

Earth Jurisprudence and the Story of Oil: Intergenerational Justice for the Post-Petroleum Period

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Humanity's way of life is on a collision course with geology—with the stark fact that the Earth holds a finite supply of oil.¹

Introduction

THE DEEPWATER HORIZON DISASTER OF 2010 spewed millions of barrels of oil into the waters of the Gulf of Mexico, offering a three-month glimpse into the costs and consequences of a worldwide dependence on oil.² After the leak was finally plugged and the well was cemented, attention soon turned to an economic recession, wars, and mid-term elections.³ When assurances were offered that the oil seemed to have dissipated and the damage was far less than anti-

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1. Tim Appenzeller, *End of Cheap Oil*, NAT'L GEOGRAPHIC MAG., June 2004, at 88, available at <http://ngm.nationalgeographic.com/ngm/0406/feature5/fulltext.html>.

2. See KRISTINA ALEXANDER, CONG. RESEARCH SERV., R41265, THE 2010 OIL SPILL: MMS/BOEMRE AND NEPA (2011), available at <http://fas.org/sgp/crs/misc/R41265.pdf>; see also Henry Fountain, *U.S. Says BP Well is Finally 'Dead'*, N.Y. TIMES, Sept. 20, 2010, at A14, available at <http://www.nytimes.com/2010/09/20/us/20well.html> (reporting that the source of the "largest accidental oil spill in history" was capped after eighty-six days on July 15 and declared "dead" on September 19, 2010).

3. E.g., Peter S. Goodman, *What Can Be Done?*, N.Y. TIMES, Aug. 29, 2010, at WK1 (voicing concerns about a second recession, impending elections, and effects of two wars).

pated, the calamity receded in the rear view mirror of public discourse.⁴

Four thousand miles away, another disaster—as horrific as the Gulf oil blowout—captured little public attention. This disaster has arisen in the Alaskan village of Kivalina, which is disappearing into the Chukchi Sea.⁵ Kivalina is one of the first communities to experience the devastating effects of global warming.⁶ Villagers claim that global warming is melting the Arctic sea ice due to petroleum-induced greenhouse gases, the largest emitters of which include oil companies such as British Petroleum.⁷

The Gulf oil disaster and the inundation of Kivalina are intertwined. They demonstrate the catastrophic consequences of an oil-based global economy, which are taking place in the looming shadow of Peak Oil.⁸ A burning economic and political question is when global oil production will peak. Peak Oil will become a “watershed moment,” signifying the transition from two hundred years of a readily available supply of cheap oil to a decreasing supply of expensive

4. See Green Right Now Reports, *BP Oil Spill Clean Up by the Numbers*, OIL SPILL NEWS (Nov. 22, 2010), <http://www.oilspillnews.net/oil-spill-clean-up/7online-com-green-content-bp-oil-spill-clean-up-by-the-numbers>. Compare Justin Gillis, *U.S. Finds Most Oil from Spill Poses Little Additional Risk*, N.Y. TIMES, Aug. 4, 2010, at A1, available at <http://nytimes.com/2010/08/04/science/earth/04oil.html> (discussing government report that three-quarters of the oil from the Gulf leak had been eliminated), with Suzanne Goldenberg, *BP Oil Spill: US Scientist Retracts Assurances Over Success of Cleanup*, GUARDIAN (LONDON), Aug. 19, 2010, at 19, available at <http://www.guardian.co.uk/environment/2010/aug/19/bp-oil-spill-scientist-retracts-assurances> (reporting that government claims that little oil remained in the Gulf were undermined by a senior government scientist and a new research study that mapped a twenty-two-mile plume of oil).

5. ORRIN H. PILKEY & ROB YOUNG, *THE RISING SEA* 6–16 (2009); Felicity Barringer, *Flooded Village Files Suit, Citing Corporate Link to Climate Change*, N.Y. TIMES (Feb. 27, 2008), <http://www.nytimes.com/2008/02/27/us/27alaska.html>.

6. PILKEY & YOUNG, *supra* note 5, at 6–7, 14.

7. Complaint for Damages and Demand for Jury Trial, *Native Village of Kivalina v. ExxonMobil Corp.*, 663 F. Supp. 2d 863 (N.D. Cal. 2009) (No. C 08-1138 SBA) [hereinafter *Kivalina Complaint*]; see also *Native Village of Kivalina v. ExxonMobil Corp.*, 663 F. Supp. 2d 863 (N.D. Cal. 2009) (order granting Defendant’s motions to dismiss), *appeal docketed*, No. 09-17490 (9th Cir. Nov. 5, 2009), and *stay lifted*, No. 09-17490 (9th Cir. Aug. 31, 2011) (order lifting stay entered after Supreme Court decision in *American Electric Power Co. v. Connecticut*, 180 L. Ed. 2d 435 (2011)); *Am. Elec. Power Co. v. Connecticut*, 180 L. Ed. 2d 435 (2011) (reversing holding of Second Circuit that governmental and land-trust plaintiffs stated federal common law public nuisance claim for injunctive relief against five power companies for failing to reduce annual carbon emissions).

8. Peak Oil marks the moment in time when global demand for oil exceeds supply. Terry Macalister, *US Military Warns Oil Output May Dip Causing Massive Shortages by 2015*, GUARDIAN (LONDON), April 12, 2010, at 29, available at <http://guardian.co.uk/business/2010/apr/11/peak-oil-production-supply>. See *infra* Part III.A for the discussion of Peak Oil.

oil.⁹ Dire predictions have been made of the state of the world on the shadow side of Peak Oil.¹⁰ Scarce oil is predicted to inflame more oil wars, threaten economic systems, and push extracting companies to riskier lengths and depths while global warming continues to claim coastal communities such as Kivalina.¹¹

This Article moves from the disasters of the Gulf and Kivalina to propose that the necessary work of our generation is to make the transition from Peak Oil to sustainable energy for future generations of humans, other-than-human species, and Earth ecosystems. The transitory period of Peak Oil also presents a transformative opportunity for law, economics, and politics. Taking that opportunity, this Article offers principles and applications of Earth Jurisprudence to guide the transformation of law and governance into the post-petroleum period.

Earth Jurisprudence is an emerging field that seeks Earth-centered approaches to law and governance for the well-being of the planet and future generations.¹² Earth Jurisprudence draws forth solutions from within as well as beyond existing law. By shifting to Earth-centered approaches to law and governance, humanity takes its proper place as a member of the Earth community. From this stance, humankind may also exercise its proper role to establish legal systems and laws that support all parts of the Earth community, including adopting sustainable, precautionary, and intergenerational approaches to energy.

To point toward systems of law and governance that support the flourishing of humanity and Earth, Part I of the Article will introduce key principles of Earth Jurisprudence. Part II will impart the story of oil, from the Paleozoic Era three hundred million years ago to the Deepwater Horizon blowout of 2010. Part III will take a critical turn to

9. Appenzeller, *supra* note 1, at 2.

10. ROBERT L. HIRSCH ET AL., PEAKING OF WORLD OIL PRODUCTION: IMPACTS, MITIGATION, & RISK MANAGEMENT 66 (2005), available at http://www.netl.doe.gov/publications/others/pdf/oil_peaking_NETL.pdf (projecting, in a report for the U.S. Department of Education, that without planning and mitigation Peak Oil “will almost certainly cause major economic upheaval”).

11. *Id.* at 5–7, 64–66; U.S. JOINT FORCES COMMAND, THE JOINT OPERATING ENVIRONMENT (JOE) 28 (2010) [hereinafter JOE REPORT], available at <http://www.peakoil.net/files/JOE2010.pdf> (advising, in a military report, that a “severe energy crunch is inevitable,” creating an economic slowdown that “would exacerbate other unresolved tensions, push fragile and failing states further down the path toward collapse, and perhaps have serious economic impact on both China and India”).

12. Judith E. Koons, *What is Earth Jurisprudence?: Key Principles to Transform Law for the Health of the Planet*, 18 PENN ST. ENVTL. L. REV. 47, 48 (2009) [hereinafter Koons, *Key Principles*]; see also Judith E. Koons, *Earth Jurisprudence: The Moral Value of Nature*, 25 PAGE ENVTL. L. REV. 263, 265 (2008) [hereinafter Koons, *Moral Value*].

examine the phenomena of Peak Oil and global warming. Part IV will engage a constructive turn to advance intergenerational equity as an application of Earth Jurisprudence.¹³ Although intergenerational equity is commonly limited to future generations of human beings, this Article articulates five arguments to bring about a sustainable world not only for present and future generations of humans, but also for other-than-human species¹⁴ and Earth ecosystems.

I. Principles of Earth Jurisprudence

The universe arises into being as spontaneities governed by the primordial orderings of diversity, self-manifestation, and mutuality.¹⁵

Earth Jurisprudence is a developing philosophy based on the insight that a sustainable system of law and governance must be Earth-centered.¹⁶ Enlightenment-era thinking, the basis for Western law and philosophy, embraced premises that permitted and justified the degradation of nature by separating humanity from nature.¹⁷ Human beings excluded nature from the moral and legal community and

13. Edith Brown Weiss advises that “[i]ntergenerational equity calls for equality among generations in the sense that each generation is entitled to inherit a robust planet that on balance is at least as good as that of previous generations.” Edith Brown Weiss, *What Obligation Does Our Generation Owe to the Next? An Approach to Global Environmental Responsibility: Our Rights and Obligations to Future Generations for the Environment*, 84 AM. J. INT’L L. 198, 200 (1990) [hereinafter Brown Weiss, *Obligation*]. For a full discussion of intergenerational equity, see *infra* Part IV.

14. In this Article, the phrase “other-than-human species” will be used to encompass beings in the natural world other than humanity. The phrase, “non-human species” will be avoided, as that phrase connotes a dualism in which humanity is separate from, and superior to, other species. *E.g.*, Koons, *Key Principles*, *supra* note 12, at 61–62.

15. BRIAN SWIMME & THOMAS BERRY, *THE UNIVERSE STORY* 72–73 (1992) (“Were there no differentiation, the universe would collapse into a homogenous smudge; were there no subjectivity, the universe would collapse into inert, dead extension; were there no communion, the universe would collapse into isolated singularities of being.”).

16. THOMAS BERRY, *THE GREAT WORK: OUR WAY INTO THE FUTURE* 56 (1999) [hereinafter BERRY, *GREAT WORK*]. Thomas Berry is the mentor of Earth Jurisprudence; the phrase “Earth Jurisprudence” arose out of a meeting sponsored by the Gaia Foundation (London) with Berry in 2001 at the Airlie Center in Virginia. CORMAC CULLINAN, *WILD LAW: A MANIFESTO FOR EARTH JUSTICE* 11 (2d ed. 2011). I approach jurisprudence as the study and evaluation of the structure, purpose, assumptions, and values of law. See ROBERT L. HAYMAN ET AL., *JURISPRUDENCE: CLASSICAL AND CONTEMPORARY* ix (2d ed., 2002) (advising that jurisprudence considers the ideas and underlying premises of law, which relate to “different conceptions of truth, knowing and meaning, and, perhaps, of values or moral principles.”); cf. Patricia Smith, *On Law and Jurisprudence: Feminism and Legal Theory*, in *FEMINIST JURISPRUDENCE* 483 (Patricia Smith ed., 1993) (defining jurisprudence as the “philosophical discipline that examines the fundamental nature or elements of law”).

17. CULLINAN, *supra* note 16, at 44–46 (tracking the philosophy of the separation of humanity from nature to Enlightenment thinkers such as Galileo, Bacon, Decartes, and Newton).

located the normative center of law solely in human affairs.¹⁸ From this narrow anthropocentric perspective, Western law became the handmaiden of the economy, justifying the exploitation of Earth and paving the way for the industrialization of the world in the name of economic progress.¹⁹ Under Western philosophy, Earth came to be understood as a collection of objects (or natural resources) to support industry and profit.²⁰

While the “glory years” of the industrial period brought new bodies of knowledge, amazing scientific discoveries, and burgeoning material development, the industrial years also wrought negative consequences that we did not envision.²¹ With the well-being of humanity as the prevailing normative referent for human activities, we plundered nature’s bounty to feed commodious appetites and, in the process, became convinced that we had freed ourselves from dependence on nature.²² Under the illusion that we were no longer dependent on nature, we turned on nature and polluted the air and water, extinguished thousands of species, and altered the geophysics of Earth.²³

In the early twenty-first century, humanity is facing the reality of the consequences of the industrial path. Two hundred years of largely unfettered industrial development have not only compromised nature, they have also brought into question the future of humans on Earth.²⁴ The scientific community has widely acknowledged the far-

18. *Id.*; see also Francis Bacon, *The Masculine Birth of Time*, in *THE PHILOSOPHY OF FRANCIS BACON* 62 (Benjamin Farrington trans., Liverpool Univ. Press 1964) (1653) (offering sexual metaphors in discussing Nature, including to “bind her to your service and make her your slave”).

19. See CULLINAN, *supra* note 16, at 67 (“Our legal and political establishments perpetuate, protect and legitimise the continued degradation of Earth by design, not by accident.”); Morton Horwitz, *The Rise of Legal Formalism*, 19 *AM. J. LEGAL HIST.* 251 (1975) (showing that the U.S. legal system was transformed in the mid-1800s to support “men of commerce and industry”).

20. BERRY, *GREAT WORK*, *supra* note 16, at 16, 140 (noting that, in the transition to an “extractive economy,” widespread benefits were justified by viewing Earth “as a collection of natural resources rather than as a mystical entity to be revered”).

21. *Id.* at 150–51.

22. *Id.* at 156–57; see also BARRY LOPEZ, *ARCTIC DREAMS: IMAGINATION AND DESIRE IN A NORTHERN LANDSCAPE* 38–39 (1986).

23. BERRY, *GREAT WORK*, *supra* note 16, at 156–57.

24. *E.g.*, JARED DIAMOND, *COLLAPSE: HOW SOCIETIES CHOOSE TO FAIL OR SUCCEED* 6–7 (2005) (drawing parallels between the causes of collapses of past societies—cases of “unintended ecological suicide”—and present environmental threats that are likely to lead to lower living standards, higher risks, and undermining of key values).

reaching perils and the anthropogenic basis of global warming.²⁵ Concurrently, we are witnessing a pervasive shift of consciousness about nature and considerable dialogue about sustainable paths to the future.²⁶

The nascent post-petroleum period marks a transitory moment in Earth's time, providing an opportunity to re-shape law and governance with the purpose of safeguarding the welfare of the entire Earth community.²⁷ To support the project of transforming law, this Article begins with the premise that a successful system of governance should reflect the attributes of what is being governed.²⁸ Instead of relying on short-term economic outcomes and embracing a host of market distortions, a system of law and governance oriented toward the well-being of Earth should be based on premises that reflect ways the Earth regulates itself.²⁹

For this jurisprudential endeavor, the story of the origin and functioning of Earth as told in the Universe Story is instructive.³⁰ The Universe Story offers an epic narrative to teach humanity about its design, functioning, and relationships.³¹ In their rendering of the Universe Story, Thomas Berry and Brian Swimme describe three organizing principles of the universe.³² The first principle is subjectivity (or autopoiesis).³³ The principle of subjectivity is evident in the self-organizing power of the beings and processes that structure the universe: "Each atom is a storm of ordered activity A galaxy, too, is an autopoietic system, organizing its stars into a nonequilibrium pro-

25. NEIL ADGER ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY, SUMMARY FOR POLICYMAKERS 7-22 (2007) [hereinafter IPCC WORKING GROUP II], available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf> (providing current knowledge of the impacts of anthropogenic global warming based on the work of 2500 scientists and more than 29,000 data series).

26. BERRY, GREAT WORK, *supra* note 16, at 200; see also RICHARD HEINBERG, SEARCHING FOR A MIRACLE: "NET ENERGY" LIMITS & THE FATE OF INDUSTRIAL SOCIETY 7-62 (2009), available at http://www.ifg.org/pdf/Searching%20for%20a%20Miracle_web10nov09.pdf (assessing eighteen energy sources and a future energy mix).

27. BERRY, GREAT WORK, *supra* note 16, at 151.

28. CULLINAN, *supra* note 16, at 27-28.

29. *Id.* at 29.

30. SWIMME & BERRY, *supra* note 15, at 63-95.

31. *Id.*; see also Herman F. Greene, *Where is the Universe in the Universe Story?*, in THE ECOZOIC, REFLECTIONS ON LIFE IN AN ECOLOGICAL AGE 57, 70 (2008) (analyzing the Universe Story as an epic narrative and a scientific account, blending meaning-making through story-telling and scientific theory).

32. SWIMME & BERRY, *supra* note 15, at 71-79.

33. *Id.* at 75.

cess and drawing forth new stars from its interstellar materials.”³⁴ Everything in the universe has “an inner capacity for self-manifestation.”³⁵

The second principle is differentiation (or diversity).³⁶ The universe is ordered by multiform creativity.³⁷ At the core of the universe is “an inexhaustible fecundity,” which continues to create itself anew.³⁸ A deep investigation of anything in the universe—a spider web, a thumbprint, the interaction of elemental particles, a dwarf star—is a discovery of its uniqueness.³⁹ In the epic narrative of the universe, there is “an outrageous bias for the novel, for the unfurling of surprise” in each thing, place, and time.⁴⁰

The third principle is communion (or interdependence).⁴¹ The universe is organized by relationships.⁴² Fifteen billion years ago, when the universe exploded into existence, each of the primitive particles was connected to all of the others: “Alienation for a particle is a theoretical impossibility. For galaxies, too, relationships are the fact of existence.”⁴³ Everything in the universe is composed of, and related to, the original elements that burst forth in creation.⁴⁴ Life and death are a cycle of relationships, as are the movement of atoms and the spiraling of planets.⁴⁵ No life form feeds itself.⁴⁶ The arc of space be-

34. *Id.*

35. *Id.*

36. *Id.* at 73.

37. *Id.* at 74.

38. *Id.*

39. *Id.*

40. *Id.*

41. *Id.* at 77.

42. *Id.*

43. “Each galaxy is directly connected to the hundred billion galaxies in the universe, and there will never come a time when a galaxy’s destiny does not involve each of the galaxies in the universe.” *Id.*

44. ELISABET SAHTOURIS, *EARTHDANCE: LIVING SYSTEMS IN EVOLUTION* 29 (2000), available at <http://www.ratical.org/LifeWeb/Erthdnce/erthdnce.pdf>; see also Berry, *Great Work*, *supra* note 16, at 27–28; JOSH FRICK, *EARTH PAPER* 6 (2007), <http://earthjuris.org/wp-content/uploads/2011/05/spring2007-Frick.pdf> (last visited July 12, 2011) (characterizing Berry’s observation that all matter on Earth is composed of the same elements as “a critical point in beginning to change our current thought process”).

45. SAHTOURIS, *supra* note 44, at 21–22, 117; see also VLADIMIR I. VERNADSKY, *THE BIOSPHERE* 25 (Peter N. Nevraumont ed., David B. Langmuir trans., 1998) (1926) (proposing, in the English translation of Vernadsky’s 1926 monograph, that “the Biosphere is not only the ‘face of the Earth’ but is the global dynamic system transforming our planet since the beginning of biogeological time”).

46. THOMAS BERRY, *EVENING THOUGHTS: REFLECTING ON EARTH AS SACRED COMMUNITY* 150 (2006) [hereinafter BERRY, *EVENING*].

speaks of “an intimacy of the universe with every being in the universe.”⁴⁷

What do the organizing principles of subjectivity, differentiation, and communion profess about the premises of law and governance? The first theme of subjectivity reflects the intrinsic value of nature.⁴⁸ From this perspective, nature has both moral and legal considerableness.⁴⁹ The idea of *moral considerableness* in the environmental context was advanced by Kenneth Goodpaster in 1978 when he proposed that living beings are entitled to moral consideration.⁵⁰ To Goodpaster, all living beings and biosystems fall “within the sphere of moral concern,” they are “morally relevant . . . [and] can be taken into account when moral decisions are made.”⁵¹

The premise that beings, entities, and systems in nature warrant *legal consideration* was advanced by Christopher Stone in a number of writings beginning in 1972.⁵² Legal personhood has been granted to many entities that are not human beings, including ships, municipalities, universities, churches, and business corporations.⁵³ The law entrusts guardians and trustees with appearing in our legal system on

47. BERRY, *GREAT WORK*, *supra* note 16, at 98.

48. Koons, *Key Principles*, *supra* note 12, at 55.

49. *Id.* at 57–58.

50. Kenneth E. Goodpaster, *On Being Morally Considerable*, 75 J. PHIL. 308 (1978).

51. CLARE PALMER, *ENVIRONMENTAL ETHICS AND PROCESS THINKING* 63 (1998) (discussing the contribution to moral thought of Goodpaster); *see also* Goodpaster, *supra* note 50, at 311 (contrasting moral considerableness with the ideas of moral significance, which are comparative judgments of moral weight to be given to factors in cases of conflict). Goodpaster also contrasted operative and regulative thresholds of moral sensitivity: moral considerability is operative where it can be acknowledged by a moral agent and is regulative where it is defensible on grounds independent of operability. *Id.* at 313.

52. *See* Christopher D. Stone, *Should Trees Have Standing? Toward Legal Rights for Natural Objects*, 45 S. CAL. L. REV. 450 (1972) [hereinafter Stone 1972]; Christopher D. Stone, *Should Trees Have Standing? Revisited: How Far Will Law and Morals Reach? A Pluralist Perspective*, 59 S. CAL. L. REV. 1 (1985) [hereinafter Stone 1985]; CHRISTOPHER D. STONE, *SHOULD TREES HAVE STANDING? AND OTHER ESSAYS ON LAW, MORALS, AND THE ENVIRONMENT* (1996) [hereinafter STONE 1996]; *see also* RODERICK FRAZIER NASH, *THE RIGHTS OF NATURE: A HISTORY OF ENVIRONMENTAL ETHICS* 127 (1989) (discussing an earlier essay espousing legal rights for nature by Clarence Morris, *The Rights and Duties of Beasts and Trees: A Law Teacher's Essay for Landscape Architects*, 17 J. LEGAL EDUC. 185, 189 (1964)).

53. STONE 1996, *supra* note 52, at 3; *Sierra Club v. Morton*, 405 U.S. 727, 742 (1972) (Douglas, J., dissenting) (“A ship has a legal personality, a fiction found useful for maritime purposes. The corporation sole—a creature of ecclesiastical law—is an acceptable adversary and large fortunes ride on its cases. The ordinary corporation is a ‘person’ for purposes of the adjudicatory processes, whether it represents proprietary, spiritual, aesthetic, or charitable causes.”); *see also* Note, *What We Talk About When We Talk About Persons: The Language of a Legal Fiction*, 114 HARV. L. REV. 1745 (2001).

behalf of people and entities who cannot speak, including infants and incompetents as well as public lands and marine mammals.⁵⁴

Legal consideration should not be conflated with legal rights.⁵⁵ An entity may be granted legal recognition in a number of ways—through rights, duties, responsibilities, privileges, immunities, liabilities, and penalties—“all of which are intermediate, operative notions that flow from the broader principle of legal considerableness.”⁵⁶ An entity with legal status is enabled to participate in the legal system, although not necessarily as a holder of rights.⁵⁷

The second theme of differentiation may be given jurisprudential focus through the principle of sustainability that is grounded in a mandate to preserve the diversity of life for present and future generations. Sustainability may be understood on several levels, both as a fundamental principle of natural and human systems as well as an ecological management tool.⁵⁸ The U.N. Report of the World Commission on Environment and Development, endorsed by the General Assembly in 1987, articulates the belief that sustainable development should be a central principle for governments and private enterprise at all levels.⁵⁹ Under a “strong” view of sustainability, the use of nature should be compatible with Earth’s carrying capacity.⁶⁰ At the jurisper-

54. STONE 1996, *supra* note 52, at 18, 165; Laura G. Kniaz, *Animal Liberation and the Law: Animals Board the Underground Railroad*, 43 BUFF. L. REV. 765, 833 (1995).

55. Stone 1985, *supra* note 52, at 23–25, 46, 64–66. This Article urges caution about a sole focus on rights, which can be reductive and deflect attention from the way law structures inequities and the necessity of deeper approaches to achieve transformation. Koons, *Key Principles*, *supra* note 12, at 58.

56. Koons, *Key Principles*, *supra* note 12, at 58.

57. STONE 1996, *supra* note 52, at 50–51.

58. Robert L. Glicksman, *Sustainable Federal Land Management: Protecting Ecological Integrity and Preserving Environmental Principal*, 44 TULSA L. REV. 147, 148–49 (2008).

59. World Commission on Environment and Development, *Our Common Future* (1987), endorsed by G.A. Res. 42/186, U.N. Doc. A/RES/42/187 (Dec. 11, 1987) and G.A. Res. 42/187, U.N. Doc. A/RES/42/187 (Dec. 11, 1987), available at <http://www.un-documents.net/ocf-02.htm>. The Report, also known as the Brundtland Report after the Chair of the Commission, Gro Harlem Brundtland, is significant in defining sustainable development (“meets the needs of the present without compromising the ability of future generations to meet their own needs”) and in embracing the interplay of many factors that support a sustainable economy. ELISABETH M. FERRERO & JOE HOLLAND, “THE EARTH CHARTER”: A STUDY BOOK OF REFLECTION FOR ACTION 40 (2005). While recognizing the advances made by the Brundtland Commission, a number of scholars have critiqued the pairing of “sustainable” with “development.” *E.g.*, BERRY, *GREAT WORK*, *supra* note 16, at 133 (describing sustainable development as “a contradiction”); ERIC T. FREYFOGLE, *BOUNDED PEOPLE, BOUNDLESS LANDS* 50–51 (1998) (noting that sustainable development “fails to capture the ethical complexity of human interactions with the rest of nature”).

60. Douglas A. Kysar, *Sustainable Development and Private Global Governance*, 83 TEX. L. REV. 2109, 2123–24 (2005) (contrasting weak and strong sustainability).

dential level, the “core value” of a legal system premised on sustainability is intergenerational justice.⁶¹

The third theme of communion raises the jurisprudential principle of interdependence—that humans are part of the Earth community and, as moral and legal agents, have ethical and legal responsibilities to nature.⁶² Aldo Leopold, a pioneer in ethics and ecology, established environmental ethics on a single premise: that each individual participates as “a member of a community of interdependent parts.”⁶³ Leopold used the example of wildflowers and songbirds that have no economic value, but that contribute to the stability and integrity of the ecological community.⁶⁴

Ecosystems—a drop of water, a rotting log, a watershed—typify interdependence by the varied and linked interactions that mark the processing of chemicals, nutrients, and energy.⁶⁵ Our present system of law, governance, and regulation is “poorly matched” to the task of governing complex, dynamic systems of nature.⁶⁶ However, ecosystems would be the focus of law if law and governance were Earth-centered.⁶⁷ Collaborative, intergovernmental ecosystem governance approaches have been developed for watersheds such as the Chesapeake Bay and the Everglades.⁶⁸ Ecosystem approaches challenge sev-

61. Glicksman, *supra* note 58, at 148.

62. CULLINAN, *supra* note 16, at 112–13.

63. ALDO LEOPOLD, *The Land Ethic*, in A SAND COUNTY ALMANAC 203 (1949) [hereinafter LEOPOLD, *Land Ethic*].

64. *Id.* at 210.

65. One definition of an ecosystem is “a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit.” MILLENNIUM ECOSYSTEM ASSESSMENT BOARD, ECOSYSTEMS AND HUMAN WELL-BEING: GENERAL SYNTHESIS, at v (2005) [hereinafter MILLENNIUM SYNTHESIS], available at <http://www.maweb.org/documents/document.356.aspx.pdf>; see also Bradley C. Karkkainen, *Collaborative Ecosystem Governance: Scale, Complexity, and Dynamism*, 21 VA. ENVTL. L.J. 189, 194–95 (2002) (“As complex dynamic systems, ecosystems are composed of many mutually *interdependent parts* operating in *dynamic, co-evolutionary trajectories*.”). Extending from “microbes in a single drop of water to the entire solar system,” ecosystems can be viewed in terms of geographic areas, management units, functional units, commodity units, and service units. *Id.* at 207; JOHN COPELAND NAGLE & J.B. RUHL, THE LAW OF BIODIVERSITY AND ECOSYSTEM MANAGEMENT 303–04, 310 (2002) (also noting that the principle units referred to in scientific literature are watersheds, biomes (the largest geographic biotic units, such as rain forests or grasslands), and ecoregions).

66. Karkkainen, *supra* note 65, at 197.

67. *Id.* at 206 (“[T]here is growing recognition that ecologically sound management must be local and/or regional in character, tailored to the ecosystem context.”).

68. *Id.* at 210; see also SOC’Y FOR ECOLOGICAL RESTORATION INT’L, LARGE-SCALE ECOSYSTEM RESTORATION: FIVE CASE STUDIES FOR THE UNITED STATES (Mary Doyle & Cynthia A. Drew eds., 2008) (reviewing restoration efforts for the Chesapeake Bay, the Everglades, the California Bay-Delta, the Platte River Basin, and the Upper Mississippi River System); AL-

eral basic assumptions of law and governance, requiring decentralized governance and collaboration to manage human activities, not the environment.⁶⁹ Ecosystem governance also invites a re-visioning of participatory democracy on a premise that widens the *polis* to include nature.⁷⁰ By recognizing Earth as a *polis* of interconnected ecosystems, humanity assumes its role as an agent of Earth and regulates human-kind for the good of the entire community.

Global warming is a master symbol of interconnections. Climate change and its other effects enfold all beings and ecosystems. Human extraction and consumption of oil are at the center of the planetary economy—greatly contributing to global warming and leading to consequences such as the tragic despoilment in the Gulf and the rising seas in the Arctic.⁷¹ The focus of the next section is oil, which has a unique history in the geo-physics and geo-politics of the world.

II. The Story of Oil: From the Paleozoic to “Hunting for Big Game” in the Gulf

The stuff we pump into our gas tanks is a freak of geology, the product of a series of lucky breaks over millions of years.⁷²

A. The Geology and History of Oil

The oil that gushed out of the blown well in the Gulf of Mexico in the spring and summer of 2010 was over one million years in the making.⁷³ Hydrocarbons, the building blocks of the fossil fuels of coal, natural gas, and oil, began to be formed in the Carboniferous Period of the Paleozoic Era, dating from 360 to 299 million years ago.⁷⁴ The hydrocarbon compounds of petroleum and liquid oil arose from bil-

fred R. Light, *The Waiter at the Party: A Parable of Ecosystem Management in the Everglades*, 36 ENVTL. L. REP. 10771 (2006).

69. Karkkainen, *supra* note 65, at 210 n.47, 238–39.

70. *Id.* at 239; *see also* VANDANA SHIVA, *EARTH DEMOCRACY* 1, 9, 89 (2005) (discussing Earth Democracy, an emerging political movement that is gathering under themes of peace, justice, and sustainability).

71. *See* BERRY, *GREAT WORK*, *supra* note 16, at 136–49, 156; PILKEY & YOUNG, *supra* note 5, at 6–16.

72. Appenzeller, *supra* note 1, at 2.

73. *See Oil . . . Black Gold . . . What's All the Fuss About?*, ROCK TALK (COLO. DEP'T OF NATURAL RES., COLO. GEOLOGICAL SURV.), Apr. 2004, at 1, 6 [hereinafter ROCK TALK], *available at* <http://geosurvey.state.co.us/pubs/Documents/rtv7n2.pdf> (advising that “virtually no petroleum is found in rocks younger than one to two million years old”).

74. *Accord* SONIA SHAH, *CRUDE: THE STORY OF OIL*, at xvi (2004); *Carboniferous Definition*, NEW WORLD ENCYCLOPEDIA, <http://www.newworldencyclopedia.org/entry/Carboniferous> (last visited July 12, 2011).

lions of corpses of plankton, diatoms, and other tiny sea plants and creatures that sank to the muddy bottom of the ocean.⁷⁵

A precise set of conditions was required to turn this “carbonate ooze” into oil.⁷⁶ The originating condition was the quick burial of the organic debris, followed by increasing pressure due to the weight of accumulating sediment.⁷⁷ The second condition was the sediment’s ending up at the right depth—between 7500 and 15,000 feet—so that the pressure of the sediment could slowly cook the organic material into oil.⁷⁸ The third condition was collecting the oil in a trap of porous sandstone.⁷⁹ The final condition was keeping the oil from escaping by topping the reservoir with an impermeable cap of rock or salt.⁸⁰ Geological forces, including the movement of Earth’s tectonic plates, brought some pools of petroleum close to the surface in lakes or tar sands and left other reservoirs buried far beneath the ocean floor.⁸¹

75. SHAH, *supra* note 74, at xiii, xv–xvi. The Colorado Geological Survey offered this explanation of the composition and formation of petroleum:

Petroleum means rock-oil, and comes from the Latin *petra*, meaning rock or stone, and *oleum*, meaning oil. Liquid petroleum, or oil, comprises a variety of liquid hydrocarbon compounds; compounds made up of different proportions of the elements carbon and hydrogen. There are also gaseous hydrocarbons (natural gas), in which methane is the most common component.

ROCK TALK, *supra* note 73, at 1; *see also* SHAH, *supra* note 74, at xv (explaining hydrocarbon chains, including methane with a single carbon atom, propane with three carbons, butane with four carbons, and octane with a chain of eight carbons).

76. SHAH, *supra* note 74, at xiii (citing JON P. DAVIDSON ET AL., *EXPLORING EARTH: AN INTRODUCTION TO PHYSICAL GEOLOGY* 389 (2d ed. 2002)); *see also* LONE STAR SECURITIES, *UNDERSTANDING AND INVESTING IN OIL AND NATURAL GAS DRILLING AND PRODUCTION PROJECTS* 5–6 (2009), *available at* <http://lonestarsecurities.com/Book-TOC.htm> (discussing the “right conditions” for oil and gas to form).

77. ROCK TALK, *supra* note 73, at 2–3.

78. *See* David Goodstein, *Marion King Hubbert Predicts the End of the Oil Age*, in *OIL: FUELING THE FUTURE* 39, 40 (Crystal McCage ed., 2007). Over millennia, chemical reactions took place, breaking down large organic molecules into smaller and simpler molecules of hydrocarbon, *id.* at 40:

In the early stages of petroleum formation, the deposit may consist mainly of larger (heavy) hydrocarbons, which have the thick, nearly solid consistency of asphalt. As the petroleum matures, and as the breakdown of large molecules continues, successively “lighter” hydrocarbons are produced. Thick liquids give way to thinner one, from which lubricating oils, heating oils, and gasoline are derived. In the final stages, most or all of the petroleum is broken down further into very simple, light, gaseous molecules—natural gas.

ROCK TALK, *supra* note 73, at 3.

79. Appenzeller, *supra* note 1, at 2.

80. *Id.*; LONE STAR SECURITIES, *supra* note 76, at 5.

81. SHAH, *supra* note 74, at xviii–xxi (relaying process of oil formation, including the role of erosion, which brought the Alberta tar sands to the surface); LONE STAR SECURITIES, *supra* note 76, at 5 (discussing migration of oil from source rock toward the surface due to

In the Middle East, oil began to be formed in this fashion over one hundred million years ago.⁸² The ancient continent of Pangaea broke into subcontinents, some of which were separated by the Tethys Sea.⁸³ For millions of years, the Tethys sea floor gathered layers of organic sediment that was later covered with more layers of salt and then sank—producing the necessary conditions for the formation of oil.⁸⁴ Fifteen million years ago, the Mesopotamian Basin was formed, bringing the remains of the Tethys Sea closer to the surface.⁸⁵ With huge anticlines of oil, the Middle East is estimated to hold over two-thirds of the oil on Earth.⁸⁶

Early humans evolved with other species and ecosystems in this lush, oil-rich cradle of human civilization.⁸⁷ Readily available oil was employed for a number of practical uses—sealing boats, heating houses, paving roads—and then for warfare.⁸⁸ Persians filled pots with oil and sulfur to light and hurl at enemies.⁸⁹ Greeks used petroleum to make flaming arrows and torches.⁹⁰ By the seventh century C.E., soldiers in the Byzantine Empire used tubes of fiery oil to fend off numerous enemies.⁹¹

From ancient Persia and Sumeria to America in the nineteenth century, petroleum was viewed as having medicinal value.⁹² Egyptians embalmed their dead with petroleum; Sumerians who were sick had to choose between water physicians and oil physicians.⁹³ In the sixteenth century, Charles V treated an attack of gout with petroleum.⁹⁴

the movement of Earth's tectonic plates); Appenzeller, *supra* note 1, at 3–4 (reporting the shift in the search for oil from the “shallows of the Gulf” to the “deep-ocean floor”).

82. SHAH, *supra* note 74, at xvi, xx (“For more than 100 million years, the Tethys sea floor collected rich layers of sediment” that got pressure-cooked into oil.).

83. *Id.*; see also LONE STAR SECURITIES, *supra* note 76, at 3–4.

84. SHAH, *supra* note 74, at xx.

85. *Id.* at xx–xxi.

86. *Id.*; see also ROCK TALK, *supra* note 73, at 6–7 (comparing the uneven oil supply and demand in the world); LONE STAR SECURITIES, *supra* note 76, at 6 (discussing anticline traps).

87. SHAH, *supra* note 74, at xxi; BERRY, GREAT WORK, *supra* note 16, at 152.

88. See Wayne M. Pafko, *The Early Uses of Oil*, in OIL: FUELING THE FUTURE 18, 18 (Crystal McCage ed., 2007); see also SHAH, *supra* note 74, at xxi–xxii.

89. SHAH, *supra* note 74, at xxii.

90. *Id.*

91. *Id.*

92. Pafko, *supra* note 88, at 18.

93. Jeremy Hinsdale, *Extreme Oil*, PUB. BROAD. SERV., <http://www.pbs.org/wnet/extremeoil/history/prehistory.html> (last visited June 31, 2010); Zecharia Sitchin, *The Sumerian Civilization Part II*, STRAYREALITY.COM, http://www.strayreality.com/Lanis_Strayreality/sumerian_civilization%202.htm (last visited July 12, 2011).

94. Pafko, *supra* note 88, at 18.

During the Revolutionary War, George Washington relied on Native Americans for their oil-based treatment of frostbite.⁹⁵ Jars of petroleum—or “snake oil”—were sold as a miracle tonic through the nineteenth century.⁹⁶ “Seneca oil” was sold as a cure for a variety of maladies, including toothaches, worms, and dropsy.⁹⁷

B. Drilling for Kerosene and Pumping Gasoline

In 1849, a new lamp fuel, kerosene, was distilled from petroleum.⁹⁸ In the early nineteenth century, whale oil had been the fuel of choice for lamps.⁹⁹ With the depletion of the supply of sperm whale oil and the discovery of a cleaner and less expensive fuel, kerosene emerged as the primary source of energy in the mid-nineteenth century.¹⁰⁰

In western Pennsylvania, oil was so plentiful that it oozed from underground springs into Oil Creek, a tributary of the Allegheny River.¹⁰¹ The Seneca and Cornplanter Indians had long soaked up the oil from the creek and wrung it into many uses.¹⁰² In the 1850s, George Bissell was led by “inspired intuition” to organize the Pennsylvania Rock Oil Company in Titusville, Pennsylvania, in an effort to find marketable kerosene.¹⁰³ His successor enlisted the services of Edwin Drake, a former rail worker, who started drilling for oil with methods used in salt mining.¹⁰⁴ In August of 1859, Drake struck oil, putting Titusville on the global map.¹⁰⁵ Drake’s oil venture “took on global proportions;” it was unknown whether there were many other sizable oil deposits in the world outside of western Pennsylvania.¹⁰⁶ By 1860, Drake’s financial supporters were exporting and marketing kerosene in London and Paris.¹⁰⁷ Europe became the primary market for Amer-

95. Hinsdale, *supra* note 93 (outlining uses of oil from prehistory to 1849 and noting Washington’s troops used oil to treat frostbite). Petroleum was also used to treat Union soldiers during the Civil War at the battle of Gettysburg. Pafko, *supra* note 88, at 24.

96. Pafko, *supra* note 88, at 18–19.

97. SHAH, *supra* note 74, at 3.

98. Hinsdale, *supra* note 93.

99. *How the Oil Industry Saved the Whales*, SAN JOAQUIN VALLEY GEOLOGY, <http://www.sjvgeology.org/history/whales.html> (last visited Aug. 17, 2011).

100. RON CHERNOW, *TITAN: THE LIFE OF JOHN D. ROCKEFELLER, SR.* 99 (1998); Pafko, *supra* note 88, at 21.

101. CHERNOW, *supra* note 100, at 73–74; Pafko, *supra* note 88, at 19.

102. CHERNOW, *supra* note 100, at 73.

103. *Id.* at 74.

104. *Id.*

105. *Id.* at 74, 102.

106. *Id.* at 102.

107. *Id.*

ican kerosene and imported “hundreds of thousands of barrels” annually during the mid-1860s.¹⁰⁸

John D. Rockefeller entered the oil business as a refiner in 1863.¹⁰⁹ At the end of the Civil War, political and economic conditions were ripe for an industrial economy fueled by oil and its promise of riches.¹¹⁰ The kerosene market was the economic staple of the post-War era, which Rockefeller ruthlessly captured with his Standard Oil Company (“Standard Oil”) in 1870.¹¹¹ During the late nineteenth century, Standard Oil assumed nearly complete control of oil refining and marketing, holding an eighty to ninety percent share of the world market.¹¹² Pennsylvania wells produced eighty-five percent of the world’s oil supply in the 1880s.¹¹³

The world dominance of Standard Oil was challenged in the 1870s when wells were struck in the Russian port of Baku on the Caspian Sea.¹¹⁴ Surface oil had been plentiful there, with residents scooping up crude oil from pits and selling it to grease wheels, to soften harnesses, and to ease rheumatism.¹¹⁵ In the early 1870s, prospectors tapped into powerful reserves of oil, some of which spouted geysers that defied capping for months.¹¹⁶

The Russian competition for the European market was supported by sophisticated management, ample funds, superior refineries, and a transportation vision.¹¹⁷ A pipeline to the Caspian Sea carried Russian

108. *Id.*

109. *Id.* at 77.

110. *Id.* at 99.

111. *Id.* at 99, 132–33; SHAH, *supra* note 74, at 6; Pafko, *supra* note 88, at 23. For a contemporary critique of Rockefeller’s unethical business practices, see IDA M. TARBELL, *THE HISTORY OF THE STANDARD OIL COMPANY* (1904).

112. CHERNOW, *supra* note 100, at 249, 253; GRANT SEGALL, JOHN D. ROCKEFELLER: ANOINTED WITH OIL 67 (2001) (advising that Standard Oil’s share of the world market fell below 90% in the early 1880s and ranged between 75% and 84% for the rest of the 1800s, having lost ground internationally due to rival wells in Russia and Southeast Asia); Pafko, *supra* note 88, at 23–24.

113. CHERNOW, *supra* note 100, at 242–48. The Pennsylvania wells ran dry after thirty years; oil was discovered in Texas before that, in 1901. SHAH, *supra* note 74, at 4 (also questioning that humans “produce” oil).

114. CHERNOW, *supra* note 100, at 242–48. Some sources claim that Polish or Russian wells were sunk before Drake’s well. For example: “In 1849, Russian engineer F.N. Semyenov used a cable tool to drill an oil well on the Absheron Peninsula, ten years before Colonel Drake’s famous well in Pennsylvania.” *Oil and Gas Well Drilling: A Brief History*, TARGET TESTING (Sept. 7, 2010), <http://target-testing.com/?p=15> (also proposing that the earliest oil wells were drilled in China in 347 B.C.E.).

115. CHERNOW, *supra* note 100, at 244.

116. One geyser poured out an estimated 2400 tons of oil in its first twenty-four hours. *Id.*

117. *Id.* at 244, 246.

oil to the first oil tanker, the *Zoroaster*, and a railroad connected the Caspian Sea and the Black Sea.¹¹⁸ Cheap Russian oil flooded the European markets.¹¹⁹ This created blistering oil wars that took place among Standard Oil and two other companies in the 1890s.¹²⁰

Consequently, by 1890, it became clear that oil was to be found in other locations under the crust of Earth and that only a “freak accident” had led to the founding of the world’s oil business in Titusville, Pennsylvania.¹²¹ Oil was found in Ohio in 1885, in California in the 1890s, and in Texas in 1901.¹²² By the early 1890s, oil production was also booming in Burma and Java.¹²³ In the 1930s, massive oil fields in the Middle East were discovered.¹²⁴

The desired product that was distilled from crude oil during this period was kerosene, which illuminated homes in the late 1800s.¹²⁵ In 1879, the role of kerosene was challenged by the invention of the incandescent light bulb.¹²⁶ Until this time, a lighter hydrocarbon, gasoline, had been merely a waste product of the refinery process.¹²⁷ Later gasoline became the fuel that matched men and money with “the machine.”¹²⁸

The nineteenth century was marked by great changes in human transportation.¹²⁹ In 1825, passenger trains developed in England and soon spread to other countries.¹³⁰ In the 1870s and the 1880s, cable cars started running in cities, followed by electric trolleys.¹³¹ A much more efficient “mechanical road transport” was invented in 1860—the bicycle.¹³² Unlike trains, which required tons of steel and coal, bi-

118. *Id.*

119. *Id.* at 246.

120. *Id.* at 244–47 (discussing competitors Nobel Brothers Petroleum Producing Company and the Caspian and Black Sea Petroleum Company, led by Baron Alphonse de Rothschild).

121. *Id.* at 248.

122. *Id.* at 284, 335, 431.

123. *Id.* at 248.

124. BERRY, GREAT WORK, *supra* note 16, at 153.

125. SHAH, *supra* note 74, at 5.

126. *Id.* at 5–6; *see also* Matthew Yeomans, *How America’s Fascination with Cars Led to Oil Dependence*, in OIL: FUELING THE FUTURE 31 (Crystal McCage ed., 2007).

127. CHERNOW, *supra* note 100, at 101 (“Before the automobile, nobody knew what to do with the light fraction of crude oil known as gasoline, and many refiners, under cover of dark, let this waste product run into the river.”); *see also* SEGALL, *supra* note 112, at 68.

128. CHERNOW, *supra* note 100, at 335; SHAH, *supra* note 74, at 6–9.

129. *See* KATIE ALVORD, DIVORCE YOUR CAR! ENDING THE LOVE AFFAIR WITH THE AUTOMOBILE 8 (2000).

130. *Id.*

131. *Id.*

132. SHAH, *supra* note 74, at 7.

cycles were affordably powered and did not depend on set schedules or routes.¹³³

It was inevitable that the bicycle and the machine would meet. In the 1880s, German engineer Karl Benz invented a motorized tricycle, drove it on the streets of Stuttgart and was immediately arrested.¹³⁴ Undeterred, Benz offered the first gasoline-powered vehicle for sale in 1888.¹³⁵ During this time period, Gottlieb Daimler built four different prototypes of horseless carriages.¹³⁶ Dazzled by the new contraption, the French called it by the half-Greek, half-Latin neologism—the automobile.¹³⁷

Before Benz and Daimler, a number of inventors had experimented with “locomobility,” leading to bans of self-propelled motorized vehicles in cities such as New York and Chicago.¹³⁸ Horrified by the “road locomotives,” in 1865 the British Parliament passed the Red Flag Act, setting speed limits of two-to-four miles per hour, and requiring that each vehicle be preceded on the road by an attendant walking with a red flag.¹³⁹ However, the automobile soon became enticing to the British, who repealed the Act in 1896.¹⁴⁰

In the United States, the automobile industry made its debut in 1896 when brothers J. Frank and Charles Duryea offered thirteen cars for sale in Springfield, Massachusetts.¹⁴¹ That year, Henry Ford developed a quadricycle that was powered by gasoline.¹⁴² In 1908, Ford introduced a gasoline-powered motorcar called the Model T.¹⁴³ Unlike other iterations of the automobile that were available only to the upper classes, the Model T “democratized driving in America.”¹⁴⁴ With the discovery of oil in Texas in 1901, a ready supply of gasoline supported wide consumption of the mass-produced machine.¹⁴⁵ Install-

133. *Id.*

134. ALVORD, *supra* note 129, at 8; *see also* SHAH, *supra* note 74, at 7.

135. ALVORD, *supra* note 129, at 8.

136. *Id.*; Yeomans, *supra* note 126, at 31.

137. SHAH, *supra* note 74, at 8 (quoting the January 3, 1899 edition of the *New York Times*).

138. ALVORD, *supra* note 129, at 8.

139. *Id.*

140. *Id.* at 9.

141. *Id.* at 11 (also noting that Bridget Driscoll was the first pedestrian killed by an automobile in London).

142. Yeomans, *supra* note 126, at 32.

143. *Id.* at 33.

144. *Id.*

145. SHAH, *supra* note 74, at 8 (relaying the discovery of oil in Texas, to the surprise of an “amazed public”); *see also* ALVORD, *supra* note 129, at 12–13 (discussing factors supporting the rapid advance of the internal combustion automobile).

ment buying of automobiles spread to U.S. banks in 1910, followed by the establishment of General Motors Acceptance Corporation in 1919.¹⁴⁶

By the 1920s, two million new cars were being sold each year in the United States.¹⁴⁷ The foundation for the automobile and domestic gasoline industry was the highway infrastructure.¹⁴⁸ In 1916, Woodrow Wilson signed the Federal-Aid Highway Act, allocating seventy-five million dollars to develop highway departments in each state.¹⁴⁹ Throughout the 1920s, highway investments amounted to one billion dollars each year.¹⁵⁰

“Asphalt fever” hit planning departments, and parkways began to stretch outside of urban areas.¹⁵¹ The new suburbs blew apart the idea of city limits and the livability of cities.¹⁵² Highways were also seen as the way out of the Great Depression. At the center of the New Deal in 1932 were highway projects, leading to some 500,000 miles of road construction.¹⁵³ Another major federal initiative was the 1956 Interstate Highway Act, budgeting twenty-five billion dollars for 38,000 miles of interstates, many of which ran directly through cities.¹⁵⁴ Due to their effect of dislocating African American families pursuant to urban renewal plans, these highways have been called “white roads through black bedrooms.”¹⁵⁵

Over the span of sixty years, the automobile became “the biggest customer of the coal and iron mines, the steel mills, the plate-glass and the rubber factories,” and the biggest guzzler of oil.¹⁵⁶ The automobile also opened the door to consumerism—cars and the consumer culture rolled together through the twentieth century.¹⁵⁷ The ownership of cars also invaded our minds, creating an “automobile

146. ALVORD, *supra* note 129, at 20.

147. Yeomans, *supra* note 126, at 33.

148. *Id.* at 34.

149. *Id.*

150. *Id.*

151. *Id.* at 34–35.

152. *Id.* at 31.

153. *Id.* at 36.

154. ALVORD, *supra* note 129, at 37.

155. *Id.* at 39.

156. *Id.* at 20 (quoting M.M. MUSSELMAN, GET A HORSE! THE STORY OF THE AUTOMOBILE IN AMERICA 269–70 (1950)).

157. *Id.* at 21.

psychology.”¹⁵⁸ We became hooked on cars and completely dependent on the gasoline that kept them going.¹⁵⁹

C. Offshore Drilling: From a California Pier to Miles Below the Sea Bed

In 1887, the first offshore oil well was drilled three hundred feet into the ocean from a wharf in Santa Barbara, California.¹⁶⁰ Then, in the 1940s, geologists advised that the Gulf of Mexico contained potentially sizable petroleum deposits.¹⁶¹ Conscious that technological advances would make extraction possible, President Truman proclaimed exclusive federal jurisdiction in 1945 over the resources below the outer continental shelf of the United States.¹⁶² Within a few years, Kerr-McGee drilled the first oil well off the Louisiana coast “out of view to the naked eye.”¹⁶³

In 1953, President Eisenhower signed the Submerged Lands Act, which gave the states title to submerged lands out to three miles.¹⁶⁴ In 1978, Congress amended the Outer Continental Shelf Lands Act (“OCSLA”), expressing a national policy of developing the oil and

158. *Id.*

159. *Id.*

160. *History of Offshore*, NAT’L OCEAN INDUS. ASS’N., <http://www.noia.org/website/article.asp?id=123> (last visited July 25, 2010); see also Christopher Hanson, *A Brief History of Offshore Drilling*, SUITE101, <http://www.suite101.com/content/a-brief-history-of-offshore-drilling-a263386> (last visited July 15, 2010).

161. Emily Heersink, Note, *Royalty Robbery: How Statutory Supremacy and the Christian Doctrine Require Oil Companies to Pay Royalties on Leases Missing the Deep Water Royalty Relief Price Threshold Clause*, 37 PUB. CONT. L.J. 303, 305 (2008). A 2006 inventory of outer continental shelf oil resources by the Department of Interior estimated oil reserves of 8.5 billion barrels, of which 82% lies in the Gulf of Mexico, and undiscovered reserves of 86 billion barrels, with 51% in the Gulf of Mexico. MARC HUMPHRIES, CONG. RESEARCH SERV., RL33493, OUTER CONTINENTAL SHELF: DEBATE OVER OIL AND GAS LEASING AND REVENUE SHARING 14 (2008).

162. Proclamation No. 2667, 10 Fed. Reg. 12,303 (Sept. 28 1945) (“[T]he Government of the United States regards the natural resources of the subsoil and sea bed of the continental shelf beneath the high seas but contiguous to the coasts of the United States as appertaining to the United States, subject to its jurisdiction and control.”). Scholars noted, “Truman’s unilateral and unprecedented assertions of control over the continental shelf were ‘almost certainly illegal at the time.’ Nonetheless, they jump-started the modern global ocean enclosure movement, and a frantic assertion of authority by coastal nations followed.” Mary Turnipseed et al., *The Silver Anniversary of the United States’ Exclusive Economic Zone: Twenty-Five Years of Ocean Use and Abuse, and the Possibility of a Blue Water Public Trust Doctrine*, 36 ECOLOGY L.Q. 1, 28 (2009) (quoting JOSEPH J. KALO ET AL., COASTAL AND OCEAN LAW: CASES AND MATERIALS 376 (3d ed. 2007)).

163. See Hanson, *supra* note 160; see also David Hammer, *Offshore Oil Drilling: A Brief History*, TIMES-PICAYUNE, July 18, 2010, at A10.

164. 43 U.S.C. § 1312 (2006).

natural gas resources of the Outer Continental Shelf and denoting the leasing and development process.¹⁶⁵ In 1982, the Minerals Management Service (“MMS”)¹⁶⁶ was delegated responsibility over the exploration, development, and leasing process.¹⁶⁷

By the 1990s, drilling for oil in the Gulf stalled, as the price of oil flattened at sixteen dollars per barrel and shallow water reservoirs became depleted.¹⁶⁸ Despite the human and ecological costs of deepwater oil extraction, the demand for oil pressed governments and oil companies to dig deeper in more hazardous ventures.¹⁶⁹

To continue deepwater oil exploration in the Gulf, the government advanced economic incentives.¹⁷⁰ The royalty program of the OCSLA was viewed as a major obstacle to deepwater exploration and extraction in the Gulf.¹⁷¹ Consequently, Congress adopted the 1995 Deep Water Royalty Relief Act (“DWRRA”), which provided inducements for energy companies to drill in the deep water of the Gulf of Mexico in order to lessen America’s dependence on oil from the volatile Middle East.¹⁷² Oil companies quickly responded to the royalty relief.¹⁷³ In the first five years following the DWRRA, MMS awarded

165. *Id.* §§ 1337, 1802; see also Edward A. Fitzgerald, *Secretary of Interior v. California: Should Continental Shelf Lease Sales Be Subject to Consistency Review?*, 12 B.C. ENVTL. AFF. L. REV. 425, 442, 464 (1985) (discussing 1978 amendments).

166. The Minerals Management Service has since been renamed the Bureau of Ocean Energy Management, Regulation, and Enforcement (“BOEMRE”). Reorganization of Title 30, Code of Federal Regulations, 75 Fed. Reg. 61,051 (Oct. 4, 2010).

167. *Id.* (“On May 19, 2010, by Secretarial Order No. 3299, the Secretary of the Department of the Interior announced the restructuring of the MMS. On June 18, 2010, by Secretarial Order No. 3302, the Secretary announced the name change of the MMS to the Bureau of Ocean Energy Management, Regulation, and Enforcement.”).

168. *E.g.*, Heersink, *supra* note 161, at 306.

169. Jad Mouawad, *Drilling Deep in the Gulf of Mexico*, N.Y. TIMES (Nov. 8, 2006), <http://www.nytimes.com/2006/11/08/business/worldbusiness/08gulf.html>; see also LONE STAR SECURITIES, *supra* note 76, at 23 (suggesting that “[c]heap oil will likely be a thing of the past” and proposing an approach of “digging deeper and in more isolated areas”).

170. Heersink, *supra* note 161, at 307; see also J. Todd Bergstrom, Comment, *The Gift That Keeps on Giving: An Examination of the Growing Problem of Offshore Oil and Gas Royalty Relief*, 112 W. VA. L. REV. 509, 510–11 (2010).

171. 43 U.S.C. § 1337 (2006); see also HUMPHRIES, *supra* note 161, at 6 (noting the royalty level of at least 12.5%); Bergstrom, *supra* note 170, at 516.

172. Alaska Power Administration Asset Sale and Termination Act, Pub. L. No. 104-58, 109 Stat. 557 (1995) (codified in part at 43 U.S.C. § 1337 (2006)); see also Appenzeller, *supra* note 1, at 7 (noting U.S. “dependence on the volatile Middle East,” which holds approximately two-thirds of the estimated conventional reserves); Bergstrom, *supra* note 170, at 517.

173. ANDY RADFORD, AM. PETROLEUM INST., UNDERSTANDING OUTER CONTINENTAL SHELF LEASING UNDER THE DEEP WATER ROYALTY RELIEF ACT 1 (2010), available at http://www.api.org/Newsroom/upload/100129_DWRRA_Analysis_Final.pdf. In 2006, the *New York Times* reported that MMS had not included price thresholds in 1031 leases awarded in 1998 and

3391 deepwater leases in the Gulf of Mexico; in the first ten years following the DWRRA, oil companies announced over one hundred discoveries in the deep water of the Gulf.¹⁷⁴

For most of the past decade, the attitude of the major oil companies was to engage in an “elephant hunt” in the Gulf, accepting enormous risk as part of the gamble of looking for large oil reserves.¹⁷⁵ In 1999, British Petroleum (“BP”) drilled to a depth of 29,000 feet in the Gulf—through over one mile of water, almost one-half-mile of salt, and nearly five miles of rock—to tap into approximately one billion barrels of reserves in what came to be known as the Thunder Horse Project.¹⁷⁶ Ten years later, BP drilled the Tiber Prospect well at nearly seven miles below the surface of the Gulf.¹⁷⁷ “[A]s deep as Mount Everest is tall,” the Tiber reserves are estimated to hold between four and six billion barrels of oil and natural gas.¹⁷⁸

1999. Edmund L. Andrews, *U.S. Has Royalty Plan to Give Windfall to Oil Companies*, N.Y. TIMES (Feb. 14, 2006), <http://www.nytimes.com/2006/02/14/business/14oil.html?page-wanted=all>. Due to the omissions—a “blunder” of the agency—MMS could not collect royalties up to statutorily specified volumes for those leases. HUMPHRIES, *supra* note 161, at 13. The Fifth Circuit agreed with an oil company that MMS did not have authority “to impose price thresholds that suspend royalty relief at production volumes less than those established by Congress” on all 3391 leases awarded between 1996 and 2000, despite the soaring prices of oil. *Keir-McGee Oil & Gas Corp. v. U.S. Dep’t of Interior*, 554 F.3d 1082, 1087 (5th Cir. 2009), *cert. denied*, 130 S. Ct. 236 (2009); *see also* RADFORD, *supra* note 173, at 2. The cost of foregone royalties is estimated to be as high as \$53 billion. U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-08-792R, OIL AND GAS ROYALTIES: LITIGATION OVER ROYALTY RELIEF COULD COST THE FEDERAL GOVERNMENT BILLIONS OF DOLLARS 3–4 (2008); *see also* Bergstrom, *supra* note 170, at 530.

174. MINERALS MGMT. SERV., DEEP WATER: WHERE THE ENERGY IS 3 (2004), *available at* http://www.boemre.gov/Assets/PressConference11152004/MSGlossySingle_110404.pdf; RADFORD, *supra* note 173, at 1–2 (noting that leases in water at or deeper than 200 meters increased from 39% in 1995 to 64% in 2000). Oil extraction in the Gulf steadily increased through 2002, and then declined in response to major hurricane activity. ASANI BREWTON ET AL., MINERALS MGMT. SERV., MMS REPORT 2009-012, GULF OF MEXICO OIL AND GAS PRODUCTION FORECAST: 2009–2018, at 14 (2009), *available at* <http://www.gomr.boemre.gov/PDFs/2009/2009-012.pdf> (also identifying declines with Hurricane Ivan in 2004 and Hurricanes Katrina and Rita in 2005). Gulf oil extraction remained steady again in 2006–2007 and declined in 2008 due to Hurricanes Gustav and Ike. *Id.*

175. David Greising, *Troubles Run Deep on Gulf Oil Platform*, CHI. TRIBUNE, (May 28, 2007), http://www.chicagotribune.com/news/local/chi-mon_bp_0528may28,0,1944401,full.story (reporting that “costs and technology hurdles are what drove BP to adopt its ‘elephant hunt’ strategy” of “[f]ocusing only on the potentially biggest and most lucrative prospects”).

176. *See* Mouawad, *supra* note 169, at 1, 4.

177. Chris Kahn, *BP Drills Deepest-Ever Oil Well in Gulf of Mexico*, DAILY HERALD (Sept. 3, 2009), http://www.heraldextra.com/business/energy/oil/article_fb84124d-b87c-523c-9b70-b5ff615eb701.html.

178. *Id.*

In March of 2008, the MMS conducted Lease Sale 206 for approximately 29.8 million acres in Central Gulf of Mexico.¹⁷⁹ Bidders were awarded 603 leases for \$3.67 billion, the highest amount in the history of the Department of Interior.¹⁸⁰ British Petroleum acquired Mississippi Canyon Block 252, the site of the Macondo well and the Deepwater Horizon disaster, for \$34 million.¹⁸¹

One year later, MMS approved BP's Initial Exploration Plan ("EP") and granted a categorical exclusion from a site-specific environmental review.¹⁸² However, prior to granting the categorical exclusion from more exacting environmental review, MMS both anticipated large spills in the Gulf and overlooked their impacts.¹⁸³

179. See MINERALS MGMT. SERV., OIL AND GAS LEASE SALE 206: FINAL BID RECAP CENTRAL GULF OF MEXICO (2008) [hereinafter MMS BID RECAP], available at <http://www.gomr.boemre.gov/homepg/lseale/206/206FinalBidRecap.pdf>; see also *Oil and Gas Lease Sales in Gulf of Mexico Attract \$3.7 Billion*, OIL VOICE, (Mar. 21, 2008), http://www.oilvoice.com/n/Oil_and_Gas_Lease_Sales_in_Gulf_of_Mexico_Attract_37_Billion/a709db35.aspx.

180. MMS BID RECAP, *supra* note 179 at 11–12. Driving the 2008 record-breaking sale price was an "insatiable appetite" for oil reserves underlying the deeper waters of the Lower Tertiary in the Central Gulf. *Lease Sale 206: U.S. Gulf Lease Sale 206 Sets Record at \$3.67B*, UPSTREAM REVIEW (July 25, 2010), <http://www.upstreamreview.com/subpage38.html>. The Lower Tertiary has been estimated to hold up to 15 billion barrels of oil in older rock formations deposited as long as 65 million years ago. Mouawad, *supra* note 169, at 2–3.

181. MMS BID RECAP, *supra* note 179, at 42.

182. BP EXPLORATION & PROD. INC., INITIAL EXPLORATION PLAN, MISSISSIPPI CANYON BLOCK 252, OCS-G 32306 (2009), <http://www.gomr.boemre.gov/PI/PDFImages/PLANS/29/29977.pdf> [hereinafter BP EP]; MINERALS MGMT. SERV., PRELIMINARY DETERMINATION BY PROJECT SUPERVISORS AND SECONDARY DETERMINATION BY ANALYSTS, BP EXPLORATION & PRODUCTION INC., MC 252 at 4 (April 15, 2009), available at <http://www.washingtonpost.com/wp-srv/nation/documents/bp060210.pdf> (stating "[t]he activities proposed in the plan are categorically excluded"); Letter from Michael Tolbert for Michael J. Saucier, MMS Reg'l Supervisor of Field Operations, to Scherie Douglas, BP Exploration & Production Inc. (April 6, 2009), available at <http://www.boemre.gov/deepwaterreadingroom/selectrequest.aspx> (follow "Drilling Techniques and Technologies" hyperlink; then follow "MMS-NOLA-B2-00003-0079.pdf" hyperlink) (approval of BP EP); see also LINDSAY CONLON & ALISA ZOMER, WORLD RES. INST., IN DEEP WATER: WEAK GOVERNANCE AND THE GULF OIL SPILL, A 30-YEAR TIMELINE, at 16–17 (2011), available at http://pdf.wri.org/in_deep_water.pdf.

183. The Initial Exploration Plan stated that an oil spill was unlikely, but that BP had the capacity to respond to a "worst case spill scenario" of 162,000 barrels per day. BP EP, *supra* note 182, § 7.1. An earlier Environmental Impact Statement ("EIS") for the five-year Plan of MMS for 2007–2012 estimated that the Gulf of Mexico wells would have nine large oil spills during a forty-year lease term. ALEXANDER, *supra* note 2, at 4–5. In the EIS for that five-year Plan, the discussion of spills from platforms was limited to assessing spills of approximately 1500 barrels; there was no assessment of larger platform spills. *Id.* at 5–6. The 2007 Multisale Environmental Impact Statement for eleven lease sales advised of a "greater than 99% chance" of a spill larger than 10,000 barrels over the lease term, but did not evaluate impacts from a spill of that size. *Id.* at 7; see also BP EP, *supra* note 182, § 14.4; Mike Soraghan, *Industry Claims of 'Proven' Technology Went Unchallenged at MMS*, N.Y. TIMES (June 2, 2010), <http://www.nytimes.com/gwire/2010/06/02/02greenwire-industry-claims-of>

Many commentators have identified a host of mistakes made by BP, aligned corporations, and the government leading up to and following the Deepwater Horizon disaster in the Gulf.¹⁸⁴ This Article submits that the mistakes were possible because our system of law and governance focuses anthropocentrically on short-term economic gain. An Earth-centered system of law and governance is based on principles that render the Gulf oil disaster unthinkable.

Two phenomena serve to place the Deepwater Horizon blowout in perspective. First, the calamity is better understood in the context of Peak Oil. Second, among the chief consequences of our oil-driven way of life is global warming. The next part of this Article takes a closer look at the slippery edge to which our addiction to oil has taken us.

III. Peak Oil and Global Warming

Little attention has been given to the consequences of basing the entire functioning of the human community on an extractive economy. An organic economy is by its very nature an ever-renewing economy. An extractive economy is by its nature a terminal economy.¹⁸⁵

A. Peak Oil: Hubbert's Prediction

As a community of humans, we are consuming oil one hundred thousand times faster than the fossil fuel can accumulate.¹⁸⁶ Earth's supply of petroleum is vast, although limited.¹⁸⁷ Because we are burning four hundred years worth of non-renewable oil every year, it is a

proven-technology-went-unch-55514.html (reporting conflict between "boilerplate" language in the EP that BP had "proven equipment and technology" for an unanticipated blowout and the post-disaster assertions of BP representatives that "there are no 'proven' methods for capping a blowout in deep water").

184. Letter from Henry A. Waxman, Chairman of the House Energy and Commerce Comm., and Bart Stupak, Chairman of the Subcomm. On Oversight and Investigation, to Tony Hayward, CEO of British Petroleum (June 14, 2010), *available at* <http://democrats.energycommerce.house.gov/documents/20100614/Hayward.BP.2010.6.14.pdf> (identifying five decisions that "posed a trade-off between cost and well safety"); *see also* Gus Lubin, *10 Disastrous Mistakes BP Made Before the Deepwater Horizon Exploded*, BUS. INSIDER (June 1, 2010), <http://www.businessinsider.com/bp-mistakes-2010-5>.

185. BERRY, GREAT WORK, *supra* note 16, at 138.

186. Sonia Shah, *A Brief History of Oil*, SUPERCONSCIOUSNESS MAG., July 2008, *available at* <http://www.superconsciousness.com/topics/environment/brief-history-oil>.

187. BERRY, GREAT WORK, *supra* note 16, at 152–53; *see also* Rachael E. Salcido, *Offshore Federalism and Ocean Industrialization*, 82 TUL. L. REV. 1355, 1445 (2008) ("The working assumption that ocean resources are inexhaustible must be eliminated from our governing mechanisms.").

simple matter to conclude that an accessible supply of petroleum will come to an end.¹⁸⁸

In 1956, scientist Marion King Hubbert calculated that the production of oil would peak in various countries and then decline to a point of depletion.¹⁸⁹ “Peak Oil,” according to Hubbert, would arrive in the United States in the 1970s.¹⁹⁰ Hubbert was largely ignored until 1971, when the Texas Railroad Commission announced that oil production in Texas was at one hundred percent capacity, followed by a decline.¹⁹¹ As Hubbert had predicted, domestic oil production in the lower forty-eight states peaked in the early 1970s.¹⁹²

When global oil production will peak and begin its irreversible decline is a significant question for the nations of the world.¹⁹³ Although consensus has not yet formed around a particular year, the geological debate focuses on the next ten years, with some geologists predicting that the peak will occur in 2012.¹⁹⁴ In a report released in February 2010, the United States Joint Forces Command projected that severe shortages in oil output could occur as early as 2015.¹⁹⁵ The military report also stated that the world oil demand in 2010 reached 86 million barrels per day.¹⁹⁶ By 2030, the global demand for oil will be 118 million barrels per day, while only 100 million barrels per day is likely to be harvested.¹⁹⁷

Energy experts forecast alarming social and economic consequences in the wake of Peak Oil: “shortages, price spikes, economic disruption, and a desperate push to wrest oil from ‘unconventional’ sources such as tar sands, oil shale, or coal.”¹⁹⁸ Researchers for the

188. DIAMOND, *supra* note 24, at 490 (“[T]he prevalent view is that known and likely reserves of readily accessible oil and natural gas will last for a few more decades.”); see VANDANA SHIVA, *SOIL NOT OIL: ENVIRONMENTAL JUSTICE IN AN AGE OF CLIMATE CRISIS* 129 (2008).

189. Goodstein, *supra* note 78, at 39, 42; see also LONE STAR SECURITIES, *supra* note 76, at 23.

190. LONE STAR SECURITIES, *supra* note 76, at 23; Goodstein, *supra* note 78, at 42.

191. LONE STAR SECURITIES, *supra* note 76, at 23.

192. Goodstein, *supra* note 78, at 42–43.

193. *E.g.*, HIRSCH ET AL., *supra* note 10, at 5; JOE REPORT, *supra* note 11, at 29.

194. See HIRSCH ET AL., *supra* note 10, at 5, 64 (advising that “[a] number of competent forecasters project peaking within a decade [from 2005]”); JOE REPORT, *supra* note 11, at 29 (stating that “surplus oil production capacity could entirely disappear” by 2012); see also Lionel Badal, *How the Global Oil Watchdog Failed Its Mission*, COUNTERCURRENTS.ORG (May 25, 2010), <http://www.countercurrents.org/badal250510.htm> (relaying a political perspective on peak oil prediction).

195. JOE REPORT, *supra* note 11, at 29.

196. *Id.* at 24.

197. *Id.* at 24, 29.

198. Appenzeller, *supra* note 1, at 2.

United States Department of Energy advised that the failure to prepare for Peak Oil would lead to “major economic upheaval.”¹⁹⁹ The military report also warned of military consequences and “dangerous vulnerabilities” of the energy crisis, including exacerbating tensions in the world and pushing “fragile and failing states further down the path toward collapse.”²⁰⁰

Some scientists and economists lessen the significance of Peak Oil, proposing that new technology will open up new reserves offshore.²⁰¹ The Deepwater Horizon disaster demonstrates the untenable consequences of drilling at the edge of technology.²⁰² Admittedly, critics of Peak Oil acknowledge that expensive oil and global warming will be the drivers of worldwide change.²⁰³ A leading report on climate change proposes that there is “an abundant supply of fossil fuels,” but that the stocks that are profitable to extract would result in dangerous levels of greenhouse gas concentrations.²⁰⁴ Consequently, human consumption of oil has the globe in an untenable grip, with dwindling supplies of accessible reserves, yet with enough oil to support a level of consumption that could push the warming of Earth past the tipping point.²⁰⁵

B. Global Warming: Changing the Face of “Eaarth”²⁰⁶

According to the Intergovernmental Panel on Climate Change (“IPCC”), global warming is “unequivocal” and is very likely caused by

199. HIRSCH, *supra* note 10, at 66.

200. JOE REPORT, *supra* note 11, at 24, 28.

201. *E.g.*, Peak Oil “Wrong,” Says Schwartz, CLEANTECH GROUP (Sept. 17, 2008), <http://cleantech.com/news/3464/peak-oil-wrong-says-schwartz> (last visited June 1, 2011) (referring to remarks of Peter Schwartz, chair of Global Business Network, at the Cleantech Forum XVIII in Washington, D.C.).

202. “The seeming inevitability of failure may be raising basic questions about the quest for deeper and deeper oil.” Randy Lee Loftis, *Deeper Wells in Gulf of Mexico Pose Heightened Risks*, DALLAS MORNING NEWS, June 27, 2010, available at <http://www.dallasnews.com/news/local-news/20100627-Deeper-wells-in-Gulf-of-Mexico-1289.ece>.

203. *Id.* (asserting that it will be “climate change catastrophes . . . and more expensive oil, not the fact that we’re running out of oil, that will drive change.”).

204. Nicholas Stern, *Executive Summary* of STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE, at xiv (2006), http://www.hm-treasury.gov.uk/d/Executive_Summary.pdf [hereinafter Stern]; see also BERRY, GREAT WORK, *supra* note 16, at 136–49 (critiquing the “extractive economy”).

205. *Id.*; see also LENNY BERNSTEIN ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT, CLIMATE CHANGE 2007: SYNTHESIS REPORT, SUMMARY FOR POLICYMAKERS 13 (2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf [hereinafter IPCC SYNTHESIS REPORT].

206. BILL MCKIBBEN, EAARTH: MAKING A LIFE ON A TOUGH NEW PLANET (2010) (describing the new planet, “Eaarth,” that human-induced global warming is creating).

human-produced increases in greenhouse gases.²⁰⁷ As explained by the U.S. Supreme Court: “[W]hen carbon dioxide is released into the atmosphere, it acts like the ceiling of a greenhouse, trapping solar energy and retarding the escape of reflected heat. It is therefore a species—the most important species—of a ‘greenhouse gas.’”²⁰⁸

In its Fourth Assessment Report, the IPCC projected a worldwide surface warming between 1.8 and 4.0 degrees Celsius (3.2 and 7.2 degrees Fahrenheit) at the end of this century, with an expected increase of 0.3 degrees (Celsius) for each of the next two decades.²⁰⁹ In 2009, a team of scientists at MIT predicted a median global temperature increase of 5.2 degrees Celsius (9 degrees Fahrenheit) by 2100.²¹⁰ The projected surface warming is based on “no policy” scenarios, in which governments have not adopted policies to require reductions in greenhouse gases.²¹¹

In a report for the British Treasury of the economic effects of climate change, Sir Nicholas Stern illustrated the environmental impacts that are likely to result from graduating levels of temperature increase.²¹² According to Stern and the IPCC, with the current stock of greenhouse gases in the atmosphere, we are already locked into a surface warming of at least 1 degree Celsius (1.8 degrees Fahrenheit).

207. IPCC SYNTHESIS REPORT, *supra* note 205, at 2, 5.

208. *Massachusetts v. EPA*, 549 U.S. 497, 505 (2007).

209. IPCC SYNTHESIS REPORT, *supra* note 205, at 8 (also stating a likely range of temperature change at the end of the twenty-first century from 1.1 to 6.4 degrees (Celsius)); see also *The MSDS Hyper Glossary, Temperature Unit Conversions, Celsius Scale*, INTERACTIVE LEARNING PARADIGM INC., <http://www.ilpi.com/msds/ref/tempunits.html> (last visited July 22, 2011) (instructing that a change of 1 degree Celsius equals 1.8 degrees Fahrenheit).

210. A.P. Sokolov et al., *Probabilistic Forecast for Twenty-First-Century Climate Based on Uncertainties in Emissions (Without Policy) and Climate Parameters*, 22 J. CLIMATE 5175 (2009); see also David Chandler, *Climate Change Odds Much Worse Than Thought*, MIT JOINT PROGRAM ON SCI. & POLICY OF GLOBAL CHANGE (May 19, 2009), <http://globalchange.mit.edu/news/news-item.php?id=76> [hereinafter MIT Press Release] (also summarizing findings of a 90% probability range of 3.5 to 7.4 degrees Celsius (6.3 to 13.3 degrees Fahrenheit); Doyle Rice, *Global Warming May Be Twice as Bad as Previously Expected*, USA TODAY (May 21, 2009), http://www.usatoday.com/tech/science/environment/2009-05-20-global-warming_N.htm (reporting MIT findings of warming of more than nine degrees Fahrenheit by the end of the century).

211. MIT Press Release, *supra* note 210; see also RICHARD B. ALLEY ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FOURTH ASSESSMENT REPORT, CLIMATE CHANGE 2007: THE PHYSICAL BASIS OF CLIMATE CHANGE, SUMMARY FOR POLICYMAKERS 18 (2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf> (identifying the emission scenarios of the IPCC Special Report on Emission Scenarios (“SRES”) which do not include “additional climate change initiatives” such as implementation of the United Nations Framework Convention on Climate Change or the emission targets of the Kyoto Protocol).

212. Stern, *supra* note 204, at v.

heit).²¹³ A warming of 1 to 2 degrees Celsius (1.8 to 3.6 degrees Fahrenheit) is expected to have impacts such as the disappearance of small mountain glaciers and the bleaching of coral reefs to an eventual point of irreversible damage.²¹⁴ Additional impacts of this relatively modest surface warming include amplified water stress for hundreds of millions of people, greater damage from storms and floods, and intensified burdens from malnutrition and diseases.²¹⁵

A temperature increase of approximately 2 to 3 degrees Celsius (3.6 to 5.4 degrees Fahrenheit) is projected to cause the “onset of irreversible melting of the Greenland ice sheet,” the potential onset of collapse of the Amazon rainforest, and an increase in the number of people at risk from hunger.²¹⁶ A warming in the range of 3 to 4 degrees Celsius (5.4 to 7.2 degrees Fahrenheit) is forecasted to cause significant changes in the availability of water, the doubling of costs from hurricane damage in the United States, and the inability of many ecosystems to maintain their form and functioning.²¹⁷ Warming in this range is also anticipated to bring about the risk of extinction of an estimated thirty percent of species, weakening of the meridional overturning circulation (“MOC”) in the ocean, the loss of approximately thirty percent of wetlands in the world, and coastal flooding for millions of people.²¹⁸

A temperature increase of 4 to 5 degrees Celsius (7.2 to 9 degrees Fahrenheit) is projected to lead to massive global extinctions, crop declines across many regions, and a rise in sea levels that will threaten the major cities of the world, “including London, Shanghai, New York, Tokyo and Hong Kong.”²¹⁹ Global warming of 5 degrees Celsius would “transform the physical geography of the world.”²²⁰ If the governance systems of the world adopt a “business as usual” approach to

213. *Id.* at iii; IPCC SYNTHESIS REPORT, *supra* note 205, at 13, 21 (“Anthropogenic warming and sea level rise would continue for centuries due to the time scales associated with climate processes and feedbacks, even if GHG [greenhouse gas] concentrations were to be stabilized.”); *see also* Interview by EarthSky Communications with Stephen Schneider, Climatologist, Stanford University (April 16, 2009), <http://earthsky.org/earth/climate-scientist-on-avoidable-and-unavoidable> (relaying that Earth warmed about 1.4 degrees Fahrenheit over the twentieth century and is predicted to warm another 2 to 6 degrees Fahrenheit over the twenty-first century).

214. Stern, *supra* note 204, at v.

215. IPCC WORKING GROUP II, *supra* note 25, at 13.

216. *See* Stern, *supra* note 204, at v (stating twenty to sixty percent increase in people at risk of hunger in the 2080s).

217. *See id.*

218. *Id.*; IPCC WORKING GROUP II, *supra* note 25, at 13.

219. IPCC WORKING GROUP II, *supra* note 25, at 13; Stern, *supra* note 204, at v.

220. Stern, *supra* note 204, at iv.

global warming, the Earth that is our hospitable home in 2010 is not the “Eaarth” that is home to nine billion people and a depleted array of species and ecosystems in 2100.²²¹

As a matter of justice and ethics, it is indefensible for our present generation to bequeath an impoverished world to future generations. The next section of the Article will apply principles of Earth Jurisprudence to support intergenerational equity for future humans, other-than-human species, and ecosystems.

IV. Earth Jurisprudence and Intergenerational Equity

At the heart of this story, I think, is a simple, abiding belief: it is possible to live wisely on the land, and to live well. And in behaving respectfully toward all that the land contains, it is possible to imagine a stifling ignorance falling away from us.²²²

A. An Overview of Intergenerational Equity

As Peak Oil advances, voices from many sectors insist that the political will must be summoned to reduce emissions to the Earth’s carrying capacity and to prepare for a near future of non-fossil fuel-based energy sources.²²³ To make the transition a reality, major human institutions must refocus on sustainable purposes and realign their functioning with the Earth processes on which they depend.²²⁴ The premises of Earth-centered systems of law and governance are not based on discontinuity between humanity and nature.²²⁵ Earth-centered systems do not allow for unfettered use (including destruction)

221. See *id.*; MCKIBBEN, *supra* note 206, at 2–20 (describing the new planet, “Eaarth,” being created by global warming); Population Div., U.N. Dep’t of Econ. & Soc. Affairs, Proceedings of the United Nations Expert Meeting on World Population in 2300, *World Population in 2300*, ¶ 8, U.N. Doc. ESA/P/WP.187/Rev. 1 (March 24, 2004), available at <http://www.un.org/esa/population/publications/longrange2/2004worldpop2300reportfinalc.pdf> (noting a “medium scenario” increase in population from 6.1 billion persons in 2000 to a maximum of 9.2 billion persons in 2075).

222. LOPEZ, *supra* note 22, at xxviii.

223. DIAMOND, *supra* note 24, at 522; HEINBERG, *supra* note 26, at 31–55, 61–62 (assessing eighteen energy sources and discussing transition plans away from fossil fuels); HIRSCH, *supra* note 10, at 6 (asserting the necessity of “planning and implementation of mitigation well before peaking”); see also Stern, *supra* note 204, at xi (relaying information about the absorption capacity of the Earth, five gigatonnes of carbon dioxide equivalent (5 GtCO₂e), which is eighty percent below the level of current annual emissions); cf. Michael B. McElroy, *Time to Electrify: Reducing our Dependence on Imported Oil—While Addressing the Threat of Climate Change*, HARV. MAG., July–Aug. 2011, 36–39, available at <http://harvardmagazine.com/2011/07/time-to-electrify?page=all> (proposing a transportation system based on wind-powered electricity).

224. E.g., BERRY, GREAT WORK, *supra* note 16, at 81.

225. CULLINAN, *supra* note 16, at 443–46.

of “natural resources” for the primary purpose of maximizing short-term profit.²²⁶ Instead, principles such as the intrinsic value of nature, sustainability, and interdependence would be at the heart of the law and the legal system.

One measure that unites these Earth-centered principles is intergenerational equity.²²⁷ This measure places responsibility on the present generation to live sustainably for itself and future generations.²²⁸ First Nations people, who for thousands of years, have lived as stewards of the land and sea, embody this principle.²²⁹ The prophet Ezekiel articulated similar values in 593 B.C.E. by warning of divine displeasure with human waste of the world.²³⁰ Centuries ago in North America, the Six Nations Confederacy of the Iroquois League embraced a Great Law of Peace based on the notion that peace is not possible without justice for the children seven generations into the future.²³¹

Since the advent of the environmental movement, intergenerational accountability has been part of several international agreements.²³² In 1972, the Stockholm Declaration on the Human Environment affirmed the conviction that humankind “bears a sol-

226. BERRY, GREAT WORK, *supra* note 16, at 80–81, 140; *see also* FREYFOGLE, *supra* note 59, at 102.

227. This Article employs the term “intergenerational equity” to include intragenerational equity as well as meta-generational justice. *See* EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY 97 (1989) [hereinafter BROWN WEISS, IN FAIRNESS] (discussing the “planetary rights” of present generation, which derive from intergenerational justice, “but enforced on an intragenerational basis”); *see also* Tony Fitzpatrick, *Making Welfare for Future Generations*, in ENVIRONMENTAL ISSUES AND SOCIAL WELFARE 38, 39–40 (Michael Cahill & Tony Fitzpatrick eds., 2002) (discussing a theory of meta-generational justice for sustainability).

228. BROWN WEISS, IN FAIRNESS, *supra* note 227, at 37.

229. FRANK BROWN & Y. KATHY BROWN (compilers), STAYING THE COURSE, STAYING ALIVE – COASTAL FIRST NATIONS FUNDAMENTAL TRUTHS: BIODIVERSITY, STEWARDSHIP AND SUSTAINABILITY, at vii–x (2009), http://www.biodiversitybc.org/assets/Default/BBC_Staying_the_Course_Web.pdf; *see also* U.N. Declaration on the Rights of Indigenous Peoples, G.A. Res. 61/295, U.N. Doc. A/RES/61/295 (Sept. 13, 2007), *available at* <http://www.un.org/esa/socdev/unpfii/en/drip.html>.

230. “Is it not enough for you to feed on the good pasture, but you must tread down with your feet the rest of your pasture? When you drink of clear water, must you foul the rest with your feet?” *Ezekiel* 34:18 (New Revised Standard Version); *Ezekiel* 1:1–1:4, n.1a (The Jerusalem Bible); *see also* Bryan G. Norton, *Future Generations, Obligations To*, in 2 ENCY. OF BIOETHICS 892 (Warren T. Reich ed., 1995).

231. David Yarrow, *The Great Law of Peace: New World Roots of American Democracy*, DYARROW.ORG (Sept. 1987), <http://www.dyarrow.org/indigenous/greatlaw.htm>.

232. BURNS H. WESTON & TRACY BACH, RECALIBRATING THE LAW OF HUMANS WITH THE LAWS OF NATURE: CLIMATE CHANGE, HUMAN RIGHTS, AND INTERGENERATIONAL JUSTICE 14 (2009).

emn responsibility to protect and improve the environment for present and future generations.”²³³ In 1987, the United Nations endorsed the Brundtland Report’s definition of sustainable development as meeting the “needs of the present without compromising the ability of future generations to meet their own needs.”²³⁴ These documents provided the foundation for the 1992 Rio Declaration, which prioritized the well-being of present and future generations.²³⁵ Five years later, the United Nations Educational, Scientific, and Cultural Organization (“UNESCO”) adopted a declaration specifically directed toward responsibilities of present generations for future generations.²³⁶

Intergenerational equity gained momentum within the legal academy in 1989 when Edith Brown Weiss asserted: “We, as a species, hold the natural and cultural environment of our planet in common, both with other members of the present generation and with other generations, past and future.”²³⁷ Brown Weiss identified three principles of intergenerational equity: conservation of options, quality, and access. As to the first principle, each generation should preserve bio- and cultural diversity so that options for future generations would not be unduly restricted.²³⁸ As to the second principle, the qualitative state of the planet should be preserved by each generation “so that it is passed on in no worse condition than the present generation received it.”²³⁹ Where one generation does not conserve the planet,

233. *Id.*; United Nations Conference on the Human Environment, Stockholm, Swed., June 5–16, 1972, Declaration of the United Nations Conference on the Human Environment, U.N. Doc. A/Conf.48/14/Rev.1, *reprinted in* 11 I.L.M. 1416 (June 16, 1972).

234. World Commission on Environment and Development, *Our Common Future* (1987), *available at* <http://www.un-documents.net/ocf-02.htm> (endorsed by G.A. Res. 42/186, U.N. Doc. A/RES/42/187 (Dec. 11, 1987) and G.A. Res. 42/187, U.N. Doc. A/RES/42/187 (Dec. 11, 1987)); *see also* FERRERO & HOLLAND, *supra* note 59, at 39–40 (discussing the 1987 Brundtland Report); BERRY, *GREAT WORK*, *supra* note 16, at 133 (critiquing notion of “sustainable development”).

235. 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 (Vol. I), Annex I (Aug. 12, 1992); *see also* FERRERO & HOLLAND, *supra* note 59, at 43 (2005) (discussing shortcomings of the Rio Declaration).

236. General Conference of the United Nations Educational, Scientific, and Cultural Organization, Paris, Fr., Oct. 21, 1997 to Nov. 12, 1997, *Declaration on the Responsibilities of the Present Generations Towards Future Generations*, UNESCO 13178 (Nov. 12, 1997) [hereinafter UNESCO Declaration].

237. BROWN WEISS, *IN FAIRNESS*, *supra* note 227, at 17.

238. *Id.*; *see also* WESTON & BACH, *supra* note 232, at 19.

239. BROWN WEISS, *IN FAIRNESS*, *supra* note 227, at 37–38; *see also* Joel Feinberg, *The Rights of Animals and Unborn Generations*, in *Philosophy and Environmental Crisis* 64–65 (William T. Blackstone ed., 1980) (referring to the “garbage heap” that humans are threatening to create for the life that follows us).

Brown Weiss advised that succeeding generations must repair the damage, even if that would be a costly enterprise.²⁴⁰ To conform to the third principle, access to the legacy of past generations must be provided to current and future generations.²⁴¹

Although the legal status of the doctrine of intergenerational equity is subject to some debate, the Supreme Court of the Philippines affirmed the doctrine as providing standing to assert the right of Filipinos to “a balanced and healthful ecology.”²⁴² In *Minors Oposa vs. Secretary of the Department of Environment and Natural Resources*, children of one generation sought to “represent their generation and generations yet unborn.”²⁴³ Overturning a dismissal of the complaint, the Court held that the minors stated a cause of action to prevent the continued deforestation of Philippine rainforests.²⁴⁴

A number of rationales have been extended for intergenerational justice: the Earth is held in common by the community of humans as a whole; the present generation benefits from the sacrifices and investments of prior generations; future generations will be disproportionately harmed by environmental degradation in the present.²⁴⁵ Global warming illustrates the practical and devastating impact that past and present human industrial activities will have on the future.²⁴⁶

Among the first communities in North America to feel the consequences of past decisions are two island communities in the Arctic Ocean. In Shismaref and Kivalina, Alaska, a combination of rising sea

240. BROWN WEISS, IN FAIRNESS, *supra* note 227, at 37–38.

241. *Id.*

242. *Minors Oposa v. Sec’y of the Dep’t of Env’t & Natural Res.*, 224 S.C.R.A. 792 (S.C., July 30, 1993) (Phil.), *reprinted in* 33 I.L.M. 173, 174 (1994) (referring to Section 16, Article II of the 1987 Constitution of the Philippines).

243. *Id.*

244. *Id.*; see also Oliver A. Houck, *Light from the Trees: The Stories of Minors Oposa and the Russian Forest Cases*, 19 GEO. INT’L ENVTL. L. REV. 321 (2007).

245. Some legal scholars have asserted contractarian grounds to support intergenerational justice, including theories of distributive, reciprocity-based, and respect-based social justice. WESTON & BACH, *supra* note 232, at 23. Other legal scholars have called for intergenerational equity as a matter of international human environmental rights, virtue ethics, or unjust enrichment. Brett M. Frischmann, *Some Thoughts on Shortsightedness and Intergenerational Equity*, 36 LOY. U. CHI. L.J. 457 (2005); Jeffrey M. Gaba, *Environmental Ethics and Our Moral Relationship to Future Generations: Future Rights and Present Virtue*, 24 COLUM. J. ENVTL. L. 249, 253–54 (1999); Prudence E. Taylor, *From Environmental to Ecological Human Rights: A New Dynamic in International Law?*, 10 GEO. INT’L ENVTL. L. REV. 309 (1998). I agree, with others, that notions of an intergenerational trust have depth and viability and also argue that Earth, as the central norm, requires intergenerational obligations. BERRY, EVENING, *supra* note 46, at 81, 84; Glicksman, *supra* note 58, at 148; Turnipseed, *supra* note 162, at 9, 18, 22, 29.

246. See PILKEY & YOUNG, *supra* note 6, at 6.

levels, melting permafrost, and extended ice-free months have caused flooding and erosion to the degree that the communities are being overtaken by the sea.²⁴⁷ Shishmaref, a village of 400, will be relocated to the mainland at an estimated cost of \$180 million.²⁴⁸ The Corps of Engineers determined that the cost of moving Kivalina, the sister community to the north, was too high.²⁴⁹ In 2008, Kivalina sued nine oil companies, fourteen power companies, and a coal company to finance the costs of relocation.²⁵⁰ Village officials assert that the companies' decisions and actions are responsible for the emissions that led to global warming and the consequent inundation of their community.²⁵¹ Unless swift and strong action is taken, the catastrophe of Kivalina promises to be played out in coastal communities across the globe.

B. Intergenerational Justice for the Earth Community

Most legal scholars have articulated intergenerational justice as accruing to the benefit of future generations of human beings. This Article argues that intergenerational equity must include present and future generations of other-than-human species and ecosystems.²⁵² Five sets of arguments support the proposition of extending intergenerational equity to the Earth community: prudential, functional, fundamental fairness, moral, and linkages between social and environmental justice.

247. *Id.* at 7.

248. *Id.* at 14.

249. *Id.*

250. *Id.*; Kivalina Complaint, *supra* note 7.

251. Kivalina Complaint, *supra* note 7, at 1; *see also* Am. Elec. Power Co. v. Connecticut, 180 L. Ed. 2d 435 (2011) (reversing holding of Second Circuit that governmental and land-trust plaintiffs stated federal common law public nuisance claim for injunctive relief against five power companies for failing to reduce annual carbon emissions); Native Village of Kivalina v. ExxonMobil Corp., 663 F. Supp. 2d 863 (N.D. Cal. 2009) (order granting Defendants' motions to dismiss), *appeal docketed*, No. 09-17490 (9th Cir. Nov. 5, 2009), *and stay lifted*, No. 09-17490 (9th Cir. Aug. 31, 2011) (order lifting stay entered after Supreme Court decision in *American Electric Power Co. v. Connecticut*, 180 L. Ed. 2d 435 (2011)).

252. KLAUS BOSSELMANN, *THE PRINCIPLE OF SUSTAINABILITY: TRANSFORMING LAW AND GOVERNANCE* 81, 204 (2008) (extending justice to "non-human others"); Prue Taylor, *The Business of Climate Change: What's Ethics Got to Do With It?*, 20 PAC. McGEORGE GLOBAL BUS. & DEV. L.J. 161, 189, 191 (2007) (arguing that the responsibility of present generations extends to present and future generations of "human beings and the larger living world") [hereinafter Taylor 2007]; Laura Westra, *Securing Earth's Bounty for Present and Future Generations*, in *EARTH CHARTER IN ACTION* 61–62 (Peter Blaze Corcoran, Alide Roerink, & Mirian Vilela eds., 2005), *available at* <http://www.earthcharterinaction.org/invent/images/uploads/ENG-Westra.pdf> (advocating the inclusion of all life, and the unborn, under the protected umbrella).

First, the prudential self-interest of humankind mandates consideration of other-than-human species and ecosystems. From a practical perspective, intergenerational equity for human beings simply will not work without equity for other species and ecosystems on which we depend.²⁵³ Humanity is utterly dependent on nature.²⁵⁴ People would starve without plants and animals.²⁵⁵ Phytoplankton is the nutrient at the base of the food web upon which all life, including human beings, depends.²⁵⁶ Plants and animals provide fiber, fur, bone, shells, shade, shelter, and spiritual sustenance.²⁵⁷

Human beings are inspired and re-created by nature, delighting in and nurtured by its complex beauty.²⁵⁸ Da Vinci's flying machines were inspired by birds.²⁵⁹ Elastic hooks were prompted by the cocklebur.²⁶⁰ The distance regulator in Volvos is an adaptation of ultrasound in bats.²⁶¹ Automobile tires mimic the action of the paws of cats coming to a stop.²⁶²

Plants and animals offer healing agents to human beings.²⁶³ For example, a secretion from frogs is the active ingredient in a painkiller, without harmful side effects.²⁶⁴ Red roses are used to treat infant diarrhea, sore throats, and skin rashes.²⁶⁵ Corn silk tea has long been a remedy for urinary tract infections and kidney ailments.²⁶⁶ Mercavor, a drug that lowers cholesterol, was derived from a fungus on a golf course in Japan, while Cyclosporine, a drug that fights transplant re-

253. Taylor 2007, *supra* note 252, at 192–93.

254. BERRY, EVENING, *supra* note 46, at 150.

255. “No living being nourishes itself.” *Id.*

256. McKIBBEN, *supra* note 206, at 25.

257. KOONS, *Moral Value*, *supra* note 12, at 330–31; *see also* GERALD G. MAY, *THE WISDOM OF WILDERNESS: EXPERIENCING THE HEALING POWER OF NATURE* 55–60 (2006) (relaying, in a spiritual sense, an experience with the “universe sound” of the cicadas).

258. “When I would recreate myself, I seek the darkest wood, the thickest and most interminable, and to the citizen, most dismal swamp. I enter the swamp as a sacred place - a *sanctum sanctorum*. There is the strength, the marrow of Nature.” HENRY DAVID THOREAU, *Walking*, in *WALDEN AND OTHER WRITINGS* 647 (Brooks Atkinson ed., 1992) (1862).

259. *E.g.*, Norbert Misch-Kunert, *Moments: Bionics*, *MOMENTUM*, Jan. 2007, at 16–18.

260. *Id.*

261. *Id.*

262. *Id.*

263. ROSITA ARVIGO, *SASTUN: MY APPRENTICESHIP WITH A MAYA HEALER passim* (1994).

264. Andrew Pollack, *Patenting Life: A Special Report; Biological Products Raise Genetic Ownership Issues*, *N.Y. TIMES* (Nov. 26, 1999), <http://www.nytimes.com/1999/11/26/business/patenting-life-special-report-biological-products-raise-genetic-ownership-issues.html?scp=1&sq=patenting+life&st=nyt&pagewanted=all>.

265. ARVIGO, *supra* note 263, at 1.

266. *Id.* at 47.

jection, was produced from a Norwegian mountain fungus.²⁶⁷ Cancer drugs that reduce deaths from childhood leukemia and testicular cancer were formulated from the rosy periwinkle of Madagascar.²⁶⁸

Ecosystems are the living web in which we live.²⁶⁹ The basin of the Amazon River embraces the world's largest tropical forest.²⁷⁰ The forests of the Amazon serve as "Lungs of our Planet," converting carbon dioxide into oxygen, cleaning the air, and regulating regional and global climate.²⁷¹ Yet, the rainforest has been significantly degraded, with one-fifth of the Brazilian Amazon deforested by farming, logging, and ranching.²⁷²

Global attention has been focused on ecosystem services—the benefits humans receive from ecosystems.²⁷³ The Millennium Ecosystem Assessment notes four primary areas in which humans depend on ecosystems: provisioning (including food, water, timber, and fiber); regulating (including climate, floods, disease, wastes, and water quality); cultural (including recreational, aesthetic, and spiritual benefits); and supporting (including soil formation, photosynthesis, and nutrient cycling).²⁷⁴ Humankind would perish without the benefits provided by nature.²⁷⁵ Consequently, intergenerational equity for present and future generations of other-than-human species and ecosystems is a prudential necessity—their survival is necessary for the continuation of the human species.²⁷⁶

267. Pollack, *supra* note 264.

268. *Id.*

269. *E.g.*, MILLENNIUM SYNTHESIS, *supra* note 65, at v.

270. LESLIE TAYLOR, THE HEALING POWER OF RAINFOREST HERBS: A GUIDE TO UNDERSTANDING AND USING HERBAL MEDICINALS 17 (2005) [hereinafter LESLIE TAYLOR].

271. *Id.* at 16; Fernando Henrique Cardoso & William D. Ruckelshaus, *Foreword* to JANET RANGANATHAN ET AL., WORLD RES. INST., ECOSYSTEM SERVICES: A GUIDE FOR DECISION MAKERS, at i (2008).

272. "One fifth of the Brazilian Amazon has been deforested by loggers, farmers, and ranchers." Cardoso & Ruckelshaus, *supra* note 271, at i (referring to the Amazon forests as the "Lungs of our Planet"); *see also* LESLIE TAYLOR, *supra* note 270, at 14, 18 ("More than 20 percent of the Amazon rainforest is already gone, and much more is severely threatened as the destruction continues.").

273. NEVILLE ASH ET AL., ECOSYSTEMS AND HUMAN WELL-BEING: A MANUAL FOR ASSESSMENT PRACTITIONERS, at xi (2010); *see e.g.*, JOHN COPELAND NAGLE & J.B. RUHL, THE LAW OF BIODIVERSITY AND ECOSYSTEM MANAGEMENT 302, 313–18 (2002) (defining ecosystems and ecosystem services).

274. MILLENNIUM ECOSYSTEM ASSESSMENT BOARD, ECOSYSTEMS AND HUMAN WELL-BEING: BIODIVERSITY SYNTHESIS (2005) [hereinafter BIODIVERSITY SYNTHESIS], *available at* <http://www.millenniumassessment.org/documents/document.354.aspx.pdf>.

275. BERRY, EVENING, *supra* note 46, at 150; *see also* Cardoso & Ruckelshaus, *supra* note 271, at iv.

276. Taylor 2007, *supra* note 252, at 192–93.

The second set of arguments takes the foregoing anthropocentric propositions and places them in a functional and Earth-centered frame. The Earth functions according to principles of interdependence, diversity, and subjectivity.²⁷⁷ Humanity is one part of the interconnected Earth community.²⁷⁸ A threshold premise of an Earth-centered jurisprudence is that human systems of law and governance must attend to the well-being of the whole Earth community, not just human welfare.²⁷⁹ In this Earth ethic, the role of humanity is changed “from conqueror of the land-community to plain member and citizen of it.”²⁸⁰

Moreover, the ecological foundation of life is biodiversity—in genes, populations, species, and ecosystems.²⁸¹ The maintenance of biodiversity on all levels requires sheltering principles in law and governance. Recall that our planetary system formed itself five billion years ago.²⁸² Creative conditions on Earth supported the birth of the first living cell, Aries, some four billion years ago.²⁸³ With capacities for differentiation and self-regulation, Aries and her progeny, the prokaryotes, saturated the planet with oxygen and allowed the emergence of Vikengla, the first cell with a nucleus and capable of meiotic sex.²⁸⁴ Multicellular organisms arose six hundred years ago:

Worms learned to wiggle in pursuit of soft prey, then sprouted fleshy wings to guide them through the oceans, and invented the tooth when another creature invented the shell [S]oon the continent that had been floating lifelessly on Earth’s mantle for two billion years heaved with amphibians and reptiles and insects and the great dinosaurs with gleaming eyes reaching up to the sunlit leaves of the forest canopy.²⁸⁵

277. *E.g.*, SWIMME & BERRY, *supra* note 15, at 71–79.

278. CULLINAN, *supra* note 16, at 112–13; *see also* Koons, *Moral Value*, *supra* note 12, at 292 (“In quantum physics, *the whole determines the behavior of the parts.*”).

279. CULLINAN, *supra* note 16, at 112–13; Taylor 2007, *supra* note 252, at 172.

280. LEOPOLD, *Land Ethic*, *supra* note 63, at 204.

281. BIODIVERSITY SYNTHESIS, *supra* note 274, at 2, 20; *see also* MILLENNIUM ECOSYSTEM ASSESSMENT BOARD, ECOSYSTEMS AND HUMAN WELL-BEING: CURRENT STATE AND TRENDS 62 (2005), *available at* <http://www.millenniumassessment.org/en/Condition.html> (stating that ecosystems have intrinsic value).

282. SWIMME & BERRY, *supra* note 15, at 8; *see also* Herman F. Greene, *Where is the Universe in the Universe Story?*, in *THE ECOZOIC, REFLECTIONS ON LIFE IN AN ECOLOGICAL AGE* 1–2 (2008) (describing the Universe Story as an epic narrative and a scientific account, blending meaning-making through story-telling and scientific theory).

283. SWIMME & BERRY, *supra* note 15, at 8; *see also* Sahtouris, *supra* note 44, *passim* (tracing the evolution of Earth from stardust to a living planet).

284. SWIMME & BERRY, *supra* note 15, at 9, 86–87.

285. *Id.* at 10.

Mammals entered the community of life two hundred million years ago.²⁸⁶ After a period of mass extinctions, animal life had to reinvent itself, and mammals developed emotional sensitivity and a capacity for feeling the universe.²⁸⁷

Nurtured in the creative and differentiating womb of Earth, human beings first stood on two limbs four million years ago in Africa.²⁸⁸ Human construction of tools and making of fire followed.²⁸⁹ The celebration of Earth's beauty was expressed in cave paintings thirty-five thousand years ago.²⁹⁰ After becoming aware of Earth's seeds and domesticating animals, humans formed villages and developed language and religion.²⁹¹ Five thousand years ago, urban civilization was formed, while five hundred years ago, European explorers colonized indigenous people around the world.²⁹² The European nation-state, with a liberal democratic form of government, its ideals of autonomy and progress, and its economic system based on free market capitalism and private ownership of property, became dominant in the eighteenth century.²⁹³ With the Industrial Revolution came the use of coal, followed by exploitation of oil and natural gas.²⁹⁴

For billions of years, Earth has regulated and sustained the biosphere of the planet to make it hospitable for the life forms that have flourished.²⁹⁵ In two hundred years, human industrial activity has threatened the very basis of life.²⁹⁶ It is incumbent on humanity to learn from Earth, her species, and ecosystems how to conduct human affairs. Humankind should infuse Earth-sensibility into law and gov-

286. *Id.*

287. *Id.*

288. *Id.* at 11.

289. *Id.*

290. *Id.*

291. *Id.* at 12.

292. "A secure supply of food enabled populations to surge." *Id.* at 11–12 (also proposing that urban civilizations "can be considered elaborations on the cultural patterns established during the Neolithic").

293. *Id.* at 13.

294. The pre-industrial level of greenhouse gases in the atmosphere was 280 parts per million. Stern, *supra* note 204, at iii. In two hundred years, the level increased to 430 parts per million and, at today's rate of emission, will reach 550 parts per million by mid-century. *Id.* At this rate, the temperature of the globe will rise 3.6 degrees Fahrenheit. *Id.*

295. See JAMES LOVELOCK, THE REVENGE OF GAIA: EARTH'S CLIMATE CRISIS AND THE FATE OF HUMANITY 162 (2006) (Scientist James Lovelock advanced Gaia theory in the early 1980s to articulate: "A view of the Earth that sees it as a self-regulating system . . . the regulation of surface conditions so as always to be as favourable as possible for contemporary life.").

296. BERRY, GREAT WORK, *supra* note 16, at 150, 157 (relaying the story of the "Petroleum Interval," which have been "the glory years of the industrial period and the devastating years of the Earth").

ernance by embracing measures such as intergenerational equity for all components of the planetary community.

The third set of reasons for intergenerational equity for other-than-human species and ecosystems is squarely based on fundamental fairness. The consequences of industrial development will not be borne by the extracting companies that have produced the rampant environmental degradation.²⁹⁷ Instead, the full consequences will be assumed by generations in the future of human beings, other-than-human species, and ecosystems.²⁹⁸ Equity embraces the notion of reciprocity—that liability should be placed where a party effects non-reciprocal harm and, conversely, that remedies should be recognized where a party receives harm without reciprocation.²⁹⁹ Remote species and ecosystems pose no threat to foregoing generations of human beings.³⁰⁰ The harm runs from humanity forward.³⁰¹ The fairness principle mandates responsibility for the present generation's non-reciprocal threat to everything and everyone in the future.

The gravity of harm that is presented also raises issues of fairness. Extinction of species is the most extreme form of injury.³⁰² We are entering what has been described as a human-induced period of mass extinction—the largest since the end of the age of the dinosaurs.³⁰³ Harvard biologist E.O. Wilson observed: “The one process now going on that will take millions of years to correct is the loss of genetic and species diversity by the destruction of natural habitats. This is the folly our descendants are least likely to forgive us.”³⁰⁴

297. Taylor 2007, *supra* note 252, at 189.

298. *Id.*

299. DAN B. DOBBS, *THE LAW OF TORTS* §§ 155, 346, at 376, 950 (2000) (explaining the non-reciprocal nature of the risk of harm as a rationale for liability in nuisance cases and in negligence cases based on *res ipsa loquitur*). *But see* TONY FITZPATRICK, *AFTER THE NEW SOCIAL DEMOCRACY: SOCIAL WELFARE FOR THE TWENTY-FIRST CENTURY* 135 (2003) (noting the argument that future generations of humans can harm present human generations in terms of reputations and legacies).

300. *Cf.* Theodore P. Seto, *Intergenerational Decision Making: An Evolutionary Perspective*, 35 *LOY. L.A. L. REV.* 235, 258–59 (2001) (arguing that reciprocity operates in limited ways in intergenerational equity: “Regardless of how we behave, our descendants will not be able to reward or retaliate against us effectively.”).

301. *Id.*; *see also* Marc R. Poirier, *Natural Resources, Congestion, and the Feminist Future: Aspects of Frischmann’s Theory of Infrastructure Resources*, 35 *ECOLOGY L.Q.* 179, 200 (2008) (discussing notions of reciprocity, caregiving, and parallels between Rawlsian intergenerational equity, feminist philosophy, and environmental ethics).

302. *See generally* EDWARD O. WILSON, *BIOPHILIA: THE HUMAN BOND WITH OTHER SPECIES* 121 (1984) [hereinafter WILSON 1984].

303. CULLINAN, *supra* note 16, at 37 (“Periods of mass extinction have only occurred five times in Earth’s fifteen billion year history.”).

304. WILSON 1984, *supra* note 302, at 121.

Based on fossil records, scientists estimate that the rate of mammalian extinction in the distant past was one species becoming extinct per millennium for every thousand mammal species.³⁰⁵ That rate of extinction has increased by at least one thousand.³⁰⁶ Professor Wilson estimated an extinction rate of 3 species per hour, 74 per day, and 27,000 per year.³⁰⁷ The destruction of natural habitats through deforestation, such as is occurring in the rainforests, is one of the primary reasons that species become extinct.³⁰⁸ In the rainforests alone, an estimated 137 species of plants and animals are lost every day.³⁰⁹

As a consequence, no one will ever see a Paradise Parrot or a Tasmanian Tiger in a forest.³¹⁰ The last Passenger Pigeon died in captivity in 1914.³¹¹ The Golden Bear, on the state flag of California, became extinct in 1922.³¹² Due to the alteration of its habitat by climate change, the Golden Toad of Costa Rica has not been seen since 1989.³¹³ In 2004, the last of the Po'o-uli, a species of Hawaiian Honeycreeper, died in the San Diego Zoo.³¹⁴ The yellow-flowered Nehe perennial was last seen in 1931.³¹⁵ Kingman's Prickly Pear of the Mojave Desert was last sighted in 1978, while Pearson's Hawthorne was last

305. MILLENNIUM SYNTHESIS, *supra* note 65, at 5 fig.4, (using fossil records to identify distant past extinction rate of 0.1–1 extinctions per 1000 species per 1000 years).

306. Elizabeth Kolbert, *The Human Factor*, ONEARTH, (Nov. 24, 2010), <http://www.onearth.org/article/the-human-factor>.

307. EDWARD O. WILSON, *THE DIVERSITY OF LIFE* 280 (Belknap Press of Harvard Univ. Press 1992) (providing “the most conservative estimate” based on current knowledge).

308. See BIODIVERSITY SYNTHESIS, *supra* note 274, at 8; LESLIE TAYLOR, *supra* note 270, at 15.

309. See LESLIE TAYLOR, *supra* note 270, at 15.

310. *Extinction is Forever*, DEP'T OF ENV'T, WATER, HERITAGE & THE ARTS, <http://www.environment.gov.au/education/publications/threatened.html> (last visited Dec. 27, 2010); see also Luba Vangelova, *True or False? Extinction Is Forever*, SMITHSONIAN MAG., June 2003, available at http://www.smithsonianmag.com/science-nature/True_or_False_Extinction_Is_Forever.html (discussing the efforts of scientists at the Australian Museum to clone a Tasmanian Tiger, extinct since 1936).

311. Anthony Kendall, *Extinction of the Passenger Pigeons*, DAMN INTERESTING, June 28, 2006, <http://www.damninteresting.com/extinction-of-the-passenger-pigeons>.

312. *Brown Bear*, NEW WORLD ENCYCLOPEDIA, http://www.newworldencyclopedia.org/entry/Brown_bear (last visited June 23, 2011).

313. Luther Avery, *10 Extinct Species That We Should Miss*, AKORRA.COM, <http://akorra.com/2010/03/04/top-10-awesome-extinct-species-that-we-should-miss/> (last visited Dec. 27, 2010).

314. Tina MacDonald, *In Memoriam*, CAMACDONALD, <http://www.camacdonald.com/birding/actionalerts.html> (last visited Dec. 27, 2010).

315. Karen Carter, *Extinct & Endangered Plants*, GARDENGUIDES.COM, <http://www.gardenguides.com/90090-extinct-amp-endangered-plants.html> (last visited Dec. 27, 2010).

observed in the south in 1994.³¹⁶ Threatened by loss of habitat through timber felling, the last remaining pink-flowered St. Helena Olive tree died in 2003.³¹⁷

A species-by-species assessment fails to capture the pervasiveness of the harm and its planet-wide repercussions. From a cross-species perspective, the Living Planet Index shows declines of about thirty percent for terrestrial and marine species and fifty percent for freshwater species between 1970 and 2000.³¹⁸ In 2011, the *Red List of Threatened Species*, published by the International Union for the Conservation of Nature and Natural Resources, identified 19,265 species of plants and animals as threatened species.³¹⁹ The effects of these losses on the fabric of life are unimaginable.³²⁰

The injury of widespread extinctions places pressure “on the existing moral and legal framework to come up with new principles for the conservation and stewardship” of Earth.³²¹ Fairness to species threatened with extinction mandates their inclusion in intergenerational planning. Widening the frame of our sense of fairness is necessary to give at-risk species such as the Giant Panda, the Tiger, the Bluefin Tuna, the Leatherback Turtle, and the Monarch Butterfly a viable chance of continuing to participate in the greater community of life.³²²

The fourth array of arguments for other-than-human intergenerational justice focuses on morality. Questions of “the good,” “the fitting,” “the right,” and “the true” are raised by the major moral languages, each of which supports widening the circle of responsibil-

316. Liz Osborn, *Recently Extinct Animals and Plants in North America*, CURRENT RESULTS, <http://www.currentresults.com/Endangered-Animals/North-America/recently-extinct-animals.php> (last visited Dec. 27, 2010).

317. See Rebecca Cairns-Wicks (Assessor), *The IUCN Red List of Threatened Species: Nesiota elliptica*, INT'L UNION FOR THE CONSERVATION OF NATURE & NATURAL RES. (2004), <http://www.iucnredlist.org/apps/redlist/details/37598/0>; see also Peter Maas, *Don't Forget the Plants*, THE SIXTH EXTINCTION, <http://extinctanimals.petermaas.nl/> (last visited Dec. 27, 2010).

318. BIODIVERSITY SYNTHESIS, *supra* note 274, at 47 fig.3.7 (reflecting data on 555 terrestrial, 323 freshwater, and 267 marine species).

319. *The IUCN Red List of Threatened Species, Summary Statistics*, INT'L UNION FOR THE CONSERVATION OF NATURE AND NATURAL RES., http://www.iucnredlist.org/documents/summarystatistics/2011_1_RL_Stats_Table_1.pdf (last visited Apr. 17, 2011) (defining “threatened” species as critically endangered, endangered, or vulnerable).

320. DIAMOND, *supra* note 24, at 488–89.

321. Stone 1985, *supra* note 52, at 13 (referring to the ten to twenty percent extinction rate estimated at the end of the twentieth century).

322. See *Ten to Watch in 2010*, WORLD WILDLIFE FED'N (Dec. 29, 2009), http://www.wwf.org.uk/wwf_articles.cfm?unewsid=3618.

ity.³²³ To consider each of the moral questions, the Article will first examine “the good,” which can be expressed in terms of reprimanded utilitarianism—“*the greatest good of the greatest number for the greatest length of time.*”³²⁴ The good, or the *summum bonum* (the maximum good that is an end in itself), cannot be identified solely with human welfare.³²⁵

Environmental destruction has been created, although unintentionally, by persons with good intentions.³²⁶ Unfortunately, we have been animated by an inadequate conception of the good.³²⁷ Human well-being has been the predominant concern, secured by control over nature.³²⁸ The underlying philosophy has been humanity versus nature, a battle “won” through technology: “[T]he greater the human intrusion into nature, the greater the so-called progress and the greater the imagined ‘improvement’ of human well-being.”³²⁹

This generation’s understanding of the good must be revised to include all species and ecosystems and should not be limited to the short-term benefit of one species.³³⁰ Moreover, as an embodiment of justice, the good must encompass the spatial and temporal dimensions of the entire planet.³³¹ Justice is best characterized in terms of the good of present and future generations of the Earth community.

The second moral question asks what is fitting for the community.³³² The community at stake is not simply humankind, but the interconnected Earth community.³³³ At bottom, the issue of what is appropriate for a community is a question of relationship.³³⁴ Humanity is not only embedded in a nest of relationships with other species

323. Koons, *Moral Value*, *supra* note 12, at 265 (explaining the moral framework of Potter’s Boxes).

324. *Id.* at 278, 281–82.

325. *Id.* at 279.

326. BERRY, EVENING, *supra* note 46, at 92–93.

327. See Alasdair MacIntyre, *Theories of Natural Law in the Culture of Advanced Modernity*, in COMMON TRUTHS: NEW PERSPECTIVES ON NATURAL LAW 91, 109 (Edward B. McLean ed., 2000); see also BERRY, EVENING, *supra* note 46, at 92–93 (“The assault on the planet is being brought about by persons whose intentions are seemingly good, but whose concept of what is good is inadequate.”).

328. BERRY, EVENING, *supra* note 46, at 92–93.

329. *Id.*

330. Koons, *Moral Value*, *supra* note 12, at 280–84.

331. WESTON & BACH, *supra* note 232, at 15.

332. Koons, *Moral Value*, *supra* note 12, at 286.

333. See Taylor 2007, *supra* note 252, at 203 (discussing “the environment as a stakeholder” in an ethic for corporate management).

334. E.g., Koons, *Moral Value*, *supra* note 12, at 265.

and Earth systems; we are also genetically related to all other life forms.³³⁵

The first flaring of the Universe brought forth all of the elements that we find on Earth.³³⁶ Evolutionary biologist Elisabet Sahtouris explained: “Everything of Earth’s surface—oceans and rivers, mountains and fertile fields, forests and flowers, creatures that float or fly or crawl or climb, everything, including ourselves, is actually made from the same original but recycled supplies.”³³⁷

Not only are we elementally related to other species, we recycle the same atoms: “Western physicists confirm that the same atoms and sub-atomic particles may be part of the soil on Monday, a plant on Tuesday and us on Wednesday.”³³⁸ Those elements and atoms are also related to each other by a “dance of interactions.”³³⁹ Quantum physicists and evolution biologists call this the principle of nonlocal causality in which “every atom in the universe is in contact with and influencing every other atom in the universe.”³⁴⁰ With relationships in this planetary community of shared time, space, genes, elements, atoms, and interactions, humanity simply does not stand alone.

The third moral question of what is right includes how humanity should live and conduct its activities. “How ought we to live” is the enduring ethical question examined by philosophers.³⁴¹ This Article proposes that humanity cannot live by laws that create only equity for itself.³⁴²

From the perspective of Kantian deontology, the key ethical focus is on human obligations—which is wider in scope than any theory of rights.³⁴³ Intergenerational justice squarely rests on the responsibili-

335. BERRY, *GREAT WORK*, *supra* note 16, at 83.

336. See SAHTOURIS, *supra* note 44, at 26–29 (excepting “the small input of meteors”).

337. *Id.* at 29.

338. CULLINAN, *supra* note 16, at 146.

339. SAHTOURIS, *supra* note 44, at 22.

340. BERRY, *EVENING*, *supra* note 46, at 85; see also FRITJOF CAPRA, *THE TAO OF PHYSICS* 310, 313 (4th ed. 2000) (discussing the findings of quantum physicists that particles in experiments not only are part of an interconnected system, but also have “instantaneous connections to the universe as a whole.”).

341. See generally Ralph B. Potter, *Qualms of a Believer*, 69 *SOUNDINGS* 111 (1986) [hereinafter Potter 1986].

342. Cf. Hillel the Elder, *Pirkei Avot* 1:14 (“If I am not for myself, who will be for me? If I am only for myself, what am I? And if not now, when?”).

343. Onora O’Neill, *Commentary on Kant’s Theory: A Simplified Account of Kant’s Ethics*, as reprinted in MORTIMER D. SCHWARTZ ET AL., *PROBLEMS IN LEGAL ETHICS* 24 (7th ed. 2005) (characterizing Kantian theory as one of “human obligations; therefore it is wider in scope than a theory of human rights”).

ties of this generation to future generations.³⁴⁴ In the Declaration on the Responsibilities of the Present Generations Towards Future Generations, the UNESCO proclaimed:

The present generations have the responsibility to bequeath to future generations an Earth which will not one day be irreversibly damaged by human activity. Each generation inheriting the Earth temporarily should take care to use natural resources reasonably and ensure that life is not prejudiced by harmful modifications of the ecosystems and that scientific and technological progress in all fields does not harm life on Earth.³⁴⁵

Those responsibilities can be understood as an intergenerational trust, with humanity acting as trustee of Earth, its species and biosystems, present and future.³⁴⁶

The fourth moral question asks what is true and includes an inquiry into the meaning and purpose of life, from both religious and secular perspectives.³⁴⁷ The “oldest defense” of the moral standing of other-than-humans argues that God created nature; thus, it is God’s will that nature flourishes.³⁴⁸ In a 1923 essay, Aldo Leopold addressed scientists and theologians with this statement:

It just occurs to me, however, in answer to the scientists, that God started his show a good many million years before he had any men for audience . . . and in answer to both, that it is just barely possible that God himself likes to hear birds sing and see flowers grow.³⁴⁹

Humanity considers truth claims by virtue of our normative self-reflective consciousness.³⁵⁰ The consciousness of human beings has served as one of the primary philosophical justifications for viewing humans as separate from the rest of nature.³⁵¹ However, human consciousness is better understood as emerging out of the universe.³⁵²

344. Brown Weiss, *Obligation*, *supra* note 13, at 202–204 (discussing rights and obligations).

345. UNESCO Declaration, *supra* note 236.

346. See Turnipseed, *supra* note 162, at 17–18. Trust law mandates that trustees manage the trust in a sustainable way, to safeguard the needs of present beneficiaries as well as those of future generations. *Id.*

347. See Potter 1986, *supra* note 341, at 122–23 (discussing the biblical tradition as one of the major moral languages).

348. NASH, *supra* note 52, at 67 (noting the “oldest defense” of the rights of other-than-humans: nature is God’s creation and God wants to nature to flourish).

349. ALDO LEOPOLD, *Some Fundamentals of Conservation in the Southwest*, in *THE RIVER OF THE MOTHER OF GOD AND OTHER ESSAYS BY ALDO LEOPOLD* 86, 96 (Susan L. Flader & J. Baird Callicott eds., 1991) (1923).

350. Koons, *Moral Value*, *supra* note 12, at 293, 302.

351. See NASH, *supra* note 52, at 134, 149, 157 (referring to philosophers P.S. Elder and William K. Frankena).

352. THOMAS BERRY, *THE DREAM OF THE EARTH* 16, 131 (1988) (quoting Brian Swimme: “The universe shivers with wonder in the depths of the human.”).

Our consciousness is an evolutionary gift, through which we are the eyes and conscious mind of the universe, able to reflect on itself, in celebration.³⁵³ Instead of the basis for separation from nature, our consciousness impels us to understand that human presence on Earth must be mutually beneficial, not pervasively destructive.³⁵⁴ According to Thomas Berry and Brian Swimme: “We have a common destiny. Not simply a common human destiny, but a common destiny for *all* the components of the planetary community.”³⁵⁵ Consequently, a deeply grounded moral sensibility requires humanity to preserve Earth not only for humankind, but also for the intrinsic value of Earth.³⁵⁶

Beyond the moral imperatives, the final reason for broadening the reach of intergenerational equity is to recognize the connections between social and environmental justice.³⁵⁷ Just as racial justice is not possible without gender justice, environmental justice cannot be actualized without social justice.³⁵⁸ All forms of justice are interdependent.³⁵⁹

The Preamble to the Earth Charter advises: “Our environmental, economic, political, social, and spiritual challenges are interconnected, and together we can forge inclusive solutions.”³⁶⁰ Consider, the major *environmental* “trouble spots” of the world—Afghanistan, Bangladesh, Burundi, Haiti, Indonesia, Iraq, Madagascar, Mongolia, Nepal, Pakistan, the Philippines, Rwanda, the Solomon Islands, and Somalia—sites of deforestation, overpopulation, pollution, and other forms of environmental stress.³⁶¹ These countries also suffer from *political* turmoil.³⁶² Regions that are environmentally stressed are also at great risk of becoming politically stressed, marked by civil wars, geno-

353. *Id.* at 132; BERRY, EVENING, *supra* note 46, at 71.

354. *See* SWIMME & BERRY, *supra* note 15, at 250.

355. *Id.* at 251.

356. Koons, *Moral Value*, *supra* note 12, *passim*.

357. Taylor 2007, *supra* note 252, at 197.

358. Earth Charter Comm’n, *The Earth Charter*, at pmb., pt.III.12.a (2000), *reprinted in* FERRERO & HOLLAND, *supra* note 59, at 170, 177 [hereinafter *Earth Charter*] (affirming that “environmental, economic, political, social, and spiritual challenges are interconnected” and articulating the principle to “[e]liminate discrimination in all its forms”).

359. *See* Judith E. Koons, *Making Peace with Difference: A Hermeneutic of Inclusive Conversation*, 12 TEX. J. WOMEN & L. 1, 7, 29 (2001) [hereinafter Koons, *Difference*] (noting interconnections between race, gender, class, and culture).

360. *Earth Charter*, *supra* note 358, at pmb., *reprinted in* FERRERO & HOLLAND, *supra* note 59, at 170; *see also* FERRERO & HOLLAND, *supra* note 59 *passim* (discussing the origin, purpose, and development of *The Earth Charter*).

361. DIAMOND, *supra* note 24, at 515.

362. *Id.* at 497, 516.

cide, overwhelming poverty, and the collapse of central governments.³⁶³ In the 1970s, the wisdom of feminism was reflected in the phrase, “the personal is political.”³⁶⁴ Today, it may be said that “the environmental is political.”

Economic development has propelled not only environmental degradation in the world, but also increasing rates of poverty in the Third World.³⁶⁵ Environmental costs are externalized by extracting companies.³⁶⁶ Toxic residue is an “irrelevant externality” and nature is a “sink assumed to have the infinite capacity to absorb and renew any of the refuse of our industrial development.”³⁶⁷ Modern business corporations—artificial persons with legal rights, limited liability, no accountability to local communities, and driven by economic profit—have gained global dominance for the sole, and short-term, benefit of elite shareholders.³⁶⁸ The hierarchical social organization of corporations has set up and legitimized enormous economic disparities, contrary to ideals of mutuality and equality.³⁶⁹ Multinational corporations have captured the environmental riches of developing nations as resource material to be prospected for new products, without regard to social and environmental consequences.³⁷⁰

The interplay between the developed nations of the First World and the developing nations of the Third World demonstrates the calamitous course that humanity has charted for itself.³⁷¹ Citizens of the First World consume thirty-two times more in fossil fuels and other Earth resources.³⁷² In addition, we are responsible for thirty-two times more waste than citizens of the Third World.³⁷³ The First World exports millions of tons of used electronic gadgets and garbage to na-

363. *Id.* at 516.

364. Koons, *Difference*, *supra* note 359, at 56.

365. Taylor 2007, *supra* note 252, at 197.

366. *E.g.*, BERRY, EVENING, *supra* note 46, at 94.

367. *Id.*; *see also Earth Charter*, *supra* note 358, at pt.II.7.d, *reprinted in* FERRERO & HOLLAND, *supra* note 59, at 174 (denoting the principle of internalizing “the full environmental and social costs of goods and services in the selling price”).

368. BERRY, GREAT WORK, *supra* note 16, at 138–46 (critiquing the predatory role of corporations in the global economy); Taylor 2007, *supra* note 252, at 204 (referring to the work of Ron Engel).

369. Taylor 2007, *supra* note 252, at 204 (quoting article by Ron Engel).

370. *See* Jim Chen, *Biodiversity and Biotechnology: A Misunderstood Relation*, 2005 MICH. ST. L. REV. 51, 54–55 (2005) (noting the accusation of developing countries that northern countries are engaging in “biopiracy”); *see also* Koons, *Moral Value*, *supra* note 12, at 319–25 (discussing conflicts in the worldwide “seed - gene war”).

371. DIAMOND, *supra* note 24, at 495–98.

372. *Id.* at 495.

373. *Id.*

tions such as China.³⁷⁴ Toxic chemicals from the industrialized world have contaminated remote regions of the world: levels of polychlorinated biophenyls (“PCB’s”) in the breast milk of Inuit mothers, “fall in a range high enough to classify the milk as ‘hazardous waste.’”³⁷⁵

At the same time that people of the industrial nations are excessively consuming, many people in the developing world are suffering from poverty.³⁷⁶ Furthermore, many citizens in developing countries aspire to these standards of living.³⁷⁷ Should citizens of the Third World adopt consumption patterns of the First World, the human impact on the globe would reach twelve times our current impact.³⁷⁸ At our present pace, the trajectory for global warming would disrupt the geobiology of the world.³⁷⁹ At an exponentially higher population rate, a more terrifying prospect for the planet comes into focus.³⁸⁰

Consequently, one of the dilemmas faced by humankind is to encourage higher standards of living for all people while preserving the life systems of Earth.³⁸¹ Principle Five of the Earth Charter directs us to “[p]rotect and restore the integrity of Earth’s ecological systems, with special concern for biological diversity and the natural processes that sustain life.”³⁸² Principle Nine of the Earth Charter commands that we “[e]radicate poverty as an ethical, social, and environmental imperative.”³⁸³ Principle Ten requires that we “[e]nsure that economic activities and institutions at all levels promote human development in an equitable and sustainable manner.”³⁸⁴

Holding together the principles of the Earth Charter points the way to equity for future generations of species and biosystems. The path to *intergenerational justice* begins with *intragenerational justice* for all people, present species, and present life systems.³⁸⁵ As trustee of the

374. *Id.* at 517; *see also* JOHN NAISH, ENOUGH: BREAKING FREE FROM THE WORLD OF MORE 97 (2008) (discussing epidemic of acquisition in developed countries that are shipping rubbish to developing countries).

375. DIAMOND, *supra* note 24, at 518 (explaining the level of poisonous chemicals in the Inuit diet of whales, seals, seabirds in which chemicals have become concentrated).

376. *E.g.*, FERRERO & HOLLAND, *supra* note 59, at 102–07.

377. DIAMOND, *supra* note 24, at 495.

378. *Id.*

379. Stern, *supra* note 204, at iv.

380. DIAMOND, *supra* note 24, at 494–96.

381. *Id.* at 496.

382. *Earth Charter*, *supra* note 358, at pt.II.5, *reprinted in* FERRERO & HOLLAND, *supra* note 59, at 173.

383. *Id.* at 175.

384. *Id.* at 176.

385. BROWN WEISS, IN FAIRNESS, *supra* note 227, at 97; Westra, *supra* note 252, at 62.

Earth community, humankind must conduct its activities justly and sustainably for people and the planet.³⁸⁶ Consequently, justice for remote species and biosystems begins with environmental and social justice today.

Conclusion

But even as we make our transition into this new century we must note that moments of grace are transient moments. The transformation must take place within a brief period. Otherwise it is gone forever. In the immense story of the universe, that so many of these dangerous moments have been navigated successfully is some indication that the universe is for us rather than against us.³⁸⁷

The great work of our generation is to make the transition to Earth-centered ways of living, and the critical issue that we face in making that transition is our dependence on petroleum.³⁸⁸ In turning from fossil fuels to renewable energy sources, our generation and the next have the opportunity to awaken to an Earth consciousness that will pull the world back from a barren, tragic future.³⁸⁹

The systems of law, economics, and politics that created the Deepwater Horizon catastrophe must be reshaped into systems that build up people and recognize our ontological connection and indebtedness to Earth ecosystems and other-than-human species.³⁹⁰ While it is too late for the villagers in Kivalina and for the species that have become extinct, the Earth is not yet against us.

Imbued with moral responsibility and empowered with legal, economic, and political tools, humankind must step into our role as trustee of Earth, for present and future generations of people, other-than-human species, and life systems. The Earth Charter proposes: "Let ours be a time remembered for the awakening of a new reverence for life, the firm resolve to achieve sustainability, the quickening of the struggle for justice and peace, and the joyful celebration of life."³⁹¹

386. DIAMOND, *supra* note 24, at 524 (questioning how much of our consumer values and First World standard of living we can afford to retain); GLICKSMAN, *supra* note 58, at 151, 190; TAYLOR 2007, *supra* note 252, at 199 (identifying propositions for changes in current economic activities to support social, economic, and environmental justice).

387. BERRY, GREAT WORK, *supra* note 16, at 201.

388. *Id.* at 1-11, 156; BERRY, EVENING, *supra* note 46, at 90.

389. HEINBERG, *supra* note 26, at 31-55, 61-62 (assessing eighteen energy sources and discussing transition plans away from fossil fuels); MCKIBBEN, *supra* note 206, at 2-20.

390. See CULLINAN, *supra* note 16, at 30 (emphasizing the lesson from Thomas Berry of the necessity to reconceptualize our idea of law to Earth-centeredness).

391. *Earth Charter*, *supra* note 358, at "The Way Forward," reprinted in FERRERO & HOLLAND, *supra* note 59, at 181.