteen Years after* Lucas, 35 ECOLOGY L.Q. 1 (2008). The argument for an expansive reading has been articulated by Professors Michael C. Blumm and J.B. Ruhl. Michael C. Blumm & J.B. Ruhl, *Background Principles, Takings, and Libertarian Property: A Reply to Professor Huffman*, 37 ECOLOGY L.Q. 805 (2010); 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); J.B. Ruhl, *Making Nuisance Ecological*, 58 CASE W. RES. L. REV. 753 (2008).

141. *See* Fred P. Bosselman, *Limitations Inherent in Title to Wetlands at Common Law*, 15 STAN. ENVTL. L.J. 247 (1996).

142. THOMAS A. LUND, AMERICAN WILDLIFE LAW 16 (1980).

143. *But see* Tulare Lake Basin Water Storage Dist. v. United States, 49 Fed. Cl. 313 (2001) (ruling that the United States must pay for diminished water deliveries as a result of ESA compliance). The George W. Bush administration settled this case for $17 million.

144. Palazzolo v. R.I., 533 U.S. 606, 610 (2001).

a factor to be considered in deciding the extent of the property owner's legitimate investment-backed expectations.[145]

Over time, the continued existence of a regulation will dampen entitlement expectations, but courts have not endorsed, and are unlikely to endorse, a radical new theory of "green property." Ultimately the failed project to create a general theory of "green property" illustrates the failure of the effort to create a non-positivist basis for a substantive environmental law.[146]

D. Science-Based Environmental Ethics

Conservation is a harmony between men and land.[147]

—Aldo Leopold

Environmental law has tried to follow the law and economics model by using other disciplines—ecology and, to a lesser extent, toxicology—to provide normative standards for a new "quasi–common" or "quasi-constitutional" law of environmental protection. This is a dicey project. Environmental law exists because science has identified problems as "environmental," but modern science has undermined much of the early hope that disciplines such as ecology would produce an objective set of prescriptions upon which a substantive environmental law could be built. And modern science has offered cascades of complexity and uncertainty in its place.

At the beginning of the environmental movement, two related views of nature dominated. Nature was either an example of divine perfection or a perfect machine.[148] Two conclusions might follow. First, undisturbed, or "pure," nature should be walled off from human use to the maximum extent possible. Second, human activities such as pollution and resource exploitation had disturbed nature's balance, and the function of the law was to limit these activities and to restore the machine's inherent balance.

The fate of equilibrium ecology, the foundation of much early environmental law, is telling. Lawyers understood ecology to teach that ecosystems

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145. *Id*. at 632–35 (O'Connor J., concurring).

146. Eric Freyfogle, a proponent of Leopoldian ethics and new, "greener" theories of property, has written: "Clearly, constructing a new environmental narrative will not be easy. The task is daunting, for a new narrative needs to promote land health and at the same time respect the individual . . . and allow for private rights in land." ERIC T. FREYFOGLE, BOUNDED PEOPLE, BOUNDLESS LANDS 111 (1998).

147. LEOPOLD, *supra* note 34, at 207.

148. Charles J. Meyers, *An Introduction to Environmental Thought: Some Sources and Some Criticisms*, 50 IND. L.J. 426, 429–31 (1975).

evolved to a climax stage and then remained relatively stable over time.[149] The two patron saints of U.S. environmentalism, John Muir and Aldo Leopold, made the ethical or moral case for preservation and the restoration of ecosystem balance. The more influential of the two, Aldo Leopold, took the principal lesson of ecology, the tendency of natural systems toward stasis, and turned it into an ethical imperative: let nature be.[150]

Just as many of environmental law's intellectual leaders taught that the law must take its substantive cues from the social and physical sciences, the stability hypothesis was being deconstructed within the discipline. Scientists have now questioned all the notions of stability, from the very idea of an ecosystem to the definition of a species, and the dominant paradigm today is non-stationarity.[151] Biologists have substituted non-equilibrium for equilibrium theories of ecosystems.[152] As one ecological deconstructionist observed, "[t]he idea of risky nature is one that is hard for many people to swallow. Environmentalists recoil at the notion precisely because it seems to give man license to transform nature at will."[153] In short, we now are more sophisticated, but also more disillusioned.[154]

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149. ROBERT P. MCINTOSH, THE BACKGROUND OF ECOLOGY: CONCEPT AND THEORY (1985) and FRANK BENJAMIN GOLLEY, A HISTORY OF THE ECOSYSTEM CONCEPT IN ECOLOGY: MORE THAN THE SUM OF ITS PARTS (1993) trace the origins of modern ecology and the importance of stasis, or steady state ecosystems, which prevailed from the late nineteenth century to the beginning of the modern environmental movement.

150. LEOPOLD, *supra* note 34, at 224–25 ("A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.").

151. DANIEL BOTKIN, DISCORDANT HARMONIES (2d ed. 2011). For a thoughtful analysis of the implications of non-equilibrium ecology for the protection of endangered species, see Holly Doremus, *The Endangered Species Act: Static Law Meets Dynamic World*, 32 WASH. U. J.L. & POL'Y 175 (2010). The non-stationarity paradigm postulates that natural systems are both dynamic and subject to a great range of disturbances from global climate change and human intervention. Thus models such as the hydrologic models used to predict flood risk and stream flow are no longer a valid basis for prediction and policy. The legal implications of non-stationarity are sketched in Robin Kundis Craig, *'Stationarity is Dead'—Long Live the Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9 (2010).

152. I have explored this paradigm shift in A. Dan Tarlock, *The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law*, 27 LOY. L.A. L. REV. 1121 (1994).

153. STEPHEN BUDIANSKY, NATURE'S KEEPERS: THE NEW SCIENCE OF NATURE MANAGEMENT 98 (1995).

154. A leading environmental philosopher has tried to rescue "Saint" Aldo from the new ecology, but the result is not promising:

> The summary moral maxim of the land ethic, nevertheless, must be dynamized in light of developments in ecology since the mid-twentieth century. Although Leopold acknowledged the existence and land-ethical significance of natural environmental change, he seems to have thought of it primarily on a very slow evolutionary temporal scale. But even so, he thereby incorporates the concept of

The acceptance of risk as a basis for regulation has encountered the same uncertainty problem, perhaps even more so. Much risk regulation is built on toxicity or cancer theory. As a leading student of the Toxic Substances Control Act has written, "the information that science can provide is costly, time-consuming to obtain, and often of modest value given its large uncertainties."[155]

Undaunted by the dynamics of science, environmental ethicists have tried to build on Leopold to create a new set of science-derived environmental ethics, but the effort has not been successful outside of academic discourse.[156] The early preservation movement saw landscapes as awe-inspiring natural areas,[157] endowed with rights,[158] which spiritually uplifted and sustained us with their physical beauty, compelling us to maintain their natural state. Environmental ethics, by contrast, sought to replace this soft spiritualism and deism with hard ethical imperatives. The ethics project can be seen as an early attempt, analogous to the precautionary principle, to transcend science: if the science did not support the outcome, the issue could be reframed as an ethical one.

Efforts to construct a theory of non-anthropocentric ecosystem rights have been unable to overcome (1) the idea that rights are generally limited to sentient beings, and (2) the positivist prohibition against deriving value from fact.[159] While philosophers continue to debate whether non-anthropocentric

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> inherent environmental change and the crucial norm of scale into the land ethic. In light of more recent developments in ecology, we can add norms of scale to the land ethic for both climatic and ecological dynamics in land-ethically evaluating anthropogenic changes in nature. One hesitates to edit Leopold's elegant prose, but as a stab at formulating a dynamized summary moral maxim for the land ethic, I hazard the following: "A thing is right when it tends to disturb the biotic community only at normal spatial and temporal scales. It is wrong when it tends otherwise."

J. Baird Callicott, *Do Deconstructive Ecology and Sociobiology Undermine Leopold's Land Ethic?*, 18 ENVTL. ETHICS 353, 372 (1996).

155. David E. Adelman, *A Cautiously Pessimistic Appraisal of Trends in Toxics Regulation*, 32 WASH. U. J.L. & POL'Y 377, 381 (2010).

156. *See* CHRISTOPHER STONE, EARTH AND OTHER ETHICS: THE CASE FOR MORAL PLURALISM (1987) (critiquing non-anthropocentric ethics); *but cf.* Purdy, *supra* note 8 (arguing that the mid-nineteenth and early-twentieth-century views of nature that shaped the modern environmental movement are part of a continuing process of community self-definition that will help us to cope with the challenge of global climate change).

157. National Park historians agree that the National Park system was created to preserve geological wonders, not large ecosystems, although later additions had more rational ecological boundaries. *See* RICHARD WEST SELLERS, PRESERVING NATURE IN THE NATIONAL PARKS: A HISTORY (1997).

158. *See* RODERICK FRAZIER NASH, THE RIGHTS OF NATURE: A HISTORY OF ENVIRONMENTAL ETHICS (1989).

159. *See* Richard A. Watson, *A Critique of Anti-Anthropocentric Biocentrism*, 5 ENVTL. ETHICS 245 (1983) (providing an early, influential critique of non-anthropocentric ethics).

ethics are possible, economists and ecologists have progressed operationally by framing the question as a wholly anthropocentric one: What do ecosystems do for us and how much are they worth?[160] As a result of this market discourse,[161] ethics have faded into the background as environmentalism has become a more rational movement, dominated by economics and ecology.[162]

IV. IS THAT ALL? : TOWARD A SUBSTANTIVE, NON-POSITIVIST ENVIRONMENTAL LAW

In light of the failed efforts to develop a substantive, non-positivist environmental law, over the years Professor Sax and others have asked me: Is there nothing more to environmental law than strict procedural duties? Are there no substantive principles that impose real constraints on the processes that are widely seen as relatively substance neutral and thus permit important trade-offs? In response to Professor Sax and others, I suggest that, despite substantial limitations,[163] it is possible to extract from our experience with positive environmental law a set of general principles that transcend their immediate legislative context. To this end, I offer international environmental law as a possible source from which to derive such principles.

This view may, of course, be dismissed by many as naive, unrealistic or just plain wrong. The arguments in favor of this bleak assessment include: (1) U.S. environmental law is the model for international environmental law. Thus, the parent has nothing to learn from the child. The United States tends to think of international environmental law simply as U.S. domestic law writ large. We gave the world the environmental impact assessment, the precautionary principle (along with the Germans), national

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See generally PETER WENZ, ENVIRONMENTAL JUSTICE (1988) (arguing that we can surmount this problem by adopting moral concern for the functioning of the entire ecological system); E.O. WILSON, THE DIVERSITY OF LIFE 351 (1992) ("[F]or what, in the final analysis, is morality but the command of conscience seasoned by a rational examination of the consequences?"). The debate is fully covered in ENVIRONMENTAL ETHICS (Paul Pojman & Louis P. Pojman eds., 2012).

160. This is the premise behind the valuation of ecosystem services. NATURE'S SERVICES: SOCIETAL DEPENDENCE ON ECOSYSTEMS 23–70 (Gretchen C. Dailey ed., 1997). It is also the justification for markets created to charge beneficiaries for the cost of those services. James Salzman, *Valuing Ecosystem Services*, 24 ECOLOGY L.Q. 887 (1997).

161. *See, e.g.*, Holly Doremus, *The Rhetoric and Reality of Nature Protection: Toward a New Discourse*, 57 WASH. & LEE L. REV. 11 (2000) (lamenting the loss of dialogue including concepts of wonder and aesthetic enjoyment from environmental protection discourse).

162. Professor Christopher Schroeder has characterized the environmental movement as a struggle for dominance between prophets, priests and pragmatists. Christopher Schroeder, *Prophets, Priests and Pragmatists*, 87 MINN. L. REV. 1065 (2003).

163. *See* discussion *supra* Part II.

parks, the original nature reserves, and tradable emissions permits.[164] (2) To a positivist, international environmental law is a set of vague and incoherent principles and thus is marginal and soft law at best.[165] It exists more in theory than in practice, primarily reflecting a set of lofty, aspirational norms. (3) International environmental law, like all international law, is based on the theory of consent to a norm or treaty. To negotiate a treaty that is likely to be ratified, the radically diverse interests of all nations must be accommodated. Diversity, driven by the North-South divide, is a persistent feature of international environmental law. The compromise necessary to secure agreement among such diverse interests often leads to compromising on the lowest common denominator.[166]

All these arguments are powerful, but I posit that international environmental law has at least two benefits as a source of substantive principles. First, international environmental law has taken a much more holistic view of the environment. True, there are media- and sector-specific treaties, but there has been a greater effort to link them together. International environmental law has been synthesized into a set of norms that apply to almost all environmental problems. Many of the same norms can be found in U.S. environmental law, but international environmental law has transformed them into more general, overarching principles that can be applied to any environmental problem. International environmental law has also tried to move from negative prohibitions to affirmative environmental protection duties. And unlike U.S. environmental law, it has been considerably influenced by academic commentary. The main academic contribution has been the synthesis of international environmental law, but visionary scholarship abounds.[167]

Second, although environmental law can never completely move beyond process-based rules given the complex and dynamic nature of the subject, international environmental law has done a better job of linking

164. Peter H. Sand, *The Evolution of International Environmental Law*, *in* THE OXFORD HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW 29, 36–37 (Daniel Bodansky et al. eds., 2006) (noting how NEPA and pollution command and control were widely copied and became models for international environmental legal regimes).

165. This argument is summarized and applied in Roda Mushkat, *Compliance with International Environmental Regimes: Chinese Lessons*, 34 WM. & MARY ENVTL. L. & POL'Y REV. 493 (2010).

166. Geoffrey Palmer, *New Ways to Make International Environmental Law*, 86 AM. J. INT'L L. 259, 278 (1992) (providing the classic exposition of the lowest common denominator problem).

167. EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY (1989). Professor Weiss's book is the classic example of visionary scholarship. She created the theory of justice toward future generations, which has become a widely invoked principle in international environmental law. More generally, my old college debate partner has, more than anyone else, created the field through her scholarship.

procedure with substance to constrain decisions that adversely impact human and ecosystem "health."[168]

This is a crucial development because we need processes that go beyond the outcome-neutral and static end-state ones that the environmental impact assessment has produced. Put simply, we need processes that are structured to carry out the substantive objectives of an environmental protection mandate. Environmental decision-making processes should have the following characteristics: (1) they should establish set baselines against which projected levels of change can be evaluated;[169] (2) they should contain a preference for ecosystem restoration and maintenance of system function or "health" over mitigation;[170] (3) they should link the protection of human health, including risk exposure, to human dignity;[171] (4) they should be dynamic and future oriented;[172] and (5) they should have a mechanism to narrow the inevitable range of scientific uncertainty.[173] In this spirit I offer three mixed substantive-procedural rules partially drawn from international law.

A. Procedural Duties Must Be Linked to the Implementation of Substantive Outcomes

Environmental law decisions do not seek to establish "truth," but rather to promote the exercise of judgment informed primarily by scientific and

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168. Like everything else in environmental law, the validity of the construct of a "healthy" ecosystem is much contested. For a defense of this idea, see Katie McShane, *Ecosystem Health*, 26 ENVTL. ETHICS 227 (2004).

169. *See* A. Dan Tarlock, *Slouching Toward Eden: The Eco-Pragmatic Challenges of Ecosystem Revival*, 87 MINN. L. REV. 1173, 1197–98 (2003).

170. In WILLIAM R. JORDAN III, THE SUNFLOWER FOREST: ECOLOGICAL RESTORATION AND THE NEW COMMUNION WITH NATURE (2003), Jordan argues that Leopold's theory is incomplete because it ignores the negative aspects of nature (Is it right to withhold DDT from the developing world?), it fails to appreciate the relationship between destruction and construction (as non-equilibrium ecology does), it fails to come to terms with the experience of consumption, and, more generally, ignores the original sin by imagining a return to an Edenic ideal. He concludes that a "philosophy or religion that ignores the destruction and shame inherent in creation and urges 'minimal impact' without providing a means for dealing in a psychologically and spiritually productive way with the impacts that we do make simply won't work." *Id.* at 41 (emphasis omitted).

171. *E.g.*, Ostra v. Spain, 20 Eur. Ct. H.R. 277 (1994).

172. Establishing the right amount of time into the future to consider is a hard issue. For an absurd time horizon, see *Nuclear Energy Institute v. EPA*, 373 F.3d 1251, 1270 (D.C. Cir. 2004). This case found that EPA erred in setting a ten thousand year compliance period for the Yucca Mountain high-level nuclear waste site because they were required to follow the advice of a National Academy of Sciences committee which found no basis for a ten thousand year limit! *Id.*

173. *Cf.* Mary Jane Angelo, *Embracing Uncertainty, Complexity, and Change: An Eco-pragmatic Reinvention of a First-Generation Environmental Law*, 33 ECOLOGY L.Q. 105, 201 (2006).

economic information. Procedure should not be an end in and of itself.[174] And decision making must be more than an ad hoc, opened-ended stakeholder process.[175] Environmental problems often do not display a repetition of similar fact patterns, as many other areas of the law do. Decision making must be a rational process, constrained by a set of principles, which ensures that the decisions are responding to our understanding of what makes a problem "environmental."

U.S. environmental law started with this vision, but developed into a formal set of procedures divorced from substance. For example, one of the great tragedies of environmental law is the unfulfilled promise of NEPA.[176] As originally conceived, NEPA was to be a vehicle to inform Congress about the need to reorient federal policies,[177] but it became a litigation tool to force better agency decisions, and the results are mixed at best.[178]

The need to link procedure and substance is an expansion and correction of the more familiar first principle of environmental law based on NEPA: activities with potentially adverse environmental impacts—however defined—should be assessed *before* they are undertaken so that these impacts can be minimized. Assessment was (and should be) a tool to make serious environmental degradation a last resort. But assessment has too often become an end in and of itself rather than a means to obtain the necessary information for informed decision making that advances environmental values.[179] NEPA currently only requires a one-time assessment of a project's environmental impacts.[180] Given the inevitable uncertainty in environmental decision making, any assessment duties must continue

174. *See* Svitlana Kravchenko, *Procedural Rights as a Crucial Tool to Combat Climate Change*, 38 GA. J. INT'L & COMP. L. 613 (2010).

175. *See* Richard B. Stewart, *Administrative Law in the Twenty-First Century*, 78 N.Y.U. L. REV. 437, 460 (2002).

176. *See generally* Oliver A. Houck, *How'd We Get Divorced? The Curious Case of the Separation of NEPA and Planning*, 39 Envtl. L. Rep. (Envtl. Law Inst.) 10,645 (July 2009).

177. *See* RICHARD A. LIROFF, A NATIONAL POLICY FOR THE ENVIRONMENT: NEPA AND ITS AFTERMATH 32 (1976) (speculating that no detailed legislative record on the judicial scope of the environmental impact assessment process exists because Senator Henry Jackson, the Senate sponsor, viewed the statute as an internal agency management tool).

178. For a cautiously optimistic assessment, see Daniel R. Mandelker, *The National Environmental Policy Act: A Review of Its Experience and Problems*, 32 WASH. U. J.L. & POL'Y 293 (2010).

179. Professor Caldwell has repeatedly pointed out that the action NEPA was intended to force was not the EIS but the substantive values of section 101. *See* A. Dan Tarlock, *supra* note 79, at 78, 87–88.

180. COUNCIL ON ENVTL. QUALITY, A CITIZEN'S GUIDE TO THE NEPA: HAVING YOUR VOICE HEARD 8 (2007).

during all phases of an activity.[181] For example, as discussed in the next proposed principle,[182] monitoring and adaptive management would be required for activities that will last over a long period of time so that new, unanticipated threats may be effectively addressed.[183]

The best illustration of the possible linkage between substance and procedure is the International Court of Justice's (ICJ) decision in *Case Concerning Pulp Mills on the River Uruguay* (*Argentina v. Uruguay*).[184] Upstream Uruguay authorized a pulp paper mill on the River Uruguay, and downstream Argentina argued that the discharges would degrade the turgid river. On the merits, the Court agreed with Uruguay that the plant was using Best Available Technology and, inter alia, that the phosphorus load contributed by the plant is "insignificant in proportionate terms as compared to the overall total phosphorus in the river from other sources."[185] However, the Court found that Uruguay failed to fulfill a treaty obligation and customary legal duty to notify a bi-lateral treaty organization—an independent international body with legal personality—charged with managing and protecting the river. This was not a bare, technical, procedural obligation, but a linked procedural and substantive one. Specifically, the Court rejected Argentina's argument that a breach of a procedural obligation automatically entails the breach of a substantive obligation but agreed that there is a "functional link, in regard to prevention, between the two categories of obligations."[186]

Uruguay's fundamental breach of the treaty and customary international law was that it informed the river treaty body after completing and issuing the initial environmental authorization for the mill.[187] The opinion stressed that notification sets in motion a response procedure, which ultimately allows the notified party to object to the work and may trigger a duty to avoid damage.

Although there was a procedural violation, the treaty did not prevent Uruguay from going ahead with construction, and dismantling the mill would not be an appropriate remedy for a procedural violation. However, the late, casual notice violated Uruguay's duty to prevent damage.[188] The late notice made it impossible for the organization to function as a forum

181. This idea has been fully articulated by Bradley C. Karkkainen, *Toward a Smarter NEPA: Monitoring and Managing Government's Environmental Performance*, 102 COLUM. L. REV. 903 (2002).

182. *See infra* Part IV.B.

183. *See infra* notes 207–210 and accompanying text.

184. Pulp Mills on the River Uruguay (Arg. v. Uru.), 2010 I.C.J. No. 135 (Apr. 20).

185. *Id*. ¶ 247.

186. *Id*. ¶ 77–79.

187. *Id*. ¶ 106–07.

188. *Id*. ¶ 101.

for Argentina's objections and to provide for the adoption of a range of mitigation measures and monitoring. As the Court explained, states have a duty not to knowingly allow their territory to be used in ways that damage the environment of another state.[189] "[T]he obligation to inform [the treaty organization] . . . allows for the initiation of co-operation between Parties which is necessary to fulfill the obligation of prevention."[190] Further, Uruguay violated the duty to conduct good faith, meaningful negotiations. As a result of the ICJ's decision, Argentina and Uruguay ended over a decade of trash talking among leading aquatic ecosystem specialists in the two countries and agreed to a joint monitoring program.[191]

B. Incomplete Information Must Be a Basis for Regulation of Risk, Provided a Minimal Scientific Threshold of Risk is Established, Processes Are in Place to Acquire Additional Information, and the Decision Maker Has Authority to Adjust the Regulation to Changed Circumstances

This cumbersome principle is an effort to develop a "rational," adaptive precautionary principle that addresses the main United States objections to the precautionary principle.[192] The four most common versions of the precautionary principle are:

1. Non-Preclusion: regulation is not precluded by scientific uncertainty about the nature of a harm.
2. Margin of Safety: activities should be limited to a level below that at which adverse effects occur.
3. Best Available Technology (BAT): BAT should be applied in cases of uncertainty rather than risk standards.

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189. Legality of the Threat of Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. 226, ¶ 29 (July 8); Corfu Channel (U.K. v. Alb.), Merits Judgment, 1949 I.C.J. 4, 22 (Apr. 9).

190. Pulp Mills on the River Uruguay (Arg. v. Uru.), 2010 I.C.J No. 135, ¶ 102 (Apr. 20).

191. *Countries Agree to Monitor Shared River*, UNITED PRINT INT'L (Aug. 17, 2010, 8:05 PM), http://www.upi.com/science_news/2010/08/17/countries-agree-to-monitor-shared-river/UPI-94231282089916/.

192. For a history of the idea, see generally David Freestone, *The Precautionary Principle*, *in* INTERNATIONAL LAW AND GLOBAL CLIMATE CHANGE 21–39 (Robin Churchill & David Freeman eds., 1991). Many situate the principle's origin in Germany's 1983 decision that it need not wait until harm had been proven before North Sea protection measures could be instituted. HARALD HOHMANN, PRECAUTIONARY LEGAL DUTIES AND PRINCIPLES OF MODERN INTERNATIONAL ENVIRONMENTAL LAW 333–34 (1994).

4. Prohibitory Precaution: proponents of an activity or product have the burden of showing that, despite uncertainty, the activity poses no appreciable risk of harm.

The first iteration is the most common. It tracks authoritative statements, such as Principle 15 of the 1992 Rio Declaration[193] and statements in the European Union Treaty of Lisbon,[194] that are regarded as significant recognitions that the precautionary principle is now customary international law.[195] All formulations of the precautionary principle attempt to balance between (1) the due process-based, common law background rule that mechanistic proof that an activity will cause demonstrable harm is a universal predicate for health and ecosystem protection, and (2) the ability to regulate in the absence of this proof. It is hardly a novel concept. It is well established in U.S. environmental law that a high degree of certainty about the adverse impacts of a substance or activity is not necessary to regulate.[196] The Constitution does not require mechanistic proof of cause-in-fact because a lesser standard of proof is appropriate for public health-based regulation. Risk-based liability can be justified as a form of tax imposed on those who directly profit from harmful activities, and which is fairly spread over larger segments of the population.[197]

Once environmental decisions are characterized as informed judgments under conditions of uncertainty, and risk is accepted as a basis for regulation, many anti-precautionary principle arguments lose their force.

193. United Nations Conference on Environment and Development, Rio de Janiero, Braz., June 3–14, 1992, *Rio Declaration on Environment and Development*, princ. 15, U.N. Doc. A/CONF.151/26 (Vol. 1) (Aug. 12, 1992) [hereinafter *Rio Declaration*] ("Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.").

194. Consolidated Version of the Treaty on the Functioning of the European Union art. 191, May 9, 2008 O.J. (C 115) 47.

195. PHILLIPPE SANDS, PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW 279 (2d ed. 2003).

196. The legal literature is immense. *E.g.*, John S. Applegate, *The Taming of the Precautionary Principle*, 27 WM. & MARY ENVTL. L. & POL'Y REV. 13, 13 (2002); Frank B. Cross, *Paradoxical Perils of the Precautionary Principle*, 53 WASH. & LEE L. REV. 851 (1996); Douglas A. Kysar, *Climate Change, Cultural Transformation, and Comprehensive Rationality*, 31 B.C. ENVTL. AFF. L. REV. 555, 565 (2004).

197. The compensation of coal miners who were the victims of black lung disease illustrates the link between due process and common law standards of liability. *Usery v. Turner-Elkhorn Mining Co.* upheld the Black Lung Benefits Act of 1972, which required companies to compensate miners who were no longer employed by the industry, because the Act was "a rational measure to spread the costs of disabilities to those who profited from the fruits of their labor." 428 U.S. 1, 18 (1976). *Eastern Enterprises v. Apfel* upheld the application of the Coal Industry Health Benefit Act to a company that had ceased operations, but the majority opinion suggested that due process might prevent applying retroactive liability to parties who could not have anticipated such liability that was disproportionate to their contribution to the problem. E. Enters. v. Apfel, 524 U.S. 498 (1994).

However, the precautionary principle remains too open ended and subject to abuse and demonization. For example, John D. Graham, an official at the U.S. Office of Management and Budget during the George W. Bush administration, stated that in the United States "[w]e consider [the precautionary principle] to be a mythical concept, perhaps like a unicorn."[198] Current articulations of precaution must be bounded by science and economic rationality. My formulation thus rejects the argument (sometimes asserted by the European Union in World Trade Organization disputes) that there can be cultural, in addition to scientific, bases for invoking the principle.[199] It rejects invoking the precautionary principle to substitute naked fear, or distaste for a production activity, for some attempt to assess the probability and magnitude of the risk. There must, as the European Court of Justice has held, be a significant risk threshold before the principle can be invoked.[200] My formulation also rejects the argument, invoked by the United States in trade disputes, that the WTO Agreement on the Application of Sanitary and Phytosanitary Measures limits a country's right to set special controls on food products to those demonstrably "based on scientific principles" (i.e., that a product such as a genetically modified organism

198. Samuel Loewenberg, *Precaution is for Europeans*, N.Y. TIMES, May 18, 2003, at WK14, *available at* http://www.nytimes.com/2003/05/18/weekinreview/precaution-is-for-europeans.html. The leading academic critique of the principle is CASS SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE (2005).

199. In the *Beef Hormones Case*, the WTO Appellate Body held that the European Commission could not ban beef products with synthetic hormones because "the scientific conclusions implicit in the EC measures do not conform with any of the scientific conclusions reached in the scientific studies the European Commission has submitted as evidence." Appellate Body Report, *European Communities—Measures Concerning Meat and Meat Products*, WT/DS48/AB/R (Jan. 16, 1998) (*adopted* Feb. 13, 1998). *Beef Hormones* was followed by Appellate Body Report, *Japan—Measures Affecting the Importation of Apples*, WT/DS245/8 (Dec. 16, 2003) (pest risk analysis was an insufficient commodity risk assessment). Then the European Community had a stronger scientific case when France banned the import and export of products containing asbestos fibers. The Panel upheld the ban because the Canadian product at issue posed a health risk. There was no way to use the product to avoid serious risk exposure. Panel Report, *European Communities—Measures Affecting Asbestos Containing Products*, WT/DS135/R (Sept. 18, 2000). The WTO refused to adopt the principle as customary law in the GMO WTO Panel report. Panel Report, *European Community—Measures Affecting the Approval and Marketing of Biotech Products*, WT/DS291/R, WT/DS292/R and WT/DS293/R (Sept. 16, 2007). The European Union argued that the Cartagena Protocol on Biosafety, Jan. 29, 2000, 31 I.L.M. 1257, recognized the principle in Article 1, but the WTO Panel ruled that it need not adopt the principle because not all countries had adopted the Protocol.

200. Case C-333/08, Comm'n v. France, 2010 EUR Lex 62008CJ0333 (Jan. 28, 2010), http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:62008CJ0333:EN:HTML; *see also* CASS SUNSTEIN, WORST-CASE SCENARIOS (2007). Sunstein combines the idea of a threshold for catastrophic risk with cost-benefit analysis. *Id.* at 167–68. I do not accept this proposed threshold limitation, but agree with the idea of bounds and his use of precaution to avoid irreversible harm. *Id.* at 177.

must be scientifically shown to be harmful before it may be restricted).[201] My formulation rejects the dichotomies between precaution and risk and assessment and management.

The crucial issues for any version of precaution are the burden of proof and adaptability. Proponents of the precautionary principle have argued that opponents of regulation should bear the burden of rebutting the exercise of the principle.[202] However, given the risk that the precautionary principle could choke off a wide range of considerations, such as risk tradeoffs, it seems more sensible to place the initial burden of justification on the government body that invokes it. This would ensure that alternative methods of minimizing the risk of injury, such as compensation, have been adequately explored and that the principle is reserved for the most serious and largely irreversible risks.

In addition, the idea that a decision to use the precautionary principle is permanent should be excised. The precautionary principle needs to be linked to the idea of adaptive management.[203] The existence of monitoring and adaptive feedback mechanisms should be a major factor in validating the decision to limit an activity when the adverse impacts are uncertain.[204]

The central objective of environmental decision making is to reduce inevitable uncertainty through the constant generation and application of new knowledge. This view builds on an idea advanced by Judge Hans Linde of the Oregon Supreme Court that courts should impose a right to due process of law making,[205] and on elements of the newer theory of reflexive environmental law.[206] Both these theories, in my opinion, stress the need

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201. Agreement on the Application of Sanitary and Phytosanitary Measures, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex lA, 1867 U.N.T.S. 493, *available at* http://www.wto.org/English/tratop_e/spsagr_e.htm.

202. The argument for placing the burden of proof on the proponent of a risky activity is summarized by Jonathan B. Wiener, *Precaution*, *in* THE OXFORD HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW, *supra* note 164, at 597, 606–07.

203. *See infra* notes 207–210 and accompanying text.

204. *Cf.* Lisa Heinzerling, *Climate Change, Human Health, and the Post-Cautionary Principle*, 96 GEO. L.J. 445 (2008) (suggesting that we have moved past any period of scientific uncertainty in regard to climate change, thereby missing our chance to discuss climate change in terms of the precautionary principle).

205. Hans A. Linde, *Due Process of Law Making*, 55 NEB. L. REV. 197 (1976). Traditional due process guarantees the right to the observance of constitutional and statutory procedures. Judge Linde's theory seeks to guarantee the subjects of legislation a right to a rational deliberative process that includes the articulation of "some agreement on a desired goal," and the obligation of "legislators to inform themselves in some fashion on existing conditions on which the proposed law would operate, and about the likelihood that the proposal would in fact further the intended purpose." *Id.* at 223.

206. Gunther Teubner's theory of reflexive law is based on the development of a post-modern legal theory premised on a constantly evolving knowledge base and multiple-participant problem solving. Reflexive law is proposed as a remedy for the inability of substantive, or as Americans would say, instrumental, law principles to cope with new,

for processes that address social problems rationally *and* provide procedures for the periodic review of regulations in light of new knowledge. Environmental decisions should be made through science-based processes that use the various candidate principles of law that have emerged in the past four decades as rebuttable presumptions, rather than as hard decision rules. Because environmental law and policy are fundamentally science-based, they are inherently dynamic. It has been just over forty years since governments began to focus on the threats that unrestrained resource use pose to the conditions necessary for human welfare. We are at the early stages of learning how to manage our use of the planet's natural functions and services; thus it is impossible to adopt fixed rules.

The current instrument of choice for keeping up with the dynamism of scientific knowledge is adaptive management. Adaptive management was developed in the late 1970s as a critique of static or deterministic environmental assessment. The basic argument was that "a fixed review of an independently designed policy" was inconsistent with the experience of resource managers worldwide and with what has come to be called non-equilibrium ecology.[207]

In short, dynamism and a constrained precautionary principle must be introduced into decision making.[208] The most serious defect in existing decision processes is the absence of a feedback loop to trigger re-evaluation of an initial decision. The need for rigorous, but flexible, procedures to make decisions under conditions of uncertainty has a long intellectual pedigree, including decision theory.[209] Many resource decisions always had an experimental component and included monitoring procedures, but few contained mechanisms to adapt regimes to new information and system changes. Adaptive management acknowledges the need to act in the face of scientific uncertainty, while also realizing that the uncertainty must be narrowed over time and that management decisions can no longer be presumed to be final. Management institutions must have the capacity to modify earlier actions as new information about environmental and other

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complex social problems. *See* Gunther Teubner, *Substantive and Reflexive Elements in Modern Law*, 17 LAW & SOC'Y REV. 239 (1983). For possible applications to environmental law, see Sanford E. Gaines, *Reflexive Law as a Legal Paradigm for Sustainable Development*, 10 BUFF. ENVTL. L.J. 1 (2003) and Eric Orts, *Reflexive Environmental Law*, 89 NW. U. L. REV. 1227 (1995).

207. ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT 136 (C.S. Holling ed., 1978).

208. For a concise explication of adaptive management, see HOLLY DOREMUS ET AL., CTR. FOR PROGRESSIVE REFORM, MAKING GOOD USE OF ADAPTIVE MANAGEMENT (2011).

209. Adaptive management owes much to the pioneering work of Howard Raiffa on how to make rational decisions in the face of incomplete and changing information. *See* HOWARD RAIFFA, DECISION ANALYSIS: INTRODUCTORY LECTURES ON CHOICES UNDER UNCERTAINTY (1968).

impacts is collected and understood. Regulation and resource management should increase or decrease as we learn from experience.[210]

C. Decisions Should Exhibit Planetary Stewardship by: (1) Applying the Best Available Technology, (2) Applying the Polluter Pays Principle, (3) Promoting an Accepted Standard of Sustainable Development, (4) Adopting the Least Intrusive Resource Use Option with Adaptive Feedback, and (5) Restoring Degraded Ecosystems

This principle is an extension of the foundational principle of international law that no state shall allow its territory to be used in a way that harms another state.[211] It extends this negative duty to the affirmative duty of stewardship.

Stewardship is a widely-invoked principle.[212] There is an emerging global consensus that we must replace the Greco-Judeo-Christian conception of Man as despot over nature[213] with the principle that we are stewards of the earth.[214] Gilbert White has written:

> People around the world in the 1990s are perceiving the earth as more than a globe to be surveyed, or developed for the public good in the short term, or to be protected from threats to its well-being both human and natural. It is all of these to some degree, but has additional dimensions. People in many cultures accept its scientific description as a matter of belief. They recognize a commitment to care for it in perpetuity. They accept reluctantly the obligation to come to terms with problems posed by growth in numbers and appetites. This is not simply an analysis of economic and social consequences of political policies toward environmental matters. The roots are a growing solemn sense of the individual as part of one human family for whom the earth is its spiritual home.[215]

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210. *See* J.B. Ruhl & Robert L. Fischman, *Adaptive Management in the Courts*, 95 MINN. L. REV. 424 (2010) (illustrating the current use of adaptive management by administrative agencies and the courts).

211. Trail Smelter Arbitration (U.S. v. Can.), Trail Smelter Arbitral Trib. (1941), *reprinted in* 35 AM. J. INT'L L. 684 (1941).

212. *E.g.*, William W. Buzbee, *Preemption Hard Look Review, Regulatory Interaction, and the Quest for Stewardship and Intergenerational Equity*, 99 GEO. WASH. L. REV. 1521 (2009).

213. John Passmore remains the leading exponent of this position. PASSMORE, *supra* note 4. One can find support in the Old Testament for a new approach, but the idea must ultimately rest on an evolved understanding of the potential of humans to mess up the planet.

214. See ROBIN ATTFIELD, THE ETHICS OF ENVIRONMENTAL CONCERN (2d ed. 1991) for a forceful exposition of this provocative thesis.

215. White, *supra* note 14, at 9.

The problem is in the principle's application. As with all overarching principles, it is difficult to translate into enforceable judicial standards.

The experience with sustainable development is instructive. Sustainable development is an important component of stewardship, encompassing the three potentially inconsistent standards of economic growth, environmental stewardship, and social justice. Lawyers have tried to apply this widely accepted norm,[216] but so far they have been stymied by its incoherence.[217] An influential concurring opinion in an ICJ case embraced sustainable development as an international norm,[218] but U.S. courts have not done the same. For example, a federal district court refused to hold that the discharge of mining wastes in Papua New Guinea violated the international duty to practice sustainable development. The claim was not actionable under the Alien Tort Claims Act[219] because the sustainable development principle lacked the requisite definition and obligatory nature, and violations of the principle lacked the three essential requirements of the Act: a universal definition, a recognition by states that the duty to follow the principle is obligatory, and state condemnations of violations.[220] In domestic litigation, courts have occasionally upheld land use sustainability initiatives, although usually on more traditional grounds.[221] Rather than trying to develop a unitary definition of sustainable development, it might be better to let it emerge incrementally as an element of the broader principle of stewardship.

Because the concept of stewardship is contested, not well-articulated, and evolving, I opt for an analogy to LEED-certified buildings. There is no single formula for Leadership in Energy and Environmental Design (LEED) certification; rather the developer can choose among a variety of

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216. International environmental lawyers argue that sustainability or sustainable development is a norm rather than a rule. Its function is to guide all forms of policy formulation. For a sustained defense of this argument, see KLAUS BOSSELMAN, THE PRINCIPLE OF SUSTAINABILITY: TRANSFORMING LAW AND GOVERNANCE (2008).

217. For early, somewhat optimistic, attempts to do so, see J.B. Ruhl, *Sustainable Development: A Five-Dimensional Algorithm for Environmental Law*, 18 STAN. ENVTL. L.J. 31 (1999) and David R. Hodas, *The Role of Law in Defining Sustainable Development: NEPA Reconsidered*, 3 WIDENER L. SYMP. J. 1 (1998).

218. Case Concerning the Gabčíkovo-Nagymaros Project (Hung./ Slovk.), 1997 I.C.J. 92, ¶ 140 (Sept. 25) ("Owing to new scientific insights and to a growing awareness of the risks for mankind—and for present and future generations—of pursuit of such [environmental] interventions . . . , new norms and standards have been developed . . . .").

219. 28 U.S.C. § 1350 (2006).

220. Sarei v. Rio Tinto PLC, 221 F. Supp. 2d 1116, 1156–61 (C.D. Cal. 2002); *accord* Flores v. S. Peru Copper Corp., 414 F.3d 233 (2d Cir. 2003).

221. *E.g.*, Greenwood v. Mayor of Hopewell, Nos. L-3594-01 & L-3597-01, 2008 WL 3462431, at *1 (N.J. Super. Ct. App. Div., Aug. 14, 2008) (upholding a zoning ordinance requiring minimum lot sizes in part because the requirement protected aquifer recharge areas and the maintenance of sufficient water supplies was considered a legitimate goal).

performance standards.[222] Similarly, all of the elements of my proposed principle are necessary to implement the core idea of respect and caring for our natural world.

For example, the "polluter pays" principle is powerful and widely accepted because it both attempts to prevent pollution and to ensure that victims of pollution are compensated.[223] The principle works best when there is a clear causal relationship between an emitter and damage, and where the emitter can pass the costs of prevention on to consumers of its product. However, as the 2010 Gulf Oil Spill illustrates, existing legal regimes often fall short of both preventing pollution and fully compensating the human victims, as well as addressing the ecosystem losses, from a serious contamination episode.[224] As we move to address global climate change, it is harder to apply the "polluter pays" principle to individual consumer and lifestyle choices.[225] For this reason, other legal strategies, such as the restoration of degraded ecosystems and the least intrusive disruption principle, backstopped by adaptive management, must complement "polluter pays."

Restoration is a component of "polluter pays,"[226] but the idea extends to the restoration of ecosystems where no polluter can be identified or is capable of financing the restoration. Least intrusive disruption[227] and

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222. ROBERT H. FREILICH ET AL., FROM SPRAWL TO SUSTAINABILITY: SMART GROWTH, NEW URBANISM, GREEN DEVELOPMENT, AND RENEWABLE ENERGY ch. 6 (2010).

223. *Rio Declaration*, *supra* note 193, at princ. 16 (enshrining the "polluter pays" principle); *see also* Sanford E. Gaines, *The Polluter Pays Principle: From Economic Equity to Environmental Ethos*, 26 TEX. INT'L L.J. 463 (1991) (tracing the evolution of the principle).

224. *E.g.*, David M. Driesen & Amy Sindin, *The Missing Instrument: Dirty Input Limits*, 33 HARV. ENVTL. L. REV. 65, 66 (2009) (suggesting that pollution prevention is overly focused on limiting production outputs rather than inputs).

225. Michael P. Vandenbergh & Anne C. Steinemann, *The Carbon Neutral Individual*, 82 N.Y.U. L. REV. 1673, 1703–04 (2007).

226. The Israel Ministry of Tourism has applied the principle to require the Dead Sea Works, whose chemical sludge deposits are raising the bed of the shrinking Dead Sea, to dredge the sludge to keep hotels from being inundated. Editorial, *Keeping the Dead Sea Alive*, JERUSALEM POST (May 25, 2011, 23:18), http://www.jpost.com/Opinion/Editorials/Article.aspx?id=222227. The Dead Sea's shrinkage is the product of upstream diversions by Israel, Jordan, and the Palestinian Authority as well as evaporation from salt ponds in the sea. The "polluter pays" principle has been invoked by all three countries in efforts to fund a regional restoration. *See* Clive Lipchin, *A Future for the Dead Sea Basin: Water Culture Among Israelis, Palestinians and Jordanians* (Fondazione Eni Enrico Mattei, Working Paper No. 115.2006, 2006), *available at* http://ideas.repec.org/p/fem/femwpa/2006.115.html.

227. Robin Kundis Craig proposes a set of principles to adapt to climate change in a non-stationary world. Principle Two, "Eliminate or Reduce Non-Climate Change Stress and Otherwise Promote Resilience," is an example of the least destructive principle. Professor Kundis Craig argues that there is a need to anticipate additional stresses from climate change, and this can be done by (1) reducing air, water and land pollution to the maximum extent possible, (2) converting maximum sustained yield to clearly sustainable yield even under climate change, (3) ending subsidies that promote unsustainable activities, and (4)

adaptive management also fill in gaps left by the limits of the "polluter pays" principle.

We cannot return to the Garden of Eden, but we can perhaps approximate it. A major 1992 report by a National Academy of Sciences Committee, *Restoration of Aquatic Ecosystems*,[228] defines restoration as "the return of an ecosystem to a close approximation of its condition prior to disturbance."[229] This definition distinguishes restoration from other improvements, such as creation, reclamation, and rehabilitation because only restoration is a holistic process rather than an "isolated manipulation of individual elements."[230] The report also distinguishes restoration from mitigation, which it dismisses as "simply the alleviating of any or all detrimental effects arising from a given action," as well as from preservation.[231]

Stewardship is supported by multiple sources.[232] It is grounded in the principle of intergenerational equity articulated by Professor Edith Brown Weiss.[233] Her standard permits resource exploitation subject to the constraint that we leave renewable resources in no worse shape than we found them, or at least preserve a wide range of use options for future generations. As a leading environmental philosopher has noted, "environmentalists will achieve more by appealing to the relatively noncontroversial and intuitive idea that the use of natural resources implies an obligation to protect them for future users—a sustainability theory based on intergenerational equity—rather than exotic appeals to hereto unnoticed inherent values in nature."[234] One of the leading examples of the application of this principle remains the Tasmanian Dam Case.[235] The Australian High Court accepted a

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preserving the maximum possible amount of open space and ecosystem connectivity. Craig, *supra* note 151, at 43–53.

228. NAT'L RESEARCH COUNCIL, RESTORATION OF AQUATIC ECOSYSTEMS (1992).

229. *Id*. at 18.

230. *Id*. at 17.

231. *Id*. at 19–20. Preservation assumes the functions to be conserved are intact and thus do not need to be re-created through restoration.

232. Stewardship will require that artificial environmental baselines be established and maintained over time. This statement masks a long-standing debate in the environmental community between using backward-looking baselines, such as "historic" or pre-human intervention levels, and artificial ones that try and extrapolate from the past, but do not seek a return to some imagined Eden. For an extremely insightful analysis of this debate, which cautions against reliance on "the past embedded in historic baselines," see J.B. Ruhl & James Salzman, *Gaming the System: The Theory and Practice of Historic Baselines in the Administrative State*, 64 VAND. L. REV. 1, 57 (2011).

233. WEISS, *supra* note 167, at 2. I have previously argued that intergenerational equity can lead to a theory of stewardship sovereignty that limits a nation's international resource and public choices. Dan Tarlock, *Ecosystems*, *in* THE OXFORD HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW, *supra* note 164, at 574, 592–94.

234. Bryan G. Norton, *Why I Am Not a Nonanthropocentrist: Callicott and the Future of Monistic Environmentalism*, 17 ENVTL. ETHICS 341, 356 (1995).

235. *Commonwealth v Tasmania* (1983) 46 ALR 625 (Austl.).

World Heritage Convention[236] listing of a rainforest in Tasmania as a restraint on a federal state's internal power to build a dam. The High Court's use of the Convention to allow Australia's constitutionally weak federal government to override a state resource use choice is an explicit recognition that the mission of the Convention is to list "natural and cultural sites whose irreplaceable value should be preserved for future generations."[237]

Stewardship is also supported by economic considerations. The economic dimension emphasizes two strands of neo-welfare economics. The first and more familiar strand adopts the concern for more accurate measures of efficiency.[238] The environmental movement brought the marginal economic concept of external costs to the fore. Too many products and activities are underpriced because their price does not reflect the full or social cost of the product or activity, either because regulations do not force the internalization of all externalities or because there is a partial subsidy.[239] The second strand is the concept of foregone opportunity costs. These are the foregone revenues (or other benefits) from alternative uses of the resource. Economists traditionally have taught that it is rational to prefer present consumption to deferred consumption.[240] Future benefits have been discounted and the opportunity costs, the future value of foregone resource development and use, have been ignored.[241] Efforts to calculate these costs force private and public actors to consider the longer-range economic consequences of decisions and a broader mix of alternative activities. The removal of old dams is just one example of greater attention to opportunity costs. The United States is starting to remove small and medium-sized

236. Convention for the Protection of the World Cultural and Natural Heritage, art. 11(2), Nov. 16, 1972, 1037 U.N.T.S. 151.

237. DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 1129 (4th ed. 2011).

238. *E.g.*, ROBERT COSTANZA ET AL., AN INTRODUCTION TO ECOLOGICAL ECONOMICS 183, 241 (1997).

239. Subsidies can be major barriers to sustainable development because they "have generated heavy economic and environmental costs and create unsustainable dependencies, especially in the agriculture, transportation, and energy sectors." ROBERTO ANDRACA & KEN F. MCCREADY, INTERNALIZING ENVIRONMENTAL COSTS TO PROMOTE ECO-EFFICIENCY 42 (1994).

240. The appropriate rate of discount is one of the most contested issues in the climate change debate. Any attempt to compare future benefits to the rate of interest that can be earned by investing the money instead of investing in climate change mitigation or adaptation could counsel against taking any measures. *See generally* K.J. Arrow et al., *Intertemporal Equity, Discounting and Economic Efficiency*, *in* CLIMATE CHANGE 1995: ECONOMIC AND SOCIAL DIMENSIONS OF CLIMATE CHANGE 127 (James P. Bruce et al. eds., 1996). For an argument that the bias against public action should yield a zero or close to zero discount rate, see NICHOLAS STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW (2007).

241. DAVID PEARCE ET AL., SUSTAINABLE DEVELOPMENT AND ENVIRONMENT IN THE THIRD WORLD 24–25 (1990).

dams that yield smaller hydroelectricity benefits compared to the economic value of a free-flowing river.[242]

CONCLUSION

Principles alone cannot implement an idea as radical and complex as environmental protection. Nor can they can they prevent republican governments from oscillating between protection and marginalization. What a set of substantive principles can do is to shift the burden of justification for actions that increase public health risks or threaten to reduce the resiliency of natural systems from those who oppose them to those who promote them in the name of necessary trade-offs.

The line between procedure and substance is always a hazy one. But, the proposed principles are on the substantive side of the line because they are not neutral. There is no ultimate truth in environmental protection. There are only assumptions, and biases, about the consequences of not acting to prevent degradation. These principles incorporate these assumptions but do not adopt them as absolutes. In short, the principles that I propose are primarily science-based and thus are designed to make it harder for those who wish to marginalize environmental protection to ignore the lessons of science, however ambiguous they may be.[243]

I do not want to return to the state of the law prior to 1969. Environmental interests were either never considered by public and private actors or, at most, were given minimal attention and then pushed aside. The processes adopted in an attempt to reverse this state of affairs were never intended to be ends in themselves. Procedures such as environmental impact assessments were always meant to produce decisions that advance the goals of environmentalism, rather than being mere boxes to be checked before decisions are made that compromise public health and ecosystem resilience and contain no feedback mechanisms for evaluating the decisions over time. The principles I propose can both cement the procedural legacy of environmental law by returning it to its early roots and carry it forward by emphasizing the link between procedure and substance, moving us closer to a substantive, non-positivist U.S. environmental law.

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242. *See* Brian Graber, *Potential Economic Benefits of Small Dam Removal*, *in* DAM REMOVAL RESEARCH: STATUS AND PROSPECTS 56, 56 (William L. Graf ed., 2003). *See generally* 52 BIOSCIENCE 653–748 (2002) (collected articles based on the August 2001 meeting of the Ecological Society of America).

243. The increasing rejection of science, and the expertise that it supports, is a general threat to the ability of the United States to sustain the level of economic and social progress that made it the envy of the world, and a specific threat to the future of environmental protection. *See* Martin Wolf, *The End of History Man*, FIN. TIMES (UK), May 28, 2011, at 3 (interviewing Francis Fukuyama, the author of *The Origins of Political Order*).