

## PACE ENVIRONMENTAL LAW REVIEW

### ARTICLE

#### Environmental Law for the 21st Century

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**Authors' Note on Method:** One of the commenters on a preliminary draft of this article suggested that we have a love-hate relationship with law and economics. Perhaps a better metaphor would be that we are prodigal sons. We both studied under the great Guido Calabresi, one of the founders of Law and Economics. We revere him as a mentor, and we believe that we are applying and extending his work to our field. We both also learned a great deal from professors Bruce A. Ackerman and Susan Rose Ackerman, also our colleagues at Yale, who were among the first to apply law and economics thinking to Environmental Law.<sup>1</sup> Elliott was privileged to co-

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1. See generally BRUCE A. ACKERMAN, SUSAN ROSE-ACKERMAN, JAMES W. SAWYER, JR., & DALE W. HENDERSON, *THE UNCERTAIN SEARCH FOR ENVIRONMENTAL QUALITY* (1974).

teach and write with Bruce early in his career and gratefully acknowledges his influence.<sup>2</sup> However, like prodigal sons, we both left our comfortable home at the Yale Law School and ventured out into Environmental Law as it actually exists in the real world, first at the Environmental Protection Agency (EPA) and then as advisers to both companies and environmental non-governmental organizations (NGOs).<sup>3</sup>

In this article, as well as its predecessor,<sup>4</sup> we have returned to our academic home to exploit our relatively unusual perspective as practitioners, as well as academics, to define what actually works best in environmental law and then to modify the prevailing paradigms of the United States' environmental laws, which are based on traditional law and economics.<sup>5</sup> In short, we try to make what works in practice also work in theory.

In that spirit, the title of our first article in this series, "The End Environmental Externalities Manifesto," has a double meaning. Yes, we find

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2. See, e.g., Bruce A. Ackerman & Donald Elliott, Opinion, *Air Pollution 'Rights,'* N.Y. TIMES (Sept. 11, 1982), at 23, <https://www.nytimes.com/1982/09/11/opinion/airpollution-rights.html> [<https://perma.cc/H6MG-UWWP>].

3. At the EPA, Elliott served as Assistant Administrator and General Counsel, and Esty was Special Assistant to the Administrator, Deputy Chief of Staff, and then Deputy Assistant Administrator for Policy. After the EPA, Esty founded a corporate sustainability consulting firm and headed the Connecticut Department of Energy and Environmental Protection. Elliott went on to head the environmental practice groups at four AmLaw100 law firms while continuing to teach and write as a full time academic. On the NGO side, Esty has served on the boards of Resources for the Future, the Connecticut Fund for the Environment, and the Connecticut Chapter of the Nature Conservancy. Elliott served on the board at the Connecticut Fund for the Environment (now "Save the Sound"), the Environmental Law Institute, and as chair of the advisory board of NYU's Institute for Policy Integrity, which he helped found.

4. E. Donald Elliott & Daniel C. Esty, *The End Environmental Externalities Manifesto: A Rights-Based Foundation for Environmental Law*, 29 N.Y.U. ENV'T L.J. 505 (2021).

5. One of us has called this approach to learning the lessons from what works and trying to replicate successful models "domestic comparative law." E. Donald Elliott, *Rationing Analysis of Job Losses and Gains: An Exercise in Domestic Comparative Law*, in DOES REGULATION KILL JOBS? 256, 256 (Cary Coglianese et al. eds., 2013). This analytic approach adopts an iterative learning process, a method adapted from the common law, in which we apply existing paradigms as a first order approximation but then seek to modify them in the light of experience. See E. Donald Elliott, *Holmes and Evolution: Legal Process as Artificial Intelligence*, 13 J. LEGAL STUD. 113, 143 (1984). We also note that this approach of studying what works and trying to understand and replicate successes is the method used in business schools, perhaps reflecting the influence of W. Edwards Deming who believed in studying and propagating successes. See John Holusha, *W. Edwards Deming, Expert on Business Management, Dies at 93*, N.Y. TIMES (Dec. 21, 1993), <https://www.nytimes.com/1993/12/21/obituaries/w-edwards-deming-expert-on-business-management-dies-at-93.html> [<https://perma.cc/HCA6-4K4L>] (summarizing Deming's life and introducing his ideas). For more on Dr. Deming and his influential legacy, see RAFAEL AGUAYO, DR. DEMING: THE AMERICAN WHO TAUGHT THE JAPANESE ABOUT QUALITY (1990).

the traditional economic concept of externalities a useful way to identify environmental problems, but just as environmental law in practice seeks to eliminate externalities with technology where reasonably possible rather than merely to reflect them in the prices of goods and services, we also wish to end uninternalized externalities through a combination of technological controls and compensation. Where we part company with the traditional economic approach to externalities<sup>6</sup> is that we do not consider merely charging polluters or others harming the environment a price for the harm they cause to be an adequate remedy if it is reasonably possible to instead stop them from causing preventable diseases or eliminating other harms altogether. In that second sense, we wish to end externalities as the be-all and end-all concept for thinking about environmental law—or perhaps better said, we wish to supplement the concept of externalities with a prescription to take environmental protection to the next level and eliminate the harms to others including loss of ecosystem services where it is reasonably practical to do so.

We maintain that our caveat that reasonably preventable harm<sup>7</sup> to health and the environment must be abated to the extent practical rather than merely priced into the costs of goods and services, better describes the actual practices of environmental law than a theoretical law and economics construct that stops at internalizing externalities by reflecting them in prices. Those theories are pernicious because they translate in practice into policies that allow polluters to continue to harm the health of others in ways that could be prevented without unreasonable effort—leaving the victims

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6. See, e.g., OFF. OF MGMT. & BUDGET, OMB CIRCULAR A-4, REGULATORY ANALYSIS (2003) (“An externality occurs when one party’s actions impose *uncompensated* benefits or costs on another party.” (emphasis added)); U.S. ENV’T PROT. AGENCY, GUIDELINES FOR PREPARING ECONOMIC ANALYSES app. at A-4 (2010) (“*Externalities* occur when markets do not account for the effect of one individual’s decisions on another individual’s well-being.”). See generally PAUL KRUGMAN & ROBIN WELLS, MICROECONOMICS, ch. 17 at 433–38 (2d ed. 2009). We are particularly grateful to our long-time friend and environmental law colleague Richard (Ricky) Revesz, Dean Emeritus of NYU Law School, now serving as the Administrator of the Office of Information and Regulatory Affairs in the Biden White House, for helping us to clarify how our views differ from those embodied in traditional law and economics.

7. We acknowledge that what is “reasonably preventable” as opposed to impractical or technologically or economically infeasible needs to be fleshed out through practical experience in a variety of situations. A good starting point is the ALARA concept, which is an acronym for “As Low As is Reasonably Achievable.” See 10 C.F.R. § 20.1003 (2022) (“ALARA . . . means making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.”).

both damaged and uncompensated. In that sense, W. Kip Viscusi is correct in his article in this symposium which takes us to task for not having a balanced view.<sup>8</sup> We plead guilty to not thinking that the right to continue harming others is a “good” to be traded in the marketplace any more than the right to break into someone’s home or to steal their car is a “good” that can be taken without consent.<sup>9</sup>

Some members of the law and economics movement have recognized this distinction for a long time. The difference between property rules, which give someone a right to something, and liability rules, which merely require financial compensation, but allow others to take the something away at will, is, for example, the theme of Calabresi’s often cited 1972 article with Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*,<sup>10</sup> one of his greatest contributions. We acknowledge the influence of that seminal article in footnote two of our original article in this series.<sup>11</sup> However, prevailing theories of environmental law based on law and economics often do not even go so far as to give victims of pollution or other environmental harms the protection of a liability rule, as in practice it is exceedingly difficult to win compensation in court for a harm that is permitted to continue with regulatory approval.<sup>12</sup>

The traditional prescription of law and economics to internalize externalities merely by reflecting them in price is not an accurate description of how US environmental law actually works. Prior to the enactment of the Clean Air Act (CAA) in 1970, the Nixon administration

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8. W. Kip Viscusi, *A Balanced Prescription for More Effective Environmental Regulations*, 40 PACE ENV’T L. REV. 475 (2022).

9. David D. Doniger, *Federal Regulation of Vinyl Chloride: A Short Course in the Law and Policy of Toxic Substances Control*, 7 ECOLOGY L.Q. 497, 521 (1978) (“[R]egulatory decisions involve moral as well as economic values. We may begin with the observation that the sacrifice of an individual for the benefit of a group is acceptable if the benefit served is the group’s survival or the fulfillment of some other basic need. The sacrifice is morally unacceptable, however, if it is for no more important benefit than the provision of the luxuries of our consuming society. That some must die so that all can eat is one thing; that some must die so that all can have see-through food packaging is another.”).

10. Guido Calabresi & A. Douglas Melamed, *Property Rules, Liability Rules, and Inalienability: One View of the Cathedral*, 85 HARV. L. REV. 1089 *passim* (1972).

11. Elliott & Esty, *supra* note 4, at 506 n.2.

12. See generally Alicia F. Curtis, *Proving Negligence in the Face of a Defendant’s Compliance with Government Regulations or Industry Standards*, BERMAN & SIMMONS: L. ARTICLES, <https://www.bermansimmons.com/law-articles/proving-negligence-face-defendants-compliance-government-regulations-or-industry/> [https://perma.cc/9PD2-FHVK] (“Jury research shows that jurors place significant weight on such evidence [of compliance with regulatory requirements].”).

proposed a tax on sulfur oxides,<sup>13</sup> which would have been a step toward internalizing the costs by reflecting them in prices. Congress declined to enact the proposed tax and opted for technological controls instead.<sup>14</sup> Similarly, as we argue in the article that follows, recent trends since the mid-1980's have rejected the use of benefit-cost analysis to limit the extent of technological controls where reasonably preventable diseases and other harms to health are at issue. Examples are the 1990 amendments to the air toxics provisions of the CAA,<sup>15</sup> the Resource Conservation and Recovery Act amendments in 1984,<sup>16</sup> the Food Quality Protection Act in 1996,<sup>17</sup> and the 2016 Lautenberg Act amending Toxic Substance Control Act (TSCA).<sup>18</sup> All of these recent amendments squarely rejected the policy prescription that is smuggled into some definitions of externalities<sup>19</sup> that an externality is eliminated when the costs of harms to others are reflected in the price of goods and services. It is past time for academic theory in environmental law to catch up with actual practice, and that is what we try to describe in this article.

We began our journey to move the prevailing theory in environmental law beyond merely internalizing the costs of externalities in the prices of goods and services in a 1990 lecture by Elliott in which he questioned whether merely internalizing the cost of harms on an industry would actually change its behavior, as opposed to merely passing the costs on to consumers.<sup>20</sup> Our apostasy reached full flower in a chapter in our jointly authored summary of US environmental law entitled "OPA90: [W]hy economic incentives only work sometimes."<sup>21</sup> In that chapter, we reflect on

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13. E. W. Kenworthy, *Nixon to Seek Tax on Sulphur Oxides Emitted by Industry*, N.Y. TIMES (Feb. 9, 1972), <https://www.nytimes.com/1972/02/09/archives/nixon-to-seek-tax-on-sulphur-oxides-emitted-by-industry-nixon-to.html> [<https://perma.cc/838A-5YBN>].

14. See Dallas Burtraw, *Innovations Under the Tradable Sulphur Dioxide Emission Permits Program in the US Electricity Sector*, OECD WORKSHOP ON INNOVATION AND THE ENV'T 3-4 (2000), <https://www.oecd.org/innovation/inno/2105265.pdf> [<https://perma.cc/7NX9-Q7CQ>].

15. 42 U.S.C. § 7401-7671q (originally enacted as the Clean Air Act, 69 Stat. 322 (1963)).

16. 42 U.S.C. § 6901-6992 (originally enacted as Resource Conservation and Recovery Act of 1976, 90 Stat. 2795 (1976)).

17. Food Quality Protection Act of 1996, Pub. L. No. 104-170, 110 Stat. 1489 (codified as amended in scattered sections of 7 U.S.C.).

18. Frank R. Lautenberg Chemical Safety for the 21st Century Act, Pub. L. No. 114-182, 130 Stat. 448 (amending Toxic Substances Control Act, 15 U.S.C. § 2601-2629 (1976)).

19. Elliot & Esty, *supra* note 4, at 526.

20. See E. Donald Elliott, *Re-Inventing Defenses/Enforcing Standards: The Next Stage of the Tort Revolution?*, 43 RUTGERS L. REV. 1069, 1071-72, 1075 (1991).

21. See E. Donald Elliott & Daniel C. Esty, *OPA90: Economic Incentives Only Work Sometimes*, in *ADVANCED INTRODUCTION TO U.S. ENVIRONMENTAL LAW* 128-37 (Edward Elgar Publ'g ed., 2021).

the puzzle of the Oil Pollution Act of 1990 (OPA90),<sup>22</sup> a statute that Elliott helped to write while at the EPA based on what he had learned from Calabresi and the Ackermans. OPA90 created multi-billion dollar economic incentives to prevent oil spills, as we explain in that chapter.<sup>23</sup> It was indeed successful at reducing the number of oil spills by 60 percent, but nonetheless, the *Deepwater Horizon* spill, the largest oil spill in American history, occurred for reasons that we try to unravel in that chapter.<sup>24</sup>

Nonetheless, we are both still true believers in benefit-cost analysis as a useful tool for policymakers.<sup>25</sup> However, we believe that a fine tuning of available technological controls to the exact point where costs match benefits is neither possible nor desirable.<sup>26</sup> Throughout our careers, we have been advocates for a hybrid approach of charging for licenses to pollute, as well as requiring technological controls to the extent reasonably practical. For example, we both contributed to the 1990 Acid Rain Trading program, one of the most successful pollution controls programs in US history.<sup>27</sup> However, it merely added charges on top of existing technological controls but did not purport to replace them.<sup>28</sup> We see the combination of the two as better than either approach alone,<sup>29</sup> and for this reason we do not see merely “internalizing” externalities in price as the ultimate goal of environmental law but rather a useful adjunct to technological controls and a second-best solution where it is not practical to eliminate the harm.

Finally, some of our critics questioned why we privilege environmental harms to health and ecosystems above the economic harms to workers in polluting industries that will result from imposing technological controls whose costs exceed their quantifiable benefits. The answer is straightforward. As we explain at length in our initial article,<sup>30</sup> we believe

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22. *Id.*

23. *Id.* at 131.

24. *Id.* at 132.

25. Elliott served as the liaison between the EPA and the Office of Information and Regulatory Affairs at OMB during his tenure at the EPA, and throughout his career, he has been an advocate for benefit-cost analysis and OIRA review. See, e.g., E. Donald Elliott, *Only a Poor Workman Blames His Tools: On Uses and Abuses of Benefit-Cost Analysis in Regulatory Decision Making About the Environment*, 157 U. PA. L. REV. 178 (2008).

26. See Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and “Fine Tuning” Regulatory Reforms*, 37 STAN. L. REV. 1267, 1271 (1985) (explaining that “fine-tuning,” realistically, and in practice, would prove to be infeasible in addressing these important environmental concerns).

27. See E. Donald Elliott, *A Critical Assessment of the EPA’s Air Program at Fifty and a Suggestion for How It Might Do Even Better*, 70 CASE W. RES. L. REV. 895, 901, 910 (2020).

28. See *id.* at 924.

29. See, e.g., *id.* at 926.

30. Elliott & Esty, *supra* note 4, at 511.

that we all have a natural law right to bodily integrity and to certain ecosystem services.<sup>31</sup> This natural law right to a healthy environment was recognized by Congressional statute in the 1970 National Environmental Policy Act (NEPA).<sup>32</sup> This same policy of protecting health and the environment has been repeatedly reiterated by Congress in subsequent environmental legislation that has repeatedly sought to protect health and the environment where reasonably achievable rather than to maximize aggregate social welfare measured in economic terms. That said, we do believe people and communities are free to trade modest risks to their health and environment for economic benefits, but only with informed consent. With this in mind, our proposed framework calls for risk disclosure as well as compensation and technological controls where practical.

### I. OUR OBJECTIVE

Now is a propitious time to assess environmental law and to make course corrections. We are roughly 50 years into the modern environmental awakening that began around 1970.<sup>33</sup> Those five decades should be regarded as environmental law's experimental phase and it is time, perhaps past time, to evaluate what works and what does not and to advance a reform agenda that aims to refresh and modernize environmental law and regulation. Others share our sense of timing, and the American Law Institute, the Environmental Law Institute, the American University's Center for Environmental Policy, and researchers across the country<sup>34</sup> are all setting about the task of codifying the lessons learned into principles for the environmental law of the future.

The preceding experimental phase of environmental law, during its formative period, coincides with our careers. We bring to the task our perspectives as participants in government, advisers to NGOs and the

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31. What human uses of eco-systems are protected and to what extent is a complex topic that we begin to address below.

32. Elliott & Esty, *supra* note 4, at 511.

33. Some might date the modern environmental movement from the publication of Rachael Carson's *Silent Spring* in 1963; others might point to the publication of Garret Hardin's *The Tragedy of the Commons* in 1968; and others to the signing into law of the Clean Air Act and the National Environmental Policy Act in the United States in 1970, but for our purposes these differences are irrelevant.

34. See, e.g., J.B. Ruhl & James Salzman, *What Happens When the Green New Deal Meets the Old Green Laws?*, 44 VT. L. REV. 693 (2020); Robert V. Percival, *Regulatory Evolution and the Future of Environmental Policy*, 1997 U. CHI. LEGAL F. 159, 160; Benjamin Zycher, *Reforming U.S. Environmental Policy*, LAW & LIBERTY: LIBERTY FUND NETWORK (Oct. 1, 2018), <https://lawliberty.org/forum/reforming-u-s-environmental-policy/> [<https://perma.cc/2HBH-WF2S>].

private sector, as well as academics. Each of us has written separately about some of the lessons to be learned from that experience.<sup>35</sup> Now, working together, and benefitting from the shared wisdom of many colleagues and friends who work in the field, we are trying to outline the principles that should guide the environmental law of the future, not only in the United States but around the world.

The prior article,<sup>36</sup> which is attached as an appendix for ease of reference, preliminarily outlined our shared vision for environmental law for the 21<sup>st</sup> century. It proposes to establish three new, more stringent legal duties of care for those releasing potentially harmful materials or otherwise harming the environment.<sup>37</sup> Some elements of this vision are already implicit in certain aspects of US and European Union environmental law, but we wish to clarify and extend that vision to aspects of environmental law to which our vision does not currently apply. That vision includes:

1. Establishing a new, more stringent legal duty of care for parties releasing harmful materials into the environment (i.e., pollution) to consult the available literature, and if necessary, sponsor original research, to assure the public that the releases are not harmful, and to make public the data upon which they rely for a reasonable assurance of no harm conclusion;
2. To the extent that data are not adequate to conclude that the releases will not be harmful, commercial enterprises, governments and all others that release materials into the environment should have a legal obligation to minimize the harm that they do to others to the extent reasonably practical, including from the psychological harm that results from exposure to uncertain risks that one might reasonably suspect might be harmful; and

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35. See, e.g., E. Donald Elliott, *Environmental Law Lessons from the U.S. Experience*, YOUTUBE (June 27, 2022) [hereinafter Elliot, *Environmental Law Lessons*], <https://www.youtube.com/watch?v=nB3yl3B9FvA> [https://perma.cc/3D7F-YAAC]; Elliott, *supra* note 27, at 896; E. Donald Elliott, *U.S. Environmental Law in Global Perspective: Five Do's and Five Don'ts from Our Experience*, 5 NAT'L TAIWAN U. L. REV. 145 (2010) [hereinafter Elliot, *Global Perspective*]; E. Donald Elliott, *Lessons From Implementing the 1990 CAA Amendments*, 40 ENV'T L. REP. 10592, 10592 (2010); Daniel C. Esty, *Mastering the Labyrinth of Sustainability: Toward a New Foundation for the Market Economy*, 4 LA REVUE EUROPÉENNE DU DROIT 119, 119–21 (2022); Daniel C. Esty, *Red Lights to Green Lights: From 20th Century Environmental Regulation to 21st Century Sustainability*, 47 ENV'T L. 1, 3–4 (2017); Daniel C. Esty, *Regulatory Transformation: Lessons from Connecticut's Department of Energy and Environmental Protection*, 76 PUB. ADMIN. REV. 403(2016); Daniel C. Esty, "Red Lights to Green Lights: Toward an Innovation-Oriented Sustainability Strategy," in A BETTER PLANET: 40 BIG IDEAS FOR A SUSTAINABLE FUTURE 87, 87–89 (Daniel C. Esty, ed.) (2019); David A. Lubin & Daniel C. Esty, *The Sustainability Imperative*, HARVARD BUS. REV., May 2010.

36. See generally Elliot & Esty, *supra* note 4.

37. See *infra* text accompanying note 65.

3. The obligation to pay financial compensation to those subject to residual risks after the application of the maximum technology reasonably practical if it turns out that the no harm conclusion was incorrect, or if some must suffer harm without their informed consent in the interest of benefitting others.

The purpose of this paper is to elaborate on the practical aspects of how such a system would operate, and to respond to concerns that have occurred to us or have been raised by others.

Many of the features describe below already exist to some extent in various systems of environmental law around the world, particularly in the United States and European Union, which we know best. For example, the environmental law that applies to workplaces in the United States embodies elements of all three key building blocks that we identify above.<sup>38</sup> That is as it should be, as we are not trying to invent a visionary scheme out of whole cloth but rather to learn the lessons of what works best and to replicate and extend successes while learning from shortcomings. The present work makes no claim to originality beyond trying to extract the successful features of environmental law and state them parsimoniously as a comprehensive system.

## II. THE OBLIGATION TO INVESTIGATE BEFORE DISCHARGING

It is sometimes said that “a clean heart and an empty head” were historically a defense against legal liability at common law.<sup>39</sup> Regardless of whether that is actually true for particular bodies of law, one of the key purposes of environmental law was to reverse that presumption and to impose on the persons and entities that environmental law regulates an obligation to investigate the potentially harmful effects of materials that they release into the environment. For example, one of the key purposes of

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38. See OSHA General Duty Clause, 29 U.S.C. § 654; see also *Industrial Union Dept., AFL-CIO v. Am. Petroleum Inst.*, 448 U.S. 607, 662 (1980) (remanding the case because the newly introduced OSHA Benzene standard failed to provide sufficient evidence of a “significant” risk to health). This section also requires employers to compensate workers for workplace injuries that occurred despite efforts to prevent them under state or federal workers compensation laws and to disclose the science of the risks remaining under the Hazard Communication Standard. 29 C.F.R. § 1910.1200(h) (2022); see also *Hazard Communication*, OSHA, <https://www.osha.gov/hazcom> [<https://perma.cc/395Q-CXJ3>]. We do not mean to imply that these systems are perfect models, but [rather merely] that all three elements that we advocate for are present in some form in the law of the environment in the workplace.

39. Several federal courts have used the phrase “a clean heart and empty head.” See, e.g., *Studiengesellschaft Kohle m.b.H. v. Dart Indus., Inc.*, 862 F.2d 1564, 1579 (Fed. Cir. 1988) (discussing patent law); *Smith v. Ullman*, 874 F. Supp. 979, 987 (D. Neb. 1994) (discussing prison violence); *American Medical Sys., Inc. v. Medical Engineering Corp.*, 794 F. Supp. 1370, 1397 (E.D. Wis. 1992) (discussing patent law).

TSCA was to impose an obligation of those who manufacture, distribute, or import a chemical substance into the United States to ensure that it was safe and would not harm others.<sup>40</sup> Accordingly, the Senate Report accompanying the original version of TSCA passed in 1976 stated the aspiration to impose on manufacturers of chemicals a duty to test them for safety before putting them on the market:

More than 200,000 infants are born with physical or mental damage each year, a staggering 7 percent of all births. . . . A total of 15 million Americans have birth defects serious enough to drastically affect their daily lives. . . . It is with alarm that our attention is drawn to some aspects of modern technology which work counter-productive to our aims. Each year billions of pounds of chemicals which are virtually untested and unregulated are produced in industrial processes and used in commercial products. Experience with vinylchloride has shown it to be a highly toxic substance which experimentally can cause cancer and birth defects; but this experience came only with its burden of proof on the public. *We look now to preventative testing of toxic substances in industrial production prior to manufacture or distribution as one critical means to reduce exogenous causes of birth defects.* In order to protect against these dangers, the proposed Toxic Substances Control Act would close a number of major regulatory gaps, for while certain statutes . . . may be used to protect health and the environment from chemical substances, none of these statutes *provides the means for discovering adverse effects on health and environment before manufacture of new chemical substances. . . . The most effective and efficient time to prevent unreasonable risks to public health or the environment is prior to first manufacture.*<sup>41</sup>

Unfortunately, however, in accordance with the prevailing popular understanding at the time,<sup>42</sup> Congress assumed incorrectly that existing and naturally-occurring substances were generally safe and focused its attention primarily on “new chemicals.”<sup>43</sup> In addition, broad rights to challenge government regulation in court in the United States create a situation in which, as a practical matter, the government had to develop “extensive factual records” showing that substances are—or at very least might be—hazardous in order to regulate them.<sup>44</sup> One of us has condemned this high

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40. See 15 U.S.C. §§ 2601–97.

41. S. REP. NO. 94-698, at 5 (1976) (emphasis added).

42. See, e.g., RACHEL CARSON, SILENT SPRING (1962) (revealing misconceptions of the time).

43. See Ortwin Renn & E. Donald Elliott, *Precautionary Regulation of Chemicals in the US and EU*, in THE REALITY OF PRECAUTION: COMPARING RISK REGULATION IN THE UNITED STATES AND EUROPE 223, 230 (Jonathan B. Wiener et al. eds., 2011).

44. See Gail Charnley & E. Donald Elliott, *Risk Versus Precaution: Environmental Law and Public Health Protection*, 32 ENV'T. L. REP. 10363, 10363 (2002).

burden of scientific research and justification on regulators as one of the five worst things about US environmental law.<sup>45</sup> In addition, the current law in the US regarding pre-manufacture testing creates perverse incentives for industry and other emitters *not* to find out whether substances are hazardous until years later when they are hit with toxic tort suits by exposed people.<sup>46</sup> As a practical matter, we allow human experimentation without informed consent by allowing polluters to expose people to potentially hazardous substances that have not been studied adequately.

By contrast, the EU pioneered the precautionary principle.<sup>47</sup> Many countries outside the EU have also adopted the precautionary principle. For example, in Peru, the precautionary principle is codified in the Statute of the National System of Environmental Management.<sup>48</sup> However, for practical reasons, these lofty goals are sometimes less than fully successful in practice.<sup>49</sup> Indeed, a few perceptive critics have argued that the precautionary principle has been transformed in some circumstances into a regulatory bias in favor of the status quo.<sup>50</sup>

#### A. Who should bear the obligation to test materials before releasing

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45. Elliot, *Global Perspective*, *supra* note 35, at 160; *see also* Elliott, *Environmental Law Lessons*, *supra* note 35.

46. Traditional law and economics might predict that the incentives created by toxic tort liability would cause manufacturers to test materials before putting them on the market, but as we have discussed elsewhere, economic incentives only work sometimes largely because of the difficulties that human beings have in understanding complex systems and predicting the future. *See* ELLIOTT & ESTY, *supra* note 21.

47. *See generally* *Communication from the Commission on the Precautionary Principle*, COM (2000) 1 final (Feb. 2, 2000).

48. Ley Marco del Sistema Nacional de Gestión Ambiental [LMSNGA], No. 28245, Congreso de la Republica [CR] 08-06-2004 (Peru). Under Title II, Article 5(k) the principles for environmental management are delineated as follows: Environmental management in the country is conducted in accordance to the following principles: . . . Application of precautionary criteria, when there are reasonable indicators of threats of serious or irreversible damages to the environment or to human health, the lack of full scientific certainty shall not be used as a reason for not adopting or postponing the adoption of effective and efficient measures to prevent that threat . . . *Id.*

49. *See generally* CASS R. SUNSTEIN, *LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE* (2005).

50. *See generally* Jonathan B. Wiener, *Precaution in a Multi-Risk World*, in *HUMAN & ECOLOGICAL RISK ASSESSMENT: THEORY & PRACTICE* 1509, 1509–11 (Dennis J. Paustenbuach ed., 2009); Jonathan H. Adler, *The Problems with Precaution: A Principle Without Principle*, AM. ENTER. INST. (May 25, 2011), <https://www.aei.org/articles/the-problems-with-precaution-a-principle-without-principle/> [<https://perma.cc/J8LS-GHWL>]. For a view more favorable to the precautionary principle, *see* Robert V. Percival, *Who's Afraid of the Precautionary Principle?*, 23 *PACE ENV'T. L. REV.* 21, 22 (2006).

**them into the environment?**

While not an easy question, we believe that, on balance, the obligation in the first instance should be on dischargers who are placing materials into our common environment. Admittedly, polluters have a conflict of interest in the sense that they often wish to dispose of waste materials cheaply by releasing them into the public's environment, and they often lack the scientific and technical expertise to determine whether this creates public health or ecological risks. In implementing a burden to test materials before releasing them, we anticipate that an industry would probably rely primarily on searching the existing scientific literature, as it usually does in doing due diligence before putting a new product on the market.<sup>51</sup> However, one of us has advocated that the government should specify criteria for such pre-market testing and due diligence, as it does for environmental due diligence before purchasing real properties.<sup>52</sup> Similarly, the EU Reach Program and the US EPA, under the pre-manufacture testing program under TSCA, already specifies a battery of tests and required information such as disposal practices and environmental fate and transport.<sup>53</sup> We argue, however, that the US approach is flawed insofar as these submissions only have to include information and studies that are already available.<sup>54</sup> As part of its more precautionary approach, the EU has recently proposed a regulation that would require product manufacturers to conduct a risk assessment that would include adverse environmental effects that might affect the user.<sup>55</sup>

Similarly, under the proposed system, if the existing research is inadequate, those who will profit from exposing the rest of us to uncontrolled materials released into the environment should fund the necessary research.<sup>56</sup> This obligation might well be undertaken through user groups as is generally the case under the REACH program rather than each

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51. See E. Donald Elliott & Gail Charnley Elliott, *Private Product-Risk Assessment and the Role of Government*, 23 JOHN LINER REV. 73, 73–74 (2009).

52. See 40 C.F.R. § 312.1(c)–(d) (2022).

53. See *Filing a Pre-Manufacture Notice with EPA*, EPA, <https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/filing-pre-manufacture-notice-epa> [<https://perma.cc/EHJ7-H3VR>].

54. *Id.*

55. Proposal for a Regulation of the European Parliament and of the Council on General Product Safety, Amending Regulation (EU) No 1025/2012 of the European Parliament and of the Council, and repealing Council Directive 87/357/EEC and Directive 2001/95/EC of the European Parliament and of the Council, COM (2021) 346 final (Dec. 21, 2022).

56. See Renn & Elliott, *supra* note 43. As a practical matter, under TSCA, the EPA often enters into an administrative consent decree that limits exposure while requiring further studies.

individual company doing the research on its own.<sup>57</sup> Similarly, under the HazCom rule for workplaces in the United States, and similar laws internationally, a variety of expert consulting businesses have cropped up, which provide standardized Safety Data Sheets for substances in common use.<sup>58</sup> These third parties not only have expertise and economies of scale in producing standard items as opposed to each employer doing this work itself, but they also have strong reputational interests not to cheat.<sup>59</sup> This is not to say that misstating the science will never occur. As the recent Volkswagen emissions scandal<sup>60</sup> or the sordid history of asbestos use without regard to known risks for the safety of workers<sup>61</sup> demonstrate, industries can ignore or understate the risks to the environment even when threatened with the risk of criminal penalties.

We are not advocating that private industry should be the only source of information about environmental risks. Government should continue to regulate, and universities, research centers, and NGOs should continue to test substances and seek to uncover new risks to health. But the sheer volume of new substances coming into commerce every year means that there is little alternative but to place the initial burden of determining that a substance is not harmful on the commercial enterprises that want to use it. Moreover, the composition of a substantial fraction of new chemical substances are claimed by the developers to be confidential business information.<sup>62</sup> Placing the burden on industry also comports with Calabresi's "cheapest cost avoider" principle that argues for assigning

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57. Harvey Black, *Chemical Reaction: The U.S. Response to REACH*, 116 ENV'T HEALTH PERSPECTIVES 125, 125 (2008).

58. See, e.g., *The Safety Data Sheet (SDS) FAQ: Index*, SAFETY EMPORIUM (Oct. 28, 2021), <http://www.ilpi.com/msds/faq/index.html> [<https://perma.cc/DXH6-EZUH>].

59. See generally Reinier H. Kraakman, *Gatekeepers: The Anatomy of a Third-Party Enforcement Strategy*, 2 J.L. ECON. & ORG. 53, 53–56 (1986) (explaining the regulatory role of third-party gatekeepers, including those who must provide certifications).

60. See Office of Public Affairs, Department of Justice, *Volkswagen AG Agrees to Plead Guilty and Pay \$4.3 Billion in Criminal and Civil Penalties; Six Volkswagen Executives and Employees are Indicted in Connection with Conspiracy to Cheat U.S. Emissions Tests*, JUSTICE NEWS (Jan. 11, 2017), <https://www.justice.gov/opa/pr/volkswagen-ag-agrees-plead-guilty-and-pay-43-billion-criminal-and-civil-penalties-six> [<https://perma.cc/YJ6U-FEQ3>].

61. See generally PAUL BRODEUR, *OUTRAGEOUS MISCONDUCT: THE ASBESTOS INDUSTRY ON TRIAL* (1985).

62. See *Confidential Business Information Under TSCA: Statistics for the TSCA CBI Review Program*, EPA <https://www.epa.gov/tsc-cbi/statistics-tsc-cbi-review-program> [<https://perma.cc/BM8D-7MW6>].

responsibility to the party best positioned to minimize negative externalities cost-effectively.<sup>63</sup>

On balance, in the first instance the legal duty to consider potential adverse effects on health and the environment should fall on the entity that proposes to release it into the environment. This allocation of the burden to investigate and to eliminate or mitigate harm has now been reflected in EU law under a 2022 European Commission Directive on corporate sustainability due diligence, which requires companies to “identify and, where necessary, prevent, end or mitigate adverse impacts of their activities.”<sup>64</sup> Several examples of successful US environmental programs, NEPA, the Toxic Release Inventory, and California’s Proposition 65, similarly require potential polluters to investigate the volumes and anticipated effects of the pollution they are releasing or intend to release.<sup>65</sup> In our experience, both at the EPA and subsequently, we have witnessed many responsible companies taking seriously their moral obligation to protect the public and have seen CEOs express genuine surprise when informed of harmful effects of their releases.

One way to assess the value of a proposed legal duty is called “backcasting.”<sup>66</sup> The idea is to test proposed policy changes by asking whether they might have prevented adverse events in the past.<sup>67</sup> Many of the environmental disasters of the past, such as the Kepone disaster in the James River in Virginia which essentially put the fishing industry of Virginia out of business,<sup>68</sup> might well have been avoided had companies been required to investigate the potential consequences of their releases of material to the environment in advance. A more challenging question is whether one of the primary shortcomings of US environmental law, its failure to address the risk of climate change in any substantial way to date, could have been avoided if dischargers of greenhouse gases had been required to disclose the existing science on climate change.

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63. See GUIDO CALABRESI, *The Fault System and General Deterrence*, in *THE COST OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS* 244, 250 (1970).

64. European Commission, Press Release, *Just and Sustainable Economy: Commission Lays Down Rules for Companies to Respect Human Rights and Environment in Global Value Chains* (Feb. 23, 2022).

65. For an evaluation of the successes and shortcomings of these information disclosure programs as a regulatory technique, see Elliott & Esty, *supra* note 4, at 511–12, 533.

66. See John B. Robinson, *Energy Backcasting: A Proposed Method of Policy Analysis*, 10 *ENERGY POL’Y* 337, 337 (1982).

67. *Id.*

68. Arthur M. Holst, *The Kepone Environmental Disaster*, *ENCYC. VA.* (Sept. 14, 2021), <https://encyclopediavirginia.org/entries/kepone-chlordecone/> [https://perma.cc/329Z-FZ4G].

## B. Should investigation and disclosure obligations be imposed by the SEC?

In recent years, significant attention has been focused on the Securities and Exchange Commission's (SEC) proposed rules for disclosing climate change risks to potential investors.<sup>69</sup> While we support these disclosure initiatives as far as they go, SEC reporting is not the ideal mechanism to investigate and disclose environmental harms to potential victims. The SEC's main concern and expertise is protecting investors against material risks to the enterprise from liability for environmental damage, not protecting the environment or informing those who may be harmed. While it is true that NEPA purported to make protecting the environment "to the fullest extent possible" part of the mission of every agency,<sup>70</sup> that mandate has largely been ignored—perhaps because that statutory provision was never picked up, elaborated on, or enforced by the courts as was the equally cryptic requirement for environmental impact statements.<sup>71</sup> We think that a better place to require additional investigation and disclosure to potential victims would be in the environmental permitting process.

### III. THE OBLIGATION TO ELIMINATE POLLUTION TO THE EXTENT REASONABLY PRACTICAL

Environmental protection in the United States took a "wrong turn" in 1981 when the Reagan administration promulgated Executive Order 12291, which enshrined a "net social benefit" standard for approving all major new regulatory rules.<sup>72</sup> It is deceptively simple and seemingly intuitive that new governmental rules should do more good than harm,<sup>73</sup> and indeed this standard does make sense for many traditional forms of economic regulation, such as regulating prices, which are intended to improve economic efficiency. However, the net social benefit standard does not work well for those forms of regulation such as environmental law that are intended to prevent injuries to others. Everyone has a fundamental human right to bodily integrity and health. However, a net social benefit or Kaldor-

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69. Laura Corb et al., *Understanding the SEC's Proposed Climate Risk Disclosure Rule*, MCKINSEY & CO. (June 3, 2022), <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/understanding-the-secs-proposed-climate-risk-disclosure-rule> [<https://perma.cc/L9XX-55F2>].

70. See National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331–32.

71. See E. DONALD ELLIOTT & DANIEL C. ESTY, *NEPA and Information Disclosure: Techniques Copied Around the World*, in *ADVANCED INTRODUCTION TO U.S. ENVIRONMENTAL LAW* 159–70 (2021).

72. Exec. Order No. 12,291, 3 C.F.R. § 127 (1981).

73. See Paul R. Noe & John D. Graham, *The Ascendancy of The Cost-Benefit State?*, 5 *ADMIN. L. REV. ACCORD* 85, 91 (2020).

Hicks test for economic efficiency literally permits harm to others provided that the cost of eliminating the harm would be greater than the benefit of doing so to the injured parties—or said differently, if the winners win more than the losers lose. We call misusing the Kaldor-Hicks test to limit the extent of protection against environmental harms “the Kaldor-Hicks fallacy.”<sup>74</sup>

The Kaldor-Hicks fallacy is not a theoretical problem, but an ongoing real-world issue. For example, Elliott remembers sitting in meetings at the EPA at which dozens of predicted deaths were discussed from pesticide use, but the EPA nonetheless approved or did not cancel the pesticide because it deemed the economic benefits from pesticide use to be greater than the painful early deaths from cancer. This reprehensible practice was halted by the 2016 amendments to TSCA which eliminated the EPA’s consideration of “non-risk factors.”<sup>75</sup> In fact the trend since the 1990’s has been to eliminate statutory language that would allow non-health related benefits to be traded off against known benefits to health from lower standards. Similarly, the academic literature is clear that National Ambient Air Quality Standards are not set at a level that eliminates all harm from pollution, but rather where there are substantial benefits to health remaining available from regulation below the existing standards.<sup>76</sup>

#### IV. THE OBLIGATION TO COMPENSATE: A SECOND-BEST SOLUTION

Our initial article argued that environmental law should set an ultimate goal of zero harmful emissions,<sup>77</sup> a concept that is consistent with the aspiration for a gradual transition to a “circular economy” in which all waste materials are recycled or reused.<sup>78</sup> Admittedly, this standard might be hard to achieve with regard to some activities that have high value to society such as making steel or cement, or flying airplanes. In these cases where the benefit to society outweighs the harm to individual, but it is not currently practical to eliminate or minimize harm. Therefore, our earlier article

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74. Elliott & Esty, *supra* note 4, at 514–17.

75. See *Our Updated Chemical Safety Law: The Lautenberg Act*, ENV’T DEF. FUND, <https://www.edf.org/health/our-updated-chemical-safety-law-lautenberg-act> [<https://perma.cc/85YQ-3YR2>].

76. See Kimberly M. Castle & Richard L. Revesz, *Environmental Standards, Thresholds, and the Next Battleground of Climate Change Regulations*, 103 MINN. L. REV. 1349, 1353–54 (2019).

77. Elliott & Esty, *supra* note 4, at 509.

78. *What is a Circular Economy?*, EPA (Sept. 29, 2022), <https://www.epa.gov/recyclingstrategy/what-circular-economy> [<https://perma.cc/3R4V-EYHD>].

proposed to create an obligation not only to minimize the harmful emissions, but also to pay fully for the injuries caused by residual pollution.<sup>79</sup> These harm charges should be paid out to those who bear the pollution effects where possible.<sup>80</sup>

Our prior article described in detail our rationale for including an obligation to compensate victims of environmental exposures,<sup>81</sup> and we will not repeat that discussion here. We do, however, add a few practical observations about how and why this might be done. While we recognize that compensation is not traditionally considered a role of environmental law but rather of state tort law, we do not consider that an insuperable impediment. A good model for compensation for environmental harms is the EU's 2004 environmental liability directive, which did not mandate the details of how member states would provide compensation for environmental harms, but rather mandated that member states must provide some effective systems of compensation.<sup>82</sup> Importantly, the rationale for the directive was not solely to compensate victims, but to prevent future harms by imposing costs on those responsible, a point made clear in its official title: "DIRECTIVE 2004/35/CE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage."<sup>83</sup>

The philosophy of using the threat of liability to prevent damage is also specifically endorsed in the text: "The fundamental principle of this Directive [is to hold operators financially liable] . . . in order to induce operators to adopt measures and develop practices to minimi[z]e the risks of environmental damage so that their exposure to financial liabilities is reduced."<sup>84</sup> We applaud the Directive's focus on incentives and the value of spurring innovation to reduce emissions harms. Indeed, we would suggest that a central focus of the restructuring of environmental law that we seek to advance would be to pay more attention to the incentives that statutes and regulations create and the value of creating incentives to minimize harm and promote creativity in addressing persistent environmental challenges.

One of the central insights of the modern environmental awakening is that the giving away of free resources held in common results in their over-

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79. Elliott & Esty, *supra* note 4, at 510, 529–31.

80. Elliott & Esty, *supra* note 4, at 518, 531.

81. Elliott & Esty, *supra* note 4, at *passim*.

82. Council Directive 2004/35, app. II 1.1.3, 2004, O.J. (L 143), 56, 72 (EC).

83. *Id.* at art. 1 (emphasis added).

84. *Id.* at cl. 2.

consumption.<sup>85</sup> Moreover, financial charges for harm caused by environmental releases serves as an important backstop to command-and-control regulation. As Elliott observed in a prior article:

[T]he reason that we have done as well as we have in the United States [in keeping dangerous chemicals off the market], despite the problems that we have regulating effectively under TSCA, is because our regulatory system is backed up the threat of liability, or what Calabresi called “general deterrence” (threat of liability) as opposed to “specific deterrence” (administrative or legislative regulation).

Even if agencies are not able to regulate chemicals in the United States based on as low an evidentiary threshold as in Europe, there are very few chemicals that have come on to the market in the United States, but not in Europe, or are regulated in one but not the other. In practice, the degree of precaution tends to be similar, despite the rhetoric that Europe regulates on a more precautionary basis than the United States. In my opinion, that similarity in outcome despite differences in regulatory approach is largely because of the potent threat of liability as a backstop to government regulation in the United States.<sup>86</sup>

The general deterrence function is satisfied by imposing charges on the polluter, whether or not they are paid over as compensation to the victims.<sup>87</sup> However, our proposal aims to do more. In particular, while monetary payment can never fully compensate victims for pollution harms to their health, or the health of their loved ones, we believe that full and even generous compensation should be paid to the victims of harmful pollution. We see this as a matter of fundamental environmental justice. And we would argue that the law should err on the side of over-charging polluters for the harms that they do to others to make sure that the polluters have incentives to prevent harm to the maximum extent reasonably practical. Thus, for us, it is less important that the harm charges are exactly right, but more important that they do not understate the harm and thereby create perverse incentives for it to continue.<sup>88</sup>

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85. See generally Garrett Hardin, *The Tragedy of the Commons*, 162 Sci. 1243 (1968); see also Elliot, *Environmental Law Lessons*, *supra* note 35.

86. Elliot, *Global Perspective*, *supra* note 35, at 159–56.

87. See E. Donald Elliott, *Why Punitive Damages Don't Deter Corporate Misconduct Effectively*, 40 ALA. L. REV. 1053, 1054 n.5 (1989).

88. The then-head of the EPA Office of Research and Development, Paul Gilman, once stated at a public meeting that the purpose of risk assessment at the EPA was to make sure that the EPA never underestimated the potential for harm to the public. Paul Gilman, Off. of Rsch. And Dev., U.S. Env't. Prot. Agency, Floor Statement at the Society for Risk Analysis Annual Meeting, (December 7, 2009).

## V. EVALUATING HARMS—RECASTING THE ROLE OF THE EPA?

Some of the most significant questions that emerged in response to our *End Environmental Externalities Manifesto* centered on who would determine the harm charges for residual emissions anticipated by our reform proposal—and on what basis. We are open to a discussion as to what entity—existing or to be established—is best positioned to undertake the process of setting the harm charges. One possibility is that the calibration of these charges and the invoicing of dischargers would fall primarily to the federal EPA and state environmental agencies with a supporting role to be played by other regulatory bodies such as OSHA, ATSDR, and the FDA, all of which have expertise in analyzing the human health effects of various pollution exposures. We recognize that this task will entail a degree of methodological complexity but we believe that the work required can be simplified to some extent by developing categorical estimates of the harm caused by each unit of a particular pollutant during risk assessments.

To the extent that some of the harm caused by emissions would affect ecological resources rather than human environmental public health, the expertise of natural resource management agencies such as the Department of the Interior's (DOI) Fish and Wildlife Service and the United States Department of Agriculture's Forest Service would need to be called upon. While we recognize that a strong case can be made for the intrinsic rights of nature,<sup>89</sup> we consider that issue to be beyond our scope in the current project. We focus our concept of harm charges for damages to nature on the loss of human use values and the estimated costs of restoration, as does the existing guidance on natural resources damages under the Comprehensive Environmental Response, Compensation, and Liability Act.<sup>90</sup> The regulations for assessing natural resource damages promulgated by the DOI and the National Oceanic and Atmospheric Administration, which have been tested by application to calculate natural resource damages in numerous cases, provide a good starting point.<sup>91</sup>

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89. See, e.g., DOUGLAS A. KYSAR, *REGULATING FROM NOWHERE: ENVIRONMENTAL LAW AND THE SEARCH FOR OBJECTIVITY* 12, 19 (2010) (arguing in favor of ethical obligations to protect other species in environmental law); see generally CHRISTOPHER D. STONE, *SHOULD TREES HAVE STANDING? LAW, MORALITY, AND THE ENVIRONMENT* (3d ed. 2010); ALDO LEOPOLD, *A SAND COUNTY ALMANAC: AND SKETCHES HERE AND THERE* (1949).

90. See *Natural Resource Damages: A Primer*, EPA, <https://www.epa.gov/superfund/natural-resource-damages-primer#nrds> [<https://perma.cc/8NE2-YQK6>].

91. 43 C.F.R. § 11.11 (2022); 15 C.F.R. § 990.10 (2022). Department of Commerce National Oceanic and Atmospheric Administration).

In his excellent contribution to this symposium, J.B. Ruhl suggests that our vision for the future of environmental law should incorporate “the default rule . . . that compensation is required for residual pollution that harms ecological resources used by other people and which thereby reduces the provision of ecosystem services.”<sup>92</sup> In principle, we agree, and that is what we intended by our references to “use values” above. However, like J.B., we also recognize that this is a complicated field that is entangled with traditional property, takings, and nuisance law.<sup>93</sup> Therefore, a full elaboration must await another day of to what extent someone who had been receiving value from natural resources that belong to someone else is entitled to compensation if those eco-system services are halted. Perhaps in subsequent work we can unravel that muddle—hopefully with J.B.’s help!

To be in a position to calculate harm charges based on the best available data on the fate and transport of emissions, epidemiological and ecological effects, and risk assessments, EPA would need new capacities and likely additional staff with relevant expertise in environmental public health and the economics and valuation of various risks. This new EPA role might well require the Agency to redeploy significant resources from its existing engineering-oriented focus on “best available technologies for pollution control.

The harm charges assessed would, of course, build on the data provided by industry as part of their legal obligations under our proposed reframing of environmental law—so the private sector would also be playing a major role in executing the shift we propose. But the industry risk assessments would need to be cross-checked by EPA officials supported by other federal departments and perhaps peer reviewed for all of the reasons discussed above.

We would also note that industries facing substantial harm charges would almost certainly challenge the assessments being leveled, arguing that the underlying risk assessments and dollar valuations were misguided. We therefore recognize that the shift toward making polluters pay for the harm they cause will not be easy.

## VI. THE ROAD FORWARD

“Rome was not built in a day,” and we are not minimizing the difficulty of transitioning to the vision of the environmental law of the future that we

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92. J.B. Ruhl, *The End Externalities Manifesto: Restatement, Loose Ends, and Unfinished Business*, 40 PACE ENV'T. L. REV. 510 (2022).

93. *Id.*; see generally J.B. Ruhl, *Making Nuisance Ecological*, 58 CASE W. RES. L. REV. 753 (2008).

propose. However, at the same time, when embarking on a journey, it is helpful to have a vision of one's destination in mind.<sup>94</sup> Just as the common law attempts to learn by abstracting principles from experience,<sup>95</sup> we propose that the experience of environmental law in countries around the world over the last fifty years leads logically to the principles that we suggest. If, however, we have gotten some of it wrong, we invite our friendly critics<sup>96</sup> to propose alternative principles for the environmental law of the 21<sup>st</sup> century.

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94. Monika U. Ehrman, *Natural Resource Systems and the Evolution of Environmental Law*, 40 PACE ENV'T L. REV. 495 (2023).

95. E. Donald Elliott, *Holmes and Evolution: Legal Process as Artificial Intelligence*, 13 J. LEGAL STUD. 113, 130, 143 (1984).

96. *Cf.* Elliott, *supra* note 27, at 904–08 (describing friendly critics of the Clean Air Act, including the author, who applauds its progress but suggests how it might have done even better).

**APPENDIX**

E. Donald Elliott and Daniel C. Esty, *The End Environmental Externalities Manifesto: A Rights-Based Foundation for Environmental Law*, 29 NYU ENV'T L. J. 505 (2021).

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