



March 16, 2009

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Re: New Executive Order on Federal Regulatory Review

To the Director of the Office of Management and Budget:

These comments are offered on behalf of the Science & Environmental Health Network, a non-profit corporation concerned with the environment and public health, and our co-signers in response to the request by the Director of the Office of Management and Budget (OMB) for assistance in developing recommendations for how to improve the process and principles of federal regulation.<sup>1</sup>

We commend President Obama for this initiative to replace Executive Order 12,866.<sup>2</sup> This is a long-overdue and welcome initiative, particularly in conjunction with the President's commitment to using science to inform the protection of public health and the environment.<sup>3</sup> We also commend the Director for seeking public input and are grateful

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<sup>1</sup> 74 FR 8819 (Feb. 26, 2009).

<sup>2</sup> President Obama's Memorandum for the Heads of Executive Departments and Agencies on Regulatory Review (January 30, 2009), 74 FR 5977-58 (Feb. 3, 2009), available at: [http://www.reginfo.gov/public/jsp/EO/fedRegReview/POTUS\\_Memo\\_on\\_Regulatory\\_Review.pdf](http://www.reginfo.gov/public/jsp/EO/fedRegReview/POTUS_Memo_on_Regulatory_Review.pdf).

<sup>3</sup> President Obama's Memorandum for the Heads of Executive Departments and Agencies on Scientific Integrity (March 9, 2009), available at: [http://www.whitehouse.gov/the\\_press\\_office/Memorandum-for-the-Heads-of-Executive-Departments-and-Agencies-3-9-09/](http://www.whitehouse.gov/the_press_office/Memorandum-for-the-Heads-of-Executive-Departments-and-Agencies-3-9-09/).

for his stated intention to seriously consider all comments.<sup>4</sup>

These comments are directed to a single issue: the decision-making structure mandated by Executive Order 12,866 for developing regulations to protect the environment. This decision-making structure requires the Federal agencies, to the extent legally possible, to justify regulations to protect the environment using cost-benefit principles.

As these comments will develop in some detail, we believe this approach to environmental protection cannot manage the environmental problems of the twenty-first century. These problems are characterized by large-scale ecological degradation, both within the United States and globally, that result from the cumulative impact of the myriad components of the human ecological footprint. The American and global human footprints on the Earth have grown too large, and are not sustainable.

Even if the decision-making structure of Executive Order 12,866 was once appropriate, it is no longer a scientifically valid approach to protecting public health, the environment, and the interests of future generations. Under our current circumstances, that structure must be reformulated around the principle of preserving an ecologically functioning biosphere, which we must retain if we are to survive and prosper.<sup>5</sup>

#### I. Executive Order 12,866 Is a Critical Component of the Federal Government's Program to Protect the Environment

The importance of Executive Order 12,866 can only be understood when placed in context of the federal environmental statutes. These represent a landmark effort by the federal government to protect the environment.<sup>6</sup> As many commentators have observed, however, these laws do not approach preserving the environment in an integrated, comprehensive, ecologically oriented way. The statutes and their implementing regulations address narrowly defined environmental problems in isolation, resulting in a continual stream of regulations, standards, and permits, each addressing particular chemicals, sources of air or water emissions, waste clean-up requirements or

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<sup>4</sup> 74 FR 8819 (Feb. 26, 2009).

<sup>5</sup> The themes presented in these comments and many of the written passages are taken from three articles that present this subject in more detail: Guth, J., "Law for the Ecological Age," *Vermont Journal of Environmental Law*, vol. 9, Issue 3, pp. 431-512 (Spring 2008) (<http://www.vjel.org/journal/pdf/VJEL10068.pdf>); Guth, J., "Cumulative Impacts: Death-Knell For Cost-Benefit Analysis in Environmental Decisions," *in press, Barry Law Review* (2009); Guth, J., "Resolving the Paradoxes of Discounting," *in press, Journal of Transnational Law and Contemporary Problems* (2009), a preliminary version of which will be published in 2009 by the Climate Legacy Initiative of Vermont Law School and the University of Iowa (<http://www.vermontlaw.edu/cli/>).

<sup>6</sup> See Robert V. Percival et al., *Environmental Regulation—Law, Science and Policy* 60–95 (Aspen Publishers 2003) (outlining environmental history of common law and federal statutes); Richard J. Lazarus, *The Making of Environmental Law* 47–97 (University of Chicago Press 2004) (history of federal environmental law).

contamination levels deemed acceptable in drinking water, air or food.<sup>7</sup>

Further fragmenting their implementation is the disparate approaches these statutes take to resolving conflicts between environmental protection and other interests. Some of these statutes specify how such conflicts should be resolved by, for example, requiring health-based standards or cost-benefit analysis. But many are ambiguous on this question, and grant wide discretion to the executive agencies to determine how vigorously they should protect the environment. It was agency exercise of this broad discretion to protect the environment that prompted President Reagan to issue the predecessor of Executive Order 12,866 to restrain what he saw as the excessive power of the administrative state under the federal environmental laws of the 1970s.<sup>8</sup>

Executive Order 12,866 constitutes a broad direction from the President to all executive agencies that specifies exactly how they should exercise their discretion in implementing Federal statutes, including the nation's environmental laws. Signed by President Clinton, it commands all Federal agencies to propose or adopt regulations, including environmental regulations, "only upon a reasoned determination that the benefits of the intended regulation justify its costs" (except when a particular statute requires otherwise).<sup>9</sup> President George W. Bush issued only slight revisions to Clinton's Executive Order 12,866.<sup>10</sup> It is actively enforced on behalf of the President by the Office of Information and Regulatory Affairs (OIRA), an office within OMB, which ensures that wherever legally possible, each significant regulation is cost-benefit justified following detailed OMB procedural guidance.<sup>11</sup> The administrative agencies have little if any recourse whenever they come into conflict with OIRA over whether or how to conduct cost-benefit evaluations of their proposed regulations.<sup>12</sup>

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<sup>7</sup> See Percival et al., *supra* note 6, at 88–94 (outlining federal environmental statutes); Lazarus, *supra* note 6, at 67–75 (outlining federal environmental statutes).

<sup>8</sup> See Richard L Revesz & Michael A. Livermore, *Retaking Rationality- How Cost-Benefit Analysis Can Better Protect the Environment and Our Health* 21-30, 151-69 (Oxford University Press 2008) (recounting history of Reagan Executive Order 12,291, 46 Fed. Reg. 13,193 (Feb. 17, 1981)).

<sup>9</sup> Exec. Order No. 12,866 (September 30, 1993), 3 C.F.R. 638 , 638 (1993), reprinted in 5 U.S.C. § 601 (2000). "Regulatory Planning and Review," § 1(b)(6) ("Each agency shall . . . propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs") (available at: <http://www.archives.gov/federal-register/executive-orders/pdf/12866.pdf>). See also Revesz & Livermore, *supra* note 8, at 31-39, 151-69 (recounting history of Clinton Executive Order 12,866).

<sup>10</sup> Revesz & Livermore, *supra* note 8, at 39-45, 151-69 (recounting implementation of Exec. Order No. 12,866 and revisions in 2007 under President George W. Bush).

<sup>11</sup> See "Regulatory Analysis," OMB Circular A-4, Office of Management and Budget (September 17, 2003) (providing detailed guidance to all federal agencies on conduct of regulatory cost-benefit analysis under Exec. Order No. 12,866) (available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>). OMB's extensive ongoing evaluation of regulations under Executive Order 12,866 before they are promulgated and after they issue is reflected in its Annual Reports to Congress on the Costs and Benefits of Federal Regulations (compiled at: <http://www.whitehouse.gov/omb/legislative/index.html>).

<sup>12</sup> *E.g.*, see Revesz & Livermore, *supra* note 8, at 21-45 (providing extensive history of the OIRA and OMB influence over administrative agencies, especially the EPA).

Executive Order 12,866 provides an interpretive overlay over virtually the entire panoply of federal environmental statutes, and serves to reduce the degree of environmental protection enabled by many of those statutes. The decision-making structure it specifies is therefore worthy of close examination. It has two key elements.<sup>13</sup> It establishes a presumption that economic activity, even where it causes damage to human health and the environment, should not be interfered with by the federal government. It does permit the government to prevent such damage, but under a heavy condition: it places the burden of proof on government to demonstrate that the costs of each proposed regulation are justified by its benefits. If government cannot carry this burden of proof, the damage is permitted to lie where it falls, usually externalized onto the environment and the broader community.

This legal structure embodies no general goal of protecting human health or the environment. It is built around a presumption against regulation, seemingly on the assumption that economic activity generally provides a net benefit to society despite any accompanying damage it might cause, and permits environmental regulation only in specific cases where government can prove that starting presumption false.

Many analysts support this decision-making structure on the grounds that it promotes social welfare. For example, Professor Cass Sunstein generally supports the use of cost-benefit analysis to implement the environmental statutes (while recognizing agencies may have reasons to avoid it in limited circumstances).<sup>14</sup> Professor Richard Revesz and Michael Livermore believe this structure ensures that regulations will increase the overall net wealth of society and enable the net benefits of regulation to be maximized.<sup>15</sup> They regard regulation, including environmental regulation, as “equivalent to governmental spending,” and see cost-benefit analysis as a tool for making government accountable for prioritizing and “spending” limited resources efficiently.<sup>16</sup>

The bottom line is that, except where Congress has clearly specified otherwise, Executive Order 12,866 limits the entire Federal environmental protection effort to individual regulatory steps that the government can prove provide benefits that outweigh their costs.

## II. The Decision-Making Structure of Executive Order 12,866 Permits Endless Growth in Cumulative Environmental Impacts

Numerous difficulties spring from this approach to regulating environmental damage. For example, our methods for tracking costs and benefits are deeply flawed, which constrains the law’s capacity to detect and prevent net-damaging activities. Some hold that if we

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<sup>13</sup> See Executive Order 12,866 § 1(b)(6), *supra* note 9.

<sup>14</sup> See Cass R. Sunstein, “Cost-Benefit Default Principles,” 99 *Mich. L. Rev.* 1651, 1665-66, 1716 (2001) (urging use of cost-benefit analysis, arguing that all branches of U.S. government have now concluded that cost-benefit analysis is desirable and that many courts now permit or even expect administrative agencies to employ cost-benefit analysis unless Congress has explicitly forbidden it).

<sup>15</sup> See Revesz & Livermore, *supra* note 8 at 10, 12, 14.

<sup>16</sup> *Id.* at 12–13.

fully accounted for all costs we would find that GNP growth in the United States is no longer increasing true human welfare.<sup>17</sup> Commentators have criticized OMB's cost-benefit calculations as systematically biased against environmental health protection.<sup>18</sup> And the cost-benefit enterprise is rife with ethical problems, including the socially corrosive and unfair distribution of environmental damage, monetization of human health and life, and our moral obligations to future generations and non-human forms of life.<sup>19</sup>

But two features inherent in the decision-making structure of Executive Order 12,866 have now rendered it no longer suitable, even in theory, for making environmental decisions. As we have seen, Executive Order 12,866 intentionally allows all environmental damage except where it can be controlled cost-effectively. As we pursue economic growth, environmental costs grow as well as economic benefits. This structure remains in place no matter how large the cumulative ecological damage to the Earth becomes. Executive Order 12,866 is structured around the goal of preventing isolated environmental impacts that are not accompanied by a net social benefit, and it contains no independent constraint on the total scale of ecological damage.

This endless growth in legally allowed environmental damage is amplified by the allocation to government of the burden of proof. Because of this allocation, Executive Order 12,866 permits environmental damage not just when it is demonstrably cost-benefit justified, but also whenever regulators cannot carry their burden of proof. In cases of incomplete science, missing information, or doubt, the decision-making structure defaults to its starting presumption: it allows the damaging activity to continue. Doubt and lack of information are transformed into barriers to regulatory protection of human health and the environment. This allocation creates an unfortunate commercial incentive for industrial interests hoping to avoid regulation to remain ignorant of the environmental consequences of their own actions, refusing to examine those consequences themselves and interfering with those who would do so. Industrial interests are even rationally motivated to invest proactively in the manufacture and spread of doubt and confusion.<sup>20</sup>

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<sup>17</sup> See, e.g., John Talberth et al., "The Genuine Progress Indicator 2006 A Tool for Sustainable Development" 19 (2006), available at <http://www.rprogress.org/publications/2007/gpi%202006.pdf>. (concluding that the U.S. economy has been stagnant since the 1970s if environment and social determinants are considered).

<sup>18</sup> See Revesz & Livermore, *supra* note 8 (describing a detailed program to correct the current "anti-regulatory bias" in the way cost-benefit analysis is conducted); Ackerman & Heinzerling, *supra* note 18 (arguing that current governmental methods of cost-benefit calculations are biased against protection of human health and the environment and describing weaknesses in the justifications supplied for many of those methods); Thomas O. McGarity et. al., *Sophisticated Sabotage: The Intellectual Games Used to Subvert Responsible Regulation* (Environmental Law Institute 2004) (demonstrating the shaky foundations underlying many cost-benefit methods).

<sup>19</sup> E.g., Ackerman & Heinzerling, *supra* note 18, at 205-34 (concluding that many of the most important values of human health and the environment simply cannot be monetized for use in cost-benefit analysis, and that we need a different environmental decision-making method grounded in democratic participation, holistic evaluation of costs and benefits, recognition of moral concerns, a precautionary approach and a deeper concern for environmental justice and the future).

<sup>20</sup> David Michaels, *Doubt Is Their Product* (Oxford University Press 2008); David Michaels, *Doubt Is Their Product*, *Sci. Am.*, June 2005, at 96-101; *Rescuing Science from Politics – Regulation and the*

To understand what we must do about these monumental problems with Executive Order 12,866, we must first examine the assumptions upon which its decision-making structure is based.<sup>21</sup>

### III. The Pre-Analytic Vision That Informs Executive Order 12,866

Former World Bank economist Herman Daly has described what he calls the “pre-analytic vision,” the set of seldom-examined starting assumptions, that mainstream neoclassical economics is built upon.<sup>22</sup> According to this pre-analytic vision, our economic system assumes that the human economy can grow forever, and indeed our society’s overriding macroeconomic goal is to ensure permanent economic growth. No limit is envisioned in the total scale of the economy or in our use of the Earth’s resources. Particular resources are obviously limited in supply. But it is assumed that all forms of natural capital, including both resources (such as oil and fisheries) and pollution sinks (such as air and water), can be replaced either by other natural resources or by human capital and technology. Thus, we need not worry if even valuable resources and pollution sinks become exhausted. Once they become scarce and therefore expensive, we will be motivated to find substitutes, which, it is assumed, we will always be able to do if the need is great enough. Though the market may not contain prices for certain valuable natural resources (e.g., clean air, clean water, wetlands), and therefore can lead only to their exhaustion, these market flaws are not thought to be serious enough to disrupt the overarching vision.

Environmental assets like clean air and water are viewed as “amenities” that we can obtain whenever we feel we can afford them, if not now then later when we are richer and can “buy” them with other forms of accumulated capital. Otherwise, each and every portion of the biosphere can and should be liquidated whenever the market justifies it. Preservation of the environment is an “investment” that must compete with investment in

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*Distortion of Scientific Research* (Wendy Wagner & Rena Steinzor eds., Cambridge University Press 2006); Carl F. Cranor, *Toxic Torts – Science, Law and the Possibility of Justice* (Cambridge University Press 2007).

<sup>21</sup> The nation’s system of common law protection of the environment has these same problems because it incorporates this same decision-making structure, and indeed was the historical source of that structure. See Guth, *Law for the Ecological Age*, *supra* note 5 at 450-74. McGarity et al. have vigorously challenged the existing structure of environmental laws, calling attention to the law’s common starting assumption that government should determine the economically efficient level of harm and questioning why the law should not place responsibility on industry to avoid harm or provide compensation for harm it causes. Henry A. Waxman, *Foreward* to McGarity et. al., *supra* note 18, at x; McGarity et. al., *supra* note 18, at 141-48. They have called for environmental decision making to adopt a precautionary focus on preventing harm, to place the burden on those externalizing risk onto others to justify why those risks are acceptable, to address the sources of pollution, to promote radical technology forcing, to focus on costs in the context of analyzing alternatives, to make polluters pay for the damage they cause and to take seriously environmental justice and a concern for the future. McGarity et. al., *supra* note 18, at 217-51.

<sup>22</sup> Herman E. Daly, *Beyond Growth* (detailed presentation and critique of these assumptions of mainstream, neoclassical economics); see also Herman E. Daly & Joshua Farley, *Ecological Economics: Principles and Applications* 15, 35, 223-44 (2004) (same).

other elements of the human economy. Every portion of the Earth is a fungible element of the larger human economy. As that economy grows forever, the services provided by the natural world become an ever-smaller fraction of that economy until in the distant future the value of the Earth seems to disappear altogether.

The logic of this pre-analytic vision leads inexorably to the legal decision-making structure of Executive Order 12,866. Since economic activity generally contributes to the social welfare, the law should give it the benefit of the doubt. As long as the legal system prevents activities shown to cause a net social loss, social welfare is best served by maximum economic growth. As long as net benefits grow, there is no reason costs may not also grow forever. Since there is no reason to value a particular element of the natural world other than for its worth in an unfettered market, environmental losses, like any other kind of cost, should be tolerated as long as they are accompanied by greater benefits. We need not be too concerned with the cumulative costs, including even severe ecological damage, for each incremental loss must be worth the greater benefits we are surely obtaining. According to this way of thinking, no general principle of ecological preservation appears necessary; indeed, it would be detrimental to the net social welfare.

It is on this foundation that Executive Order 12,866 presumes we can and should sacrifice every part of the Earth in the pursuit of economic growth, subject only to government proof in a particular case that the cost of doing so outweighs the benefits.

#### IV. The Endless-Growth Assumptions Underpinning Executive Order 12,866 Are No Longer Scientifically Valid

These endless-growth assumptions were adopted in the past, when the human enterprise was but a fraction of the size it is today. In that “empty” world – with comparatively few people living low-impact lives surrounded by seemingly boundless resources and pollution sinks – it might have seemed reasonable to unleash costs and benefits to grow forever.<sup>23</sup> But that world is gone, and the world that has come upon us is an empty one no longer.

The global scientific community is reporting severe and ongoing degradation of ecosystems in virtually all regions of the Earth. Just a few recent examples illustrate the depth and scope of these reports. In 2005, a comprehensive assessment of the global environment compiled by over 2,000 scientists from 95 countries concluded that 60 percent of global ecosystem services are “being degraded or used unsustainably,” including fresh water supplies, capture fisheries, air purification, water purification, and

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<sup>23</sup> See John G. Sprankling, “The Antiwilderness Bias in American Property Law,” 63 *U. Chi. L. Rev.* 519, 529–32 (1996) (documenting the widespread social view at the turn of the nineteenth century that the vast American wilderness was essentially valueless and should be brought under cultivation); Morton J. Horwitz, *The Transformation of American Law 1780–1860*, at 74–108 (1977) (discussing history of nineteenth century changes in legal system designed to promote industrial revolution); Guth, *Law for the Ecological Age*, *supra* note 5, at 450–73 (reviewing findings of legal historians showing legal accommodation of social desire for industrialization, especially including development of modern doctrines of nuisance and negligence).

the regulation of natural hazards and pests.<sup>24</sup> In 2007, the United Nations Environment Programme concluded that current trends in environmental degradation are threatening human development and overall wellbeing.<sup>25</sup> It identified many elements of the environment that are being degraded<sup>26</sup> and concluded that we are now crossing thresholds of sudden, irreversible environmental changes. It reported the collapse of fisheries, dead zones in the sea, regional climate change, and loss of species, and warned that it is difficult to know exactly where more thresholds lie or when they might arise.<sup>27</sup> The World Wildlife Fund and its collaborators found that their biodiversity index of 4,000 populations of 1,477 vertebrate species has declined by 27 percent in the last thirty-five years.<sup>28</sup>

Scientists have documented similar extensive degradation of ecosystems across the United States.<sup>29</sup> Americans have among the largest per capita ecological footprints of all people in the world.<sup>30</sup> Despite the Federal environmental laws of the last few decades, which resulted in some improvements, serious environmental problems have persisted or even worsened.<sup>31</sup> Long-time leading American environmentalist James Gustave Speth recently concluded that despite current U.S. and global environmental laws, “We are losing the planet.”<sup>32</sup>

These reports also explain the root cause of these ecological problems: the cumulative impact of the myriad human activities that comprise the human ecological footprint. Billions of people acting individually and together in various enterprises are causing

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<sup>24</sup> *Millennium Ecosystem Assessment, Ecosystems and Human Well-Being: Synthesis 2* (2005) [hereinafter Millennium Assessment], available at <http://www.millenniumassessment.org/documents/document.356.aspx.pdf>. The Millennium Ecosystem Assessment is an evaluation of the world’s ecosystems and human well-being that was carried out between 2001 and 2005 under the auspices of the United Nations. *Id.* at ii–ix. The reports are available at <http://www.millenniumassessment.org/en/index.aspx>.

<sup>25</sup> U.N. Env’t Program, *Global Environment Outlook—Environment for Development Geo-4*, at 6 (2007), available at [http://www.unep.org/geo/geo4/report/01\\_Environment\\_for\\_Development.pdf](http://www.unep.org/geo/geo4/report/01_Environment_for_Development.pdf) (this report was prepared by over 400 scientists and environmental policy makers).

<sup>26</sup> *Id.* at 202 (box 6.1).

<sup>27</sup> *Id.* at 362–63.

<sup>28</sup> Ben Collen et al., “Living Planet Index,” in *2010 and Beyond*, at 4 (Jonathon Loh ed., 2008), available at [http://www.wwf.org.uk/filelibrary/pdf/2010\\_and\\_beyond.pdf](http://www.wwf.org.uk/filelibrary/pdf/2010_and_beyond.pdf).

<sup>29</sup> See Reed F. Noss et al., U.S. Geological Survey, “Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation” (1995) (unpaginated document), available at <http://biology.usgs.gov/pubs/ecosys.htm> (reporting “more than 30 critically endangered, 58 endangered, and more than 38 threatened ecosystems” in the United States).

<sup>30</sup> *2010 and Beyond*, *supra* note 28, at 3 (tbl. 1), 14–15, 16, 18, 19, 28.

<sup>31</sup> James G. Speth, *The Bridge at the Edge of the World—Capitalism, the Environment, and Crossing from Crisis to Sustainability*, at 71–78 (2008) (outlining current environmental problems in the United States). See also Mary Wood, “Nature’s Trust: Reclaiming an Environmental Discourse,” 25 *Va. Env’tl. L.J.* 431, 432–36, 440–47 (2007) (outlining failure of U.S. environmental law).

<sup>32</sup> Speth, *supra* note 31, at 78.

numerous and diverse impacts on the Earth. These include climate disruption from greenhouse gas emissions, deforestation (from logging and agriculture), degradation of productive land (from desertification, erosion, and other processes), loss of freshwater watercourses and unpolluted water supplies for human use, depletion of marine fisheries (through over-fishing and destructive practices), discharges of toxic pollution (into air, water, and land), biotic impoverishment from loss of species, and over-fertilization with nitrogen leading to oceanic dead zones.<sup>33</sup> These impacts know few geographical bounds. American impacts are felt beyond our borders, contributing to global warming, creating dead zones in the seas, and generating accumulations of waste such as the Pacific Gyre. Toxic air pollution from Mexico and China, generated at least in part by production for the U.S. market, settles onto our lands and into our waters and lungs.

The essential difficulty is that these growing impacts are being visited upon a finite biosphere. Comprising no more than a thin film on the surface of the Earth, the biosphere has a finite physical size, containing only so much air, water, and land. Environmental damage and pollution become concentrated as they accumulate. Because the various constituents of the biosphere are so deeply interdependent, our various impacts interact, each compounding the effects of the others. Moreover, the time scale on which the biosphere evolves is immense, so that losses of species and ecosystems are essentially permanent for us and accumulate with the passage of time. As a result of its inherently limited and interconnected nature, the biosphere has a limited capacity to assimilate ongoing ecological damage and still maintain the ecological systems we are so dependent upon.

There is today widespread agreement that the international and U.S. legal systems are not containing these mounting cumulative impacts.<sup>34</sup> In the years since President Reagan signed the predecessor of Executive Order 12,866, it has become clear that for the first time in human history we are approaching and have likely surpassed the biosphere's assimilative limits. The World Wildlife Fund and its collaborators have found that, by the 1980's, humanity's "Global Ecological Footprint" had reached the capacity of the biosphere to provide resources and absorb waste; that by 2003 it had overshot that

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<sup>33</sup> See Speth, *supra* note 31, at 19–38. See also *2010 and Beyond*, *supra*, note 28, at 2–3 (classifying myriad human impacts into five categories: habitat loss, overexploitation of species, pollution, spread of invasive species or genes, and climate change); *Global Environment Outlook—Environment for Development Geo-4*, *supra* note 25, at xxii–xxiii (classifying human pressures on the environment into categories of land use, resource extraction, external inputs (such as fertilizers, chemicals, irrigation), emissions (of pollutants and waste), and modification and movement of organisms).

<sup>34</sup> See, e.g., Speth, *supra* note 31, at 85–86 (growing cumulative environmental threats with ever-larger environmental consequences cannot be controlled by current U.S. system for environmental protection); Millennium Assessment, *supra* note 24, at 99 (recommending that environmental decision-making consider cumulative effects); *Global Environment Outlook—Environment for Development Geo-4*, *supra* note 25, *supra* note 25, at 111, 467 (explaining that tipping points are reached when cumulative effects reach thresholds of unsustainable damage, and concluding that existing environmental institutions have been unable to keep up with increasing cumulative environmental degradation); *2010 and Beyond*, *supra* note 28, at 2–3, 14–15, 23, 24 (outlining many components of the human ecological footprint and the many steps that must be taken to reduce it).

capacity by 25 percent; and that it continues to grow every year.<sup>35</sup> They concluded that humanity is now depleting reserves of ecological assets that accumulated on the Earth over long periods of time, and that we cannot do so much longer without damaging the Earth's ability to renew them.<sup>36</sup> Other groups of scientists have similarly concluded that in the last several decades, humanity's demands on the biosphere surpassed sustainable levels.<sup>37</sup> The United Nations summarizes our current situation starkly:

Human activity is putting such strain on the natural functions of Earth that the ability of the planet's ecosystems to sustain future generations can no longer be taken for granted.<sup>38</sup>

We should not doubt the value of functioning ecological systems to human welfare. Indeed, since we cannot live without it, an ecologically functioning Earth is worth everything we have. As the summary of the Millennium Ecosystem Assessment Synthesis begins:

Everyone in the world depends completely on Earth's ecosystems and the services they provide, such as food, water, disease management, climate regulation, spiritual fulfillment, and aesthetic enjoyment.<sup>39</sup>

Nor should we harbor any doubt that we can destroy the capacity of the Earth to sustain us. History proves that we can. Scientists have shown that many past civilizations have used their resources unwisely, outgrown them, and collapsed.<sup>40</sup> This continues today as societies deplete the resources upon which they have long depended and then decline or move away, having overused their means of survival and then proved unable to invent new ones. The notion is false that this cannot happen on a global scale, that we can always substitute technology or new resources for those that we deplete, and that there is no part of the Earth that we truly need. That idea is not derived from science or history. It

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<sup>35</sup> *2010 and Beyond*, *supra* note 28, at 1 (Fig. 2), 8–9.

<sup>36</sup> *Id.* at 9.

<sup>37</sup> *E.g.*, *Global Environment Outlook—Environment for Development Geo-4*, *supra* note 25 (concluding that human activities now require 54 acres (22 hectares) per person globally, but Earth can provide only 39 acres (16 hectares) per person without suffering permanent degradation); Mathis Wackernagel et al., "Tracking The Ecological Overshoot Of The Human Economy," *Proceedings of the National Academy of Sciences*, Vol. 99, No. 14 at 9266-9271 (July 9, 2002), available at: [http://www.precaution.org/lib/tracking\\_overshoot\\_of\\_human\\_economy.020719.pdf](http://www.precaution.org/lib/tracking_overshoot_of_human_economy.020719.pdf) (human demand constituted 70% of the biosphere's regenerative capacity in 1961 and 120% of that capacity in 1999). *See also* Global Footprint Network web site: <http://www.footprintnetwork.org/en/index.php/GFN/>.

<sup>38</sup> *See* Board of the Millennium Ecosystem Assessment, "Living Beyond Our Means: Natural Assets and Human Well-being," *Millennium Ecosystem Assessment* at 5 (2005), available at <http://www.precaution.org/lib/livingbeyondourmeans.050315.pdf> (introducing "bottom line" of *Millennium Assessment*).

<sup>39</sup> *Millennium Assessment*, *supra* note 24, at 1. *See also* Edward O. Wilson, *The Creation: An Appeal to Save Life on Earth* 26–36, 62–69 (2006) (discussing deep biological dependence of human beings on the Earth).

<sup>40</sup> *See generally* Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* 18–19 (2005).

is a fantasy of the economist's imagination, made necessary by the hopes for endless growth of costs and benefits in a world that, as science is making all too clear, is finite and exhaustible.<sup>41</sup>

Thus we see the fatal flaw inherent in Executive Order 12,866. By allowing all environmental impacts except those proved to cause a net social loss, it permits those impacts to grow without limit even when their cumulative effect exceeds the capacity of the Earth's ecological systems to assimilate them without being degraded. Even if cost-benefit analysis can promote the public welfare when the human ecological footprint is substantially below ecological limits, it cannot do so once we approach and exceed those limits. Each incremental impact, if taken alone in an empty world, might cause cost-benefit justifiable harm or even, in many cases (such as carbon emissions), no harm at all. But under conditions of ecological overshoot, each incremental impact contributes to a total loss that is immeasurable. Indeed, the permanent loss of the ecological integrity of the Earth, since we need it to survive and prosper, might fairly be considered an infinite loss. An immeasurable or infinite loss simply cannot be meaningfully allocated among a finite, even if large, number of increments of damage.<sup>42</sup> For how can the cost to humanity of the ecological devastation of the Earth be allocated among each source of carbon emissions, each filled acre of wetlands, each lost fishery, each felled stand of trees, or each farmer's fertilizer contribution the dead zones in the sea? How can the value of individual species be calculated when the loss of each contributes to the permanent unraveling of the web of life? How can liability for making the Earth uninhabitable to us be allocated among the thousands or millions of small increments of damage?

The reason, then, that the environmental decision-making structure of Executive Order 12,866 is no longer appropriate is this: while each small part of the ecologically functioning biosphere may seem dispensable for some finite gain, the entire biosphere, though finite and composed only of these small parts, is nevertheless indispensable. While any individual island, lake, or forest has a finite value, the ecological functioning of the Earth as a whole has an immeasurable, indeed infinite, value. We can sacrifice any of the individual parts, but we cannot sacrifice the whole. Once the human footprint begins to threaten the ecological viability of the Earth, therefore, we continue our adherence to Executive Order 12,866 at our peril.

Executive Order 12,866 embeds regulators in a decision-making structure that claims the mantle of science, but it is profoundly unscientific. Rooted in the starting assumption that ecological overshoot is not possible, it forces regulators to analyze impacts as narrow, isolated events. It does not permit them broadly to assess those impacts in the context of

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<sup>41</sup> Some economists have strongly criticized the endless-growth assumption that man-made capital is infinitely substitutable for natural capital, and argued that we must have policy interventions if we are to ensure that we pass a legacy of natural capital on to future generations. *See, e.g.,* Daly & Farley, *supra* note 22, at 15, 35, 223–44; Douglas A. Kysar, “Discounting . . . on Stilts,” 74 *U. Chi. L. Rev.* 118, 126–28 (2007); Daly, *supra* note 22.

<sup>42</sup> *See* Kysar, *supra* note 41, at 129 (arguing that the assumption that all our projects are small can lead to an intolerable result if applied across the economy, noting that global fishery depletion is the result of cumulative “local” fishery collapses).

the comprehensive and detailed findings by the world scientific community that cumulative impacts are exceeding the capacity of the Earth's ecological systems to assimilate them. Executive Order 12,866 is firmly based in the outdated conception of the world as an empty one rather than as the full one that is arising all around us. Its decision-making structure as applied to the environment is based on assumptions that science has proved to have become false.

The Executive Order itself has become scientifically invalid.<sup>43</sup>

V. The Flaws Inherent in Executive Order 12,866  
Are Vividly Apparent When It Is Used to  
Evaluate Long-term Ecological Degradation

The consequence of the inherent blindness of Executive Order 12,866 to large-scale, cumulative environmental degradation emerges in stark relief when it is used to evaluate future environmental degradation and its effect on future generations.

Many economists hold that when future costs and benefits are valued, regulators should apply some positive discount rate to all costs and benefits. This reflects their conclusion that we should view harm that occurs in the future as less costly than harm occurring today and, symmetrically, should prefer to obtain benefits today rather than in the future.<sup>44</sup> In a 2001 survey, 2,160 economists most commonly chose a discount rate of 2 percent (with a median choice of 3 percent and a mean of 4 percent) for calculating the present value of the costs of long-term environmental problems.<sup>45</sup>

Following this view, OMB has issued detailed guidance on the use of positive discount rates in cost-benefit analysis under Executive Order 12,866.<sup>46</sup> This guidance provides that agencies should perform two separate analyses of their regulations, one employing a 3

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<sup>43</sup> The environmental decision-making structure of Executive Order 12,866, by not being well-grounded in contemporary ecological science, does not comport with President Obama's memorandum on scientific integrity, *supra* note 3 ("Science and the scientific process must inform and guide decisions of my Administration on a wide range of issues, including improvement of public health, protection of the environment, increased efficiency in the use of energy and other resources, mitigation of the threat of climate change, and protection of national security").

<sup>44</sup> Paul R. Portney & John P. Weyant, "Introduction" in *Discounting and Intergenerational Equity* 6–7 (Paul R. Portney & John P. Weyant eds., Resources for the Future 1999) ("[O]ne of the most important conclusions" of this workshop proceeding is that all but one of the authors agree that it is "essential" that future benefits and costs be discounted at a positive rate, particularly for long time frames.); David A. Weisbach & Cass R. Sunstein, "Introduction to Symposium On Intergenerational Equity and Discounting," 74 *U. Chi. L. Rev.* 1, 3 (2007) ("[M]ost of the authors [of articles in this symposium volume] believe that a positive discount rate is appropriate.").

<sup>45</sup> Geoffrey Heal, "Discounting: A Review of the Basic Economics," 74 *U. Chi. L. Rev.* 59, 72 (2007) (summarizing a 2001 survey of economists reported in Martin L. Weitzman, "Gamma Discounting," 91 *Am. Econ. Rev.* 260, 266–69 (2001)).

<sup>46</sup> OMB Circular A-4, *supra* note 11, at 32. See also John D. Graham, "Valuing the Future: OMB's Refined Position," 74 *U. Chi. L. Rev.* 51, 51–57 (2007) (discussing OMB Circular A-4, various discount rates and when they should be used).

percent discount rate<sup>47</sup> and one employing a 7 percent discount rate.<sup>48</sup> In some circumstances, OMB believes a higher rate of 10 percent,<sup>49</sup> or sometimes a rate below 3 percent,<sup>50</sup> could be appropriate and suggests that regulatory agencies should consider these as well. Analysts who have broadly examined compliance with this guidance find that federal agencies now frequently employ discounting.<sup>51</sup> In a recent example, the EPA calculated the costs and benefits of a Clean Air Act regulation using both 3 percent and 7 percent discount rates.<sup>52</sup>

OMB offers several reasons for attributing a lower value to future costs and benefits than to present ones.<sup>53</sup> One is the empirical evidence that people have a “positive time preference.”<sup>54</sup> Another is that if the economy continues to grow as it has for most of U.S. history, consumption of particular benefits now will be of greater marginal utility than in the future when we are richer and our consumption is greater.<sup>55</sup>

Economists generally find unworkable the idea of avoiding discounting and simply assuming that future costs and benefits are worth the same as present ones (which is equivalent to applying a discount rate of zero). They argue that this would lead to numerous “anomalies” or “paradoxes.”<sup>56</sup> Consider, for example, environmental damage that permanently affects all future generations, such as loss of a species or global warming. The total cost of losses that are permanent would accrue every year for thousands or even millions of years and reach a vast accumulated value. These costs would seem to justify extensive, immediate social actions and expenditures to avoid

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<sup>47</sup> OMB Circular A-4, *supra* note 11, at 33 (reciting the 3 percent rate as the historical real rate of return on long-term government debt, and arguing that it approximates the social preference for present consumption over future consumption and is therefore the appropriate discount rate whenever a regulation primarily affects private consumption (e.g., by affecting the price of consumer products)).

<sup>48</sup> OMB Circular A-4, *supra* note 11, at 33 (reciting the 7 percent rate as the average before-tax rate of return to private capital in the U.S. economy, and arguing that it approximates the opportunity cost of capital and is therefore the appropriate discount rate whenever a regulation displaces the use of capital by the private sector).

<sup>49</sup> *Id.* at 34.

<sup>50</sup> *Id.* at 36.

<sup>51</sup> See W. Kip Viscusi, “Rational Discounting For Regulatory Analysis,” 74 *U. Chi. L. Rev.* 209, 224–26 (2007) (analyzing the use of discounting by regulatory agencies).

<sup>52</sup> Clean Air Interstate Rule, 70 *Fed. Reg.* 25, 162 (May 12, 2005).

<sup>53</sup> See OMB Circular A-4, *supra* note 11, at 32. See also Heal, *supra* note 45, at 71–77; Graham, *supra* note 46, at 52–54.

<sup>54</sup> See, e.g., OMB Circular A-4, *supra* note 11, at 32.

<sup>55</sup> *Id.*; Tyler Cowan, “Caring about the Distant Future: Why It Matters and What It Means,” 74 *U. Chi. L. Rev.* 5, 6–7 (2007).

<sup>56</sup> Viscusi, *supra* note 51, at 216–17 (outlining four “anomalies” caused by failure to discount, concluding that “serious economic discussions do not suggest that zero discount rates are appropriate”); Cass R. Sunstein & Arden Rowell, “On Discounting Regulatory Benefits: Risk, Money and Intergenerational Equity,” 74 *U. Chi. L. Rev.* 171, 175–78 (2007) (outlining “paradoxes” caused by zero discount rate).

them. Some analysts view this outcome as “absurd,” believing that “not even Greenpeace” would want to spend current resources commensurate with the large costs associated with undiscounted, long-term environmental damage.<sup>57</sup> Discounting avoids this “absurd” result and its immediate social consequences by mathematically reducing the apparently staggering costs of future environmental degradation.<sup>58</sup>

The main reason for using positive discount rates, however, is grounded in the opportunity cost associated with spending resources now rather than later while the economy steadily grows.<sup>59</sup> OMB’s logic is that if we spend money to obtain particular benefits (or avoid harm) today, we will have forgone the opportunity to invest the money, let it grow in value, and then have more real wealth in the future with which to purchase benefits (or avoid harm). Positive discount rates are thought necessary if we are to place our choices about the future in the context of a steadily growing economy and increasing future social wealth.

Nevertheless, application of positive discount rates can produce its own set of “anomalies,” especially when applied to long time periods. Some writers have referred to discounting with positive rates as “shrinking the future,” for the mathematics of discounting makes effects in the distant future, even very large effects, seem insignificant compared to effects in the present.<sup>60</sup> For example, discounting at a rate of 5 percent per year causes the value of any future cost or benefit to be mathematically reduced by a factor of 131 in 100 years and by a stunning factor of over 39 billion in 500 years.<sup>61</sup> Discounting can make a dollar’s worth of benefits today appear to outweigh millions or even billions of dollars of damage in the future. Saving one life today can appear more valuable than saving billions of people in the future.<sup>62</sup> The entire global economy of several centuries in the future can be discounted to just two dollars per person today.<sup>63</sup> Positive discount rates make very small benefits today appear more valuable than far larger benefits in the future.

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<sup>57</sup> Richard A. Posner, “Efficient Responses To Catastrophic Risk,” 6 *Chi. J. Int’l L.* 511, 519 (2006) (calculating that if global warming causes \$100 billion in damages per year for one million years, the undiscounted value of that damage is \$100 quadrillion).

<sup>58</sup> A second commonly-cited “anomaly” of using a zero discount rate is the fear that it would create an incentive to defer expenses that would generate a continual stream of future benefits, and thereby cause us to purchase fewer benefits today rather than more. *See, e.g.,* Viscusi, *supra* note 51, at 217. *Cf.,* Kysar, *supra* note 41, at 122–24 (this rationale depends on the unlikely assumption that we actually would invest the unspent resources and set them aside for future purposes).

<sup>59</sup> OMB Circular A-4, *supra* note 11, at 32.

<sup>60</sup> Ackerman & Heinzerling, *supra* note 18, at 179–203.

<sup>61</sup> Cowan, *supra* note 55, at 8.

<sup>62</sup> Sunstein & Rowell, *supra* note 56, at 176 (quoting Frank Ackerman & Lisa Heinzerling, “Pricing the Priceless,” 150 *U. Pa. L. Rev.* 1553, 1571 (2002)).

<sup>63</sup> *See* Portney & Weyant, *supra* note 44, at 5.

Discount rates profoundly affect the outcome of cost-benefit analyses.<sup>64</sup> In one striking example, a 2006 report from the British Treasury, *The Stern Review on the Economics of Climate Change*, found that global warming would impose large costs on the future, warranting substantial and immediate preventive action.<sup>65</sup> This conclusion differed from that of other economists who had found that global warming justifies only modest action now.<sup>66</sup> The difference was driven by Sir Stern's choice of a very low positive discount rate rather than the higher rate used by other economists.<sup>67</sup> Thus, under the environmental decision-making structure of Executive Order 12,866, the question of whether we should take strong immediate action on the critical issue of global warming turns on the seemingly arcane, disturbingly arbitrary choice of a discount rate.<sup>68</sup>

It is simply not possible to use discounting to rationally and consistently protect the interests of future generations. Using any rate of discounting or even not discounting leads to "absurdities."<sup>69</sup> This has led Professor Cass Sunstein and Arden Rowell, as well as other analysts, to conclude:

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<sup>64</sup> See, e.g., Lisa Heinzerling, "Regulatory Costs of Mythic Proportions," 107 *Yale L.J.* 1981, 1984–85, 2069–70 (1998) (choice of discounting method can determine whether regulations are judged cost-effective; discounting value of future human lives saved causes many environmental health regulations to seem far less cost-effective).

<sup>65</sup> Nicholas Stern, *Stern Review: The Economics of Climate Change*, at vi (Oct. 30, 2006) (Summary of Conclusions), available at <http://www.hm-treasury.gov.uk/6520.htm>.

<sup>66</sup> See Weisbach & Sunstein, *supra* note 44, at 2 (discussing difference between results of *Stern Review* and of models used by other analysts); William Nordhaus, *A Question of Balance—Weighing the Options on Global Warming Policy* 1–29 (2008), available at [http://nordhaus.econ.yale.edu/Balance\\_2nd\\_proofs.pdf](http://nordhaus.econ.yale.edu/Balance_2nd_proofs.pdf).

<sup>67</sup> For discussion disapproving the near-zero discount rate used in *Stern Review* and analysis of alternative approaches, see Nordhaus, *supra* note 66, at 9–11, 59–62, 165–91.

<sup>68</sup> In practice, the choice of a discount rate is virtually arbitrary because no persuasive reasons or consensus exist for applying any particular discount rate to long term environmental damage. Besides the various rates discussed above, some analysts have suggested using different discount rates for projects involving different time frames, ranging from 15 percent (5 years) to 5 percent (30 to 50 years), down to 2 percent (100 years). Heal, *supra* note 45, at 68–69. Others have suggested "hyperbolic discounting" in which the discount rate is not constant, but varies over the time period involved. Maureen Cropper & David Laibson, "The Implications of Hyperbolic Discounting for Project Evaluation," in *Discounting and Intergenerational Equity* 163, 163–72 (Paul R. Portney & John P. Weyant eds., 1999). Still others have insisted the same discount rate should be applied to all generations. Viscusi, *supra* note 51, at 209–46. One prominent commentator has argued that because evidence from the American political system shows that Americans place little value on future generations, benefits occurring in the distant future should be deemed to have zero value, and for long time periods, "the effective discount rate should be infinity." Richard A. Posner, "Agencies Should Ignore Distant Future Generations," 74 *U. Chi. L. Rev.* 139, 139–40 (2007). Analysts have suggested negative discount rates as well. Partha Dasgupta, Karl-Goran Maler, & Scott Barrett, "Intergenerational Equity, Social Discount Rates, and Global Warming," in *Discounting and Intergenerational Equity* 51, 51–77 (Paul R. Portney & John P. Weyant eds., 1999). But this option is generally discarded out of hand. Portney & Weyant, *supra* note 44, at 6 (observing that their volume's one proposal for zero or negative discount rates "would be an unusual case"); Sunstein & Rowell, *supra* note 56, at 176 (discussing negative discount rates).

<sup>69</sup> Weisbach & Sunstein, *supra* note 44, at 1–2 (noting that both discounting and not discounting create "absurdities").

It follows that the moral obligations of current generations should be uncoupled from the question of discounting, because neither discounting nor refusing to discount is an effective way of ensuring that those obligations are fulfilled. The moral issues should be investigated directly, and they should be disentangled from the practice of discounting.<sup>70</sup>

But this does not solve the dilemma. If all methods of discounting, including not discounting, can lead to “absurdities,” then the problem is not with discounting. The problem is with cost-benefit analysis. Thus, the question remains: why is it that cost-benefit analysis, with or without discounting, is unable to produce any coherent approach to long-term environmental protection? What is the reason for the “absurdities” and “paradoxes” that so trouble economists and lawyers alike?

Unfortunately, many analysts, OMB included, have had difficulty directly confronting this question. The reason is they are unable to disengage from the endless-growth assumptions that underpin the decision-making structure of Executive Order 12,866. Even when the specter of large-scale future ecological degradation is implicated, these analysts often revert almost reflexively to reminders of these assumptions. For example, John Graham, the leader of the OMB’s approach to federal regulatory analysis during much of the last decade, recently wrote in support of OMB’s use of discounting that U.S. regulators should “almost always” assume they are evaluating small projects with no economy-wide implications:

That is because (a) the U.S. economy is only one part of a huge and growing world economy, and (b) a single regulation is rarely expected to have a discernible impact on the overall growth path of the U.S. economy. Even in the case of policies to address global climate change, we should not assume that general equilibrium approaches to analysis [of the entire economy] will be required. The U.S. economy, for example, is far less sensitive to changes in energy prices than it was thirty or fifty years ago. Moreover, climate change policies that have a significant impact on the overall U.S. economy are not likely to be politically feasible.<sup>71</sup>

Similarly, Professor Sunstein and Arden Rowell, though they are troubled enough by large-scale future ecological degradation to suggest that our moral obligations to future generations should be “uncoupled” from questions of discounting, nevertheless cannot

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<sup>70</sup> Sunstein & Rowell, *supra* note 56, at 199. *See also* Kysar, *supra* note 41, at 120 (expressing hope that after publication of papers from 2006 Symposium those interested in long-term policymaking will be able to put discounting aside and “focus instead on the more important task of conceiving and realizing equitable relations between human generations”); Richard L. Revesz, “Environmental Regulation, Cost-Benefit Analysis, and the Discounting of Human Lives,” 99 *Colum. L. Rev.* 941, 1015–18 (1999) (discounting across multiple generations is unethical because it unavoidably privileges the current generation; any reasons a person might use to make cost-benefit tradeoffs in his or her own lifetime do not apply across generations and so cannot justify cross-generational discounting); Revesz & Livermore, *supra* note 8, at 107-17 (concluding discounting is inappropriate for evaluating impacts on future generations).

<sup>71</sup> Graham, *supra* note 46, at 51–55.

help reverting to endless-growth assumptions:

Some people believe that current generations are obliged not to make the environment worse than it is today. On this view, current generations are environmental trustees. As such, they must follow a kind of *environmental nondegradation principle*. But there is a problem with this position, which is its *selective focus on environmental quality*. Suppose that the current generation sacrifices *a remote island*, but that as a direct result of that action, it is able to confer significant economic, medical, and other benefits on posterity, giving them healthier, longer, and better lives. Is it so clear that the sacrifice is morally unacceptable?<sup>72</sup>

These same analysts support the notion of preventing “irreversible” environmental change but caution against taking this idea too far, again reverting to endless-growth assumptions:

But environmental protection can burden the future too, especially if it is extremely costly, and there is no abstract reason to believe that preserving a particular environmental *amenity* (*a forest, a lake*) is always better for posterity than other investments that do not involve the environment in particular (expenditures on basic research, reductions in national debt).<sup>73</sup>

For these analysts, committed to viewing the world as an empty one that can tolerate endless growth in environmental damage, no reason can exist for an “environmental nondegradation principle” or a “selective focus on environmental quality.” We should be willing to sacrifice every environmental “amenity,” every “remote island,” every “forest” and every “lake” whenever we think it will lead to greater benefits.<sup>74</sup>

Thus we see the error that is causing the discounting paradoxes. The empty-world, endless-growth pre-analytic vision underpinning the decision-making structure of Executive Order 12,866 is being extrapolated from the empty world that gave it birth into a distant future and to very large scales of economic growth and ecological degradation. And there paradoxes abound. For the empty-world, endless-growth assumptions simply

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<sup>72</sup> Sunstein & Rowell, *supra* note 56, at 200 (emphasis added).

<sup>73</sup> *Id.* at 205 (emphasis added).

<sup>74</sup> Similarly, Professor Revesz has suggested a set of ethical principles rather than discounting to inform our obligations to future generations. Ultimately, however, he also is unable to disengage from endless-growth assumptions when it comes to protecting the global environment. When considering the idea of sustainable development and environmental preservation, Revesz considers environmental projects only in isolation, concluding that “it does not make sense to undertake environmental expenditures for the benefit of future generations if the investment can yield higher benefits elsewhere.” Revesz, *supra* note 70, at 1009, 1015. The best he can offer, on the environment at least, is that we might “seek to prevent catastrophic harms and the destruction of unique natural resources.” However, defining those, he admits, may be “hard.” *Id.* at 1015.

do not apply once the growing human footprint becomes capable of permanently degrading the biosphere.

In several centuries or more, the endlessly growing economy of the discounting projections will be many hundreds or even thousands of times larger than it is today. Under our current market structure, absent further legal intervention to preserve the environment, the ecological footprint of such an economy would be vastly larger than today's, assuredly far beyond the Earth's ecologically sustainable limits. Though discounting may make the value of sacrificed islands, forests and lakes seem mathematically to shrink to nothing in the future, the physical reality of those losses is real and permanent. A few elements of the biosphere may seem recoverable at our option, such as air free of short-lived pollutants. But for the most part, in the future we will not be able at any price to reconstitute the soils, productive oceans, forests, and species constituting the web of life that we think we cannot afford to save in the present. Many of these "amenities," once sacrificed, will be gone forever.

The resolution of the paradoxes of discounting, then, is this: An increment of environmental damage that seems affordable in an empty world cannot be projected at that value (or at a discounted lesser value) into a distant future where the total cost of the cumulative increments of damage will have become immeasurable. An economy that sells off bits and pieces of the Earth without means for recognizing they are parts of an invaluable whole cannot be projected into a future in which that economy is assumed to grow forever.

The essential problem lies, however, not with discounting but with cost-benefit analysis. No rate of discounting, whether positive, negative, zero, or hyperbolic, can mold that structure into a form that can manage large-scale ecological degradation. Cost-benefit analysis remains saddled always with the paradox inherent in attributing definite and finite values to individual increments of environmental damage, and then projecting endless growth of such damage onto a finite biosphere.<sup>75</sup>

#### VI. The Decision-Making Structure of Executive Order 12,866 Should Be Replaced with a Decision-Making Structure Designed for Our Current Circumstances

To ensure that the Federal environmental laws promote the public welfare and the welfare of future generations of Americans, the decision-making structure of Executive Order 12,866 should be revised to reflect our current circumstances rather than our past ones.

The first step is to develop a new, more appropriate set of starting assumptions. OMB must accept the message from the scientific community about the full world that has come upon us: the growing cumulative impact of the human footprint is threatening the

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<sup>75</sup> A more complete discussion of this view of discounting is presented in Guth, *Resolving the Paradoxes of Discounting*, *supra* note 5.

ecological integrity of the biosphere, which we need to survive and prosper. In the interest of the long-term public welfare, a new or revised Executive Order should adopt as an overarching priority for implementing the nation's environmental laws, to the extent possible under those laws, the imperative of restraining the cumulative impact of our environmental damage to an ecologically sustainable scale.

Many legal analysts have suggested adoption of legal principles like that of maintaining ecological integrity. For example Ackerman and Heinzerling as well as McGarity et al. have called for alternative methods of decision-making, and recommend what they call a precautionary approach that focuses on avoidance of harm and places the burden of proof on industrial interests to show they are not causing undue harm.<sup>76</sup>

Professor Sunstein has written that cost-benefit analysis may not be appropriate where a particular law seeks to prevent “irreversible” and “catastrophic” damage, such as species loss under the Endangered Species Act, because in such cases lawmakers have decided that the losses protected against are too important to warrant economic balancing. In such cases Sunstein suggests a precautionary approach, or what he calls a “rights-based” approach, may be more appropriate.<sup>77</sup>

What we must recognize, however, is that the ecological degradation we now face cannot reasonably be characterized as comprising just a few isolated problems that threaten “irreversible” or “catastrophic” effects or impacts on future generations. It results from the cumulative effect of our myriad impacts on the Earth. We cannot solve this problem by exempting a few discrete impacts from cost-benefit balancing. We must subject *all* our actions to a new decision-making structure designed to defend and maintain the ecological integrity of the biosphere.

Our economy would be dramatically reshaped under such a new legal principle: it would be directed onto an ecologically sustainable path. It would motivate us perpetually to

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<sup>76</sup> E.g., Ackerman & Heinzerling, *supra* note 18, at 223–29 (calling for better ways of making decisions); McGarity et al., *supra* note 18, at 218–22. See also Joseph L. Sax, “Property Rights and the Economy of Nature: Understanding *Lucas v. South Carolina Coastal Council*,” 45 *Stan. L. Rev.* 1433, 1452 (1993) (stating that law should accommodate “the economy of nature” by redefining land ownership in terms of usufructuary rights, in which a landowner “does not have exclusive dominion of her land; rather, she only has a right to uses compatible with the community's dependence on the property as a resource”). See also Guth, *Law for the Ecological Age*, *supra* note 5, at 489–91 (discussing many other legal writers who have made similar calls for legal reform).

<sup>77</sup> Sunstein, *supra* note 14, at 1651, 1697–98 (2001) (society might find “rights-based thinking,” which forbids balancing an interest against costs, appropriate for certain “irreversible” environmental losses); Cass R. Sunstein, “Irreversible and Catastrophic,” 91 *Cornell L. Rev.* 841, 894–96 (2006) (discussing a form of precautionary approach rather than current cost-benefit analysis for events that may be “irreversible” and “catastrophic”); Sunstein & Rowell, *supra* note 56, at 188–90, 203 (suggesting that use of discounting in cost-benefit analysis should be altered in the case of “catastrophic” future events, such as global warming). See also Posner, *supra* note 57 (proposing modified cost-benefit approaches in cases of catastrophic risk, such as global warming); Revesz & Livermore, *supra* note 8, at 107–17 (perhaps “irreplaceable” resources should be preserved); Revesz, *supra* note 70, at 1015–18 (urging that determining our responsibilities to future generations should focus on, inter alia, prevention of “catastrophic” harms).

reduce environmental damage per unit of output so that the economy could continue to develop within the ecological reality imposed by the Earth. It would focus on using renewable or unlimited resources and those that can be obtained and used without contributing to ecological degradation. As long as we are inventive enough, there is no reason we could not continually increase true human welfare.

Many economists and business people today advocate such an economic restructuring. They encourage preservation of natural capital<sup>78</sup> and reorganization of our economic activity around the principle that the capacities of the Earth are sufficient for us to live within.<sup>79</sup> They encourage creation of products that cause no environmental degradation at any point in their lifecycle.<sup>80</sup> They encourage a constraint on the scale of economic throughput, though we should allow the economy to develop and grow while maintaining the ecological integrity of the Earth.<sup>81</sup> There are, of course, many other examples.

OMB's task should be to craft a legal decision-making structure that is capable of restraining cumulative impacts. Legal structures capable of doing this already exist, and in fact have long existed in American law.<sup>82</sup> Examples in the modern Federal environmental statutes include the Clean Air Act's National Ambient Air Quality Standards,<sup>83</sup> the Clean Water Act's Water Quality Standards,<sup>84</sup> the Endangered Species

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<sup>78</sup> Paul Hawken et al., *Natural Capitalism* (1999).

<sup>79</sup> Thomas Princen, *The Logic of Sufficiency* (2005).

<sup>80</sup> William McDonough & Michael Braungart, *Cradle to Cradle – Remaking the Way We Make Things* (2002) (explaining how products can be designed from the outset so as not to cause damage to the Earth at any point in their lifecycle).

<sup>81</sup> See Daly, *supra* note 22, at 31-60 (distinguishing “development” (defined as improvement in quality of products but within a fixed ecological impact) from economic “growth” (defined as quantitative increase in total scale of throughput)). Using Daly’s terminology, some forms of economic growth would implicate ecological degradation, while other forms may not if they utilize resources that are plentiful and can be obtained without causing ecological degradation (such as renewable energy).

<sup>82</sup> See Guth, *Cumulative Impacts*, *supra* note 5 (discussing legal structures in existing and past American law capable of controlling cumulative impacts).

<sup>83</sup> Clean Air Act, 42 U.S.C. §§ 7401–7671(q) (2000). See *Whitman v. American Trucking Ass’n*, 531 U.S. 457 (2001) (NAAQS are to be set without regard to costs); Sunstein, *supra* note 14, at 1651, 1664 (discussing NAAQS, and citing cases confirming that they are to be based on public health alone). When regions are out of compliance with a NAAQS, states must develop a State Implementation Plan for bringing the region into compliance, which requires them to inventory existing emissions, project their future growth, decide what control strategies to employ, and then allocate emissions reductions among the sources. See Percival et al., *supra* note 6, at 521-26 (outlining requirements for State Implementation Plans). See Guth, *Cumulative Impacts*, *supra* note 5 (discussing control of cumulative impacts by this law).

<sup>84</sup> Clean Water Act, 33 U.S.C. §§ 1251–1387 (2000). These comprise water quality “criteria” that define limits of specific toxic and non-toxic pollutants necessary to protect designated water “uses” (such as drinking, fishing or recreation). When a water body or segment of a river is out of compliance with a water quality standard for a toxic pollutant, then a state must develop a control strategy that will produce a reduction in the emissions among all the relevant dischargers to achieve compliance with the standard. See Percival et al., *supra* note 6, at 637-73 (outlining Clean Water Act provisions for water quality standards). See Guth, *Cumulative Impacts*, *supra* note 5 (discussing control of cumulative impacts by this law).

Act,<sup>85</sup> and the Clean Air Act's cap-and-trade system for sulfur dioxide.<sup>86</sup> Further examples can be found in the early American common law rules grounded in the principle of "do no harm," under which the law was able to protect such interests as the public's right to navigable waters from being interfered with by industrial discharges from numerous sources.<sup>87</sup>

The general lesson of these examples is that the law is capable of controlling cumulative impacts by establishing a standard of environmental or human health, and then, if that standard is exceeded, requiring every contributor to the harm to reduce or eliminate their impacts. We should extend this concept from the handful of existing examples (e.g., NAAQs, Water Quality Standards, and listed endangered or threatened species) to the broader problem of widespread ecological degradation. This will require defining and maintaining a standard of ecological integrity that allows us to live on the Earth, but proscribes contributing to degradation of the ecological systems we need to survive and prosper.<sup>88</sup>

The second critical element in constructing a new decision-making structure is the allocation of the burden of proof. This allocation, by defining the law's default decision in cases of doubt or missing information, defines the law's highest priority. It also should be designed to reflect recognition of imbalances in power, who possesses information, and the incentives it creates to produce or conceal information.<sup>89</sup> For all these reasons, a new decision-making structure should place the burden of proof on those whose conduct threatens to contribute to ecological degradation. Ultimately, cumulative impacts will never be contained if environmental damage is permitted in all cases of doubt or missing information.

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<sup>85</sup> Endangered Species Act, 16 U.S.C. §§ 1531–1544 (2000). *Tenn. Valley Auth. v. Hill*, 437 U.S. 153 (1978) (Endangered Species Act does not require consideration of costs); Sunstein, *supra* note 14, at 1697–98 (discussing lack of cost-balancing in the ESA). Once regulators demonstrate that species are "endangered" or "threatened" as defined under the Act, the ESA requires the Secretary of the Interior to develop and implement a recovery plan for the species, requires all federal agencies to ensure that their actions are not likely to jeopardize the existence of the species or result in the adverse modification or destruction of critical habitat, and prohibits other parties from a variety of activities that would harm the species, including by modifying habitat. See Percival et al., *supra* note 6, at 858–60, 866–69, 892–94, 904–906 (overview of ESA). See Guth, *Cumulative Impacts*, *supra* note 5 (discussing control of cumulative impacts by this law).

<sup>86</sup> 42 U.S.C. § 7651(a)–(e) (2000). Once a particular level of cumulative pollutant emissions is defined under a cap-and-trade regime, the law then focuses solely on allocating a fixed number of permits and forbids all additional emissions. See also Guth, *Cumulative Impacts*, *supra* note 5 (discussing control of cumulative impacts by cap-and-trade).

<sup>87</sup> See Guth, *Cumulative Impacts*, *supra* note 5 (discussing common law cases and how they controlled cumulative impacts); Guth, *Law for the Ecological Age*, *supra* note 5, at 446–450 (structure of older common law).

<sup>88</sup> See Guth, *Law for the Ecological Age*, *supra* note 5, at 495–99 (discussing potential legal definition of ecological degradation); Guth, *Cumulative Impacts*, *supra* note 5 (same).

<sup>89</sup> See Guth, *Law for the Ecological Age*, *supra* note 5, at 499–504 (discussing allocating the burden of proof for ecological degradation, including defining a threshold level of threat).

Placing the burden of proof on industrial interests can be done, and indeed has been done in American law.<sup>90</sup> OMB should also consider what is perhaps the most significant environmental law passed in the world in the last few years, the European Union's regulation known as REACH.<sup>91</sup> That law constitutes a new chemicals policy that will apply to about 30,000 chemicals manufactured in or imported into the European Union.<sup>92</sup> Under REACH, the burden of proof has been placed on industry, including U.S. companies that export to Europe products subject to the law. As a condition for keeping or placing several classes of hazardous chemicals on the market, manufacturers (including U.S. companies) must prove that the socioeconomic benefits of each use of those chemicals outweigh their risks and that there are no suitable alternatives.<sup>93</sup>

Legal writers have begun to develop these principles into various proposals for new decision-making structures designed to contain large-scale ecological degradation. Examples include (1) requiring those who have impaired or are seeking to impair any aspect of the global commons that is critical to human needs and ecological sustainability to bear the burden of proof to justify their conduct,<sup>94</sup> (2) a statutory limit to a society's total ecological impact,<sup>95</sup> (3) a legal rule that would presumptively impose liability for impacts on the environment that may contribute to ecological degradation,<sup>96</sup> (4) a Model State Environmental Quality Act for review of government action that would place the burden of proof on proponents of a project seeking government approval to demonstrate that their project will not contribute to ecological degradation or unfair treatment of any subpopulation,<sup>97</sup> (5) granting of environmental rights to future generations that place the burden of proof on current generations to demonstrate that their actions do not contribute

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<sup>90</sup> See Guth, *Law for the Ecological Age*, *supra* note 5, at 503-04 (citing examples).

<sup>91</sup> Eur. Comm'n, Env't Directorate General, REACH in Brief 3-5 (2007), *available at* [http://ec.europa.eu/environment/chemicals/reach/pdf/2007\\_02\\_reach\\_in\\_brief.pdf](http://ec.europa.eu/environment/chemicals/reach/pdf/2007_02_reach_in_brief.pdf).

<sup>92</sup> *Id.* at 15.

<sup>93</sup> European Parliament and Council, Regulation 1907/2006, art. 60(4), 2006 O.J. (L 396) 150 (EU).

<sup>94</sup> James M. Olson, "Shifting the Burden of Proof: How The Common Law Can Safeguard Nature and Promote an Earth Ethic," 20 *Env'tl. L.* 891, 900 (1990).

<sup>95</sup> Bruce Parady, "In Search of the Holy Grail of Environmental Law: A Rule to Solve the Problem," 1 *McGill Int'l J. Sust. Dev. L. & Pol'y* 29-57 (2005), *available at* <http://jsdlp.mcgill.ca/en/content/1-1/>.

<sup>96</sup> Guth, *supra* note 5, *Law for the Ecological Age*, at 494-511 (also defining a threshold level of environmental impacts that would trigger placing the burden of proof on defendants, a definition of who should have standing to assert this rule of law, and a temporary affirmative defense for those engaged in a meaningful search for less damaging alternatives).

<sup>97</sup> Joseph H. Guth, *Model State Environmental Quality Act of 2007*, *available at*: <http://www.sehn.org/lawpdf/ModelStateEQA2007.pdf> (proposal by the Science & Environmental Health Network of a new model National Environmental Protection Act (NEPA) focusing on the burden of proof, cumulative impacts and environmental justice).

to ecological degradation either now or in the future,<sup>98</sup> and (6) a proposal for a massive cap and trade system to manage humanity's global footprint.<sup>99</sup>

Admittedly, these proposals generally do not reflect the same procedural or governmental context as a Presidential Executive Order. But they reflect an array of ideas for how the law can prevent broad ecological degradation. They uniformly include definitions of a standard of environmental health that the law should define and protect, legal barriers to all acts that contribute to invasion of such a standard when it is exceeded, placing the burden of proof on those whose actions threaten the environment, recognizing broad standing to enforce such rules of law, and a focus on motivating continual development of less-damaging alternatives. Under these new decision-making structures, cost-benefit analysis and even discounting might continue to help us choose among less damaging alternatives, but they would no longer be used to justify incremental contributions to ecological degradation.

These are the principles OMB should incorporate into a new Executive Order for implementing the Federal environmental laws.

## VII. Conclusion

President Obama and the Director of OMB are undertaking a much-needed initiative, which we whole-heartedly support.

We encourage the President and the Director to take this opportunity to fully rethink how the Federal environmental laws should be implemented, starting from first principles. When a decision-making structure is designed to replace that of Executive Order 12,866 § 1(b)(6), OMB should clearly explain the first principles that inform it to the American people. OMB should explain the assumptions underlying that decision-making structure, the specific environmental goals of that structure, the allocation of the burden of proof and the incentives that allocation creates, and the reasons the selected structure follows from the chosen assumptions and goals.

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<sup>98</sup> See Science & Environmental Health Network and International Human Rights Clinic at Harvard Law School, *Models for Protecting the Environment for Future Generations* (2008) (proposing legal rights and guardians for future generations) (2008), available at [http://www.law.harvard.edu/programs/hrp/documents/Models\\_for\\_Protecting\\_the\\_Environment\\_for\\_Future\\_Generations\\_Ir.pdf](http://www.law.harvard.edu/programs/hrp/documents/Models_for_Protecting_the_Environment_for_Future_Generations_Ir.pdf); Edith Brown Weiss, *In Fairness to Future Generations: International Law, Common Patrimony, and Intergenerational Equity* (2nd prtg. 1992) (defining principles of intergenerational equity); Science & Environmental Health Network and International Human Rights Clinic at Harvard Law School, "Model Provisions to Amend State Constitutions for the Purpose of Establishing Environmental Rights for Present and Future Generations" in Burns H. Weston & Tracy Bach, *Recalibrating the Law of Humans with the Laws of Nature: Climate Change, Human Rights, and Intergenerational Justice* (Climate Legacy Initiative, forthcoming 2009), to be available at: <http://www.vermontlaw.edu/x4128.xml>.

<sup>99</sup> World Wildlife Fund, Zoological Society of London & Global Footprint Network, *Living Planet Report 2006 25* (2006), available at: [http://assets.panda.org/downloads/living\\_planet\\_report.pdf](http://assets.panda.org/downloads/living_planet_report.pdf).

We believe it is critical that a new or revised Executive Order be solidly grounded in the scientific reality of today's global and U.S. ecological degradation. That reality diverges starkly from the assumptions that informed Executive Order 12,866 and its predecessor from the Reagan Administration. Because science is showing that those assumptions have become outdated, a new or revised Executive Order must take a different approach if it is to be scientifically valid.

There is now a compelling reason for us to selectively avoid environmental impacts that contribute to ecological degradation rather than simply subject them to an individualized cost-benefit comparison to all other human interests. That reason is not based in people's cognitive difficulties, false beliefs in the beneficence of nature, probability neglect, irrational fears or social panics caused by social cascades and group polarization.<sup>100</sup> It is not answered by creating a special exception to cost-benefit analysis for a limited number of "catastrophic" or "irreversible" harms.

The reason is that the ecological systems that we need to survive and prosper are being irreversibly and permanently degraded by cumulative effects of the myriad human impacts on the Earth that comprise the human footprint. Science is telling us very clearly that a mounting tsunami of cumulative impacts is threatening the biosphere, the public welfare, and the fate of future generations.

President Obama and the Director have an obligation to the American people to design a new or revised Executive Order directing all Federal executive agencies to respond to this new reality as they implement the nation's environmental laws.

Thank you for the opportunity to submit these comments. We would be happy to answer any questions, provide additional material, and otherwise assist the President and the Director in this important matter.

Very truly yours,

/ss/

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<sup>100</sup> Cass R. Sunstein, *Laws of Fear – Beyond The Precautionary Principle* 6, 44-45, 64-88 (Cambridge University Press 2005).

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