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WHY ENVIRONMENTAL LAWS FAIL

JAN G. LAITOS* & LAUREN JOSEPH WOLONGEVICZ**

ABSTRACT

Although governments have deployed an array of environmental protection laws, our planet continues to experience unprecedented environmental “crises,” including climate change, resource depletion, species extinction, ecosystem damage, and toxic air-water-land pollution. Despite universal acknowledgment and recognition of these serious environmental issues, and despite a growing list of laws designed to address these issues, the reality is that these adverse Earth-based environmental changes continue, and may even be worsening. Environmental protection laws have often failed because they usually include certain problematic characteristics: they are anthropocentric, in that their goal is to protect and benefit humans, not the environment in which humans live; they assume human superiority and exceptionalism to nature and natural processes; they are based on the notion that humans are separate from nature; they presume that humans are not ultimately limited by planetary boundaries, because they are superior and somehow insulated from nature. Moreover, these laws use an unrealistic model for humans—where human motivations are consistent with the *homo economicus* model used by traditional resource economists—the always rational, self-interested economic person motivated by negative laws, which tell humans what not to do. They also rely on an unrealistic model for nature, where nature is perceived too simply, as a closely integrated, self-regulating, complex system that works best when left alone by humans. This view is not consistent with the science of how nature really works, which is as complex adaptive systems. This Article reviews how these assumptions and models have largely influenced legal resources and environmental decision-making over four distinct eras during the past three hundred years—the Use, Conservation, Preservation,

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and Protection Eras. For environmental laws to work in a new, more Ecocentric Era, laws would be built on three foundations. First, environmental laws would not continue to rely exclusively on the assumptions and models used in previous eras, but instead would reflect the reality of how humans behave and nature works. Second, these laws would impose an affirmative duty on humans to make choices consistent with ecological integrity and planetary boundaries—in other words, rather than telling humans what not to do, laws should tell or encourage humans what to do. And third, rather than rely on rules that seek to prevent humans from creating negative environmental externalities, these new laws would create incentives for humans to create positive ecocentric externalities.

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INTRODUCTION

Environmental and natural resource laws permeate the statute books of the United States. Anti-pollution laws seek to clean up the air, water, and land;¹ endangered species laws are designed to slow extinctions;² open space and parkland laws are intended to preserve dwindling wilderness areas;³ forest management statutes try to conserve timberland for future generations;⁴ and energy and mineral laws are in place to regulate the removal and use of valuable resources.⁵ These laws directing human actions regarding natural and environmental resources have been in place for decades and are both comprehensive and ubiquitous, at both a national and state level. Nonetheless, despite all these laws, it is increasingly becoming apparent that human actions have (1) dramatically altered environmental spaces and natural systems;⁶ (2) started to exhaust the planet's store of natural resources;⁷ and (3) poisoned living organisms, including humans, and their ecosystems.⁸ There is, then, an odd paradox. We have been exceptionally aggressive in utilizing our legal institutions to manage, regulate, and protect environmental and natural resources,

¹ See, e.g., Clean Air Act, 42 U.S.C. §§ 7401–7671 (2012).

² See, e.g., Endangered Species Act of 1973, 16 U.S.C. §§ 1531–44 (2012).

³ See, e.g., Federal Land Policy and Management Act, 43 U.S.C. §§ 1701–81 (2012).

⁴ See, e.g., National Forest Management Act of 1976, 16 U.S.C. §§ 1600–14 (2012).

⁵ See, e.g., General Mining Law of 1872, 30 U.S.C. §§ 22–47 (2012).

⁶ See Paulo Prada, *Special Report: Rainforest Raiders Foil the Guardians of the Amazon*, REUTERS (Jan. 16, 2014), <http://www.reuters.com/article/2014/01/16/us-brazil-deforest-special-report-idUSBREA0FORU20140116>,

<http://perma.cc/AB7Q-BTSN>; Darryl Fears, *Global Warming Already Affecting U.S., White House Assessment Says*, WASH. POST, May 7, 2014, at 19A; Robert Lee Hotz, *Ocean Levels Continue to Rise*, WALL ST. J., Aug. 7, 2013, at A4.

⁷ See Denise Chow, *Water Woes: Vast US Aquifer is Being Tapped Out*, DISCOVERY NEWS (Aug. 27, 2013), <http://news.discovery.com/earth/plants/kansas-aquifer-water-depletion-130827.htm>, archived at <http://perma.cc/N7QM-H2D6>.

⁸ See Maria Cheng, *Air Pollution Causes Cancer, WHO Agency Concludes*, MSN.COM (Oct. 17, 2013), <http://news.msn.com/science-technology/air-pollution-causes-cancer-who-agency-concludes>, archived at <http://perma.cc/98ND-QS94>; Seth Borenstein, *Study: Species Disappearing Far Faster than Before*, MSN NEWS (May 29, 2014, 2:08 PM), <http://bigstory.ap.org/article/study-species-disappearing-far-faster>, archived at <http://perma.cc/A5CS-VEE8>.

yet there is a growing consensus that the earth and its planetary systems are in serious trouble.⁹ Why have all these laws been unable to do the job?

For nearly two centuries, laws directed at resource and environmental regulations have relied on certain false assumptions about nature, humans, and humans in nature. For example, underlying most environmental and natural resource law is the belief that the primary purpose of these laws should be to benefit *humans*, not humans as a component of nature, not nature itself, and not the planet that contains both humans and nature. These anthropocentric laws are mostly aimed at furthering human benefits and welfare, and are also grounded in notions of human superiority and exceptionalism. As such, our laws reflect a distinct separateness between humans and nature, where humans are not part of nature, but instead are apart and detached from nature.¹⁰ This separateness is manifested in the way legal responses have neglected to concentrate on the harmful impacts human activities have on natural resources, and instead have focused on how human actions affecting nature have various destructive effects on humans. In addition, humans have until relatively recently assumed that the earth's resources were basically limitless. It was only when resources began disappearing or were entirely exhausted that humans began to acknowledge that there may be fixed planetary boundaries that place limits on resource use.¹¹

These wrong assumptions have helped to ensure the eventual failure of many of the laws that humans have put in place to address human actions that disrupt Earth-based systems and resources. Another contributor to this failure is the tendency of environmental and natural resource laws to be based on two unrealistic models.¹² The first of these posits how nature works. That model traditionally began with the idea that nature will always achieve stability if left alone by humans, and that nature is

⁹ According to the latest United Nations intergovernmental report on climate change, humans are interfering with the climate and the resultant climate change presents risks for both humans and nature. See Intergovernmental Panel on Climate Change, *Climate Change 2014: Impacts, Adaption, and Vulnerability: Technical Summary*, IPCC WGII AR5 (Mar. 31, 2014) available at http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-TS_FGDall.pdf.

¹⁰ See William Leiss, *Modern Science, Enlightenment, and the Domination of Nature: No Exit?*, FAST CAPITALISM 2.2 (2007), http://www.uta.edu/huma/agger/fastcapitalism/2_2/leiss, archived at <http://perma.cc/Y364-8KUY> (explaining that humans calculate the "world as prey" and separate themselves from nature in order to master it).

¹¹ See Johan Rockström et al., *A Safe Operating Space for Humanity*, 461 NATURE 472, 472 (Sept. 24, 2009), available at http://www.studentsonice.com/antarctic2013/documents/rockstrom_2009.pdf [hereinafter Rockström et al., *A Safe Operating Space*].

¹² *Id.*

self-regulating.¹³ To the contrary, nature acts as a “complex adaptive system,” which thrives on non-linear constant change, not stasis, where humans cannot simply “leave nature alone” because we are not outside of this system, but rather an inevitable and embedded part of it.¹⁴

The second unrealistic model is based on unsound beliefs about how humans behave. Among the most cherished and longest held of these beliefs, particularly by economists, is that humans are rational actors driven by the self-interested need to maximize one’s own welfare.¹⁵ In reality, however, humans sometimes act contrary to this rational actor *homo economicus* model. They often behave altruistically or without any direct benefit to the human actor, and are instead influenced by emotional and cognitive biases, not just welfare maximization.¹⁶

Many of these erroneous assumptions and inaccurate models have played out during the Four Troubled Eras of environmental and natural resource laws. In Era I, the “Use” Era, humans assumed that resources were largely inexhaustible and nonpollutable, and an ethic of resource use for immediate human benefit pervaded the laws.¹⁷ In Era II, the “Conservation” Era, lawmakers began to comprehend the importance of maintaining resources for future generations, although the prevailing attitude—that natural resources should be used by humans—was still the dominant belief, even as laws aimed to manage and conserve resources for later human use.¹⁸ Eventually, however, as humans began to appreciate the consequences of planetary boundaries legal policies shifted from a resource and conservation focus to an emphasis first on resource *preservation* (Era III)¹⁹ and then environmental *protection* (Era IV).²⁰ The laws in Era III were aimed at preserving certain lands and species, such as wilderness, parklands, and endangered wildlife that we realized were disappearing.²¹ And the laws in Era IV were directed at protecting environmental goods, like air and water, which were fast becoming polluted.²²

¹³ *Id.* at 113.

¹⁴ Simon Levin et al., *Social-Ecological Systems Are Complex Adaptive Systems: Modeling and Policy Implications*, 18 ENV’T & DEV. ECON. 111 (April 2013).

¹⁵ See DANIEL KAHNEMAN, THINKING, FAST AND SLOW (2009).

¹⁶ See CASS R. SUNSTEIN, WHY NUDGE?: THE POLITICS OF LIBERTARIAN PATERNALISM (THE STORRS LECTURE SERIES) 32 (2014).

¹⁷ See *infra* Part II.A.

¹⁸ See *infra* Part II.B.

¹⁹ See *infra* Part II.C.

²⁰ See *infra* Part II.D.

²¹ See *infra* Part II.A.

²² See *infra* Part II.B.

Nevertheless, in both Eras III and IV, laws were still anthropocentric and based on notions of human separateness from nature.

Part I of this Article details the central fallacies that have underscored virtually all of our traditional legal responses to natural resources and environmental goods. Part II recounts the four eras that have characterized American environmental and natural resource laws. Part II illustrates how lawmakers, mistakenly relying on faulty assumptions and inexact models, have so degraded our laws that rules for resource use have been unable to prevent humans from systematically removing, polluting, and altering the planet's resources and natural systems. Part III suggests a new legal paradigm that might avoid the past flaws in our thinking about humans and nature, and better establish more practical ground rules for human-nature interactions. Part III outlines how a new class of "Era V" laws would be more likely to bring about a better balance between humans and nature, because such laws would reflect a more realistic view of all the various components of the biosphere, including the one involving humans.

I. THE PROBLEM WITH NATURAL RESOURCES AND ENVIRONMENTAL LAWS

Several fallacies embedded in our natural resources and environmental laws have historically caused them to fail to maintain a workable and sustainable balance between humans and nature.²³ Among these fallacies are: (1) the myth of human superiority and exceptionalism; (2) the belief in human separateness; and (3) the theory of no planetary boundaries. Lawmakers have not only relied on these false assumptions, but they have also grounded their laws on inaccurate models as to how (1) nature works and (2) humans behave.²⁴ As a consequence of these wrong assumptions and unrealistic models, natural resources and environmental laws have been unsuccessful and in some cases even destructive.²⁵

A. *Flawed Assumptions*

One principal and recurrent theme in natural resources and environmental laws is that they tend to fail because they include a number of problematic characteristics rooted in anthropomorphism. Laws that are

²³ See *infra* Part II.

²⁴ See *infra* Part II.

²⁵ For a discussion of how the underlying assumptions were destructive, see *infra* Part II.

anthropocentric are aimed at protecting and benefiting *humans*, not the environment in which humans live or even the planet itself.²⁶ For example, laws to preserve nature are often put in place not because of a desire to safeguard the intrinsic value of nature, but rather, to protect humans' ability to enjoy and use natural objects and places that are now preserved.²⁷

Anthropocentric laws were particularly concerned with enhancing the *economic* welfare of humans.²⁸ Humans presumed that economic growth and development always provided a benefit to civilized society.²⁹ However, this presumption of the inevitable benefits of economic growth is unsound. The presumption results in a decision-making structure that systematically overestimates the value of development and growth while underestimating

²⁶ See *Environmental Ethics*, STANFORD ENCYCLOPEDIA PHIL. (Jan. 8, 2008), <http://plato.stanford.edu/entries/ethics-environmental/#IntChaEnvEth>, archived at <http://perma.cc/XC5J-LSYP>.

²⁷ See John O'Neill, *The Varieties of Intrinsic Value*, 75 *MONIST* 119–38, 119 (1992). A quintessential example of anthropomorphic laws are the laws adopted during the Preservation and Protection eras (Eras III and IV) of the twentieth century that were designed to restrict the widespread resource exploitation by private owners that had contributed to vast resource depletion; these laws created *publically* owned property and regulated *privately* owned resources. DANIEL H. COLE & PETER Z. GROSSMAN, *PRINCIPLES OF LAW AND ECONOMICS* 325–26 (2005); see, e.g., *Home Builders Ass'n of Cent. Ariz. v. Kard*, 199 P.3d 629, 630 (Ariz. Ct. App. 2008) (discussing a home builder's challenge to state air quality permits that were required for earth-moving operations on privately owned land). But these laws were not principally concerned with the harm caused to the environment by resource overuse. JAN G. LAITOS, *THE RIGHT OF NONUSE* 55, 119 (2012) (“[T]he rationale for the legal intervention has primarily been anthropocentric—to enhance immediate human self-interest, or to prevent harm to humans.”). Rather, preservation and protection laws were more focused on avoiding damage to human health and welfare, which seemed to be the consequence of resource overuse and environmental degradation. *Id.*; RICHARD J. LAZARUS, *THE MAKING OF ENVIRONMENTAL LAW* 59 (2004).

²⁸ LAITOS, *supra* note 27, at 119 (“[C]onsistent with standard welfare economics theory, legal policies should depend ‘solely on concerns for human welfare.’”) (quoting LOUIS KAPLOW & STEVEN SHAVELL, *FAIRNESS VERSUS WELFARE* 16 (2002) (emphasis in original)). See generally ROBERT COSTANZA ET AL., *THE VALUE OF THE WORLD'S ECOSYSTEM SERVICES AND NATURAL CAPITAL*, 387 *NATURE* 253, 253 (1997) (explaining that ecosystem services provided between a 16- and 57-trillion-dollar annual global value).

²⁹ See Joseph H. Guth, *Cumulative Impacts: Death-Knell for Cost-Benefit Analysis in Environmental Decisions*, 11 *BARRY L. REV.* 23, 37 (2008). See generally Minxin Pei, *China's Environment: An Economic Death Sentence*, *FORTUNE* (Jan. 28, 2013, 2:25 PM), <http://fortune.com/2013/01/28/chinas-environment-an-economic-death-sentence/>, archived at <http://perma.cc/WQ8A-BD5Y> (discussing how China's economic growth policy has led to worsening environmental hazards); David Stanway, *To Tackle Pollution, China to Drop Growth at All Costs*, *REUTERS* (Nov. 18, 2013, 2:46 AM), <http://www.reuters.com/article/2013/11/18/us-china-reform-environment-idUSBRE9AH07M20131118>, archived at <http://perma.cc/L5QW-Q3HQ> (“Three decades of industrialization and double-digit growth in China have left the country badly polluted.”).

its impact. Environmental decisions, then, are skewed in favor of economic development over ecological integrity.³⁰

Because major societal institutions have been premised on anthropocentric assumptions, humans too often perceive the world through a lens of human superiority and exceptionalism—a belief that the rules governing the rest of nature simply do not apply to humans.³¹ Consequently, the workings of human social systems and their lawmaking institutions are largely detached from the workings of the natural systems within which they exist.

Anthropocentric natural resources and environmental laws orbiting around notions of human exceptionalism further presume that humans are not limited by natural and largely fixed planetary boundaries. However, humans are in fact dependent upon the functioning of key planetary and ecosystem processes that are responsible for maintaining the environmental conditions necessary for both human life and all living organisms on this planet. As a result of this reality, which humans have wanted to deny, a sustainable relationship between humans and the rest of nature requires that human activities be constrained and limited by the surrounding ecosystem's ability to provide for that activity. Without that constraint there will be irreversible degradation of critical ecological functions.³² Nonetheless, our laws have tended not to reflect the limits of planetary boundaries where ecological integrity should be the standard by which the permissibility of human activity is measured.³³

1. Human Superiority and Exceptionalism

Ideas about human superiority and exceptionalism are based on the dominant belief that humans (1) function independently from nature and (2) are inherently superior to natural organisms. These twin beliefs are repeatedly legitimized and perpetuated through societal and institutional decisions³⁴ and tend to insulate humans from the natural world.³⁵

³⁰ *Id.* Lawmaking decisions based primarily on the goal of economic development and its dependence on the exploitation of nature degrades both critical ecosystem processes and humans who rely on these systems.

³¹ At their core, views of human superiority and exceptionalism are ingrained in the self-serving notion that humans are separate and independent from nature.

³² MATHIS WACKERNAGEL & WILLIAM REES, *OUR ECOLOGICAL FOOTPRINT: REDUCING HUMAN IMPACT ON EARTH* 4–5 (1996).

³³ Guth, *supra* note 29, at 41.

³⁴ See CORMAC CULLINAN, *WILD LAW: A MANIFESTO FOR EARTH JUSTICE* 63 (2d ed. 2011) (discussing the prevalence of the anthropocentric world-view in dominant societies' systems of law).

³⁵ See EMILIO F. MORAN, *PEOPLE AND NATURE* 7 (2006).

For example, in the first two eras of natural resource laws, the Use and Conservation Eras, humans deployed laws because we thought that nature existed for our own benefit—to be exploited for the immediate present (Era I), or the eventual future (Era II).³⁶ In Era I, where resource *use* was the dominant ethos, it was thought that nature was intended for productive human use.³⁷ “[N]ature [had] a telos: to be fruitful and support human life.”³⁸ The ideology of human superiority arose in conjunction with the belief that the natural world was created for humans’ productive benefit.³⁹

The frontier mentality in the early nineteenth century, for instance, embraced the idea that human labor and resource cultivation could, and indeed should, improve the natural condition of the wilderness.⁴⁰ The largely unpopulated American West was perceived as fearsome, unruly, and in need of human taming.⁴¹ By settling the frontier, Americans were reclaiming what was otherwise considered waste, and then subordinating natural resources to human desires and needs.⁴² What was driving these actions was the assumption that humans were morally superior beings, and as such, had a responsibility to exploit nature by exercising dominion over it.⁴³ This human-nature domination paradigm is still demonstrated today in the general societal attitude that environmental laws should not overly constrain human exploitation of nature.⁴⁴

A belief in human superiority and exceptionalism continued to exhibit itself during the conservation laws of Era II.⁴⁵ By promulgating various forest and timber management statutes, American lawmakers assumed that they were intelligent enough to fine-tune natural processes so as to manage, and even control, nature for eventual human use. For

³⁶ See *infra* Part I.B.1.b.

³⁷ Jedediah Purdy, *American Natures: The Shape of Conflict in Environmental Law*, 36 HARV. ENVTL. L. REV. 169, 169 (2012) [hereinafter Purdy, *American Natures*].

³⁸ *Id.* at 173.

³⁹ See generally James Buchanan, President, Second Annual Message to Congress (Dec. 6, 1858) (transcript available at <http://www.presidency.ucsb.edu/ws/?pid=29500>) (summarizing the task of territorial settlement as “generally to reclaim the wilderness”).

⁴⁰ See *id.*; see also Jonathan Baert Wiener, *Law and the New Ecology: Evolution, Categories, and Consequences*, 22 ECOLOGY L.Q. 325, 339 (1995) [hereinafter Wiener, *Law and the New Ecology*].

⁴¹ Buchanan, *supra* note 39.

⁴² Purdy, *American Natures*, *supra* note 37, at 181–82.

⁴³ Jonathan Baert Wiener, *Beyond the Balance of Nature*, 7 DUKE ENVTL. L. & POL’Y F. 1, 3–4 (1996) [hereinafter Wiener, *Beyond the Balance of Nature*].

⁴⁴ *Id.* at 6.

⁴⁵ See *supra* Part II.B.

example, Gifford Pinchot, the national forest system's leading architect,⁴⁶ believed that management of the nation's forests would ultimately serve human ends. National forests would, if managed properly, provide "a continuous supply of timber."⁴⁷ The anthropocentric underpinnings of such conservation laws of Era II, like the laws in Era I that encouraged resource use, were driven by assumptions of human entitlement and natural dominance of nature.⁴⁸ Their emphasis was not on seeking a practical balance between humans and nature, but instead on controlling nature for human consumption.

The belief that humans were superior to nature was linked to a feeling that we were also gifted multitaskers. The idea of human exceptionalism contributed to the system that encouraged a multiple-use philosophy for the nation's forests and eventually for much of our public lands.⁴⁹ Such a resource management scheme assumed that humans could take charge of natural processes, and manage natural resources according to human beliefs about how nature works, even though these beliefs may be different from the more complicated ecological realities of the environment.⁵⁰ The perception that humans not only can, but should, exercise dominion over nature, ultimately resulted in humans distancing themselves from nature even further.⁵¹

Even as the movement to preserve and protect threatened resources and environmental goods gained steam in the late twentieth century, there remained a general societal belief that natural resources and environmental laws should not confine humans' ability to exploit nature.⁵² Although Eras III and IV are marked by environmental preservation and protection ethics, human superiority and exceptionalism, while present to a lesser extent than in the first two eras, still enjoyed a prominent position in our

⁴⁶ See generally DOUGLAS BRINKLEY, *THE WILDERNESS WARRIOR: THEODORE ROOSEVELT AND THE CRUSADE FOR AMERICA* 396–430 (2009).

⁴⁷ 16 U.S.C. § 475 (2012).

⁴⁸ See LAITOS, *supra* note 27, at 119–21.

⁴⁹ The Multiple-Use Sustained-Yield Act of 1960 (MUSYA) required that national forests be managed for multiple uses, including: fish and wildlife, rangeland, recreation, wilderness, watersheds, and timber supplies, while maintaining the resources without impairment of productivity "in perpetuity." See Multiple-Use Sustained-Yield Act of 1960, 16 U.S.C. §§ 473–82, 551 (2012).

⁵⁰ See *infra* Part I.B.

⁵¹ Leiss, *supra* note 10; see also *infra* Part I.A.2 for an in-depth discussion of how human superiority and exceptionalism have led to increased separateness between humans and nature.

⁵² See Wiener, *Beyond the Balance of Nature*, *supra* note 43, at 6.

legal response to natural resources and environmental goods.⁵³ While preservation and protection laws sought to address aesthetic, recreational, and human health problems caused by resource overexploitation,⁵⁴ such laws also were designed to maintain the value nature was seen to impart to humans in its pristine or unused state.⁵⁵ As self-righteous beings, humans have taken upon themselves the obligation, really almost a self-assigned moral duty, to impose their superior and exceptional power over the natural world.⁵⁶

2. Separateness

In addition to the anthropomorphic values of human superiority and exceptionalism, natural resources and environmental laws reflect a certain separateness between humans and nature, where humans are segregated and independent from the natural world. Human separateness rationally follows from the first flawed assumption—that humans are so superior to nature that they can exercise dominion over natural resources. Since we believe that we are exceptional beings able to manage nature, there then must be an inherent level of human separation from the rest of the world. Humans are, in effect, the predators, with all of nature the prey. Human separateness also meant that humans did not concern themselves with whether their actions might have unforeseen consequences of actually harming humans, because humans assumed that any bad decisions about nature would be experienced by nature, not by humans.

The origins of this human-nature separation can be traced back to seventeenth century notions that viewed the visible world, especially the earth, as an intricate and complex machine.⁵⁷ The earth, as well as its organic components and systems, was thought to operate like any machine, according to fixed and unvarying rules.⁵⁸ This mechanical world-view helped to separate humans from nature: “When the natural world is conceived as a machine, the human mind necessarily retains a godlike portion *outside* of that world. It is this privileged position [that gives us license] for the possession, mastery, and control of nature . . .”⁵⁹

⁵³ See *infra* Parts II.B. and II.C.

⁵⁴ See LAITOS, *supra* note 27, at 119.

⁵⁵ *Id.*

⁵⁶ See Purdy, *American Natures*, *supra* note 37, at 191–94.

⁵⁷ See David Abrams, *The Mechanical and the Organic: On the Impact of Metaphor in Science*, in SCIENTISTS ON GAIA 66 (Stephen H. Schneider & Penelope J. Boston eds., 1991).

⁵⁸ *Id.*

⁵⁹ Abrams, *supra* note 57, at 68.

Unfortunately, this degree of separation means that humans may be moving ever further away from our connections with the environment. For example, humans seem to have chosen material consumption over ecological and sustainability ethics, and many consumers choose not to adapt their buying practices to favor less wasteful and more environmentally sound production of material goods.⁶⁰ In other words, humans seem increasingly detached from environmental realities. This detachment becomes particularly pronounced in a global economy, where decisions that consumers make in one part of the world have environmental consequences in another part of the world.⁶¹ People become oblivious to the actual effects of their consumption choices when individuals never receive any actual feedback regarding the consequences of their decisions.⁶²

To exacerbate the problem of human-nature separation, urban populations have grown exponentially, which further distances humans from ecological realities.⁶³ Numerous technological advances similarly hide from these urban dwellers their connection to the planet and their environment.⁶⁴ Additionally, governments generally do a poor job of providing their citizens with information about ecological realities.⁶⁵ As a result, human attitudes about nature are often ambiguous and contradictory: on the one hand, many humans profess a commitment to environmental protection, but on the other, these same humans continue to engage in environmentally damaging behaviors.⁶⁶

The laws of Eras III and IV that seek to preserve nature and protect environmental goods also reflect the inherent separateness between

⁶⁰ See John Cairns, Jr., Abel Wolman Distinguished Lecture, *Eco-societal Restoration: Re-examining Human Society's Relationship with Natural Systems* (Dec. 5, 1994), in ESEP BOOK 1: GOALS AND CONDITIONS FOR A SUSTAINABLE WORLD, 21 (Inter-Research 2002) [hereinafter Cairns, *Eco-societal Restoration*] (discussing how contemporary lifestyles have brought us further away from the traditional connections humans had with nature). For a discussion of the choices that humans make when ignoring natural laws and the consequences that follow, see John Cairns, Jr., *Sustainable Co-evolution*, 14 INT'L J. SUSTAINABLE DEV. & WORLD ECOLOGY 103, 106 (2007) [hereinafter Cairns, *Sustainable Co-evolution*].

⁶¹ Modern lifestyles also mask the usual connections between humans and their surrounding natural systems. *But see* Cairns, *Eco-societal Restoration*, *supra* note 60.

⁶² Cairns, *Eco-societal Restoration*, *supra* note 60, at 24.

⁶³ MORAN, *supra* note 35, at 68–69.

⁶⁴ Cairns, *Eco-societal Restoration*, *supra* note 60.

⁶⁵ MORAN, *supra* note 35, at 134–35; *see also* Levin et al., *supra* note 14, at 113 (“Individuals repeatedly ignore the social costs of their actions, often because the people and organizations that act locally are at least somewhat removed from those who suffer the consequences. Making matters worse, negative changes tend to accumulate gradually in the broader social-ecological environment.”).

⁶⁶ MORAN, *supra* note 35, at 7.

humans and the environment. For example, various environmental laws have the goal of protecting nature from harm caused by humans, yet have the effect, whether unintended or not, of further separating humanity from nature.⁶⁷ Environmental protection laws often seek to stifle human behaviors that produce negative externalities. But since humans generally do not alter their behaviors without some perceived threat to their anthropomorphic welfare, these laws are usually justified on anthropocentric, not ecocentric, grounds.⁶⁸ Anthropocentric environmental laws thereby suppress the conditions necessary for humans to engage in behaviors that recognize the intrinsic value of nature.⁶⁹ Such laws fail to integrate humanity and nature.⁷⁰

Laws designed to preserve landscapes place restrictions on landowners, such as by limiting how they may use or develop their land. Such limitations on human behaviors, which tell humans what not to do, result in property owners having negative perceptions of preservation laws.⁷¹ Consequently, embittered landowners become more separated from nature, exacerbating the detachment between humans and nature. When such resource owners pass their values along to subsequent generations, the likelihood of humans and nature becoming unified is reduced.⁷²

3. No Planetary Boundaries

Another idea undermining environmental and natural resource laws has been the belief that the earth and its resources are so vast that there are no limits on humans' use of natural resources and environmental goods.⁷³ Instead of perceiving limits, humans have operated under the

⁶⁷ See Holly Doremus, *The Rhetoric and Reality of Nature Protection: Toward a New Discourse*, 57 WASH. & LEE L. REV. 11, 14–15 (2000).

⁶⁸ Cairns, *Eco-societal Restoration*, *supra* note 60, at 24.

⁶⁹ See Raymond De Young, *Expanding & Evaluating Motives for Environmentally Responsible Behavior*, 56 J. SOC. ISSUES 509, 515–17 (2000); Stephen Kaplan, *Human Nature and Environmentally Responsible Behavior*, 56 J. SOC. ISSUES 491, 497–99 (2000).

⁷⁰ Doremus, *supra* note 67, at 15.

⁷¹ *Id.* at 43 (“The property rights stories often depict powerful regulators running roughshod over landowners whose entire financial and emotional lives are closely tied to their land.”).

⁷² See Eric Freyfogle, *The Owning and Taking of Sensitive Lands*, 43 UCLA L. REV. 77, 109 (1995).

⁷³ See Rockström et al., *A Safe Operating Space*, *supra* note 11, at 472–74 (discussing the threshold levels for Earth systems that, if crossed, could lead to “unacceptable environmental change” and explaining that some boundaries, such as “global freshwater use, change in land use, ocean acidification, and interference with the global phosphorus cycle,” are close to being crossed while threshold levels for “climate change, rate of

faulty assumption that natural resources are largely inexhaustible—the boundless planet will continue to provide natural resources regardless of human exploitation. Humans therefore can continue to fish, hunt, graze, harvest, extract, remove, and pollute endlessly, and the planet will eventually self-correct and continue to offer whatever humans desire. However, the reality is that planetary boundaries do exist. These boundaries mean that all environmental goods are eventually limited, that the earth has a fixed carrying capacity, and that human actions can adversely affect an ecosystem's ability to produce natural services.⁷⁴

The assumption of no planetary boundaries is not conducive to a sustainable human-nature relationship. Human societies are dependent on functioning ecosystems and planetary processes that maintain the environmental conditions required for both human and other planetary life. Human activities must be constrained by the realities of ecosystem and planetary limitations.⁷⁵ To presume otherwise is to ensure that the planet will likely undergo, if it has not already, irreversible degradation of the biosphere.⁷⁶

Unfortunately, natural resource laws have traditionally failed to reflect the basic principle that there are planetary boundaries and that consequently human behavior should be restrained in order to safeguard the biological integrity of the planet.⁷⁷ The laws put in place in the era of resource use (Era I) and the era of conservation (Era II) did not effectively restrict humans' ability to extract natural resources and exploit environmental goods. Accordingly, human activity often exceeded the ecological limits of natural systems.

In Era I, laws completely ignored planetary boundaries and systematically rejected the idea that once used and exhausted, the resources that were so highly coveted would be gone forever. As John Locke explained, the natural environment was seemingly placed on this planet by a higher force for the “industrious and rational”⁷⁸—in other words, for human

biodiversity loss, and interference with the nitrogen cycle” have already exceeded their planetary boundaries).

⁷⁴ See Keith H. Hirokawa & Elizabeth J. Porter, *Aligning Regulation with the Informational Need: Ecosystem Services and the Next Generation of Environmental Law*, 46 AKRON L. REV. 963, 969 (2013).

⁷⁵ WACKERNAGEL & REES, *supra* note 32, at 4–5.

⁷⁶ Rockström et al., *A Safe Operating Space*, *supra* note 11.

⁷⁷ Guth, *supra* note 29, at 41–42.

⁷⁸ JOHN LOCKE, *SECOND TREATISE ON CIVIL GOVERNMENT* 22 (Prometheus Books 1986) (1690); see also JAMES TULLY, *AN APPROACH TO POLITICAL PHILOSOPHY: LOCKE IN CONTEXTS* 166–71 (1993) (describing the influence John Locke's views had on early American legal thought).

use. This belief, which permeated American legal and political thought in Era I, is most easily seen in the rise of property law.⁷⁹ Laws that granted rights in land and resources to individual owners created private property interests that allowed the owners to exploit their natural resources essentially without any limits.⁸⁰ Reckless exploitation of renewable and stock resources in the twentieth century led to the unsustainable use and near exhaustion of some natural resources, such as timber, rangeland, minerals, oil, and gas.⁸¹ These resources were extracted, developed, and used without appreciation for the reality of the natural limits of the resources.⁸²

Even in Era II, where resource conservation laws reflected the growing realization of dwindling natural supplies of stock and renewable goods, the conservation was intended to ensure future human *use*, not a restoration of human-nature balance.⁸³ These laws were, once again, based on anthropocentrism—the impetus for conservation laws being the fear that once exhausted, humans would not be able to enjoy the historic benefits from natural resources. Era II conservation laws continued to be grounded in incorrect belief systems while failing to recognize the realities of the earth’s limits.

By Era III, the Preservation Era, humans began to have an inkling that, contrary to the assumption of no planetary boundaries, there may in fact be some limits on certain resources, such as wilderness lands and endangered wildlife.⁸⁴ Nonetheless, humans adhered to inaccurate models of how both humans and nature work, and these faulty models ultimately undermined preservation efforts.⁸⁵ Even in Era IV, the Protection Era, where planetary boundaries became so evident that environmental protection laws became as ubiquitous as Era I resource use laws, humans continued to cling to the belief that societies organized in individual countries are always benefited by economic growth and development.⁸⁶ Indeed,

⁷⁹ See LAITOS, *supra* note 27, at 85.

⁸⁰ *Id.*

⁸¹ *Id.* at 86.

⁸² See John R. McNeill, *Resource Exploitation and Over-Exploitation: A Look at the 20th Century*, in EXPLOITATION AND OVEREXPLOITATION IN SOCIETIES PAST AND PRESENT 52–53 (Brigitta Benzing & Bernard Herrmann eds., 2003).

⁸³ See LAITOS, *supra* note 27, at 86.

⁸⁴ See *id.* at 100–05.

⁸⁵ See *infra* Part I.B.

⁸⁶ Guth, *supra* note 29, at 26. See generally Pei, *supra* note 29 (discussing how China’s economic growth policy has led to worsening environmental hazards); Stanway, *supra* note 29 (“Three decades of industrialization and double-digit growth in China have left the country badly polluted.”).

despite overwhelming evidence that at least one planetary boundary—greenhouse gas limits for a stable climate—is being exceeded, many in Era IV still stubbornly deny this real limit on planetary systems.⁸⁷

B. *Inaccurate Models*

Although there has been some attempt in environmental laws to incorporate advances from the fields of large-scale ecology and complex adaptive systems theory, a number of natural resources and environmental laws still deny these realities of the true workings of nature in favor of more anthropocentric ideas. These inaccurate views about how nature works are based upon human convenience, *not scientific realities*.⁸⁸ Central to this belief system is the false idea that, when left alone, nature always achieves stability.⁸⁹ This misguided commitment to how we want nature to function ignores the true dynamics of how natural systems actually operate. The environmental standards that follow fail to ensure the integrity of ecological functioning and may even contribute to its decline.

This misguided model about nature is not the only model that erodes the effectiveness of environmental laws. A second flawed model that drives many laws is grounded in the theory that humans behave as rational actors—the *homo economicus* model.⁹⁰ Consistent with this assumption, it is thought that humans respond best when laws tell them what not to do, or somehow punish or deter behavior that yields bad environmental results. But, as will be seen below, humans may be more incentivized if they are told what to do, and if their actions result in nonfinancial emotional and psychological rewards, not economic punishment.⁹¹

1. How Nature Works

Natural resources and environmental laws too often fail to take into account the true internal framework of natural systems. Despite growing recognition of large-scale ecology theory,⁹² environmental laws

⁸⁷ See Elaine McKewon, *Chill Wind of Climate Denial*, SYDNEY MORNING HERALD, June 17, 2014, <http://www.smh.com.au/national/chill-wind-of-climate-denial-20140612-3a0j1.html>, archived at <http://perma.cc/7EYQ-WWL3>.

⁸⁸ Levin et al., *supra* note 14, at 113.

⁸⁹ *Id.*

⁹⁰ Boris N. Mamlyuk, *Analyzing the Polluter Pays Principle Through Law and Economics*, 18 SE. ENVTL. L.J. 39, 62–63 (2010).

⁹¹ See *infra* Part III.C.

⁹² Fred Bosselman, *What Lawmakers Can Learn from Large-Scale Ecology*, 17 J. LAND USE & ENVTL. L. 207, 222–23 (2002) (citing SIMON A. LEVIN, FRAGILE DOMINION: COMPLEXITY

continue to be based on the unsound idea that nature is ultimately self-correcting.⁹³ This more stable, self-regulating view is preferred because lawmakers are more comfortable with anthropocentric laws aimed at maximizing human welfare. This view holds that nature is eventually able to rid itself of human-induced poisons and ecological scars by being left alone; all humans need to do then is temporarily step back and let nature and environmental processes correct themselves. Laws, in turn, should simply order humans to “stop” behaving in environmentally destructive ways, and nature will take care of itself. This approach is easier for humans to understand, because (1) it does not require us to understand what really happens when nature is left alone (which is not simple, but complex), and (2) it is consistent with the assumption that humans and nature are separate.

a. Fragmentation

Natural resource and environmental laws are often rigidly organized by resource (e.g., timber, minerals, rangelands) or environmental good (e.g., air, water, land). Such laws tend to consider particular natural resources and environmental goods as independent ecosystems, existing apart or separate from each other.⁹⁴ These laws seek to empower humans to manage according to the type of resource at issue, not according to the complex dynamics between different ecological systems.⁹⁵ A regulatory fragmentation then takes place that separates natural resources (like forests and rangelands) from their surrounding environment (like air, water, and land).⁹⁶ Just as artificially designed human geographic boundaries sometimes sever ecosystem relationships, regulatory fragmentation plays a role in the mounting disconnect among different organisms and ecological units.⁹⁷

Fragmentation in laws also occurs when multiple government agencies and private individuals manage a single natural resource, without

AND THE COMMONS 17–38 (1999) (discussing the emergence of large-scale ecology as a model that links different scientific disciplines in studying natural systems and which recognizes that “ecological systems are more than just the sum of their parts”).

⁹³ Levin et al., *supra* note 14, at 113.

⁹⁴ For an explanation of the fragmentation displayed in federal laws and how the legal system fails to promote sustainable development, see Nancy P. Spyke, *Heeding the Call: Making Sustainability A Matter of Pennsylvania Law*, 109 PENN. ST. L. REV. 729, 756–57 (2005).

⁹⁵ *Id.*

⁹⁶ John C. Dernbach & Scott Bernstein, *Pursuing Sustainable Communities: Looking Back, Looking Forward*, 35 URB. LAW. 495, 498 (2003).

⁹⁷ Kenneth L. Rosenbaum, *The Challenge of Achieving Sustainable Development Through Law*, 27 ENVTL. L. REP. 10455, 10455 (1997).

regard for environmental goods, such as the air, water, and land that affect that resource.⁹⁸ “When a number of interchangeable agencies perform similar regulatory functions for a single resource, the result is inefficient fragmentation, not resilience-inducing diversity.”⁹⁹ But, natural resources and environmental goods are inherently intertwined.¹⁰⁰ They do not exist in separate enclaves from one another and should not be regulated as though they are independent entities.¹⁰¹

b. Nature as Self-Regulating v. Nature as a Complex Adaptive System

Legal regimes that presume that resources are easily separated into fragmented isolated systems will likely fail, and so too will laws which are premised on the belief that nature should be left alone by humans. This model of nature posits that natural resource systems are internally self-correcting, and will achieve stability if preserved as islands free from human interference.¹⁰² The basic idea behind this view is that what humans need to do is enact preservation and protection laws that aim to stop human interference with nature.¹⁰³ Then, the harmful effects of human-caused environmental change will be eliminated and nature will eventually achieve homeostasis.¹⁰⁴

The reality is that ecosystems do not simply exist in a state of equilibrium, but in fact are governed by various processes that interact with one another and which form subsystems within the larger ecosystems, and that humans have a role in affecting ecosystem functioning.¹⁰⁵ These subsystems are affected by numerous biological processes, which cause

⁹⁸ *Id.* at 10456. For example, in the American Northwest salmon are managed by the U.S. Army Corps of Engineers, the Bureau of Reclamation, the Federal Regulatory Commission, the National Marine Fisheries Service, the Bureau of Land Management, local and state administrations, and private landowners.

⁹⁹ Spyke, *supra* note 94, at 756.

¹⁰⁰ *Id.* The natural world cannot be divided easily into discrete components of environmental and resource use. Therefore, resources should not be regulated in isolation from environmental protection standards, nor separately from one another.

¹⁰¹ *See id.*

¹⁰² *See* Levin et al., *supra* note 14, at 113–14 (discussing how distorted views of how natural systems work lead to unproductive legal policies).

¹⁰³ *Id.* at 117.

¹⁰⁴ *Id.*

¹⁰⁵ C.S. Holling et al., *Sustainability and Panarchies*, in PANARCHY: UNDERSTANDING TRANSFORMATIONS IN HUMAN AND NATURAL SYSTEMS 63 (Lance H. Gunderson & C.S. Holling eds., 2002).

the subsystems to develop their own adaptive cycles.¹⁰⁶ The harmful effects of human-induced air, water, and land pollution, for example, should be considered in the aggregate, as a chronic and highly influential component of ecosystems and their subsystems. These natural systems are altered by human interference, and they adapt and evolve to reflect that exogenous anthropomorphic reality. Nature and nature's ecosystems are not self-regulating, but instead, become "complex adaptive systems."¹⁰⁷

Laws have, however, traditionally ignored these adaptive dynamics between humans and ecosystems and their subsystems, which has led to policies that are either ineffective or counterproductive.¹⁰⁸ For example, in Eras III and IV, the focus was first on resource preservation (Era III) and then environmental protection (Era IV), because lawmakers mistakenly relied on the belief that if left in a natural state (i.e., a state with little or no human interference), environmental systems would achieve some kind of equilibrium.¹⁰⁹ But, in actuality, preservation and protection laws may have actually hindered nature's ability to maintain diversity and heterogeneity, which are essential components to a healthy ecological system.¹¹⁰ "Evolution under constant condition erodes genotypic diversity by selection, which reduces the ability to respond to a changing environment. In competitive or human-controlled situations, these selective processes also reduce diversity by increasing the frequency of the most optimal types or ideas."¹¹¹

An even more problematic issue with many environmental laws is that they incorporate such a level of rigidity that they fail to reflect the nuanced and largely unpredictable reality of the environmental systems that those laws seek to address. For example, the National Environmental Policy Act ("NEPA") demands prior consideration of the environmental consequences of actions that will impact the environment.¹¹² However, by

¹⁰⁶ *Id.* at 68–69.

¹⁰⁷ For more discussion of complex adaptive systems and a suggestion for how laws should move towards a more realistic approach to natural resources and environmental law, see *infra* Part III.B.I.

¹⁰⁸ Levin et al., *supra* note 14, at 113.

¹⁰⁹ See *infra* Part II.

¹¹⁰ Levin et al., *supra* note 14, at 115.

¹¹¹ *Id.*

¹¹² See National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. §§ 4321–4370a (2012). NEPA has an essentially procedural mandate. See *id.* It requires federal agencies to consider specific environmental issues during the decision-making process before the agency action. *Id.* However, NEPA procedure does "not mandate particular results, but simply prescribes the necessary process." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989) (citing *Strycker's Bay Neighborhood Council, Inc. v. Karlen*, 444 U.S. 223, 227–28 (1980) (per curiam); *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519, 558 (1978)).

attempting to preemptively assess the impacts on nature of a certain action, NEPA endorses a belief completely contrary to that established by science.¹¹³ NEPA presumes that the consequences of anthropogenic action can be anticipated before the fact in a relatively logical manner.¹¹⁴ However, nature is fundamentally non-linear and the reactions of its systems are often not foreseeable.¹¹⁵

Laws such as NEPA should instead adopt a degree of flexibility to accommodate the ever-changing and unpredictable characteristics of nature, especially after anthropogenic changes occur in nature.¹¹⁶ Infusing such reality within resource and environmental laws would entail two major changes in policy. First, instead of concentrating solely on before-the-fact legal action, we should also consider regulatory follow-up that takes into account how nature has in fact engaged in after-the-fact adaptation. Second, any workable and effective environmental and resource legal regime should be grounded in how nature is, not how humans want nature to be.¹¹⁷

2. How Humans Behave

Another model that decision makers rely on when crafting regulation of natural resources and environmental goods is the idea that legal policies should depend solely on concerns for *human* welfare.¹¹⁸ Consistent with this model, optimized “Pareto Efficiency” is the end goal of regulation, which is when human welfare achieves a state where the allocation of resources is such that no person can be better off without one person becoming worse off.¹¹⁹ Human welfare in turn is presumed to be a function of individuals’ well-being and existing preferences.¹²⁰ It follows then,

¹¹³ See *infra* Part III.

¹¹⁴ See 42 U.S.C. §§ 4331, 4366.

¹¹⁵ Levin et al., *supra* note 14, at 113.

¹¹⁶ See Lance H. Gunderson, *Ecological Resilience—In Theory and Application*, 31 ANNU. REV. ECOL. SYST. 425, 433 (2000).

¹¹⁷ For a more workable approach to environmental and natural resource laws, see *infra* Part III (providing a suggestion for consideration on how to adapt our laws to more accurately take into account the complex-adaptive model).

¹¹⁸ LOUIS KAPLOW & STEVEN SHAVELL, FAIRNESS VERSUS WELFARE 23 (2002).

¹¹⁹ Jules L. Coleman, *Efficiency, Utility, and Wealth Maximization*, 8 HOFSTRA L. REV. 509, 512–13 (1980).

¹²⁰ Once again, these legal policies are anthropocentric, focusing on exploiting the use component of natural resources and environmental goods when humans wish to maximize their well-being and economic welfare, or remedying the environmental problems that follow when humans overuse resources that as a consequence results in pollution and health

consistent with this standard economic model, that human welfare is not dependent on the welfare or health of any nonhuman, natural system. “The hallmark of welfare economics is that [legal] policies are assessed exclusively in terms of their effects on the well-being of individuals. [W]hatsoever is unrelated to individuals’ well-being is excluded from consideration under welfare economics.”¹²¹

Era IV environmental protection laws, in particular, have been premised on the assumption that humans act consistently with this *homo economicus* model.¹²² Human behavior under the *homo economicus* model is driven by the self-interested need to maximize one’s own welfare, and more specifically, one’s economic welfare.¹²³ Laws in Era IV attempted to reflect rules advanced by resource economists, and law professors, who argued that we needed to use economic models in order to change human demand for, and exploitation of, natural resources.¹²⁴ For instance, federal and state laws attempted to make resource extraction, development, and use more costly.¹²⁵ Other laws restricted the availability of natural resources and even environmental goods, like air, by putting a cap on how much human interference would be tolerated.¹²⁶ Within that cap a market in pollution would arise, and market participants (e.g., polluters) would obey the normal laws of supply and demand to ensure that the cap was never exceeded.¹²⁷ Some laws punished resource developers and users with taxes or flat bans.¹²⁸

issues that adversely affect humans. Whether nature is thought most valuable to humans when it is used, or when it is not used, the rationale for the legal intervention has primarily been to enhance immediate human self-interest, or to prevent harm to humans. Joshua J. Bruckerhoff, Note, *Giving Nature Constitutional Protection: A Less Anthropocentric Interpretation of Environmental Rights*, 86 TEX. L. REV. 615, 618 (2008); Susan Emmenegger & Axel Tschentscher, *Taking Nature’s Rights Seriously: The Long Way to Biocentrism in Environmental Law*, 6 GEO. INT’L ENVTL L. REV. 545,552 (1994).

¹²¹ KAPLOW & SHAVELL, *supra* note 118, at 16.

¹²² LAITOS, *supra* note 27, at 48–49.

¹²³ Boris N. Mamlyuk, *Analyzing the Polluter Pays Principle Through Law and Economics*, 18 SOUTHEASTERN ENVTL. L.J. 39, 70 (2009) (explaining that the core values of the *homo economicus* model are individualism and self-interest).

¹²⁴ See generally LAITOS, *supra* note 27, at 48–62 (illustrating how economic models were used in lawmaking during Era IV).

¹²⁵ *Id.* at 49.

¹²⁶ *Id.* at 53–54.

¹²⁷ *Id.*

¹²⁸ See, e.g., Archeological Resources Protection Act, 16 U.S.C. § 470ee (2012) (providing that “[n]o person may excavate, remove, damage, or otherwise alter or deface any archeological resources located on public lands or Indian lands”); Colorado Parks and Outdoor Recreation, COLO. REV. STAT. § 33-10-101 (2014) (declaring that the state’s policy was to

The Wild and Scenic Rivers Act, for example, imposes a flat prohibition on resource use proposals that may hinder the scenic value of some rivers or have a negative aesthetic effect on people wishing to view and recreate on these rivers.¹²⁹ Virtually all attempts to slow climate change and the emission of greenhouse gasses do so by imposing a cap, or limit, on the amount of carbon dioxide that is permitted from a particular source.¹³⁰ These laws adhere to the standard economic notion that to bring about a particular end humans need to be (1) directed on how to behave, (2) told what not to do, or (3) economically discouraged from taking certain actions. Otherwise, in accordance with the *homo economicus* model, humans would mindlessly exploit resources and goods to selfishly benefit themselves.¹³¹

But this prevailing anthropocentric approach is deficient. It ignores the fact that changes occur naturally to resources, natural systems, and environmental processes that are not tied somehow to human welfare.¹³² These changes are consistent with organisms acting like complex adaptive

protect, preserve, enhance, and manage outdoor recreation areas “for the use, benefit, and enjoyment of the people of this state and visitors of this state”); *see also* Rep. of the U.N. Conf. on Env't & Dev., prin. 16, U.N. Doc. A/CONF.151/26 (Aug. 12, 1992) (illustrating the polluter pays principle, which requires a polluting private party or nation to bear the cost of their pollution as a method of abating and allocating harm to the environment).

¹²⁹ 16 U.S.C. § 1271 (2012) (“It is . . . the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.”). *See generally* § 1281(a).

¹³⁰ *See, e.g.*, Geoffrey Styles, *Does EPA's CO₂ Rule Open a Back Door to Cap & Trade?*, ENERGY TRENDS INSIDER (June 12, 2014), <http://www.energytrendsinsider.com/2014/06/12/does-epas-co2-rule-open-a-back-door-to-cap-trade/>, archived at <http://perma.cc/ZY6J-Q9V2>.

¹³¹ *See generally* Vill. of Euclid v. Ambler Realty Co., 272 U.S. 365, 397 (1926) (enforcing that the state police power includes the ability to enact zoning regulations that promote citizen health, safety, and welfare); Brian Goldberg, Note, *New Reactions to Old Growth: Land Use Law Reform in Florida*, 34 COLUM. J. ENVTL. L. 191, 194–95 (2009) (“Government possessed the authority to tell land owners for which purposes the owners’ land could be used. . . . Planning would still give property owners the right to improve their lands, but within limits and in accordance with the values enunciated by states and localities.”). In Part III, this Article offers an alternative to the standard economic model that guides environmental laws, and emphasizes laws that are more interested in how to encourage humans to create positive externalities, as opposed to the current legal regime that is focused on rules prohibiting negative externalities.

¹³² *See, e.g.*, Virginia Dailey, *Sustainable Development: Reevaluating the Trade vs. Turtles Conflict at the WTO*, 9 J. TRANSNAT'L L. & POL'Y 331, 354 (2000) (“The notion of the homo economicus, whose only goal is to maximize his or her wealth, ignores non-wealth-motivated individuals (such as philanthropists and environmentalists) who want to protect the environment for its aesthetic value.”).

systems, but they may not necessarily further near-term human welfare. Conversely, when anthropocentrism is instead supplemental to (or in some cases even replaced by) ecocentrism, then resource long-term sustainability and the planet's survivability is more likely.¹³³ In other words, what seems needed is recognition that natural resources and environmental values are a good in their own right, and that resource nonuse has intrinsic value, *irrespective of human welfare*.¹³⁴

It would be a paradigm shift to cease a long-standing policy in which the protection and welfare maximization of humans is the central focus, and replace it with one in which the natural environment (with humans embedded within it) became the object of our laws. Policy makers would not simply ask: What can we do to preserve and maintain something that is good for us? Rather, the question would be: What should we do to protect something because it is inherently necessary for the continuation of the earth's biosphere?¹³⁵ A change to a nonanthropocentric perspective would be similar to the altered world-view that took place in the seventeenth century when scientists such as Galileo and Newton realized that humans were not the center of the cosmos, where "the [pre-seventeenth century] world was a play performed for our benefit. . . . In the new picture, man is not the pinnacle of creation, but an afterthought."¹³⁶

Second, the anthropocentric *homo economicus* model presumes that humans behave in predictable fashion, which is to rationally think through the relative costs and benefits of choices, always with an eye towards maximizing one's selfish individual welfare.¹³⁷ However, behavioral psychologists are realizing that humans make choices for emotional and intuitive reasons, where selflessness and altruism sometimes may trump rational choice self-maximization.¹³⁸ Laws which ignore this reality

¹³³ Dinah Shelton, *Environmental Rights*, in PEOPLE'S RIGHTS 184, 186–87 (Philip Alston ed. 2001); see also MARK SAGOFF, PRICE, PRINCIPLE, AND THE ENVIRONMENT 31, 54 (2004).

¹³⁴ Myrl L. Duncan, *The Rights of Nature: Triumph for Holism or Pyrrhic Victory?*, 31 WASHBURN L.J. 62, 62, 70 (1991); Lawrence H. Tribe, *Ways Not to Think about Plastic Trees: New Foundations for Environmental Law*, 83 YALE L.J. 1315, 1343 (1974); see *infra* Part III.

¹³⁵ ECCY DE JONGE, SPINOZA AND DEEP ECOLOGY: CHALLENGING TRADITIONAL APPROACHES TO ENVIRONMENTALISM 9–15 (2004).

¹³⁶ EDWARD DOLNICK, THE CLOCKWORK UNIVERSE: ISAAC NEWTON, THE ROYAL SOCIETY AND THE BIRTH OF THE MODERN WORLD 95 (2011).

¹³⁷ See KAHNEMAN, *supra* note 15, at 269–70.

¹³⁸ See *id.* at 13; SUNSTEIN, *supra* note 16, at 28–29, 31. Even the godfather of law and economics, Judge Richard A. Posner, has admitted that his previous "faith" in economic analysis as the basis for legal action has been shaken. See Joel Cohen, *An Interview with Judge Richard A. Posner*, 100.7 A.B.A. J. 52, 57 (2014) ("[D]evelopments in psychology have required qualification of the 'rational choice' model of economic behavior.").

of human beings—e.g., laws which simply tell us what *not* to do—are bound to be less effective than laws that are tailored to more accurate models of human behavior. Laws that encourage what *to do*, may be more likely to motivate positive human action. For example, state and local land use laws that command or encourage humans to provide ecological exactions as a prerequisite for development, or by promoting the use of conservation easements, may receive a more positive reception than flat bans.¹³⁹

II. THE FOUR TROUBLED ERAS OF NATURAL RESOURCES AND ENVIRONMENTAL LAW

The American legal response to demands for natural resources development, for preservation of certain lands and species, and for “protection” of the quality of environmental goods, may roughly be organized around four “eras,” occurring over the past 200 years. During each of these four eras, lawmakers have continually relied on certain assumptions and inaccurate models (introduced in Part I) about nature, humans, and humans’ place in nature.¹⁴⁰ Subparts A and B below suggest how resource use (Era I) and conservation (Era II) laws reflected anthropocentric assumptions of human superiority, exceptionalism, separateness, and no planetary boundaries. Subpart C explains how, when humans began to realize that there were some limits to certain resources, they nonetheless continued to ground their Era III preservation laws on premises grounded in anthropocentrism and separateness. In this era of “preservation” law, humans continued to rely on a model which postulates that nature will achieve stability if preserved (in fragmented islands) and left alone. Subpart D explains that Era IV environmental protection laws still were characterized by anthropomorphism and premised on human-nature separateness, but at least no longer denied the realities of planetary boundaries. However, Era IV laws were, and still largely are, rooted in the standard *homo economicus* model that assumes humans behave as rational welfare-maximizing actors.

A. *Era One—Resource Use*

Laws in Era I, the “Use” Era, arose in a 200-year period between the beginning of the seventeenth century and end of the nineteenth

¹³⁹ See Goldberg, *supra* note 131, at 194–95, 197 (explaining that certain types of zoning regulations block high-intensity development while simultaneously ensuring the preservation of natural landscapes).

¹⁴⁰ See *supra* Part I.

century.¹⁴¹ Era I laws were grounded in the anthropomorphic belief that nature and its natural resources were meant for productive human use.¹⁴² The American westward expansion, for example, was driven in part by the view that the land and natural bounty of this new continent were intended to be used by humans who were both “industrious and rational.”¹⁴³ Lawmakers embraced the ideology that use of natural resources was a virtue.¹⁴⁴ Out of this belief system emerged a private property and ownership regime that helped facilitate the exploitation of nature. The core idea of private ownership rights in land and resources was already present in some European countries,¹⁴⁵ and it became an integral part of the United States’ economy by the nineteenth century.¹⁴⁶

The advent of the law of property ownership encouraged the rush to exploit natural resources.¹⁴⁷ The ensuing charge to extract, develop, and use natural resources depleted stock resources and frequently outpaced the regeneration of renewable resources.¹⁴⁸ Users were principally concerned with the individual benefits they derived from exploiting the natural world, and were unconcerned if their use and removal of these resources imposed negative externalities for a larger group of potential future users, who would thereby be denied their opportunity to benefit from the resource.¹⁴⁹ Era I laws reflected a high discount rate, where future value was discounted in favor of present benefits.¹⁵⁰ Era I anthropomorphic ideas led resource users to predictably make choices based on

¹⁴¹ See Purdy, *American Natures*, *supra* note 37, at 169.

¹⁴² See *id.* (discussing how the belief that nature is intended for human productive use “justified the European claim to North America, [and] defined public debates about nature in the early republic, and persists in important aspects of private and public land-use law.”).

¹⁴³ LOCKE, *supra* note 78, at 22.

¹⁴⁴ 7 Cong. Rec. 1861–69 (1878).

¹⁴⁵ DOUGLAS C. NORTH & ROBERT PAL THOMAS, *THE RISE OF THE WESTERN WORLD: A NEW ECONOMIC HISTORY* 22–23 (1973).

¹⁴⁶ See Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347, 350–53 (1967) (describing the evolution of private property rights amongst American Indians, and within the fur trade); David Feeny, *The Development of Property Rights in Land: A Comparative Study*, in *TOWARD A POLITICAL ECONOMY OF DEVELOPMENT: A RATIONAL CHOICE PERSPECTIVE* 294 (Bates ed., 1988) (describing the United States’ colonization of the Philippines in 1898, and the subsequent confusion between the different property rights schemes).

¹⁴⁷ JAMES WILLARD HURST, *LAW AND CONDITIONS OF FREEDOM IN THE NINETEENTH-CENTURY UNITED STATES* 7 (1956) (“[Nineteenth century Americans] had in common a deep faith in the social benefits to flow from a rapid increase in productivity.”).

¹⁴⁸ See CAROL A. DAHL, *INTERNATIONAL ENERGY MARKETS: UNDERSTANDING PRICING, POLICY, AND PROFITS* 16–22, 35 (2004).

¹⁴⁹ LAITOS, *supra* note 27, at 19.

¹⁵⁰ *Id.*

their own near-term self-interest without regard for widespread and future consequences.¹⁵¹

The property rights idea in this country originated with early colonial ideals of sovereignty and resistance to tyranny that dominated American thought before and immediately after independence from the British crown.¹⁵² Indeed, one of the foremost complaints the colonists had against the King was that he had denied them the right to cultivate land west of the Alleghenies.¹⁵³ The colonists “aligned clearing and using the land with inviolable human rights, invoking the Declaration of Independence.”¹⁵⁴ According to one American historian, colonists linked the idea of freedom with the notion of private ownership of land and natural resources, because institutions built on such private property regimes allowed settlers the opportunity to become proprietors, which in turn gave individuals dignity.¹⁵⁵

The idea of property was also rooted in the assumption, advanced by John Locke, that resource ownership evolved through individual labor.¹⁵⁶ That is, individuals had a natural right of private ownership to land and natural resources, but the mere passive ownership of natural assets was insufficient; resources also needed to be *used* by the owners where labor was an obvious manifestation that the resource’s potential was being released.¹⁵⁷

¹⁵¹ *Id.* at 42. As a result of extensive resource use, “[f]orests and woodlands shrank, accounting for perhaps half of the net deforestation in world history. . . . Rangelands and pasturelands became overgrazed, degrading or destroying naturally occurring grasslands along with the considerable ecological values provided when these resources are not used as a commodity.” *Id.* (citing SING C. CHEW, *WORLD ECOLOGICAL DEGRADATION: ACCUMULATION, URBANIZATION AND DEFORESTATION, 3000 B.C.–A.D. 2000*, at 3 (2001); J.R. MCNEILL, *SOMETHING NEW UNDER THE SUN: AN ENVIRONMENTAL HISTORY OF THE TWENTIETH-CENTURY WORLD* 229–47 (2009); DAVID EVANS, *A HISTORY OF NATURE CONSERVATION IN BRITAIN* 57 (2d ed. 1992); DANIEL H. COLE, *POLLUTION & PROPERTY* 97 (2002)).

¹⁵² See Purdy, *American Natures*, *supra* note 37, at 173.

¹⁵³ See THE DECLARATION OF INDEPENDENCE para. 3 (U.S. 1776).

¹⁵⁴ Jedediah Purdy, *The Politics of Nature: Climate Change, Environmental Law, and Democracy*, 119 *YALE L.J.* 1122, 1141 (2010) [hereinafter Purdy, *The Politics of Nature*].

¹⁵⁵ See ERIC FONER, *FREE SOIL, FREE LABOR, FREE MEN: THE IDEOLOGY OF THE REPUBLICAN PARTY BEFORE THE CIVIL WAR 1–72* (1995 ed. 1995) (explaining that manual labor was elevated to a high status in the American social system and gave people a sense of personal worth); see also DREW R. MCCOY, *THE ELUSIVE REPUBLIC: POLITICAL ECONOMY IN JEFFERSONIAN AMERICA 48–100, 185–208* (1980) (discussing how the American concept of freedom was coupled with ownership principles).

¹⁵⁶ LAITOS, *supra* note 27, at 37–38.

¹⁵⁷ See *id.*; see also Jeffrey M. Gaba, *John Locke and the Meaning of the Takings Clause*, 72 *MO. L. REV.* 525, 526 (2007) (discussing how John Locke’s *Two Treatises of Government* provided a “coherent intellectual justification” for private property).

Locke's labor theory justified both the initial acquisition and subsequent ownership and use of natural resources.¹⁵⁸ Era I laws mirrored the influential Lockian ideology "to make the continent fruitful by disbursing land to private owners and promoting infrastructure to translate their labors into continental commerce."¹⁵⁹

Beliefs about anthropomorphic superiority and exceptionalism contributed to the prominence of private property laws that encouraged resource use, as demonstrated by the prevailing idea that uncultivated land amounted to waste.¹⁶⁰ According to the dominant frontier mentality in the early and mid-nineteenth century, by settling and therefore taming the wilderness, Americans would reclaim the waste.¹⁶¹ Humans operated under the assumption that they had a natural right to dominate their environment because they were morally superior beings that would bring anthropomorphic refinement and civilization to wilderness.¹⁶²

In Era I, humans also assumed they were separate and detached from nature, and therefore saw land, nature, and natural objects as gifts to acquire and own and control.¹⁶³ Nor did humans in Era I consider the long-term consequences of their overzealous resource use. Humans did not take into account that the earth would be unable to supply natural resources or environmental goods forever, because the humans in Era I (and their laws) had no conception of inherent planetary boundaries.¹⁶⁴ Rather, the singular focus was to exploit, dominate, own, and above all use natural resources consistent with Lockian theories about private property. "The right to have a legal property interest in a natural resource grant[ed] the

¹⁵⁸ Gaba, *supra* note 157, at 533.

¹⁵⁹ Purdy, *American Natures*, *supra* note 37, at 185; see Gaba, *supra* note 157, at 536 (explaining that Locke's labor theory was premised on the assumption that even in the absence of government laws, there was an undeniable natural law which allowed individuals to assert their ownership rights by mixing their labor with a piece of property).

¹⁶⁰ See Andrew Jackson, President, Fourth Annual Message to Congress (Dec. 4, 1832) (transcript available at <http://www.presidency.ucsb.edu/ws/?pid=29474>) ("[A] portion of the waste lands owned by the States should be ceded to the United States for the purposes of general harmony and as a fund to meet the expenses of the war."); Martin van Buren, President, First Annual Message to Congress (Dec. 5, 1837) (transcript available at <http://www.presidency.ucsb.edu/ws/?pid=29479>) (declaring that west bound settlers moving westward left "immense wastes behind them and enlarge[d] the frontier beyond the means of the Government to afford it adequate protection. . .").

¹⁶¹ Buchanan, *supra* note 39 (stating that the job of American settlers was "generally to reclaim the wilderness").

¹⁶² See *supra* notes 40–47.

¹⁶³ See LAITOS, *supra* note 27, at 85.

¹⁶⁴ See *supra* notes 82–86.

owner dominion over it, which in effect remove[d] the privately owned resource from the realm of nature while transferring its potential utility to the human owner.”¹⁶⁵ As a consequence, humans became largely insulated from their connections with the rest of nature. Such isolation meant that humans were mostly oblivious to the effects their actions had, and would have, on the planet’s ecosystems and natural systems.

B. Era Two—Conservation

Although laws in Era II, the “Conservation” Era, continued to reflect assumptions about human superiority and separateness, decision-makers finally began to comprehend that humans were exhausting natural resources.¹⁶⁶ Lawmakers realized that a use-only ethic would eventually produce long-term resource shortages, because one fast-becoming-apparent planetary boundary was the earth’s fixed supply of natural resources.¹⁶⁷ To ensure that future generations could still use certain diminishing resources, present use needed to be tempered by a need also to conserve for future use.¹⁶⁸ In the latter part of the nineteenth century and early twentieth century, these conservation ideals surfaced as part of a progressive legal reform movement, which was reflected in federal land policy.¹⁶⁹ Conservation laws, however, continued to be anthropomorphic, motivated by what was in the best interest for humans.¹⁷⁰ These laws adhered to the belief that nature was intended for productive future human use.¹⁷¹ Era II laws also continued to be grounded in incorrect belief systems about nature and humans.¹⁷²

As had been the case in Era I, the distribution of property interests was still a primary vehicle by which natural resources and environmental goods were exploited in Era II.¹⁷³ But during this time lawmakers

¹⁶⁵ See LAITOS, *supra* note 27, at 87.

¹⁶⁶ See Purdy, *The Politics of Nature*, *supra* note 154, at 12–13.

¹⁶⁷ See LAITOS, *supra* note 27, at 86.

¹⁶⁸ See Purdy, *American Natures*, *supra* note 37, at 173.

¹⁶⁹ See *id.* at 169.

¹⁷⁰ See LAITOS, *supra* note 27, at 85.

¹⁷¹ See Purdy, *American Natures*, *supra* note 37, at 169 (“In this view, natural systems will reliably serve human ends only with expert governance at the system level: irrigation networks, silviculture, game preserves, and parks administration were early paradigms of this understanding.”).

¹⁷² See LAITOS, *supra* note 27, at 78.

¹⁷³ See Leonard Zobler, *An Economic-Historical View of Natural Resource Use and Conservation*, 38 *ECON. GEOGRAPHY* 189, 190 (1962).

began to appreciate the importance of maintaining resources for sustainable future use.¹⁷⁴ This conservation override on present use served to diminish the role of privatization and gave government a more resource managerial role.¹⁷⁵ Federal agencies, such as the United States Forest Service and the National Park Service, were established to ensure that certain resources would outlast the current generation.¹⁷⁶ Behind these laws was the realization that the private market should not be the sole arbitrator that controls the allocation of natural resources.¹⁷⁷ Instead, government policy would regulate the rate of depletion of stock resources and ensure the sustainability of particular renewable resources.¹⁷⁸

When stock energy resources like oil, gas, and coal began to be depleted, lawmakers initiated reform efforts to ensure that if these valuable minerals were owned by the government, then that government would control their rate of depletion.¹⁷⁹ When an otherwise renewable resource, like timber, was overharvested, lawmakers imposed conservation limits on timber-cutting.¹⁸⁰ And when cattle and sheep grazing threatened to denude the nation's grasslands, conservation legislation restricted and managed rangeland use by ranchers.¹⁸¹

Conservation thinkers, such as Gifford Pinchot, the founder of the U.S. Forest Service, Perkins Marsh, a leading American diplomat and philologist, and Theodore Roosevelt, all advocated for government to take a more active role in regulating use of natural resources.¹⁸² As the nation's leading forester, Pinchot argued that without a conservation mandate, America's forests awaited a doomed fate—they would all soon be cleared.¹⁸³ Pinchot similarly believed that the Era I use ethic would eventually empty

¹⁷⁴ See LAITOS, *supra* note 27, at 86.

¹⁷⁵ Conservation laws manage over a quarter of the United States' acreage. Purdy, *American Natures*, *supra* note 37, at 173, 189.

¹⁷⁶ See Organic Administration Act of 1897, ch. 2, 30 Stat. 11 (codified as amended at 16 U.S.C. §§ 473–75, 477–78(a), 479(a), 482 (2012)); An Act to Establish a Natural Park Service, Pub. L. No. 64-238, 39 Stat. 535 (codified as amended at 16 U.S.C. § 1 (2012)).

¹⁷⁷ See Purdy, *The Politics of Nature*, *supra* note 154, at 13–14.

¹⁷⁸ LAITOS, *supra* note 27, at 92.

¹⁷⁹ The Mineral Leasing Act of 1920, 30 U.S.C. § 181 (2014).

¹⁸⁰ The Forest Reserve Act of 1891, 26 Stat. 1095, 1103 (1891).

¹⁸¹ Taylor Grazing Act, 43 U.S.C. § 315 (2014).

¹⁸² See generally GIFFORD PINCHOT, *THE FIGHT FOR CONSERVATION* (Double Day, Page & Co. 1910); GEORGE PERKINS MARSH, *MAN AND NATURE* (David Lowenthal ed., Univ. of Washington Press 2003) (1864) (advocating for the cessation of unregulated timber-cutting in public forests); Theodore Roosevelt, *The New Nationalism* (Aug. 3, 1910), in THEODORE ROOSEVELT, *THE NEW NATIONALISM* (1961).

¹⁸³ PINCHOT, *supra* note 182, at 17.

the mines, erode the waterbeds and cause the rich soil to become barren.¹⁸⁴ As early as 1890 the American Forestry Association presented similar arguments to Congress,¹⁸⁵ and by 1891 a report by the Secretary of the Interior Department urged Congress and the President to intervene and establish limits on resource use, especially the timber resource.¹⁸⁶

Pinchot was not alone in advocating for resource conservation. Perkins Marsh stressed that healthy forests prevented erosion and played a vital role in soil integrity, promoting reasonably steady water flows and benefiting people that lived downstream who depended on continuous stream flow.¹⁸⁷ Theodore Roosevelt sought to invoke a spirit of civic motivation by declaring that Americans owed it to themselves and to future generations to conserve natural resources.¹⁸⁸ “[T]he health and vitality of our people are at least as well worth conserving as their forests, waters, lands, and minerals,” Roosevelt stated in a 1910 speech.¹⁸⁹

But conservation laws still encouraged resource use.¹⁹⁰ Their goal was to “manage present resources for undiminished future benefits.”¹⁹¹ The Mineral Leasing Act of 1920, for example, withdrew gas, coal, oil, and oil shale from the giveaway provisions of the General Mining Act of 1872 that otherwise offered individuals ownership rights to these valuable energy resources.¹⁹² But use was still permitted, despite the withdrawal, since the Leasing Act simply placed energy developers within a leasing system instead of an ownership regime.¹⁹³ Consistent with the leasing system, use of stock resources could occur, albeit in line with a theme of more regulated use.¹⁹⁴

In addition to optimizing resource use, Era II conservationists also were concerned with the “spoliation of human bodies and energies.”¹⁹⁵

¹⁸⁴ See generally *id.*

¹⁸⁵ See 21 CONG. REC. 2537 (1890).

¹⁸⁶ DEP'T OF THE INTERIOR, REPORT OF THE SECRETARY OF THE INTERIOR 14 (1891) (discussing the importance of avoiding stream erosion and the danger of unregulated timbering).

¹⁸⁷ Jedediah Purdy, *What Has to Change for Forests to Be Saved? A Historical Example from the United States*, 19 DUKE J. COMP. & INT'L L. 467, 471 (2009) (“Their experience of ecological interconnectedness as a motive for political action was among the earliest instances of a new approach to the natural world.”).

¹⁸⁸ See Roosevelt, *supra* note 182.

¹⁸⁹ See *id.*

¹⁹⁰ LAITOS, *supra* note 27, at 94.

¹⁹¹ Purdy, *American Natures*, *supra* note 37, at 190.

¹⁹² LAITOS, *supra* note 27, at 94.

¹⁹³ 30 U.S.C. §§ 181, 22 (2012); JOHN S. LOWE, OIL AND GAS LAW 18–26 (2d ed. 1995).

¹⁹⁴ LOWE, *supra* note 193, at 18–26.

¹⁹⁵ Purdy, *American Natures*, *supra* note 37, at 192.

Conserving natural spaces for their aesthetic beauty and recreational uses was thought to be of benefit to citizens' physical and mental health.¹⁹⁶ National forests, for instance, were to provide "a continuous supply of timber,"¹⁹⁷ while national parks had the "fundamental purpose" to "conserve [for humans] the scenery and the natural and historic objects and wild life therein"¹⁹⁸

Era II laws, therefore, were still rooted in anthropomorphic principles about what would benefit humans. And because these laws presumed that human managers could manipulate resources and natural processes to serve human interests, they were driven by assumptions of human superiority and exceptionalism.¹⁹⁹ The goal of conservation laws was not to strike a balance between humans and nature, but rather to control natural resources for human consumption and economic welfare. Humans assumed that they were superior entities that could and should control, and even adjust, natural processes so as to ensure that nature would continue to provide for both current and future humans' needs.

Most of the flawed assumptions and incorrect models of Era I largely remained in place during Era II. Human exceptionalism and superiority justified the central tenet of Era II, which was that humans could manipulate and control natural processes to enhance present and future human welfare. The belief that humans can, and should, control nature also contributed to the separation between humans and nature.²⁰⁰ These laws were grounded in an overly simplified conception of nature, and how nature works. The human engineer in Era II could seize control of natural processes and force particular resources to do the bidding of human masters.²⁰¹

Another assumption that remained was the notion of the "rational man." The goal of these Era II laws was to further *homo economicus*, the rational decision maker whose economic welfare, present and past, was the epitome of societal optimality.²⁰² What was unique about Era II was the growing, and correct, realization that unchecked resource use would eventually encounter planetary limits. But even this eventual recognition of planetary limits did not produce laws that effectively limited the extraction

¹⁹⁶ *Id.*

¹⁹⁷ 16 U.S.C. § 475 (2012).

¹⁹⁸ § 1.

¹⁹⁹ See *supra* Part I.A.1 ("A belief in human superiority and exceptionalism continued to exhibit itself during the conservation laws of Era II.").

²⁰⁰ Leiss, *supra* note 10; see also *supra* Part I.A.2.

²⁰¹ See *supra* Part I.A.2.

²⁰² See generally *supra* Part I.A.2.

and use of natural resources. While conservation laws did limit the use rights of private parties, they continued to authorize the exploitation of resources through public land management statutes.²⁰³

C. *Era Three—Preservation*

Laws in Era III, the “Preservation” Era, which first appeared during the middle of the twentieth century, reflected a change in assumptions about the limits of natural resources.²⁰⁴ Lawmakers discovered, to their bewilderment, that some natural resources and iconic vistas, as well as various wildlife species and historic sites, were disappearing as a result of the resource policies of the previous two eras. As a response to this alarming reality, laws were hurriedly adopted that were designed to preserve places, like wild rivers and wilderness areas, and certain natural objects, like endangered plants and animals, as well as archeological ruins that evidenced our cultural heritage.²⁰⁵ Increased understanding about the limits of Earth’s plentitude demonstrated an emerging central belief that was contrary to the foundation of many Era I use laws—that there were real planetary boundaries.

Nonetheless, Era III laws continued to be centered on anthropocentric values. Landscapes and natural objects were preserved because it was thought that humans would benefit from their existence.²⁰⁶ And this policy reinforced the continuation of the separation between humans and nature, since preservation laws created pristine areas that were off-limits to human interference, but which allowed us to view these special places from the outside.

Even worse, however, preservation laws relied on the unrealistic model that nature should be left alone, in protected islands, because it is self-regulating.²⁰⁷ Preservation laws failed to preserve ecosystems and

²⁰³ See Organic Administration Act of 1897, 16 U.S.C. §§ 473–82 (2012).

²⁰⁴ See Wild and Scenic Rivers Act, 16 U.S.C. § 1271.

²⁰⁵ See, e.g., Juliet Eilperin, *Obama Will Propose Expanding Pacific Sanctuary*, DENVER POST, June 17, 2014, at 14A.

²⁰⁶ See Purdy, *American Natures*, *supra* note 37, at 173 (“[C]ertain places or qualities in the natural world elicit essential human experiences. Alone in the wilderness, or facing the dramatic vistas that Romantic aesthetics deemed sublime, people could shake off habit and custom, discover their authentic wishes and convictions, and become, in that respect, more free. Romantic epiphany has seemed a way to salvage individuality and meaning from a disenchanting and pervasively managed world.”).

²⁰⁷ See DON HINRICHSEN ET AL., CONSEQUENCE OF OVERUSE AND POLLUTION, XXVI POPULATION REPORTS, ch. 4 (Info Program ed., 1998); WILLIAM MCKIBBEN, THE END OF NATURE 51 (2006).

the larger environmental spaces enveloping specially protected lands and object.²⁰⁸ Consequently, environmental goods continued to degrade and fall below suboptimal levels.²⁰⁹

Firmly embedded in Era III laws was the anthropocentric premise that nature, in its untouched state, provided psychic, almost semi-religious value to humans.²¹⁰ Part of this perceived benefit was the deeply personal and often mystical feelings humans had about nature.²¹¹ Behind this idea was the belief that untouched nature had an almost transcendent power—experiencing the natural beauty of the outdoors could lead one towards self-enlightenment and awareness.²¹² In the Wilderness Act of 1964, for example, Congress defined wilderness as a place that offered “outstanding opportunities for solitude or a primitive and unconfined type of recreation.”²¹³ This recognition of the benefits nature provided for humans when it remained unused justified government rules demanding preserved special lands found in national forests, national parks, national refuges, and wild rivers.²¹⁴

Humans also realized that they cared deeply about preserving wildlands, wildlife, and endangered species and their habitats, partly because of an emotional, non-economic appreciation of the benefits that follow from humans being closely interconnected with their natural environment.²¹⁵ John Muir, an American naturalist and the founder of the

²⁰⁸ See HINRICHSEN ET AL., *supra* note 207.

²⁰⁹ See *id.*; MCKIBBEN, *supra* note 207.

²¹⁰ Purdy, *American Natures*, *supra* note 37, at 169–73 (describing the “aesthetic and spiritual value[s] of nature”).

²¹¹ See, e.g., Wallace Stegner, *Why We Need Wilderness*, MOTHER EARTH NEWS, Aug./Sept. 2004, at 64, 65.

²¹² Purdy, *American Natures*, *supra* note 37, at 199–200; see also Dan Tarlock, *Is a Substantive, Non-positivist United States Environmental Law Possible?*, 1 MICH. J. ENVTL. & ADMIN. L. 159, 191 (2012) (“The early preservation movement saw landscapes as awe inspiring natural areas, endowed with rights, which spiritually uplifted and sustained us with their physical beauty, compelling us to maintain their natural state.”).

²¹³ 16 U.S.C. § 1131(c) (2012).

²¹⁴ See, e.g., Wild and Scenic Rivers Act, 16 U.S.C. §§ 1271–81(a) (2012) (“It is . . . the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations.”); National Forest Management Act of 1976, 16 U.S.C. §§ 1600–14; *Colorado v. New Mexico*, 467, U.S. 310, 314 (1984) (discussing the importance of in-stream flow in relation to water users’ needs for a continuous supply).

²¹⁵ Dan Tarlock, *The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law*, 27 LOY. L.A. L. REV. 1121, 1126–27 (1994); JOHN MUIR, MY FIRST SUMMER IN THE SIERRA 175 (1911).

Sierra Club, described the connection with nature that he discovered in his first summer exploring the Sierra Nevada:

Never before had I seen so glorious a landscape, so boundless an affluence of sublime mountain beauty. . . . I shouted and gesticulated in a wild burst of ecstasy [T]he whole body seems to feel beauty when exposed to it as it feels the camp-fire or sunshine, entering not by the eyes alone, but equally through all one's flesh like radiant heat, making a passionate ecstatic pleasure-glow not explainable.²¹⁶

Not only did nature in its pristine state provide a spiritual and aesthetic benefit to humans, people also were concerned that unchecked exploitation of natural resources and environmental goods adversely affected human health and welfare.²¹⁷ What seemed most troubling in Era III were activities adversely impacting the “quality of the *human* environment.”²¹⁸ What seemed less troubling were human actions that degraded natural environmental systems necessary for the continuation of the biosphere.²¹⁹

This anthropocentric emphasis was particularly apparent in laws designed to address overuse of open access resources, such as air and water.²²⁰ In addition, many of the preservation laws of Era III emphasized the need for publically owned lands to be protected from development because of the “anthropocentric virtues of wild lands.”²²¹ For instance, the purpose of the National Wilderness Preservation System was to designate certain federally owned areas as:

²¹⁶ MUIR, *supra* note 215, at 153, 175.

²¹⁷ See LAZARUS, *supra* note 27, at 59.

²¹⁸ See 42 U.S.C. § 4332(2)(c) (2012) (establishing that under the National Environmental Policy Act, an environmental impact statement must be prepared if a proposed action might impact the human environment) (emphasis added).

²¹⁹ See generally Günther Handl, *Human Rights and Protection of the Environment: A Mildly “Revisionist” View*, in HUMAN RIGHTS, SUSTAINABLE DEVELOPMENT AND THE ENVIRONMENT 117 (Antonio Trindade ed., 1992) (explaining that preservationist statutes and regulations were focused on the harmful effects resource use decisions had on humans, instead of the deleterious impacts they had on the natural environment itself).

²²⁰ Resources such as air, sunlight, and wind, are open access goods because they are not subject to private ownership the same way specific tracts of land, for example, can be. JAN G. LAITOS, NATURAL RESOURCES LAW 2–3 (2002). That is, they are open to the public and considered common property because it is not practical for users to exclude others. See *id.*

²²¹ Sandra Zellmer, *A Preservation Paradox: Political Prestidigitation and an Enduring Resource of Wilderness*, 34 ENVTL. L. 1015, 1040 (2004). See Wilderness Act of 1964, 16 U.S.C. § 1131(a) (2012); LAZARUS, *supra* note 27, at 93.

“[W]ilderness areas,” [which] shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness.²²²

By “secur[ing] . . . an enduring resource of wilderness” for human benefit,²²³ Congress sought to ensure that natural resources and objects would provide value to present and future generations of Americans.²²⁴

Era III laws were not only shaped by anthropocentric ideals, their preservation emphasis was also grounded in the belief that, if left alone in a natural state, nature would eventually self-correct and reach some kind of eco-friendly balance with humans.²²⁵ In other words, by preserving nature and preventing “the imprint of man’s work,”²²⁶ the natural world would revert back to a condition which was considered desirable and beneficial for human welfare and enjoyment. But the reality of nature is that it is never in balance, but rather is asymmetrically dynamic and changing as a “complex adaptive system.”²²⁷ Ecosystems do not exist in a constant state of equilibrium, but rather are influenced by various changing intertwined natural processes.²²⁸ By preserving focused, localized areas, environmental spaces, and natural objects, Era III laws may have denied to nature the essential components of diversity and heterogeneity, which are vital to a healthy ecosystem.²²⁹

D. *Era Four—Protection*

Era IV, the “Protection” Era, began in the latter half of the twentieth century and continues to this day. In Era IV, environmental goods were protected, primarily air and water, as well as soil and subsurface waters.²³⁰ The catalyst for environmental protection laws can still be

²²² 16 U.S.C. § 1131(a).

²²³ *Id.*

²²⁴ *Id.*

²²⁵ See *supra* Part I.B.1 (discussing the unrealistic model of how nature works that was used to justify certain natural resource laws).

²²⁶ 16 U.S.C. § 1131(c).

²²⁷ Holling et al., *supra* note 105, at 89.

²²⁸ See *id.* at 63–76.

²²⁹ See *id.*

²³⁰ See 33 U.S.C. § 1251(a)(2) (2012); 42 U.S.C. § 7409(b) (2012).

characterized as anthropocentric and premised on assumptions about an inherent separateness between humans and nature. Humans in Era IV recognized that while we were polluting and poisoning natural resources and environmental goods, we were also contaminating natural systems in a way that was harming us.²³¹ The environmental protection laws of Era IV assumed that humans could be regulated to rein in this anthropomorphic penchant to poison our surroundings, by managing the human interface with the natural environment.

By Era IV, it became even more obvious that there were indeed planetary boundaries. Although we began to suspect the presence of these limits to resource use in Era II, in Era IV planetary boundaries became undeniable.²³² The role of humans in transgressing Earth's limits and producing perhaps unalterable changes in planetary systems is also becoming less debatable.²³³ Laws in Era IV, nonetheless, seem to have fully embraced a model of human behavior based on resource economics and *homo economicus*.²³⁴ This model presumes that humans are best regulated if they are told *what not to do*, or if their actions that adversely affect environmental goods are punished.²³⁵ Consistent with this model, laws would impose on humans the costs of their environmentally harmful actions, so that humans *do not* engage in the behaviors that produce the harm. But, as we will see below, humans are equally motivated (or more efficiently motivated) by laws encouraging them *to do* something. Era IV's more negative laws, grounded in the "rational man" wishing to avoid costs, have proven to be less successful than laws based on a more nuanced and realistic model of human behavior.

Era IV's environmental protection laws by and large continued the tradition of previous eras by keeping the central purpose of these laws the promotion of human welfare.²³⁶ Lawmakers only contemplated laws that placed limits on human consumption, when the idea of preserving or protecting natural resources and ecological systems was beneficial to humans.²³⁷ Nevertheless, throughout Era IV people more and more

²³¹ See generally Holmes Rolston III, *Is There an Ecological Ethic?*, 85 ETHICS 93, 98 (1975) (discussing the idea that humans were not the only natural organisms that deserved to be protected).

²³² See Johan Rockström et al., *Planetary Boundaries: Exploring the Safe Operating Space for Humanity*, 14 ECOLOGY & SOC'Y 32 (2009) [hereinafter Rockström, *Planetary Boundaries*].

²³³ See *id.*

²³⁴ See Mamlyuk, *supra* note 90, at 62–63.

²³⁵ See *id.* at 42–44.

²³⁶ John Passmore, *Attitudes in Nature*, in NATURE & CONDUCT 259 (R.S. Peters ed. 1975).

²³⁷ See O'Neill, *supra* note 27, at 119 (explaining that nature and natural resources had derivative values, not intrinsic values in of themselves).

questioned the soundness of purely anthropocentric laws.²³⁸ Humans began to realize that both humans *and nature* were being negatively impacted by environmental pollution.²³⁹ This recognition represents a departure from the common understanding in Era III, which was solely centered on the impact environmental degradation and contamination had on humans. By contrast, in Era IV, an environmental ethic emerged in the public discourse that voiced concern about the threats to Earth itself.²⁴⁰

Despite this growing recognition that nature and natural objects have intrinsic value, not derivative of human welfare, Era IV protection laws continue to be dominated by anthropocentric ideals. For instance, the focus of the Clean Air Act is to prevent atmospheric pollution for human health and welfare, not because of the greenhouse gases which may result in climate change that disables the natural systems necessary for Earth's biosphere.²⁴¹ And the parent statute of Era IV—the National Environmental Policy Act of 1969—requires an environmental impact assessment only when actions might affect the quality of “the *human* environment.”²⁴²

The anthropocentric assumptions of human separateness and superiority also continue to be present in Era IV. Separation is reflected in environmental ethics that simultaneously elevate nature to a morally superior position, while perceiving humans as a taint upon the pristine and perfectly balanced conditions of the natural world.²⁴³ However, during Era IV humans still occupy a dominant position in the natural world. This dominance is reflected in part by the tendency to assign to humans the duty to serve as stewards to, and self-righteous protectors of, nature.²⁴⁴ Era IV laws seek to manage natural forces by reining in human tendencies to treat environmental sinks as garbage dumps for our

²³⁸ LAITOS, *supra* note 27, at 203.

²³⁹ See generally Purdy, *The Politics of Nature*, *supra* note 154, at 1160 (“[A]n ‘ecological’ awareness of natural and human phenomena as pervasively interconnected [arose].”).

²⁴⁰ “Environmental ethics . . . sought to replace [the] spiritualism and deism [of preservationist laws] with hard ethical imperatives.” Tarlock, *supra* note 212, at 191. However, it is debatable whether this effort gained any momentum outside of the academic sphere. *Id.*

²⁴¹ 42 U.S.C. § 4332(2)(c) (2012); see also *Util. Air Regulatory Grp. v. U.S. Envtl. Prot. Agency*, 134 S. Ct. 2427 (2014) (the Clean Air Act does not compel a definition of “air pollutant” that includes greenhouse gases).

²⁴² 42 U.S.C. § 4332(b) (emphasis added); see also Purdy, *The Politics of Nature*, *supra* note 154, at 1160 (discussing that “concern with the public-health effects of pollution” still formed the basis for environmental protection laws).

²⁴³ Wiener, *Law and the New Ecology*, *supra* note 40, at 343.

²⁴⁴ Purdy, *American Natures*, *supra* note 37, at 189, 197.

economic progress. Such laws are still grounded in notions of human independence from, and superiority to, the rest of nature.²⁴⁵

Another hallmark of Era IV protection laws is the desire to achieve environmental goals in more economically efficient ways.²⁴⁶ Many environmental protection laws are consistent with the principles developed by resource economists, who have argued that we need to utilize economic models to control human exploitation and consumption of natural resources.²⁴⁷ Legal protections of ecosystem services are based on human-centric economic values, where the assumption has been that restrictions of environmental goods as waste dumps will provide measurable long-term economic benefits to humans.²⁴⁸ These advantages are thought to offset the short-term disadvantages of forgoing or limiting development by making pollution more costly.

Era IV laws reflected this assumption by telling polluters not to pollute environmental goods, or face stiff penalties and cleanup costs.²⁴⁹ Era IV laws were also modeled on the presumed behavior of *homo economicus*, who prefers to make choices in markets where supplies are limited. To mimic this behavior, economists advanced systems that allocated transferable private property rights in pollution emissions.²⁵⁰ Title IV of the 1990 Clean Air Act Amendment is a leading example of a trading program that created markets which allocated waste discharge costs to regulated firms that had the lowest control costs.²⁵¹

Era IV's assumptions of protecting environmental goods continue to rely on a model of human behavior grounded in the assumption that

²⁴⁵ *Id.* at 212–13.

²⁴⁶ Alyson C. Flournoy, *The Case for the National Environmental Legacy Act*, in *BEYOND ENVIRONMENTAL LAW* 3, 5 (A. Flournoy & D. Driesen eds. 2010); Daniel H. Cole & Peter Z. Grossman, *When is Command-and-Control Efficient? Institutions, Technology, and the Comparative Efficiency of Alternative Regulatory Regimes for Environmental Protection*, 1999 WIS. L. REV. 887 (1999).

²⁴⁷ Flournoy, *supra* note 246, at 4–5.

²⁴⁸ *Id.*

²⁴⁹ *See, e.g.*, The Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9601 (2012) (requiring cleanup of abandoned hazardous waste sites, where those responsible for the land contamination may be jointly severally and strictly liable for all cleanup costs).

²⁵⁰ J.H. DALES, *POLLUTION, PROPERTY & PRICES: AN ESSAY IN POLICY-MAKING AND ECONOMICS* 107 (1968).

²⁵¹ 42 U.S.C. § 7651(b) (2012) (“It is the intent of this subchapter to effectuate such reductions [of sulfur dioxide emissions] by requiring compliance by affected sources with prescribed emission limitations by specified deadlines, which limitations may be met through alternative methods of compliance provided by an emission allocation and transfer system.”).

humans are driven by a self-interested need to maximize one's own welfare, in particular, one's economic welfare.²⁵² Federal and state laws attempted to make resource use as a pollution receptacle less economically viable; other laws restricted the availability of natural resources and even environmental goods by putting a limit on how much human use would be tolerated; some laws penalized resource developers and users with taxes or flat bans.²⁵³ These laws are consistent with the prevailing standard economic model that humans need to be told how to behave, and need to be directed on what not to do. Otherwise, humans would instinctively exploit resources and goods to benefit themselves and blindly maximize their welfare in accordance with the *homo economicus* model.²⁵⁴

III. TOWARDS A MORE REALISTIC APPROACH TO ENVIRONMENTAL AND NATURAL RESOURCE LAWS

In order to step away from the failed environmental laws of the past, what is needed is an approach grounded on a more accurate model of nature and human behavior. Part III proposes a more realistic model

²⁵² Mamlyuk, *supra* note 90, at 70 (explaining that the core values of the *homo economicus* model are individualism and self-interest).

²⁵³ See, e.g., Archeological Resources Protection Act, 16 U.S.C. § 470ee(a) (2012) (providing that “[n]o person may excavate, remove, damage, or otherwise alter or deface . . . any archeological resource located on public lands or Indian lands”); 16 U.S.C. §§ 1271, 1281 (a) (2012) (imposing a flat prohibition on resource-use proposals that may hinder the scenic value of some rivers or have a negative aesthetic effect on people wishing to view and recreate on these rivers); COLO. REV. STAT. § 33-10-101 (2014) (declaring that the state’s policy was to protect, preserve, enhance, and manage outdoor recreation areas “for the use, benefit, and enjoyment of the people of this state and visitors of this state.”); see also United Nations Conference on Environment and Development, Rio de Janeiro, Braz., June 3–14, 1992, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1(Vol. I), Annex I (Aug. 12, 1992) (illustrating the polluter pays principle, which requires a polluting private party or nation to bear the cost of their pollution as a method of abating and allocating harm to the environment).

²⁵⁴ See generally *Village of Euclid v. Ambler Realty Co.*, 272 U.S. 365, 387 (1926) (the state police power includes the ability to enact zoning regulations that restrict land use decisions by property owners in order to promote citizen health, safety, and welfare); Goldberg, *supra* note 131, at 194–95 (“Government possessed the authority to tell land owners for which purposes the owners’ land could be used. . . . Planning would still give property owners the right to improve their lands, but within limits and in accordance with the values enunciated by states and localities.”). In Part III, this Article offers an alternative to the standard economic model that guides environmental laws, and emphasizes laws that are more interested in how to encourage humans to *create* positive externalities, as opposed to the current legal regime that is focused on rules *prohibiting* negative externalities.

of nature, which would be rooted in complex adaptive systems (“CAS”) analysis. CAS theory reflects the true dynamic nature of natural processes much better than the historic idea that nature acts like a self-regulating, predictable machine. Likewise, a more realistic model of human behavior would be embedded in both the deliberative rational and the emotional intuitive model of humans, as opposed to the overly simplified *homo economicus* model. Part III offers an alternative to the standard economic model that has in the past guided past environmental laws. This alternative model emphasizes laws that encourage humans to create positive externalities, as opposed to the current legal regime that is focused on punitive rules prohibiting negative externalities.

A. *Humans as Part of Nature, Not Apart from Nature*

Contrary to the belief system that has dominated natural resources and environmental laws, humans are not independent from and superior to nature; humans instead are dependent upon the natural systems within which they exist as merely a single species, albeit a particularly destructive one. The continued availability of natural resources and the sustained functioning of certain ecological life-supporting processes are absolutely necessary to support both human life and all organic life on the planet.²⁵⁵ Although humans are dependent upon nature, humans and nature exist interdependently as well. All human actions have effects on the natural systems contextualizing those actions. The rules governing the dynamics of the natural world govern humans, too. Indeed, human evolution itself seems linked to, and is likely caused by, environmental variability.²⁵⁶ And despite an otherwise persistent anthropomorphic belief, the laws governing natural processes, rather than the laws of humans, usually reign supreme.

Well-established principles within the natural sciences have demonstrated our genetic connection to all living things.²⁵⁷ This connection does not mean that humans occupy a position of superiority within nature; rather they occupy a position of dependence. The reality is that

²⁵⁵ See Rockström et al., *Planetary Boundaries*, *supra* note 232, at 33.

²⁵⁶ C. Magill, G. Ashley, & K. Freeman, *Ecosystem Variability and Early Human Habitats in Eastern Africa*, 110 PNAS 1167–74 (2013) (discussing the emergence and dispersal of *Homo erectus* two million years ago in Africa, which impacted local ecosystems).

²⁵⁷ WACKERNAGEL & REES, *supra* note 32, at 4–5; P. Wesley Schultz, *Inclusion with Nature: The Psychology of Human Nature Relations*, in THE PSYCHOLOGY OF SUSTAINABLE DEVELOPMENT, 61–78 (P. Schmuck et al. 2002).

humanity's sustainability is contingent on natural systems and processes, not the reverse.²⁵⁸

The healthy functioning of life-supporting processes at a global and an ecosystem level is the natural dynamic that permits humans to survive.²⁵⁹ While humans' dependence on specific natural resources is apparent and well understood, what is less commonly perceived is humans' connection to the services provided by *ecological systems*. Ecosystems and Earth-based systems ensure that the biosphere continues to meet the specific environmental conditions required for human life.²⁶⁰ The earth is not valuable solely as a storehouse repository of stock and renewable natural resources for humans to extract and use, which has been the focus of so many natural resource laws, as recounted in Part II of this Article. Rather, our survival requires the continued functioning of the biosphere and natural systems, where environmental laws have been strangely silent.²⁶¹

Moreover, nature is not a machine that functions "according to fixed and unvarying rules" or is "something that has been built."²⁶² This belief fosters the mistaken idea that humans are independent from nature, and that we are outsiders viewing nature exogenously.²⁶³ The reality, however, is that humans are "[i]n concert with the other animals, with the plants, and with the microbes themselves, . . . [and] are an active part of the Earth's atmosphere, constantly circulating the breath of this planet through our bodies and brains."²⁶⁴

To step towards an approach that recognizes the interdependence of humans and nature, laws need to move away from the problematic characteristics of anthropomorphism and separation that have defined the traditional legal approach to dealing with humans and the environment. A new "Era V"—an "ecocentric" era—would be characterized by natural resources and environmental laws where humans are part of an intricate framework that makes up the world, not detached or superior to it.²⁶⁵

²⁵⁸ Flournoy, *supra* note 246, at 4.

²⁵⁹ *Id.* at 5.

²⁶⁰ See Rockström et al., *Planetary Boundaries*, *supra* note 232, at 33.

²⁶¹ Carl Folke et al., *Reconnecting to the Biosphere*, 40 *AMBIO* 719 (2011) (discussing the effects of societal advances on planetary systems).

²⁶² Abrams, *supra* note 57, at 66.

²⁶³ *Id.* at 66–68.

²⁶⁴ *Id.* at 71.

²⁶⁵ See generally Leiss, *supra* note 10 (explaining that humans calculate the "world as prey" and separate themselves from nature in order to master it).

Also, instead of reflecting a distinct separateness which presumes human superiority and exceptionalism,²⁶⁶ Era V laws should concentrate on the negative effects human activities have on *natural resources*, not simply the impact human actions affecting nature have on *humans*. Most Era IV environmental laws are typically justified on anthropomorphic grounds, since humans generally do not modify their actions without some perceived threat to their own welfare.²⁶⁷ Era V environmental laws should instead be grounded in ecocentric rationales, where humans engage in more environmentally conscious behaviors where they more fully assimilate with, and become a part of, nature.²⁶⁸

B. *Laws Grounded in More Accurate Models*

Environmental laws should not rely on inaccurate models about how either nature works or humans behave and make decisions.²⁶⁹ A more accurate explanation of how natural processes operate relies on CAS theory. A CAS-based understanding of nature embraces the belief that natural systems flourish when there is constant, relatively unpredictable, non-linear change. This more realistic model also acknowledges that humans are inherently embedded within naturally occurring changes that take place in the world; human actions are not separate or detached from natural systems.²⁷⁰

Another parallel model involves human decision-making. This model is grounded in the idea that humans behave *both* as deliberative rational beings *and* emotional, altruistic intuitive organisms. Such a view presumes that humans are not just self-interested benefit seekers, but instead are more complex figures that sometimes make choices without any direct benefit to the human actor. Laws seeking to alter behaviors should realize that we are sometimes influenced by cognitive biases, not just welfare maximization.²⁷¹

²⁶⁶ See *infra* Parts I.B.1 & I.B.2.

²⁶⁷ See Doremus, *supra* note 67, at 21.

²⁶⁸ See De Young, *supra* note 69, at 517; Kaplan, *supra* note 69, at 498; Doremus, *supra* note 67, at 15.

²⁶⁹ The first model, discussed in Part I.B.1, is the idea that nature will always achieve stability if left alone, and that nature is self-regulating. The second inaccurate theory, described in Part I.B.2, is the *homo economicus* model which presumes that humans are rational actors driven by the self-interested need to maximize one's own welfare.

²⁷⁰ Levin et al., *supra* note 14, at 113.

²⁷¹ SUNSTEIN, *supra* note 16; see Cohen, *supra* note 138 (“[D]evelopments in psychology have required qualification of the ‘rational choice’ model of economic behavior.”).

1. Nature as Complex Adaptive Systems

Humans are a subsystem within natural systems comprising the much larger planetary biosphere.²⁷² Principles governing the workings of natural systems direct humans' interactions with the rest of nature. Natural systems function as complex adaptive systems and exhibit a number of characteristic properties that have implications for the ways humans interact with the rest of nature. For example, natural systems do not follow linear dynamics.²⁷³ The non-linearity property of ecological systems means that the effects of human interventions in ecosystems cannot be accurately predicted.²⁷⁴ Ecological systems are dynamic and can exist in multiple stability configurations.²⁷⁵ When humans try to impose their cause-and-effect assumptions upon natural surroundings that are so dynamic that foreseeability is impossible, the result of the human intervention can be unintended and unexpected.²⁷⁶

Era IV environmental laws often view the earth's natural systems as closely integrated, self-regulating, complex, but capable of being systematically understood by humans, who eventually can make reasonable guesses about human inputs and environmental outputs. CAS theory disputes this perception, and holds instead that biological systems have features consisting of resilience, diversity, redundancy, and compartmentalization, which permits the system's components to be separated and then combined, despite intrinsic and extrinsic disturbances.²⁷⁷ CAS theory suggests that when humans used Era III laws to separate ecosystems in order to create preservation "islands," (e.g., parks, monuments, refuges, and wilderness areas), these islands may not be healthy or sustainable.²⁷⁸ They are not designed to operate consistent with CAS theory, but according to human wishes. We have, in other words, tried to create environments that reflect how we want natural systems to work, not how they

²⁷² WACKERNAGEL & REES, *supra* note 32, at 4.

²⁷³ Robin Kundis Craig, "Stationarity Is Dead"—*Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 40 (2010).

²⁷⁴ *Id.*

²⁷⁵ Craig Anthony Arnold & Lance H. Gunderson, *Adaptive Law and Resilience*, 43 ENVTL. L. REP. NEWS & ANALYSIS 10426–27 (2013). Humans and their legal institutions often overlook or ignore a number of key characteristics of complex adaptive systems in favor of erroneous anthropogenic assumptions about nature. *Id.* A common misperception regarding nature, reflected in many resource preservation laws, is that it exists in or actively moves towards a stable equilibrium state. *Id.*

²⁷⁶ *See id.* at 15.

²⁷⁷ *See id.* at 21–22.

²⁷⁸ *See generally* Arnold & Gunderson, *supra* note 275.

do work. Era V's more ecocentric laws reflecting CAS theory would integrate and connect these preservation islands, so that unpredictable changes and recombinations of a system's components can take place.²⁷⁹

Era V ecocentric laws might also seek to reflect "social-ecological systems" ("SES") theory, which holds that a more natural reality is comprised of coupled human and ecological systems.²⁸⁰ SES theory reflects the fact that any human-derived divide between humans and nature is artificial and arbitrary.²⁸¹ SES theory is based on the view that anthropomorphic social systems, and the ecological systems within which they are embedded, constitute not two separate regimes, but instead a single complex system that possesses its own resilience, multiple stability domains, and thresholds.²⁸²

Environmental and natural resource laws consistent with CAS theory recognize that ecosystems do not simply exist in a state of stasis, but are instead governed by various dynamic, nonlinear, interdependent processes.²⁸³ Such laws should also reflect, consistent with SES theory, that human-caused air, water, and land pollution is taking place within a single complex system, comprised of both humans and natural systems. Environmental pollution is not some exogenous reality, apart from humans, but a manifestation of a dysfunction within a world where nature and humans co-exist.²⁸⁴

2. Humans as Both Deliberative Rational Beings and Emotionally Intuitive Organisms

Humans are complex creatures guided by a variety of motivations. For centuries the standard model presumed that the central influence was selfishness and welfare maximization.²⁸⁵ But more and more behavioral psychologists realize that selflessness and altruism are also important.²⁸⁶

²⁷⁹ See generally Jason Blevins, *Two Groups Join Hands Over Lands*, DENVER POST, Sept. 12, 2014, at 8A (describing a plan connecting "hundreds of thousands of acres that the [conservation] groups have locked into conservation easements [so that the areas] will endure as wild, natural open spaces").

²⁸⁰ Folke et al., *supra* note 261, at 719 (discussing the effects of societal advances on planetary systems).

²⁸¹ *Id.* at 720.

²⁸² Levin et al., *supra* note 14, at 113–16.

²⁸³ See Holling et al., *supra* note 105, at 64.

²⁸⁴ *Id.*

²⁸⁵ SUNSTEIN, *supra* note 16, at 6.

²⁸⁶ See KAHNEMAN, *supra* note 15, at 270–71; SUNSTEIN, *supra* note 16, at 6–12; Cohen, *supra* note 138.

In reality, humans are not rational actors driven only by the self-interested need to maximize one's own welfare.²⁸⁷ Era V laws that are more consistent with a balanced and nuanced picture of human decision-making incorporate both the deliberative and rational model and the emotional intuitive model of human behavior.²⁸⁸

Modern behavioral economists and neuroeconomists have skewed the Era IV assumption that human beings are almost always rational in their decision-making.²⁸⁹ In reality, humans do not deliberately and rationally weigh costs and benefits of alternative courses of action, but instead make choices based on other influences, such as altruism, fairness, teamwork, or the choices of others.²⁹⁰ The implications are significant for lawmakers contemplating environmental protection rules. If individuals make choices based on influences other than rational self-interest, if uncertainty and more "bounded" rationality are equally powerful motivators, and if humans are influenced by a desire to be cooperative and improve their natural world, then environmental laws based primarily on the *homo economicus* model may not be successful.²⁹¹

Unlike standard economic theory that relies on the *homo economicus* model,²⁹² which emphasizes coercive laws that either command humans how to behave or seek to deter or punish them (e.g., with higher costs or oppressive taxes) for behaviors that run contrary to environmental policies,²⁹³ behavioral economics suggests that governments can perhaps

²⁸⁷ See KAHNEMAN, *supra* note 15; Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1473 (1998) ("The absence of sustained and comprehensive economic analysis of legal rules from a perspective informed by insights about actual human behavior makes for a significant contrast with many other fields of economics, where such 'behavioral' analysis has become relatively common.").

²⁸⁸ See KAHNEMAN, *supra* note 15; SUNSTEIN, *supra* note 16.

²⁸⁹ Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263 (1979).

²⁹⁰ Amos Tversky & Daniel Kahneman, *The Framing of Decisions and the Psychology of Choice*, 211 SCIENCE 453 (1981); Peter Earl, *Why Evolution Wouldn't Favour Homo Economicus*, OUPBLOG (Dec. 11, 2013), <https://blog.oup.com/2013/12/evolution-homo-economicus-homo-sapiens-enjoy-sex/>, archived at <http://perma.cc/7RTV-DBGF>.

²⁹¹ DANIEL COHEN, HOMO ECONOMICUS: THE (LOST) PROPHET OF MODERN TIMES 4 (2014); ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990); Richard Thaler, *From Homo Economicus to Homo Sapiens*, 14 J. ECON. PERSP. 133, 134–40 (2000).

²⁹² Levin et al., *supra* note 14, at 113–15 (explaining that the *homo economicus* model perceives nature too simply as a closely integrated, self-regulating, complex system that works best when left alone by humans). This view is not consistent with the science of how nature really works, which is as complex adaptive systems whose central features include resilience, diversity, redundancy, modularity (compartmentalization), and nonlinear feedback loops. *Id.*

²⁹³ See Rod McGuirk, *Demise of Australia's Carbon Tax May Be Warning for U.S. Proposal*,

better realize environmental goals by noncoercive means.²⁹⁴ Humans may be more responsive if Era V ecocentric laws rely less on economic punishment, and instead encourage us to act a certain way; when our actions result in nonfinancial emotional and psychological rewards, natural resources and natural systems are also the beneficiaries.²⁹⁵ The creation of a positive externality elicits a more efficient and sympathetic response than the imposition of a penalty for imposing a negative externality. For example, state and local land use laws that encourage humans to provide ecological dedications as a precondition for development, or by promoting the use of conservation easements, may receive a more receptive human reaction than flat bans.²⁹⁶

C. *Environmental Laws that Work*

Effective and more realistic environmental and natural resource laws would be built on two foundations. First, such Era V ecocentric laws would impose an affirmative *duty* on humans to make choices consistent with ecological integrity and planetary boundaries. Era V laws would not be intent on punishing human behavior deemed harmful to environmental systems, such as many Era IV laws that tell humans what *not to do*. Era V ecocentric laws would instead encourage humans to do affirmative acts consistent with more workable models of (1) nature as a “complex adaptive system,” and (2) humans as both deliberative rational beings and emotional intuitive organisms.²⁹⁷ These new Era V laws would create incentives for humans to create positive ecocentric externalities. The establishment of an affirmative duty imposed on humans would be coupled with a parallel legal recognition that nature, natural resources, and natural processes should be granted a legally recognized *right* to resist certain human interventions.²⁹⁸ Natural resources could exercise this right when humans take actions that threaten ecological integrity,

DENVER POST, July 7, 2014, at 14A (discussing how a *homo economicus* based regulation has failed in Australia).

²⁹⁴ See, e.g., RICHARD H. THALER & CASS R. SUNSTEIN, *NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS* 6 (2008) (describing how humans can be persuaded or “nudge[d]” into making different decisions).

²⁹⁵ See *id.*; *infra* Part III.C.1.

²⁹⁶ Goldberg, *supra* note 131, at 191 (explaining that certain types of zoning regulations block high-intensity development by simultaneously ensuring the preservation of natural landscapes); see Blevins, *supra* note 279.

²⁹⁷ See SUNSTEIN, *supra* note 16; THALER & SUNSTEIN, *supra* note 294, at 6–8, 65–66.

²⁹⁸ LAITOS, *supra* note 27, at 208–09.

or transgress fixed planetary boundaries, or interfere with the workings of natural complex adaptive systems.²⁹⁹

1. Impose Affirmative Duties on Humans

If humans are emotional intuitive beings, not strictly rational entities relentlessly striving towards their own self-interest, then Era V laws should not rely only on flat bans and mandates, but instead should use default rules and more incentivized bottom-up decision-making.³⁰⁰ Rather than rely on rules that seek to prevent humans from creating environmental damage by penalizing their bad behavior, new laws would either obligate humans, or create incentives for humans, to produce positive externalities.³⁰¹ For example, if a dam was proposed that altered a natural watercourse that was a habitat to an endangered bird species, then the dam builders should have the duty to compensate for any habitat loss by producing an alternative habitat that would permit the birds to flourish despite the dam. And the dam builders should be made to realize that the benefit of encouraging and even creating species habitat has both psychological and even an economic spillover effect on the dam builders, who will more likely to green-light future dam projects.

The rationale behind such “libertarian paternalism” is that when governments structure the choices available to humans in such a way as to gently persuade them in the desired direction, humans will ultimately make decisions consistent with social goals, regardless of their own self-interest.³⁰² For example, one way to help guide humans’ choices is to fully disclose information to people to enable them to make informed decisions that go beyond an individual’s desire for short-term welfare maximization.³⁰³ Humans are altruistic beings, who “care about being treated fairly and want to treat others fairly if those others are themselves behaving fairly.”³⁰⁴ When given a range of choices in a system that recognizes humans as both deliberative rational beings that will seek to ensure their long-term benefit, and emotional intuitive entities that look beyond individual self-actualization, humans generally make decisions that are

²⁹⁹ *Id.*

³⁰⁰ See SUNSTEIN, *supra* note 16, at 6–7.

³⁰¹ See *infra* Part III.C.2.

³⁰² *Id.* at 4–6, 11, 22–37 (discussing various cognitive tools that can guide people into making better decisions).

³⁰³ Admin. Off. Info. and Reg. Aff., *Memorandum for the Heads of Executive Departments and Agencies*, WHITEHOUSE.GOV (June 18, 2010), http://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/disclosure_principles.pdf.

³⁰⁴ Jolls et al., *supra* note 287, at 1479.

conducive to policy goals. That is, humans tend to be “concerned about the well-being of others, even strangers in some circumstances, and this concern and their self-conception can lead them in the direction of cooperation at the expense of their material self-interest (and sometimes spite, also at the expense of their material self-interest).”³⁰⁵

An example of a law that seems to be problematic because it commands or tells humans not do something, is a moratorium issued by the Bureau of Land Management that prohibits leasing of public lands by energy companies where the land is the habitat for the Gunnison sage grouse.³⁰⁶ Members of the oil, gas, and coal industry have vowed to fight this command and control regulation.³⁰⁷ Natural resource developers, wrapped in an Era I and Era II mentality argue that the federal government’s moratorium is negatively impacting employment prospects and economic development in the affected communities, without reliable information that the ban will even be beneficial for the sage grouse.³⁰⁸ That kind of formidable opposition will either delay implantation of the moratorium or perhaps weaken it or cause its demise.³⁰⁹ An Era V ecocentric approach would integrate the resource developers’ social and economic wish to be respected by and partnered with environmental interests, as a well as valued by shareholders. Instead of a moratorium, a duty to provide habitat for sage grouse might have yielded a better result.

It would seem that a law that instructs people how to behave has higher prospects for success than a law that punishes resource developers by imposing a ban or moratorium. Take for example an initiative by the U.S. Energy Department that is providing \$167 million for a project that aims to reduce coal-fired power plant pollution.³¹⁰ The initiative is part of a larger scale program that funds carbon capture projects.³¹¹ The

³⁰⁵ *Id.* at 1545.

³⁰⁶ Bruce Finley, *Feds Block Energy Leasing of Sage Grouse Habitat*, DENVER POST, June 17, 2014, at A4 (“Sage grouse are chicken-sized, ground-nesting birds famed for loud mating dances. Roads, power lines and housing have fragmented much of the sagebrush terrain they need. An estimated 4,500, fewer than a tenth of the historical population, have survived”). The moratorium includes 800,000 acres in southwest Colorado and eastern Utah. *Id.*

³⁰⁷ *Id.* at A4.

³⁰⁸ *Id.*

³⁰⁹ Reid Wilson, *Western States Worry Decision on Bird’s Fate Could Cost Billions in Development*, WASH. POST, May 11, 2014, <http://www.washingtonpost.com/blogs/govbeat/wp/2014/05/11/western-states-worry-decision-on-birds-fate-could-cost-billions-in-development/>, archived at <http://perma.cc/SC3Y-RWZS>.

³¹⁰ Rebecca Smith, *Turning CO2 into an Energy Asset*, DENVER POST, July 16, 2014, at B6.

³¹¹ See *id.*; Int’l Energy Ass’n, *Carbon Capture and Storage*, IEA, <http://www.iea.org/topics/ccs> (last visited Nov. 13, 2014), archived at <http://perma.cc/WRT5-2J2P> (“[C]arbon capture and storage, or CCS, is a family of technologies and techniques that enable the

carbon capture program, which coincides with an Environmental Protection Agency (“EPA”) proposal to limit the release of carbon dioxide from coal-fired plants, may reduce greenhouse gases from coal *and* provide a mechanism for reinvigorating otherwise depleted oil and gas fields, whose use as an energy fuel produces less pollution than coal.³¹²

2. Generating Positive Externalities

Laws that are based on preventing negative externalities are founded on the anthropocentric belief that humans do not change their behavior unless the costs of continuing the behavior are so impactful that the human will decide to forgo or modify that behavior.³¹³ Such laws are grounded in notions of human desires to avoid costs and minimize penalties.³¹⁴ The syllogism reflected in such laws is that if human behavior produces a negative environmental externality (e.g., pollution), then to alter the behavior and remove the negative externality, humans should be deterred from producing that externality, by reflecting in the behavior the true cost of the behavior that is otherwise causing the externality.³¹⁵ Many Era IV environmental laws were designed only to curb negative environmental externalities.³¹⁶ What seems relatively untried as a means of bringing about environmentally sound decisions is reliance on laws that seek to generate positive externalities.

capture of CO₂ from fuel combustion or industrial processes, the transport of CO₂ via ships or pipelines, and its storage underground, in depleted oil and gas fields and deep saline formations. CCS can have unique and vital role to play in the global transition to a sustainable low-carbon economy, in both power generation and industry.”).

³¹² See Smith, *supra* note 310, at A4.

³¹³ KAHNEMAN, *supra* note 15, at 269.

³¹⁴ *Id.* at 269–70.

³¹⁵ An externality is a cost that is not borne by the parties to a particular transaction. For instance, when a manufacturing plant pollutes and its neighbor’s property becomes devalued as a consequence of the pollution, the devaluation is a spillover cost, or negative externality of allowing the plant to operate and pollute. Regulations that focus on preventing or reducing negative externalities are designed to compensate for the deleterious impacts of decisions that create such results, or negative externalities. See *generally* Koontz v. St. Johns River Water Mgmt. Dist., 133 S. Ct. 2586, 2595 (2013) (“Insisting that landowners internalize the negative externalities of their conduct is a hallmark of responsible land-use policy, and we have long sustained such regulations against constitutional attack.”) (citing Village of Euclid v. Ambler Realty Co., 272 U.S. 365 (1926)); Am. Coatings Ass’n, Inc. v. S. Coast Air Quality Dist., 278 P.3d 838, 851 (Cal. 2012) (explaining that, in general, industry does not have sufficient “incentive to develop or adopt new pollution control technology in the absence of regulation” since “pollution is a negative externality”).

³¹⁶ See *supra* Part II.D.

Command-and-control regulations that wish to abate negative externalities often leave no bargaining power for firms, and are mandatory if a firm desires to participate in a certain market.³¹⁷ By contrast, Voluntary Environmental Programs (“VEPs”) are designed to “induce firms to produce positive environmental externalities beyond what [existing] government regulations require.”³¹⁸ For example, with certain types of VEPs, there are “collaborative arrangements between firms and regulators in which firms voluntarily commit to actions that improve the natural environment.”³¹⁹ When the federal regulator is EPA, the agency will reward the firm that participates in a VEP with non-*homo economicus* benefits by publicizing the firm’s participation in the VEP and pollution prevention record.³²⁰ The benefits to the firm are in the form of goodwill, not welfare maximization. These kinds of Era V laws may be able to encourage positive industry actions more effectively than laws that punish failure to comply.³²¹

3. Grant Nature Rights

An anthropomorphic legal right granted to natural resources will further help to unify humans and nature, which are now perceived in many environmental laws as being separate. What, then, should be the rights granted to nature? There are four basic rights, similar to those traditionally given to humans: (1) a right to exist; “(2) a right of personal protection; (3) a right to liberty;” and (4) a right to have these rights legally recognized by the government.³²² A right to exist provides nature a biocentric right when human interference threatens to harm living organisms.³²³ A right to personal protection includes the right of the resource to be protected from human activity which destroys its ecological

³¹⁷ See Aseem Prakash & Matthew Potoski, *Collective Action through Voluntary Environmental Programs: A Club Theory Perspective*, 35 POL’Y STUD. J. 773, 775 (2007).

³¹⁸ *Id.* at 773–75.

³¹⁹ *Id.*; see also Magali A. Delmas & Ann K. Terlaak, *A Framework for Analyzing Environmental Voluntary Agreements*, 43 CAL. MGMT REV. 44 (2001).

³²⁰ See, e.g., *State and Local Transportation Resources: Voluntary Programs*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/otaq/stateresources/voluntaryprograms.htm> (last updated Feb. 2, 2013), archived at <http://perma.cc/YB94-8TV8>. Another example of a positive externality generated by a regulation that tells humans what to do, instead of how not to act, is the carbon capture program discussed in Part III.C.1. See Smith, *supra* note 310; *supra* text accompanying notes 310–15.

³²¹ See Dinah Koehler, *The Effectiveness of Voluntary Environmental Programs—A Policy at a Crossroads?*, 35 POL’Y STUD. J. 689, 691 (2007).

³²² LAITOS, *supra* note 27, at 209.

³²³ *Id.* at 210.

integrity and ability to provide planetary services.³²⁴ A right to liberty allows nature to function as it otherwise would without exogenous human intervention.³²⁵ Finally, a right to have legally recognized rights would provide nature and natural objects some legal mechanism to assert these rights when they are threatened by human actions.³²⁶

Environmental laws that provide natural rights provide nature, natural resources, and natural processes a means to resist human interventions that adversely affect natural systems. If humans are to engage in behaviors that threaten ecological integrity, transgress planetary boundaries, or interfere with the workings of complex adaptive systems, the act of bestowing nature with legally recognizable anthropomorphic rights should permit more of an equivalency between natural systems and human actions.

CONCLUSION

A new era of ecocentric environmental and natural resource laws would (1) impose affirmative duties on humans, (2) be more interested in actions that generate positive externalities, and (3) grant nature rights. These Era V laws would recognize that humans are intricately a part of, and firmly embedded with, the natural world. Ecocentric laws would be grounded in more accurate models of how humans and nature work, and would no longer cling to impractical notions of humans as superior entities—separate and detached from the earth's ecosystems, unhindered by fixed planetary boundaries. By reflecting CAS theory and a model of humans as both deliberative rational beings and emotional intuitive organisms, such laws could bring about much needed, and much healthier, balance between humans and nature.

³²⁴ *Id.*

³²⁵ *Id.*

³²⁶ See, e.g., David S. Cassuto, *The Law of Words: Standing, Environment, and Other Contested Terms*, 28 HARV. ENVTL. L. REV. 79 (2004); Jan G. Laitos, *Standing and Environmental Harm: The Double Paradox*, 31 VA. ENVTL. L.J. 56 (2013).