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ARTICLES

**Earth Jurisprudence: The Moral Value  
of Nature**

JUDITH E. KOONS\*

*There are times in our lives, particularly as we grow older,  
when the long arm of the horizon becomes our teacher.<sup>1</sup>*

**I. INTRODUCTION**

Earth Jurisprudence is an emerging field of law that calls us to pause as we enter the twenty-first century to consider the ground under our feet and the teachings bearing down on us from the horizon.<sup>2</sup> As planetary environmental crises advance toward

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\* Associate Professor of Law, Barry University School of Law, Orlando, Florida. B.A., J.D., University of Florida, M.T.S., Harvard Divinity School. Copyright, Judith E. Koons, 2007. I offer my gratitude to Thomas Berry for his long life of soulful work and natural wisdom; to Sr. Pat Siemen, O.P., J.D., for her devotion to the call to "wear out rather than rust out"; to Julie Perry for her passionate and talented research assistance; to Pat Tolan and Eric Hull for their helpful comments; to the many earnest thinkers whose work graces this article; and to Earth for continuing to count us among her own. I serve as chair of the governing committee of the Center for Earth Jurisprudence, founded in 2006 as a collaborative initiative of St. Thomas and Barry Universities. However, all views, interpretations, and errors are my own.

1. CAROLYN MCDADE, *Horizons (Musicians Playing Land)*, on O BEAUTIFUL GAIA: LOVE SONGS TO EARTH (Carolyn McDade 2003) (quote from booklet accompanying compact disc, containing composer McDade's comments on instrumental piece entitled "Horizon (Musicians Play Land)").

2. Earth Jurisprudence is a new field of law that, recognizing and respecting the rights of nature and the health of the Earth community as a whole, "invites a fundamental rethinking of the basis of law." See Center for Earth Jurisprudence, <http://>

us like an enormous oil spill, the call of Earth Jurisprudence becomes louder, suggesting with more emphasis that a shift is necessary in the way that we think about law, governance, and nature.<sup>3</sup>

A predicate to rethinking the law is to re-value nature by re-considering its moral status.<sup>4</sup> The philosophical heritage of the West places nature outside of the moral community.<sup>5</sup> With human beings panoptically centered in the law, nature is viewed as a collection of objects that are to be used as property owners see fit.<sup>6</sup> As a consequence, Earth has suffered degradation.<sup>7</sup> Also as a conse-

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www.earthjuris.org (last visited Oct. 16, 2007). The term "Earth Jurisprudence" arose out of a meeting sponsored by the Gaia Foundation with theologian Thomas Berry in April of 2001 at the Airlie Center in Virginia. See CORMAC CULLINAN, *WILD LAW: A MANIFESTO FOR EARTH JUSTICE* 17 (2003).

3. The 1989 spill by an Exxon tanker of 11 million gallons of oil in Prince William Sound, Alaska, was one of the worst ecological disasters in North American history. See Henry Fountain, *Oil's Lasting Presence*, N.Y. TIMES, Feb. 6, 2007, at F3; see also Tamara Jones, *Alaska Tanker Piloted by Unqualified Officer*, LOS ANGELES TIMES, Mar. 27, 1989, at 1 (identifying the worst oil spills in the world, topped by the 183.9 million gallon Ixtoc oil well blowout in the Gulf of Mexico in 1979).

4. Widely held beliefs and values often shape law and policy. See, e.g., V.F. Nourse, *Self-Defense and Subjectivity*, 68 U. CHI. L. REV. 1235, 1283, 1287 (2001) (demonstrating how law absorbs social meaning); see also H.L.A. HART, *THE CONCEPT OF LAW* 163-76 (1961) (discussing cardinal features of moral principles which distinguish them from legal rules); cf. Richard R. Niebuhr, *The Creation of Belief*, 40 CROSS CURRENTS: RELIGION AND INTELLECTUAL LIFE 207, 209 (1990) ("What you come to believe, what you come to love, will lead you into the future; and by those beliefs and loves you will build the future. The future does not wait for you. You are bringing it into being.").

5. Francis Bacon, *The Masculine Birth of Time*, in *THE PHILOSOPHY OF FRANCIS BACON* 62 (B. Farrington trans., Liverpool University Press 1964) (1653) (relaying the narrator's offer to bind Nature "to your service and make her your slave"); RODERICK FRAZIER NASH, *THE RIGHTS OF NATURE: A HISTORY OF ENVIRONMENTAL ETHICS* 17 (1989) (discussing the views of Hugo Grotius and Samuel Pufendorf that the relationship of human beings to nature "was not a subject for ethical concern"); CULLINAN, *supra* note 2 at 44-46 (attributing the development of the separation of humanity from nature, as well as the mechanization of nature in Western culture, to such scientists and philosophers as Galileo, Bacon, Decartes, and Newton).

6. "The difficulty is that with the rise of the modern sciences we began to think of the universe as a collection of objects rather than as a communion of subjects." THOMAS BERRY, *THE GREAT WORK* 16 (1999) [hereinafter BERRY, *GREAT WORK*]; see also ERIC T. FREYFOGLE, *BOUNDED PEOPLE, BOUNDLESS LANDS* 102 (1998) (discussing four interpretations of private property rights, including the traditional view, in which an owner "who wants to ruin the soil, strip the trees, or destroy wildlife habitat is free to do so, so long as the harmful effects of such conduct don't traverse the all-important boundary"). In the late 1700s, Jeremy Bentham designed a panopticon "inspection-house" for prisons, "mad-houses," factories, and hospitals that allowed a centrally located observer to see all occupants without their being able to assess whether they were being observed. Jeremy Bentham, *Panopticon*, in *THE PANOPTICON WRITINGS* 29 *passim* (Miran Bozovic ed., Verso 1995) (1787).

7. See, for example, *infra*, the discussion of global warming in II.B.

quence, some philosophers and scientists have called into question the continuation of the human species.<sup>8</sup>

This article posits that, to preserve a healthy planet for future generations of human beings—and for Earth itself—it is necessary to recognize Earth as the center of the moral community.<sup>9</sup> As an ethical endeavor, the article turns the question of the moral status of nature through the lens of four moral questions: what is good?; what is fitting?; what is true?; and what is right?<sup>10</sup>

The question of the “good” is a teleological inquiry, focusing on the *telos* or ends of an action.<sup>11</sup> Inquiring into what is “fitting” is to privilege relationships, loyalties, and what is appropriate for a particular community.<sup>12</sup> Plumbing questions of meaning, the question of the “true” asks what counts, what can be affirmed as knowledge, and what qualities and things warrant moral consideration.<sup>13</sup> Based in deontology, the question of the “right” focuses on duties and “just” action.<sup>14</sup>

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8. *E.g.*, JAMES LOVELOCK, *THE REVENGE OF GAIA: EARTH'S CLIMATE CRISIS AND THE FATE OF HUMANITY* xiv (2006); SALLIE MCFAGUE, *MODELS OF GOD: THEOLOGY FOR AN ECOLOGICAL, NUCLEAR AGE* 7 (1988).

9. BERRY, *GREAT WORK*, *supra* note 6, at 56 (“We need to move from our human-centered to an Earth-centered norm of reality and value.”); FREYFOGLE, *supra* note 6, at 31-32.

10. Questions of the good, fitting, true, and right represent central inquiries of different moral languages, or orientations toward the world. *See generally* Ralph B. Potter, *Qualms of a Believer*, 69 *SOUNDINGS* 111, 113-15 (1986) [hereinafter Potter 1986]. Ethicist Ralph B. Potter, Professor Emeritus at Harvard Divinity School, adapted the social systems theory of sociologist Talcott Parsons to develop a pluralist ethical framework of moral deliberation for public and interpersonal discourse. *Id.* at 112-13 (also discussing the depth of our moral pluralism and the interplay of the moral languages of utilitarian individualism, expressive individualism, the civic republican tradition, and the biblical tradition). Also known as “Potter’s Boxes,” the methodology seeks to ensure that different modes of moral discourse that focus on facts, loyalties, logic, and ultimate meaning are included in moral deliberation. Ralph B. Potter, *Justice and Beyond in Moral Education*, 19 *ANDOVER NEWTON Q.* 145, 146-47 (1979) [hereinafter Potter 1979]; *see also* Judith E. Koons, *Making Peace With Difference: A Hermeneutic of Inclusive Conversation*, 12 *TEX. J. WOMEN & L.* 1 (2002) [hereinafter Koons, *Making Peace*] (extending Potter’s insights to a jurisprudential inquiry into the “problem” and “potentiality” of difference); Judith E. Koons, *Gunsmoke and Legal Mirrors: Women Surviving Intimate Battery and Deadly Legal Doctrines*, 14 *J.L. & POL’Y* 617 (2006) [hereinafter Koons, *Gunsmoke*] (using Potter’s Boxes to critique gender contradictions in criminal justice doctrines).

11. *E.g.*, ISAAK I. DORE, *THE EPISTEMOLOGICAL FOUNDATIONS OF LAW* 207 (2007).

12. Koons, *Gunsmoke*, *supra* note 10, at 646, 648 n.103.

13. *Id.* at 648, n.103; *see also* IRIS MARION YOUNG, *INCLUSION AND DEMOCRACY* (2000) [hereinafter YOUNG, *INCLUSION*] (conceiving of justice based on inclusion and a relational model of self).

14. *E.g.*, DEBORAH L. RHODE, *PROFESSIONAL RESPONSIBILITY* 23-25 (1998).

This inquiry into the moral status of nature from the perspective of four moral languages makes several significant departures from contemporary legal and moral discourse. First, the prevailing understanding of moral reasoning is founded on a mistaken premise that one moral language must be found that adjudicates all questions of life.<sup>15</sup> Failing to find or apply this impossible standard, many people have fallen back on moral relativism, marked by short-term and shallow welfarist interests, with dire long-term effects on humanity and nature.<sup>16</sup> In contrast, one premise of this article is that the interplay of all moral languages is necessary for a full deliberation on contested moral questions.<sup>17</sup> The interchange among the languages leads to qualitatively better moral decisions which, by acknowledging the moral status of Earth, may also save humanity from itself.

Second, to squarely engage the question of the moral status of nature, the article bridges metaethics and normative ethics.<sup>18</sup> As a metaethical enterprise, the article will unfold a moral conversation which tests the premises and conditions of each of the four moral languages.<sup>19</sup> As a normative enterprise, the article will hatch a normative line of reasoning within each moral domain and

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15. *E.g.*, Potter 1986, *supra* note 10, at 117 (critiquing ROBERT N. BELLAH ET AL., *HABITS OF THE HEART* (1985) as posing civic republicanism as a moral first language).

16. PARKER J. PALMER, *LET YOUR LIFE SPEAK* 2-3 (2000) (observing that living by “highest truths and values” led to results that were “unreal, a distortion of my true self—as must be the case when one lives from the outside in, not the inside out”); ALBERT W. ALSCHULER, *LAW WITHOUT VALUES: THE LIFE, WORK, AND LEGACY OF JUSTICE HOLMES* 189-90 (2000) (citing the “central lyric of twentieth-century American jurisprudence”: “Ain’t no wrong, ain’t no right, only pleasure and pain” as shouted by rock singer Perry Farrell); Christopher D. Stone, *Should Trees Have Standing? Revisited: How Far Will Law and Morals Reach? A Pluralist Perspective*, 59 S. CAL. L. REV. 1, 145 (1985) [hereinafter Stone 1985] (distinguishing pluralism and “rank relativism”).

17. Potter 1979, *supra* note 10, at 147; Stone 1985, *supra* note 16, at 9 (contrasting Moral Monism and Moral Pluralism).

18. *See generally* SIMON BLACKBURN, *THE OXFORD DICTIONARY OF PHILOSOPHY* 239 (1994) (defining metaethics as the “second-order activity of investigating the concepts and methods of ethics, rather than directly engaging with practical ‘first-order’ issues of what to do and how to behave”).

19. Alyson C. Flournoy, *In Search of an Environmental Ethic*, 28 COLUM. J. ENVTL. L. 63, 76 n.38 (2003) (describing metaethics, or philosophical ethics, in part as “theory building”); *see also* David Copp, *Metaethics*, in *ENCYCLOPEDIA OF ETHICS* 1080 (Lawrence C. Becker & Charlotte B. Becker eds., 2d ed. 2001) (discussing the broadening of metaethical thought from its mid-century focus on “the analysis of moral language”).

will suggest bases for widening the moral circle to include nature.<sup>20</sup>

Third, in posing moral questions, the article asks how science informs or deforms the inquiry. Science has become increasingly important to legal and moral thought.<sup>21</sup> Western legal philosophy is linked to the scientific findings of sixteenth and seventeenth century Enlightenment thinkers.<sup>22</sup> However, climatologists and quantum physicists, among other postmodern scientists, are proffering challenges that completely undermine the premises of early modern legal and moral philosophy.<sup>23</sup> It is time for law and morality to “fast forward” into twenty-first century postmodernity. To begin the metaethical enterprise, the next section of the article inquires into the “good.”

## II. WHAT IS GOOD?: UTILITARIANISM FOR THE TWENTY-FIRST CENTURY

*Snows of a thousand winters  
Melt in the sun of one summer.*<sup>24</sup>

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20. See generally NASH, *supra* note 5, at 121-61 (reviewing varying perspectives on philosophical attempts to broaden the moral community to include nature); Christopher D. Stone, *Do Morals Matter? The Influence of Ethics on Courts and Congress in Shaping U.S. Environmental Policies*, 27 ENVIRONS ENVTL. L. & POL'Y 13, 50 (2003) [hereinafter Stone 2003] (observing that “the moral status of Nature, somehow conceived other than as a means to human welfare, remains problematic”).

21. FREYFOGLE, *supra* note 6, at 15, 35 (discussing importance of and limitations to science and technology).

22. CULLINAN, *supra* note 2, at 46 (noting that “we continue to govern ourselves on the basis of a discredited 17th century understanding of how the universe functions”). With the Enlightenment came the dawning of modernity, that marked change in European thought dating from the mid-sixteenth century which rejected the dogma and substantive rationality of religious and metaphysical world-views. ELISABETH SCHÜSSLER FIORENZA, RHETORIC AND ETHIC 35 n.18 (1999) (defining modernity in terms of procedural rationality that gave credence to objective knowledge, moral practical insight, and aesthetic judgment).

23. SCHÜSSLER FIORENZA, *supra* note 22, at 35 (1999) (defining postmodernity as critical thought based on its modern predecessor, but posing three correctives—esthetic (valuing experiential concreteness and intuitive imagination over rationalist abstraction), cultural (emphasizing cultural autonomy and the wisdom of particular communities over universalization), and political (orienting to power as the starting point, not reason)). For discussions of scientific findings that bear on the moral status of nature, see sections II.B., III.A., III.B., III.C., IV.B., IV.C., and V.B., *infra*.

24. Kenneth Rexroth, *The Wheel Revolves*, in THE NORTON ANTHOLOGY OF MODERN POETRY 714 (Richard Ellmann & Robert O'Clair eds., 2d ed. 1988).

Utilitarianism is the prototypical moral language that focuses on what is “good.”<sup>25</sup> A paradox marks postmodern moral discourse in that utilitarianism is much maligned as a moral language, especially in environmental matters.<sup>26</sup> At the same time, utilitarianism is the dominant moral framework in the West.<sup>27</sup> In this section of the article, I ask whether utilitarianism is capable of being reanimated to serve as a healthy participant in the moral conversation about humanity and nature. What shifts within utilitarian language are possible and necessary? How might they be prompted? I begin the inquiry with a brief history of the utilitarian idea.<sup>28</sup>

### A. Utilitarianism: A History of Ideas

In classical utilitarianism, the good is defined in terms of utility, or the “greatest happiness” principle, described in terms of seeking pleasure and avoiding pain.<sup>29</sup> To Jeremy Bentham, who popularized utilitarianism in the late 1700s, utility was assessed on a quantitative basis of the happiness of individuals who constitute a community.<sup>30</sup> Under Benthamite utilitarianism, there was

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25. *E.g.*, RHODE, *supra* note 14, at 20.

26. *E.g.*, Susan Emmenegger, *Taking Nature's Rights Seriously: The Long Way to Biocentrism in Environmental Law*, 6 GEO. INT'L ENVTL. L. REV. 545, 559 (1994) (proposing that “utilitarian rationales regularly arrive at the conscious subjugation of nature in the superficially calculated interest of humanity”); *see also* Alasdair MacIntyre, *Theories of Natural Law*, in COMMON TRUTHS: NEW PERSPECTIVES ON NATURAL LAW 91, 110-11 (Edward B. McLean ed., 2000) (arguing that the sovereignty of individual choice has arisen from a malfunctioning of human nature).

27. *E.g.*, ALSCHULER, *supra* note 16, at 2 (proposing that “utilitarian pragmatism remains the principal style of analysis in American law schools”); *see also* John G. Sprankling, *An Environmental Critique of Adverse Possession*, 79 CORNELL L. REV. 816, 868 (1994) (describing utilitarianism as the “dominant theory underpinning American property law”).

28. *See generally* Judith E. Koons, *Motherhood, Marriage, and Morality, The Pro-Marriage Moral Discourse of American Welfare Policy*, 19 WIS. WOMEN'S L.J. 1 (2004) [hereinafter Koons, *Motherhood*] (inspecting welfare from a critical genealogical or history of ideas approach); *see also* FRIEDRICH NIETZSCHE, ON THE GENEALOGY OF MORALS: A POLEMIC 16 (Walter Kaufmann & R. J. Hollingdale trans., Vintage Books ed. 1989) (1887) (developing a critical genealogical approach to question “where our good and evil really originated”) (emphasis in original); CORNEL WEST, PROPHECY DELIVERANCE 48 (1982) (seeking, in a non-reductive historiography, the “moment of arising of the idea of white supremacy within the modern discourse in the West”).

29. Jeremy Bentham, *An Introduction to the Principles of Morals and Legislation* (1789), *reprinted in* ETHICAL THEORIES 367, 368 n.2, 376 n.7 (A. I. Melden ed., 1967) (1789) [hereinafter MELDEN]; *see also* DORE, *supra* note 11, at 388.

30. Bentham, *reprinted in* MELDEN, *supra* note 29, at 381 (“Sum up the numbers expressive of the degrees of good tendency . . . do this again with respect to each individual, in regard to whom the tendency of it is *bad* upon the whole. Take the balance. . .”).

no such thing as a motive that was bad in itself.<sup>31</sup> Consequently, an action motivated by ill-will on the part of a person could produce pleasure and, although it was “wretched pleasure,” it was still a good.<sup>32</sup>

Six decades after Bentham, John Stuart Mill extended utilitarianism in several notable ways.<sup>33</sup> Mill added a qualitative assessment of happiness and clarified that the happiness that informed the standard of utilitarianism was “not the agent’s own happiness, but that of all concerned.”<sup>34</sup> Mill punctuated that clarification by referring to the Golden Rule as the “ideal perfection of utilitarian morality.”<sup>35</sup> In fact, to Mill, utilitarian ethical education and moral persuasion should establish in the mind of every person “an indissoluble association” between individual happiness and the common good.<sup>36</sup>

By opposing cruelty to animals, both philosophers permitted the extension of the greatest happiness principle to nature.<sup>37</sup> Refusing to draw an ethical line between people and other-than-human animals and resting his opposition squarely on the pleasure-pain principle, Bentham asserted, “The question is not, Can they *reason*? nor Can they *talk*?, but Can they *suffer*?”<sup>38</sup> Yet, there was an ethical hierarchy in Bentham’s thought. Animals that were useful to people, such as horses, were ethically inferior to slaves but superior to other animal life forms.<sup>39</sup> However, Bentham also predicted that the time would come when the mantle of legal protection and moral status would be extended “over every thing which breathes.”<sup>40</sup>

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31. *Id.* at 388.

32. “Let a man’s motive be ill-will, call it even malice, envy, cruelty; it is still a kind of pleasure. . . . Now even this wretched pleasure, taken by itself, is good: it may be faint, it may be short: it must at any rate be impure: yet while it lasts, and before any bad consequences arrive, it is as good as any other that is not more intense.” *Id.* at 388 n.16, 385-86 (measuring, too, the value of pain or pleasure by intensity, duration, certainty or uncertainty, propinquity or remoteness, fecundity, purity, and extent).

33. John Stuart Mill, *Utilitarianism* (1863), reprinted in MELDEN, *supra* note 29, at 391 (1863).

34. *Id.* at 402.

35. *Id.*

36. *Id.*

37. NASH, *supra* note 5, at 23.

38. *Id.* (citing Jeremy Bentham, *An Introduction to the Principles of Morals and Legislation* 311 n.1 (Laurence J. LaFleur ed., 1948) (1789)).

39. *Id.*

40. *Id.* (citing Jeremy Bentham, *Principles of Penal Law*, in 1 THE WORKS OF JEREMY BENTHAM 562 (John Bowring ed., 1843)).



Mill's ethical umbrella also opened wide. Happiness to Mill was to be secured for all of humanity and "to the whole sentient creation."<sup>41</sup> In Mill's view, there were only two distinctions between human beings and other animals—an extended range of sympathy and a more developed intelligence.<sup>42</sup>

Present-day utilitarianism is a shadow of the fairly robust and expansive ethical thought of Bentham and Mills. From the perspective of a history of ideas, three streams of thought in the United States have flattened classical utilitarianism to individual consequentialism.<sup>43</sup> First, some argue that the rise of American liberalism, with its emphasis on individual autonomy, has elided the common good from ethical thought.<sup>44</sup> Second, others assert that the rise of the market economy has resulted in the marriage of law and economics, rather than law and ethics.<sup>45</sup> Third, still others contend that the convergence of pragmatism and moral skepticism in the wake of the Civil War and their instantiation in the legal realist movement of the twentieth century has cut a broad swath through all moral claims.<sup>46</sup>

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41. Bentham, *reprinted in* MELDEN, *supra* note 29, at 399 (providing "so long as the nature of things admits").

42. *Id.* at 425.

43. See, e.g., Jules L. Coleman, *Efficiency, Utility, and Wealth Maximization*, 8 HOFSTRA L. REV. 509, 511 (1980) (acknowledging utilitarianism as a consequentialist moral theory); Bryan Norton, *Which Morals Matter? Freeing Moral Reasoning from Ideology*, 37 U.C. DAVIS L. REV. 81, 83 (2003) [hereinafter Norton, *Which Morals*] (criticizing Gifford Pinchot's conservation ethic as a "grossly simplified, materialistic and economic conception of utilitarianism" and Pinchot's present-day progeny as "doctrinaire, economic utilitarians . . . who pay obeisance only to 'free markets' and treat the environment as a set of commodities to be distributed to the highest private bidder"); see also Koons, *Motherhood*, *supra* note 28, *passim* (utilizing a feminist history of ideas to inspect the genealogy of four sets of values in the moral discourse of contemporary welfare policy).

44. FREYFOGLE, *supra* note 6, at 59 ("Perhaps no obstacles to the cooperative promotion of land health loom larger than the tradition of liberal individualism and the institution of the free-market economy.").

45. *Id.*; see also Morton Horwitz, *The Rise of Legal Formalism*, 19 AM. J. LEG. HIST. 251 (1975), as *reprinted in* STEPHEN B. PRESSER & JAMIL S. ZAINALDIN, *LAW AND JURISPRUDENCE IN AMERICAN HISTORY* 354-57 (2000) (arguing that, after the American Revolution, the legal system underwent a transformation that was nearly complete by 1850: "Anti-commercial legal doctrines had been destroyed or undermined and the legal system had almost completely shed its eighteenth century commitment to regulating the substantive fairness of economic exchange.").

46. See, e.g., ALSCHULER, *supra* note 16, at 1 (presenting a critical view of the pragmatism and moral skepticism of Oliver Wendell Holmes "who, more than any other individual, shaped the law of the twentieth century").

By the 1860s, Henry David Thoreau stood alone in his environmental ethic.<sup>47</sup> In the early twentieth century, the conservation movement in America was marked by the pairing of utilitarianism with anthropocentrism, leaving as the rationale for the preservation of nature that “people took better care of the environment so that the environment would take better care of them.”<sup>48</sup> Even with the rise of the environmental movement in the 1970s, the ensuing legislation was exhortative of nature’s interests but protective of and centered on human interests in nature.<sup>49</sup> By the late twentieth century, human self-interest, expressed in short-term instrumental consequentialism, resulted in the degradation of nature to an extreme that even environmentally conscious eco-tourists were destroying the very nature that they visited.<sup>50</sup> From the promise of the greatest happiness for the greatest number, including creation, some propose that we have lost the way.<sup>51</sup> The next section of the article asks whether science can help redefine a better ethical way.

## B. Informing the “Good” by Science

Scientific evidence has been mounting that greenhouse gas emissions are causing global warming, with attendant climate changes.<sup>52</sup> Noting that the rise in global temperatures is “well-

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47. NASH, *supra* note 5, at 37 (“in the middle of the nineteenth century, Thoreau was not only unprecedented in these ideas, he was virtually alone in holding them”).

48. *Id.* at 149.

49. FREYFOGLE, *supra* note 6, at 43 (discussing Congressional pronouncements in the 1970s that took “a more holistic view of the land” but only “in precatory, introductory language, not in substantive legal provisions”).

50. Susan Krakoff, *Mountains Without Handrails. . . Wilderness Without Cellphones*, 27 HARV. ENVTL. L. REV. 417, 452 (2003) (relaying that sea-kayaking in Thailand’s limestone caves “has gone from eco-friendly to eco-threatening”).

51. ALSCHULER, *supra* note 16, at 187 (“We have walked Holmes’s path and have lost our way.”).

52. See IPCC, 2007: SUMMARY FOR POLICYMAKERS, in CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (S. Solomon et al. eds., Cambridge University Press 2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf> [hereinafter IPCC Working Group I]. With a stated role of assessing “the latest scientific, technical and socio-economic information produced worldwide relevant to the understanding of the scientific basis of risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation,” the IPCC was established by the World Meteorological Organization and the United Nations Environment Programme in 1988. Intergovernmental Panel on Climate Change, *About IPCC, Mandate and Membership of the IPCC*, <http://www.ipcc.ch/about/index.htm> (last visited May 25, 2008), (also noting three Working Groups and three prior assessment reports that were based on peer-reviewed and published scientific and technical literature).

documented,” the Supreme Court of the United States recently stated that “[r]espected scientists” believe that global warming is related to the increase in carbon dioxide in Earth’s atmosphere.<sup>53</sup> According to the Court, “when 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.’”<sup>54</sup>

Furthermore, wide agreement has formed among scientists that global warming is human-induced.<sup>55</sup> Based on 29,000 data sets, the Intergovernmental Panel on Climate Change (IPCC) observed significant changes in many biological systems due to anthropogenic global warming.<sup>56</sup> Changes include increased rock avalanches, greater run-off and earlier discharges in snow- and glacier-fed rivers, earlier onset of spring events such as leaves unfolding and birds migrating, and reductions in the abundance of fish in high-altitude oceans.<sup>57</sup>

Scientists estimate that, over the twentieth century, ninety percent of large fish disappeared from the oceans.<sup>58</sup> Meanwhile, a rise of ten to twenty centimeters in sea levels over the twentieth

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53. *Massachusetts v. EPA*, 127 S. Ct. 1438, 1446 (2007); *see also* IPCC Working Group I, *supra* note 52, at 5 (“Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.”).

54. *See Massachusetts v. EPA*, 127 S. Ct. at 1446.

55. IPCC Working Group I, *supra* note 52, at 2 (“Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 . . .”). However, some scientists contend that “[t]here is no proof that the current warming is caused by the rise of greenhouse gases from human activity.” *E.g.*, S. Fred Singer, *The Great Global Warming Swindle*, SAN. FRAN. EXAMINER, May 22, 2007, available at <http://www.independent.org/newsroom/article.asp?id=1945> (arguing that temperature increases have not resulted from increases in carbon dioxide and that current warming is likely due to a natural cycle); *see also* THE GREAT GLOBAL WARMING SWINDLE (Channel 4 (Britain) broadcast Mar. 8, 2007) (a documentary asserting that Earth’s climate is changing without help from humans, the science of global warming is uncertain, and that temperature increases lead carbon dioxide by 800 years), available at [http://www.channel4.com/science/microsites/G/great\\_global\\_warming\\_swindle](http://www.channel4.com/science/microsites/G/great_global_warming_swindle).

56. IPCC, 2007: SUMMARY FOR POLICYMAKERS, in CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY. CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (M.L. Parry et al. eds., Cambridge University Press 2007), available at <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf> [hereinafter IPCC Working Group II] (“Of the more than 29,000 observational data series, from 75 studies, that show significant change in many physical and biological systems, more than 89% are consistent with the direction of change expected as a response to warming . . .”).

57. *Id.* at 8.

58. Ransom A. Myers & Boris Worm, *Extinction, Survival or Recovery of Large Predatory Fishes*, 360 PHIL. TRANSACTIONS OF ROYAL SOC’Y B: BIOLOGICAL SCI. 13

century was noted by the Supreme Court, which cited as a consequence that “rising seas have already begun to swallow Massachusetts’ coastal land.”<sup>59</sup> Advising that carbon emissions quadrupled in the last half of the twentieth century, the United Nations Millennium Report noted that the costs of natural disasters in 1998 far exceeded the cost of such disasters in the 1980s: “Tens of thousands of mostly poor people were killed that year, and an estimated 25 million ‘environmental refugees’ were forced from their homes.”<sup>60</sup>

When the data is projected into the future, the anticipated impacts of global warming become arresting.<sup>61</sup> According to a utilitarian assessment of climate change by Sir Nicholas Stern for the British Treasury, the present level of greenhouse gases in the atmosphere is marked at 430 parts per million, compared with 280 parts per million prior to the Industrial Revolution.<sup>62</sup> As a conse-

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(Jan. 29, 2005), available at <http://www.pubmedcentral.nih.gov/picrender.fcgi?tool=pmcentrez&artid=1636106&blobtype=pdf>.

59. *Massachusetts v. EPA*, 127 S. Ct. at 1456. Climate change is forcing cartographers to redraw maps of the world: “The Aral Sea in Central Asia has shrunk by 75 feet since 1967 . . . Lake Chad in Africa has shrunk by 95 percent since 1963 . . . The Dead Sea is 82 feet (25 meters) lower than it was 50 years ago.” Andrea Thompson, *Climate Change Redraws World Maps* (Sept. 6, 2007), at <http://news.yahoo.com/s/livescience/20070906> (also noting the Inupiat village in Shishmaref, Alaska, where the sea is advancing at the rate of 10 feet per year, may become the first U.S. community forced to relocate due to global warming).

60. KOFI A. ANNAN, MILLENNIUM REPORT OF THE SECRETARY-GENERAL OF THE UNITED NATIONS, *Sustaining Our Future*, in “WE THE PEOPLES”: THE ROLE OF THE UNITED NATIONS IN THE 21ST CENTURY 57 (United Nations 2000), available at <http://www.un.org/millennium/sg/report/ch4.pdf> [hereinafter U.N. Millennium Report]; see also IPCC Working Group II, *supra* note 56, at 7, 9, 15 (associating the intensity of tropical cyclones (hurricanes and typhoons) with increased sea surface temperatures); Goddard Institute for Space Studies, *NASA Study Predicts More Severe Storms With Global Warming* (Aug. 30, 2007), <http://www.giss.nasa.gov/research/news/20070830> (predicting stronger and more severe storms and tornadoes). Some scientists propose that, to minimize damage from tsunamis and storms, “we need to focus not on reducing emissions but on reducing our vulnerability to disasters.” Daniel Sarewitz & Roger A. Pielke, Jr., *Rising Tide: The Tsunami’s Real Cause*, THE NEW REPUBLIC, Jan. 17, 2005, at 10, available at <http://www.cspo.org/ourlibrary/articles/RisingTide.htm> (arguing that the increase in disasters is not attributable to increases in the frequency or severity of earthquakes or storms, but to “an increase in vulnerability because of growing populations, expanding economies, rapid urbanization, and migrations to coasts and other exposed regions”).

61. THOMAS BERRY, EVENING THOUGHTS 17 (2006) [hereinafter BERRY, EVENING] (suggesting that we need “a certain alarm at what is happening at present and a fascination with the future available to us if only we respond creatively to the urgencies of the present”).

62. NICHOLAS STERN, *The Science of Climate Change*, in STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE, 3-4 (2006), available at [http://www.hm-treasury.gov.uk/media/5/9/Part\\_I\\_Introduction\\_group.pdf](http://www.hm-treasury.gov.uk/media/5/9/Part_I_Introduction_group.pdf) [hereinafter Stern Chapter 1] (estimating

quence of these concentrations, Earth has already warmed a half-degree Celsius and, based only on these concentrations, will warm another half-degree over the next few decades.<sup>63</sup> Without any increase in the current emission flow, the level of greenhouse gases in the atmosphere will reach 550 parts per million between 2035 and 2050.<sup>64</sup> At the present flow of emission, the resultant global temperature increase will reach between two and three degrees Celsius by mid-century.<sup>65</sup>

A temperature increase of two degrees Celsius will produce significant impacts, including the onset of an "irreversible melting of the Greenland ice sheet."<sup>66</sup> Melting glaciers will increase the risk of flooding and then will reduce water supplies, "threatening one-sixth of the world's population."<sup>67</sup> Two-thirds of the world's population will be water-stressed by 2025, triggering increased prevalence of disease.<sup>68</sup> Due to declining crop yields, hundreds of millions of people will also be at greater risk of hunger, particularly in Africa.<sup>69</sup> A five to ten percent increase in hurricane wind speed, prompted by an increase in sea temperatures, will double the annual damage costs of hurricanes in the United States.<sup>70</sup>

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the level of the six greenhouse gases (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) covered by the targets in the Kyoto Protocol to the United Nations Framework Convention on Climate Change, 37 I.L.M. 22 (1998), available at <http://unfccc.int/resource/docs/convkp/kpeng.pdf> [hereinafter Kyoto Protocol]). The IPCC estimated the concentration of carbon dioxide, alone, at 379 parts per million (ppm) in 2005, which "exceeds by far the natural range over the last 650,000 years (180 to 300 ppm) as determined from ice cores." IPCC Working Group I, *supra* note 52, at 2.

63. NICHOLAS STERN, *Executive Summary*, in STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE, iii-iv (2006), available at [http://www.hm-treasury.gov.uk/media/4/3/Executive\\_Summary.pdf](http://www.hm-treasury.gov.uk/media/4/3/Executive_Summary.pdf) [hereinafter Stern]. The IPCC projected increased warming at 0.3 degrees Celsius per decade. IPCC Working Group I, *supra* note 52, at 12.

64. Stern, *supra* note 63, at iii.

65. *Id.* at vi. An increase of three to four degrees would prompt increased flooding of many coastal areas. *Id.* at vi; see also IPCC Working Group II, *supra* note 56, at 13 (forecasting the loss of approximately thirty percent of global wetlands with a three-degree elevation in temperature). By the middle of the century, two hundred million people may become displaced on a permanent basis due to rising sea levels, flooding, and drought. Stern, *supra* note 63, at iv.

66. *Id.* at v; see also IPCC Working Group II, *supra* note 56, at 5-13 (projecting impacts of climate change by region for this century, including water stress, ecosystem disturbances, crop loss, coastal flooding, increased climate-related deaths, extensive species loss, and deforestation).

67. Stern, *supra* note 63, at vi.

68. U.N. Millennium Report, *supra* note 60, at 60.

69. Stern, *supra* note 63, at v-vi.

70. *Id.* at viii; see also IPCC Working Group II, *supra* note 56, at 11-13 (noting key impacts of increasing temperature, including coral bleaching, increased damage from floods and storms, increased malnutrition and infectious diseases, changed distribu-

At a warming level of two degrees Celsius, scientists forecast that fifteen to forty percent of species may become extinct.<sup>71</sup> The planet is entering what has been described as the largest mass extinction since the end of the age of the dinosaurs, sixty-five million years ago.<sup>72</sup> In 1992, Harvard biologist E.O. Wilson estimated the extinction rate at three species per hour, seventy per day, and twenty-seven thousand per year.<sup>73</sup> Today, an estimated 1093 mammals (twenty percent), 1206 species of birds (twelve percent), and 1811 species of amphibians (thirty-one percent) are regarded as threatened with extinction.<sup>74</sup> The "Red List of Threatened Species," published by the International Union for the Conservation of Nature and Natural Resources, identifies 16,118 species of plants and animals as facing a high risk of extinction.<sup>75</sup>

Among the current critically endangered species is the Catalina mountain mahogany, which is down to six adult trees in a gully on Santa Catalina Island in California.<sup>76</sup> For the Republic of Seychelles, sixty-one Magpie robins are left on two islands.<sup>77</sup> According to Wilson, four species of the honeycreeper, a distinctive Hawaiian bird which inhabited a forest on the island of Maui, are likely to have perished by now.<sup>78</sup>

However, if human civilization continues to follow a "business as usual" (BAU) approach that continues to *increase* greenhouse emissions, the level of such gases in the atmosphere could *treble* by the end of the century, prompting a significant risk of a temper-

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tion in some disease vectors, and increased morbidity from heat waves, floods, and droughts for a temperature increase *below* two degrees).

71. Stern, *supra* note 63, at vi; *see also* IPCC Working Group II, *supra* note 56, at 11 ("Approximately 20-30% of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5-2.5°C.").

72. *E.g.*, CULLINAN, *supra* note 2, at 37 ("Periods of mass extinction have only occurred five times in Earth's fifteen billion year history.").

73. EDWARD O. WILSON, *THE DIVERSITY OF LIFE* 280 (1992) [hereinafter WILSON 1992]; *see also* CULLINAN, *supra* note 2, at 40 (placing the background rate of extinction at one per 500 to 1000 years).

74. The International Union for the Conservation of Nature and Natural Resources, *The IUCN Red List of Threatened Species, Summary Statistics*, at <http://www.iucnredlist.org/info/tables/table1> [hereinafter IUCN Red List] (summarizing the number of critically endangered and vulnerable species in 2006); *see also* CULLINAN, *supra* note 2, at 40 (relaying similar statistics).

75. IUCN Red List, *supra* note 74.

76. EDWARD O. WILSON, *THE DIVERSITY OF LIFE* xvii (2d ed. 1999) [hereinafter WILSON 1999].

77. *Id.*

78. *Id.*

ature increase of *five degrees* Celsius in the following decades.<sup>79</sup> A five-degree increase in temperature would “transform the physical geography of the world,” with lasting effects on human and other-than-human species.<sup>80</sup> Scientists anticipate that a five-degree increase in temperature would raise sea levels to a degree that would threaten major world cities such as Tokyo, New York, Cairo, Shanghai, Hong Kong, and London.<sup>81</sup> Furthermore, at a five-degree elevation in temperature, entire regions would experience major reductions in crops.<sup>82</sup> An increase of five degrees would take us into completely uncharted territory in which most ecosystems likely would not be able to maintain their current form and functioning.<sup>83</sup>

According to the Stern Review, annual emissions must be reduced to the level that is compatible with Earth’s capacity to remove greenhouse gases from the atmosphere.<sup>84</sup> Because actions to induce climate change have “long lead times,” the steps that are taken now may not have immediate discernible effects.<sup>85</sup> However, upon the release of the latest Assessment Report of the IPCC, the chairman of the intergovernmental scientific body expressed a sense of urgency about international action on greenhouse gas emissions: “If there is no action before 2012, that’s too late. What we do in the next two to three years will determine our future. This is the defining moment.”<sup>86</sup>

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79. Stern, *supra* note 63, at iv; *see also* IPCC Working Group I, *supra* note 52, at 13, 18 (predicting a four-degree increase, with a likely range of 2.4 to 6.4 degrees, for a scenario of rapid economic growth and fossil-intensive technology).

80. Stern, *supra* note 63, at iv.

81. *Id.* at v, vi.

82. *Id.* at v (depicting a chart showing that up to one-third of Africa could experience crop declines).

83. *Id.* at iv, v.

84. *Id.* at xi (advising that Earth can absorb five gigatonnes of carbon dioxide equivalent (five GtCO<sub>2</sub>e), which is more than eighty percent below the level of current annual emissions); *see generally* Tomorrow Project, *What Will Shape the Next 20 Years?* (June 26, 2007), [http://www.tomorrowproject.net/pub/1\\_GLIMPSES/Sustainability-1282.html](http://www.tomorrowproject.net/pub/1_GLIMPSES/Sustainability-1282.html) (last visited May 24, 2008) (noting that present annual emissions are over forty GtCO<sub>2</sub>e).

85. Stern, *supra* note 63, at i; *see also* IPCC, 2007: SUMMARY FOR POLICYMAKERS, in CLIMATE CHANGE 2007: SYNTHESIS REPORT 13, 21, available at [http://ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr\\_spm.pdf](http://ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf) [hereinafter IPCC Synthesis Report] (“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.”); LOVELOCK, *supra* note 8, at 7 (advising that the Earth system “is trapped in a vicious cycle of positive feedback, and this is what makes global heating so serious and so urgent”).

86. Elisabeth Rosenthal, *U.N. Chief Seeks More Leadership on Climate Change*, N.Y. TIMES, Nov. 18, 2007, at 1 (quoting the head of the IPCC, Rajendra Pachauri,

The Stern Review advises that it is likely too late to attempt to stabilize greenhouse gas emissions at 450 parts per million.<sup>87</sup> Stabilization at 550 parts per million, with an ensuing two to three degree temperature increase, is still feasible.<sup>88</sup> However, if “weak action” on emissions is taken in the next ten to twenty years, stabilization at 550 parts per million also would be out of reach.<sup>89</sup>

From a utilitarian cost perspective, there is a “high price to delay.”<sup>90</sup> With delay in reducing emissions and taking other concerted action on global warming, the stage could be set for higher temperatures, greater impacts on humanity and the natural world, and higher mitigation costs.<sup>91</sup> The Stern Review estimates that the annual cost of stabilizing carbon emissions at 550 parts per million would be approximately one percent of the global gross domestic product (GDP) by 2050.<sup>92</sup> For net benefits at stabilizing at 550 parts per million, savings are estimated of approximately \$2.5 trillion in the medium to long-term.<sup>93</sup>

How do scientific findings about global warming inform the question of the good? Can utilitarianism be reshaped to effectively respond to the challenges posed by global warming? In the next section of the article, I will address these questions and the potential repristination of utilitarianism.

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and noting the expiration of the Kyoto Protocol in 2012); *see also* Stern, *supra* note 63, at i (proposing that our actions over the next ten to twenty years should have “a profound effect on the climate in the second half of this century and the next”).

87. Stern, *supra* note 63, at xv.

88. *Id.* at xi.

89. *Id.* at xv.

90. *Id.*; but *see* Björn Lomborg, *Stern Review, The Dodgy Numbers Behind the Latest Warming Scare*, WALL ST. J., Nov. 2, 2006, available at <http://www.opinionjournal.com/extra/?id=110009182> [hereinafter Lomborg] (asserting that “dramatic and early carbon reductions cost more than the good they do”).

91. Stern, *supra* note 63, at xv.

92. *Id.* at xiii, xiv. Gross domestic product is a term for “[t]he total market value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports.” InvestorWords.com, GDP Definition, at <http://www.investorwords.com/2153/GDP.html> (last visited May 24, 2008).

93. Stern, *supra* note 63, at xvii. Björn Lomborg argues against spending one percent of the GDP (or \$450 billion annually) to cut carbon emissions: “Spending just a fraction of this figure—\$75 billion—the U.N. estimates that we could solve all the world’s major basic problems. We could give everyone clean drinking water, sanitation, basic health care and education right now. Is that not better?” Lomborg, *supra* note 90.



### C. Utilitarianism for Future Generations

Utilitarianism, in its present-day mutation, has become little more than short-term pragmatic consequentialism.<sup>94</sup> Under a consequentialist morality, the worth of acts and beliefs are judged by what they produce.<sup>95</sup> With pragmatism, the moral test is what works.<sup>96</sup> As a point of irony, based on the scientific findings on global warming, short-term instrumentalism clearly is not working.

Although utilitarianism is not without its conceptual flaws and carries a powerful regressive edge, one crest of which we are now riding, it remains a powerful language that may be shifted to better ends.<sup>97</sup> From a pluralist metaethical stance, there is not one overarching moral language.<sup>98</sup> We are saved from the worst of utilitarianism by other moral languages that serve to correct its excesses and deficiencies.<sup>99</sup>

To be an effective moral voice responding to the environmental challenges of the twenty-first century, utilitarianism must be transformed.<sup>100</sup> As a predicate, those endorsing utilitarian ends should consider broadening their sights to consider *the greatest good of the greatest number for the greatest length of time*. This reformulation of utilitarianism raises three issues.

First, the question of “the good” is often considered the most difficult issue.<sup>101</sup> In Nicomachean Ethics, Aristotle proposed: “Every art and every inquiry, and similarly every action and pursuit, is thought to aim at some good; and for this reason the good

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94. ALSCHULER, *supra* note 16, at 2-3 (noting the dominance of utilitarian pragmatism in law schools and defining pragmatism as consequentialist).

95. *Id.*

96. *Id.* at 187.

97. NASH, *supra* note 5, at 23 (describing Bentham’s utilitarianism as containing “the potential of transcending a narrow anthropocentric sense of the term”); *but see* Indira Hakalingam Carr, *Saving the Environment: Does Utilitarianism Provide a Justification?*, 12 LEGAL STUD. 92, 101-102 (1992) (proposing that “utilitarianism cannot support the variety of interests that environmental legislation seems to have taken into account”).

98. Potter 1986, *supra* note 10, at 114.

99. *Id.* at 125.

100. *Cf.* Stone 1985, *supra* note 16, at 13 (“A sense of limits has always provided the drive for law and ethics.”).

101. *Id.* at 46-47 (asserting that “where lies the good in sacrificing our more obvious desires” is the “real and really tough issue”); *see also* BERRY, EVENING, *supra* note 61, at 93 (noting that ecosystems are harmed by people with good intentions, “but whose conception of what is good is inadequate”).

has rightly been declared to be that at which all things aim."<sup>102</sup> To the classical Greek philosophers, the good was considered to be *eudaimonia*, which was thought of as a compound of happiness, virtue, freedom, and success.<sup>103</sup>

In thinking of the *summum bonum* (or, the maximum good, that which is an end in itself), Hobbes asserted that "there is no such thing in this world . . . for while we live, we have desires and desire presupposeth a further end."<sup>104</sup> Hobbes settled for a subjective sense of the good—"whatsoever is the object of any man's appetite or desire."<sup>105</sup> Other philosophers, such as Hume and Kant, aimed at the "good in itself" (or that which is good without being a means to some other good).<sup>106</sup> The classical Utilitarians stepped into the philosophical stretch between the good and the maximum good and defined the greatest good in terms of seeking pleasure and avoiding pain.<sup>107</sup> To Hume, the *summum bonum* was defined as virtue, while to Kant it was good will.<sup>108</sup>

In its life as a moral language, the utilitarian idea of the good has come to be identified with human welfare, most often driven by notions of wealth maximization.<sup>109</sup> To further reduce its moral height, the postmodern utilitarian notion of the good has often been identified with the welfare of corporations.<sup>110</sup> However, in some utilitarian conceptions, the good has not simply been defined in human welfarist terms, but also in terms of qualities such as "freedom, knowledge, beauty, fairness of resource distribution, and capacity for individual self-realization."<sup>111</sup>

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102. ARISTOTLE, NICOMACHEAN ETHICS 1094a (Martin Ostwald trans., Bobbs-Merrill 1962) (350 B.C.E.).

103. See DORE, *supra* note 11, at 258; see also BLACKBURN, *supra* note 18, at 160.

104. BLACKBURN, *supra* note 18, at 367; see also THOMAS HOBBS, LEVIATHAN, in MELDEN, *supra* note 29, at 221 (1651) ("For there is no such *finis ultimus*, utmost aim, nor *summum bonum*, greatest good, as is spoken of in the books of the old moral philosophers.").

105. HOBBS, LEVIATHAN, in MELDEN, *supra* note 29, at 220 (1651); see also BLACKBURN, *supra* note 18, at 160.

106. DORE, *supra* note 11, at 388; BLACKBURN, *supra* note 18, at 160.

107. DORE, *supra* note 11, at 258, 388; Jeremy Bentham, *An Introduction to the Principles of Morals and Legislation*, in MELDEN, *supra* note 29, at 368 n.2 (1789).

108. DORE, *supra* note 11, at 388; BLACKBURN, *supra* note 18, at 160.

109. E.g., Emmenegger, *supra* note 26, at 556-57; see also Martha C. Nussbaum, *Flawed Foundations: The Philosophical Critique of (A Particular Type of) Economics*, 64 U. CHI. L. REV. 1197, 1197-1214 (1997) (noting shortcomings of law and economics theory, which relies on utilitarian philosophy, animated by the idea of wealth maximization).

110. BERRY, GREAT WORK, *supra* note 6, at 131, 143.

111. RHODE, *supra* note 14, at 20; see also JOHN FINNIS, NATURAL LAW AND NATURAL RIGHTS, as reprinted in ROBERT L. HAYMAN ET AL., JURISPRUDENCE: CLASSICAL AND

For the reanimation of utilitarianism, the greatest good must be expanded to include, not only human welfare, but also the well-being of the Earth community and its component parts. To give some substance to the idea of the good as the well-being of the Earth community, I refer to the idea of “land health,” or that which sustains “nature’s ability to keep doing what it has long done.”<sup>112</sup> The goal of land health is brought into being through “mutually enhancing relations” between humanity and the Earth community.<sup>113</sup> For Thomas Berry, an important moment in the formation of the idea of the good came at the age of eleven when his family moved to a new house on the edge of town:

The house, not yet finished, was situated on a slight incline. Down below was a small creek and there across the creek was a meadow. It was an early afternoon in late May when I first wandered down the incline, crossed the creek, and looked out over the scene.

The field was covered with white lilies rising above the thick grass. A magic moment, this experience gave to my life something that seems to explain my thinking at a more profound level than almost any other experience I can remember. It was not only the lilies. It was the singing of the crickets and the woodlands in the distance and the clouds in a clear sky.<sup>114</sup>

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CONTEMPORARY 26-28 (2d ed. 2002) (proposing seven basic goods: “life, knowledge, play, aesthetic experience, sociability, practical reasonableness, and religion”).

112. For scientific land health, Freyfogle gave examples of “building and retaining soil, clothing the land with lush vegetation, cleansing water flows, capturing sunlight and moving energy through multiple trophic levels, pulling minerals from the subsoil and cycling them through predation chains, and, ultimately, giving rise to new life-forms able to find or create suitable niches.” FREYFOGLE, *supra* note 6, at 49. Freyfogle also presented land health as an ethic and a goal (encompassing “the kind of durable, flourishing, self-recreating communal life that is the mark of a lasting link between people and place”). *Id.* at 51, 53. By using the word “land,” I am not suggesting a division between the geosphere and biosphere. *See, e.g.,* LOVELOCK, *supra* note 8, at 162.

113. BERRY, *GREAT WORK*, *supra* note 6, at ix, 105 (“The basic ethical norm is the well-being of the comprehensive community and the attainment of human well-being within that community.”). However, significant critiques of the “common good” have been lodged, including erasing valuable differences through homogenizing efforts. *E.g.,* YOUNG, *INCLUSION*, *supra* note 13, at 43-44 (suggesting that, due to social inequality, the idea of the common good “can often serve as a means of exclusion” and that public dialogue reveals differences, not commonality). Consequently, as it bears on the common good, the notion of the good should be based on premises of differentiation and biodiversity, not on homogeneity. *Id.* at 221-22 (proposing “differentiated solidarity” as an ideal of social and political inclusion); BERRY, *EVENING*, *supra* note 61, at 145 (“The three basic tendencies of the universe at all levels of reality are differentiation, spontaneous self-organization, and bonding.”).

114. BERRY, *GREAT WORK*, *supra* note 6, at 12-13.

This experience became normative, as a pervasive matter, for Berry: "Whatever preserves and enhances this meadow in the natural cycles of its transformation is good; whatever opposes this meadow or negates it is not good. My life orientation is that simple."<sup>115</sup> Shifting to this type of moral sensibility would bring needed life and breadth to the utilitarian notion of the greatest good.

Second, to consider the temporal question, adherents of utilitarianism should consider lengthening their moral horizon to include the good of future generations. Sustainability has been taught throughout the ages.<sup>116</sup> In a midrash on the creation, for example, God took the first person to all the trees in the Garden of Eden and said: "See my handiwork, how beautiful and choice they are. . . . Be careful not to ruin and destroy my world, for if you do ruin it, there is no one to repair it after you."<sup>117</sup>

In *Utilitarianism*, John Stuart Mill excluded short-term expedience from his vision of the good.<sup>118</sup> To Mill, the trajectory by which sources of human suffering would be conquered was "grievously slow," involving "a long succession of generations."<sup>119</sup> Furthermore, Mill applauded the renunciation of individual happiness where it was devoted to the happiness of others "either of mankind collectively or of individuals within the limits imposed

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115. *Id.* at 13. Berry's ethical sense follows the lead of early ecologist, Aldo Leopold. Aldo Leopold, *The Land Ethic*, in *A SAND COUNTY ALMANAC* 224-25 (1949) [hereinafter Leopold] ("A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.").

116. In discussing the "ancient origins" of the obligation to act sustainably, Bryan Norton pointed to the warning of the Hebrew prophet Ezekiel against fouling the water and trampling pasture. Bryan G. Norton, *Future Generations, Obligations to*, in 2 *ENCY. OF BIOETHICS* 892, 895 (Warren T. Reich ed., 1995) [hereinafter Norton, *Future*] (also defining the moral principle of sustainability: "each generation is obligated to use the earth, and especially the processes that sustain its productivity, so that future generations face options and possibilities as rich as the preceding generation had").

117. Rabbi Yehudah Levi, *Ecological Problems B Living on Future Generations' Account*, at [http://www.askmoses.com/article\\_print.html](http://www.askmoses.com/article_print.html) (quoting Midrash Rabba, *Ecclesiastes* 7:13 s.v. re'eh). "Midrash" are "[c]ommentaries and explanatory notes on the Scriptures produced by Jewish rabbis from the period of the Babylonian exile until approximately A.D. 1200." DONALD K. MCKIM, *WESTMINSTER DICTIONARY OF THEOLOGICAL TERMS* 173 (1996).

118. Mill distinguished between "that which is expedient for some immediate object, some temporary purpose" (denominated as "a branch of the hurtful") from that which is "expedient in a much higher degree." John Stuart Mill, *Utilitarianism*, in *MELDEN*, *supra* note 29, at 406.

119. *Id.* at 401.

by the collective interests of mankind.”<sup>120</sup> Consequently, considering the good of future generations would be compatible with an extended form of Millian utilitarianism.<sup>121</sup>

The call for “intergenerational equity” in our actions that bear on future generations was given considerable momentum in 1989 by the publication of *In Fairness to Future Generations* by Edith Brown Weiss, who argued:

[W]e, the human species, hold the natural environment of our planet in common with all members of our species: past generations, the present generation, and future generations. As members of the present generation, we hold the earth in trust for future generations. At the same time, we are beneficiaries entitled to use and benefit from it.<sup>122</sup>

Weiss considered intergenerational equity to be a matter of group rights and obligations.<sup>123</sup> Other scholars have advanced equity to future generations either as a matter of individual rights,<sup>124</sup> as a question of virtue,<sup>125</sup> or as arising from an intragenerational contract “made by the present generation nationals of each country . . . for the benefit of their country’s future generation nationals.”<sup>126</sup>

Among the difficulties of basing policy and action on the interests of future generations is the “identification problem”: “How can unknown and unknowable interests, rights, and values of the future be taken into account if the individuals who will experience and express those values cannot be identified?”<sup>127</sup> This conun-

120. *Id.* at 402.

121. See Daniel Holbrook, *Utilitarianism on Environmental Issues Reexamined*, 7 INT’L J. APPLIED PHIL. 1 (sum. 1992).

122. Edith Brown Weiss, *What Obligation Does Our Generation Owe to the Next?*, 84 AM. J. INT’L L. 198, 198-99 (1990) [hereinafter Weiss, *Obligation*]; see also EDITH BROWN WEISS, *IN FAIRNESS TO FUTURE GENERATIONS* (1989).

123. Weiss, *Obligation*, *supra* note 122, at 203.

124. Aaron-Andrew P. Bruhl, *Justice Unconceived: How Posterity Has Rights*, 14 YALE J.L. & HUMAN. 393 (2002).

125. Jeffrey M. Gaba, *Environmental Ethics and Our Moral Relationship to Future Generations: Future Rights and Present Virtue*, 24 COLUM. J. ENVTL. L. 249, 286-87 (1999).

126. Paul A. Barresi, *Beyond Fairness to Future Generations: An Intragenerational Alternative to Intergenerational Equity in the International Environmental Arena*, 11 TUL. ENVTL. L.J. 59 (1997).

127. Norton, *Future*, *supra* note 116, at 894; see also Stone 1985, *supra* note 16, at 47-50 (engaging questions of appeals to anticipated interests of future generations).

drum is avoided by abjuring an individual point of view for a wider social perspective.<sup>128</sup>

Another difficulty is deciding how far into the future that moral consideration should extend.<sup>129</sup> Data on global warming indicates that the actions that we take now will have an impact on inhabitants of the world in the middle to latter half of the twenty-first century.<sup>130</sup> The severity and irreversibility of anticipated impacts of global warming mandate a response from the present generation.<sup>131</sup> Our moral response should match the scientific data that has been presented, requiring a reduction in emissions to the level that accords with the natural capacity of Earth to remove them from the atmosphere.<sup>132</sup> In addition, updated data on the looming extinction rates of other species “puts pressure on the existing moral framework” to expand moral consideration not only to future generations of human beings, but also to remote species and Earth systems.<sup>133</sup>

A moral, as well as political, consensus is forming in favor of an ethic of sustainability.<sup>134</sup> In this regard, I am speaking of a sustainable way of life, not “sustainable development.”<sup>135</sup> The notion of sustainable development gained currency in the 1987 report of the World Commission on Environment and Development.<sup>136</sup> While the concept has helped draw attention to

128. *E.g.*, Weiss, *Obligation*, *supra* note 122, at 203 (regarding intergenerational rights as group rights); Norton, *Future*, *supra* note 116, at 895 (discussing an approach that rejects an individualistic formulation in favor of an obligation to society as a whole); *but see* Barresi, *supra* note 126, at 143-44 (noting that group rights and duties “have very little in common with Western cultural and legal traditions”).

129. Norton, *Future*, *supra* note 116, at 894-95; *see also* Gaba, *supra* note 125, at 254 (suggesting that, while there may be no distinctive moral issue regarding our relationship to the generations of our children, grandchildren, and even perhaps to our great-grandchildren, the unique question may focus on our moral relationship to people more than two or three generations into the future).

130. Stern, *supra* note 63, at i.

131. Norton, *Future*, *supra* note 116, at 892.

132. Stern, *supra* note 63, at xi (proposing that annual emissions be eventually brought down to five gigatonnes of carbon dioxide equivalent, the level that the Earth can absorb, which is “more than 80% below the absolute level of current annual emissions”).

133. *E.g.*, Stone 1985, *supra* note 16, at 13 (referring to the ten to twenty percent extinction rate estimated at the end of the twentieth century as putting pressure “on the existing moral and legal framework to come up with new principles for the conservation and stewardship” of Earth).

134. Norton, *Future*, *supra* note 116, at 897.

135. BERRY, *GREAT WORK*, *supra* note 6, at 133.

136. *Id.* at 113-14 (observing that “sustainable development” gained currency in the 1987 Brundtland Report, Report of the World Comm. on Env’t. & Dev., G.A. Res. 42/187 (Dec. 11, 1987), available at <http://www.un.org/documents/ga/res/42/ares42->

the need to live so that we are not diminishing Earth for future generations, it also has significant drawbacks.<sup>137</sup> By referring to economic processes that consume nature and push natural systems closer to collapse, the notion of development “pulls against the idea of sustainability, leaving the sum of the words in doubt.”<sup>138</sup> Consequently, the goal of a sustainable future is supported by a thoughtful approach to development, in which economic choices are constrained by scientific data on the nature of the risks to the health of Earth.<sup>139</sup>

The third ensuing inquiry is whether “the greatest number” includes only human beings, only sentient beings, only living beings, or all of the members of the Earth community. A host of questions is raised in broadening the greatest happiness principle to include all living beings or the entire Earth community (including rocks, rivers, and mountains). For example, what about weeds? Are gardeners morally prohibited from killing weeds?<sup>140</sup> Is a mosquito the moral equal of a human being, triggering a no-killing, positive-regard rule?<sup>141</sup> What about brown recluse spiders? How should a line of sugar ants in the kitchen be treated? Since a swarm of termites outnumber people in a building, should it be allowed to destroy the building?<sup>142</sup> How is a river or a mountain to be counted, under a broader utilitarian assessment?<sup>143</sup>

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187.htm); see also ELISABETH M. FERRERO & JOE HOLLAND, “THE EARTH CHARTER”: A STUDY BOOK OF REFLECTION FOR ACTION 39-41 (2002) (discussing the Brundtland Report and actions taken by the United Nations regarding the Earth Charter Initiative).

137. FREYFOGLE, *supra* note 6, at 50.

138. *Id.*

139. Bryan Norton, *Intergenerational Equity and Environmental Decisions: A Model Using Rawls’ Veil of Ignorance*, 1 ECOLOGICAL ECON. 137, 146 (1989) [hereinafter Norton, *Intergenerational*]; see also Norton, *Future*, *supra* note 116, at 895 (recognizing, in a two-tiered approach, that “economic values should predominate most decisions” but that, where there is a “threat of serious and irreversible harms, risky activities should be considered morally forbidden”).

140. *E.g.*, David Barsmian, *Monocultures of the Mind: An Interview with Vandana Shiva*, Z MAG. (Dec. 2002), available at [http://www.thirdworldtraveler.com/Vandana\\_Shiva/Monocultures\\_Mind.html](http://www.thirdworldtraveler.com/Vandana_Shiva/Monocultures_Mind.html) (relaying environmental activist Shiva’s criticism of Monsanto’s herbicide-resistant crops as “a war against weeds” which violates principles of biodiversity essential to health).

141. RACHEL CARSON, *SILENT SPRING* 85 (1962) (challenging the “needless havoc” of killing “birds, mammals, fishes, and indeed practically every form of wildlife by chemical insecticides indiscriminately sprayed on the land”); see also NASH, *supra* note 5, at 78-82 (discussing Carson’s humanitarian-based philosophy that “all life-forms, even insects, were not commodities but deserved ethical consideration”).

142. *E.g.*, FINNIS, *supra* note 111, at 29 (arguing that the good of a community cannot be measured in a computational, aggregate way).

143. CULLINAN, *supra* note 2, at 109, 117-18 (discussing rights of natural entities to fulfill their roles within the Earth community and concluding that the right of a river

What is the moral status of germs?<sup>144</sup> The bacteria in the bathroom? Viruses?<sup>145</sup> Cancer cells? Under a greatest happiness principle for all living beings or for all members of the Earth community, what principled basis can be advanced for ethical line-drawing?<sup>146</sup>

The short answer, for those advocating moral inclusion, is illustrated by considering the moral stances of physician Albert Schweitzer and early conservationist Aldo Leopold. To Albert Schweitzer, the basis for ethics was "Reverence for Life."<sup>147</sup> Because Schweitzer extended this principle to all matter, an ethical person "shatters no ice crystal that sparkles in the sun, tears no leaf from its tree, breaks off no flower, and is careful not to crush any insect as he walks."<sup>148</sup> In contrast, ecologist Aldo Leopold was less concerned about individual organisms.<sup>149</sup> Leopold's ethic operated on the level of species and ecosystems.<sup>150</sup> Consequently, activities such as hunting and altering an ecosystem were permissible.<sup>151</sup> The ethical touchstone for Leopold was to ensure that human action avoids degrading the land and, for Leopold and Schweitzer, that biotic life only be taken out of necessity and with reverence for the life-form that was killed.<sup>152</sup>

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or the "riverine" equivalent of a human right would be the right to flow); *see also* LEOPOLD, *supra* note 115, at 129-32 (discussing the significance of "thinking like a mountain" and the knowledge that only the mountain and wolf share); *see also* NASH, *supra* note 5, at 70 (noting the holistic basis of Leopold's ethics).

144. Bacteriologist René Dubos spent his early career killing germs and his later career arguing that germs should not be exterminated, but that germs and people should co-exist. NASH, *supra* note 5, at 77 (also noting that Dubos won the Pulitzer Prize). Because the harmony of the world includes disease, Dubos proposed that germs could be controlled by antibiotics, but not exterminated. *Id.*

145. Ecologist David Ehrenfeld considered the smallpox virus as part of the biotic community, as much a product of evolution as whales, wolves, and willow trees. NASH, *supra* note 5, at 84-85 (also referring to the work on smallpox of English physician Bernard Dixon).

146. Stone 2003, *supra* note 20, at 45-51 (posing questions of ethic's ambitions, ethic's foundational bases, and moral counting). Another issue, noted by Barry alumnus Eric Hull, is the utility of species to each other, which becomes apparent when a species is removed from an ecosystem and other species struggle to adapt.

147. *E.g.*, NASH, *supra* note 5, at 60.

148. *Id.* at 61 (quoting ALBERT SCHWEITZER, *PHILOSOPHY OF CIVILIZATION* 254 (John Naish trans., 1923)).

149. *Id.* at 71.

150. *Id.*

151. *Id.*

152. *Id.*



The longer answer to the breadth of the moral circle invites two separate moral inquiries. First, what is fitting for a community? Second, what may be relied on as true?

### III. WHAT IS FITTING?: THE SCIENCE OF RELATIONSHIP

*To appreciate the extent to which we are embedded in the evolutionary ecosystem requires an act of imagination . . .*<sup>153</sup>

Communitarianism is the representative moral language that focuses on what is fitting for a community.<sup>154</sup> The moral community has traditionally been considered to be the exclusive domain of human beings.<sup>155</sup> Nature has been placed outside the moral community for diverse reasons. Animals were thought to lack souls, consciousness, and capacity for moral reasoning.<sup>156</sup> Non-animals were considered non-sentient and, therefore, "matter."<sup>157</sup> Undergirding this belief-system has been Enlightenment philosophy, particularly binarist thinking that erects antinomies of subject vs. object, culture vs. nature, and mind vs. matter.<sup>158</sup>

With the dawning of modern scientific thought in the Enlightenment, "man" was centered as the subject, and other humans and nature were seen as objects.<sup>159</sup> Critiquing this philosophical stance, Thomas Berry proposed, "The universe is a communion of subjects, not a collection of objects."<sup>160</sup> Aldo Leopold echoed a communitarian sensibility in his land ethic: "We abuse land because

153. McFAGUE, *supra* note 8, at 8 (1987).

154. *E.g.*, ALASDAIR MACINTYRE, *AFTER VIRTUE* (1981).

155. *E.g.*, Stone 2003, *supra* note 20, at 50 ("The moral considerability of humans is uncontroversial. By contrast, the moral status of Nature, somehow conceived other than as a means to human welfare, remains problematic.").

156. Lori Gruen, *The Moral Status of Animals*, STAN. ENCY. OF PHIL. (2003), available at <http://plato.stanford.edu/entries/moral-animal/>.

157. *E.g.*, Kenneth E. Goodpaster, *On Being Morally Considerable*, 75 J. OF PHIL. 308 (June 1978) [hereinafter Goodpaster, *On Being*].

158. *E.g.*, HANS-GEORG GADAMER, *TRUTH AND METHOD* 480 (Joel Weinsheimer & Donald Marshall trans., 2d rev. ed. 1999) (1960) (suggesting that, since Rousseau, nature came to be conceived "as the mirror image of the concept of art. As the counterpart of the mind, as the non-I, nature became a polemical concept, and as such it has none of the universal ontological dignity possessed by the cosmos, the order of beautiful things").

159. Koons, *Making Peace*, *supra* note 10, at 35-36 (disrupting the normative center of the dominant discourse that "emanates from and protects the perspectives, experiences, and interests of White, Euro-American, heterosexual men of privilege").

160. CULLINAN, *supra* note 2, at 115 (quoting Thomas Berry, *The Origin, Differentiation and Role of Rights* (2001)).

we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.”<sup>161</sup>

Is it defensible to propose extending the boundaries of the moral community to include all sentient beings, all living beings, or all of nature? Intuition and experience are sometimes offered as aligned bases to justify expanding moral boundaries.<sup>162</sup> Instead of resting this moral inquiry on either intuitionism or phenomenology, this article makes another turn to the interplay of science and morality.

Oddly, the “scientific method” which, in its infancy, consigned nature to the status of object, to be used mechanically, now may be seen as giving birth to theories which re-animate nature and bring it into the moral community. Scientific disciplines such as quantum physics, evolution biology, and ecology have unearthed data and offered insights that challenge a mechanistic, objectified view of nature. In discussing some of the findings of these disciplines, I pose two principles that stand at the intersection of science, philosophy, and ethics.

### A. A Principle of Interconnectedness

Evolution biologists inform us that, between four and one-half and five billion years ago, a great star exploded, sending gases and dust that gathered into an “Earthball” made of some ninety different kinds of atomic elements.<sup>163</sup> In a dynamic process, the ele-

161. LEOPOLD, *supra* note 115, at viii.

162. Ethical intuitionism asserts that propositions may be recognized as true or false, based on the faculty of intuition. BLACKBURN, *supra* note 18, at 198, 250 (referring to British analytic philosopher GEORGE EDWARD MOORE, *PRINCIPIA ETHICA* (1903)). Phenomenology may be understood as the “science of experience.” DAVID ABRAM, *THE SPELL OF THE SENSUOUS* 34-35 (1996) (referring to the thought of Edmund Husserl and Maurice Merleau-Ponty). While experience and intuition are easily discounted, we should not underestimate their capacity “to provide us with coherent notions about the essence of things quite independent from what we *want* those things to be.” Stone 1985, *supra* note 16, at 31. A number of objections have been raised toward approaches based on intuition and experience, including the necessity of justifying a moral theory or judgment empirically. David Copp, *Metaethics*, in 2 *ENCY. OF ETHICS* 1081, 1083 (Lawrence C. Becker & Charlotte B. Becker eds., 2001).

163. ELISABET SAHTOURIS, *EARTH DANCE: LIVING SYSTEMS IN EVOLUTION* *passim* (2000), available at <http://www.ratical.org/LifeWeb/Erthdnce/erthdnce.pdf> (tracing the evolution of Earth from stardust to a living planet); Karl Kruszelnicki, *The Land of Giant Elements* (2003), at <http://www.abc.net.au/science/k2/moments/s161220.htm> (advising that ninety elements can be found in nature); BERRY, *EVENING*, *supra* note 61, at 21 (discussing the collapse of the first-generation supernova “whereby the ninety-some elements needed for life and consciousness came into existence”).

ments bonded together to form matter, a swirling gaseous environment, and eventually single cell beings.<sup>164</sup> The expanding, differentiating process led to an array of simple and complex animate and inanimate forms.<sup>165</sup> Everything on Earth—trees, rock, water, air, insects, mammals—is still composed of those same elements.<sup>166</sup> The notion that “we are stardust” is more than a poetic metaphor.<sup>167</sup> Human beings, as well as all other animate and inanimate matter on the planet Earth, are physically composed of the same elements that constituted the originating stardust.<sup>168</sup>

Evolution biologists and quantum physicists have documented not only that everything on Earth is composed of the same elements, but also that the elements are intimately related in a “dance of interactions.”<sup>169</sup> The interactions are not simply among living matter, but among animate and inanimate entities. Indeed, many scientists argue that life is less a question of type of matter and more a question of process.<sup>170</sup>

In fact, when considering data from the natural sciences, it is difficult to clearly demarcate what is a life-form. For example, Russian biologist Vladimir I. Vernadsky defined life in terms of dispersal of rock, or rock that is rearranging itself.<sup>171</sup> In Vernadsky’s view, the crust of Earth has sufficient energy to transform the passive parts (called geological) into living parts through met-

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164. SAHTOURIS, *supra* note 163, at 27-91 (reviewing evolutionary steps to the first single-cell creatures on Earth); *see also* BERRY, GREAT WORK, *supra* note 6, at 196-201 (reflecting on the “moments of grace” that have marked the transformation of the universe, such as the supernova event, the appearance of the first cell, and the present moment, when we are making the transition from human destruction of Earth to a new “Ecozoic” Era).

165. SAHTOURIS, *supra* note 163, at 27-173; *see also* CULLINAN, *supra* note 2, at 86 (discussing qualities of the universe, including differentiation, which refers to “an inherent tendency towards diversity, variation and complexity”).

166. SAHTOURIS, *supra* note 163, at 29 (excepting “the small input of meteors”); *see also* BERRY, GREAT WORK, *supra* note 6, at 27-28; Josh Frick, *Earth Paper* 6 (2007), <http://www.earthjuris.org> (defining 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”).

167. *See* SAHTOURIS, *supra* note 163, at 27, 37.

168. *Id.*; Frick, *supra* note 166, at 6-7 (“The Earth has been combining and weaving atoms together for billions of years, constantly changing the landscape and the inhabitants of Earth. All the while the same elements were constant and unchanging.”).

169. SAHTOURIS, *supra* note 163, at 19.

170. *Id.* at 30-31.

171. VLADIMIR I. VERNADSKY, THE BIOSPHERE 25 (Peter N. Nevraumont ed., David B. Langmuir trans., 1998) (1926) (the English translation of Vernadsky’s 1926 monograph proposing 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”); *see also* SAHTOURIS, *supra* note 163, at 117.

abolic action.<sup>172</sup> Consequently, living organisms are composed of inorganic minerals from the crust of Earth, which transforms living matter into inorganic minerals and then cycles those minerals back to living form.<sup>173</sup> Of some significance to Vernadsky was the fact that the same atoms alternate between inanimate and animate matter.<sup>174</sup>

Quantum physics explodes any tidy view of nature as a collection of objects that are separate from each other and from humanity.<sup>175</sup> Theorizing from the perspective of classical physics, Albert Einstein posited a physical reality that consisted of independent, spatially separated elements.<sup>176</sup> Disagreeing with the quantum physicists who were amassing evidence of a universe that is an interconnected and interdependent network of relations, Einstein developed the "EPR experiment"<sup>177</sup> in which two electrons were spinning in opposite directions, but the axis of rotation could not be defined with certainty.<sup>178</sup> When an observer chose an axis and measured the spin on particle one, particle two acquired a definite spin along the chosen axis.<sup>179</sup> Particle one may have been in New York and particle two may have been in Paris, or one may have been on Earth while the other was on the moon.<sup>180</sup>

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172. SAHTOURIS, *supra* note 163, at 118. For example, rock on the ocean floor may have begun as sediment that was passed through the metabolic processes of sand- and mud-eating worms. *Id.* at 119. A similar process may be seen in the transformation of soil by earthworms on dry land. *Id.*

173. *Id.* at 118; see also THICH NHAT HANH, *LIVING BUDDHA, LIVING CHRIST, as reprinted in* FREDERIC BRUSSAT & MARY ANN BRUSSAT, *SPIRITUAL LITERACY* 134-35 (1996) ("One day as I was about to step on a dry leaf, I saw the leaf in the ultimate dimension. I saw that it was not really dead, but that it was merging with the moist soil in order to appear on the tree the following spring in another form.").

174. SAHTOURIS, *supra* note 163, at 118.

175. BRUCE ROSENBLUM & FRED KUTTNER, *QUANTUM ENIGMA: PHYSICS ENCOUNTERS CONSCIOUSNESS* 3 (2006).

176. FRITJOF CAPRA, *THE TAO OF PHYSICS* 313 (4th ed. 2000).

177. The "EPR experiment" was named after Einstein and his two assistants, Boris Podolsky and Nathan Rosen. *Id.* at 311. In a simplified version of the experiment, two electrons were spinning in opposite directions; the axis of rotation could not be defined with certainty. *Id.* at 312. The particles drifted apart in a way that did not affect their spins. *Id.* When they were separated by a large distance, an observer chose an axis and measured the spin of one of the particles. *Id.* at 313. The act gave *both* particles a definite axis of rotation. *Id.* In other words, at the instant that the measurement was performed on particle one, particle two acquired a definite spin along the chosen axis, even though the particles were at some distance from each other. *Id.* at 312-13.

178. *Id.* at 312.

179. *Id.* at 313.

180. *Id.* at 312.

How did the second particle know which axis had been chosen? From the viewpoint of classical physics, Einstein argued that no signal can travel faster than the speed of light, rendering the theory incomplete.<sup>181</sup> To quantum physicists, the two particles were part of an indivisible, interconnected system in which hidden variables were “instantaneous connections to the universe as a whole.”<sup>182</sup> Stated another way, every atom in the universe is connected to all other atoms.<sup>183</sup>

There are a number of implications of the EPR experiment. Not only are parts of the universe linked in dynamic ways we do not understand, but what happens in one place is affected by what happens thousands of miles away.<sup>184</sup> Furthermore, the act of conscious observation is a key part of the physical reality observed.<sup>185</sup>

If this principle of interconnectedness is true—and everything is dynamically connected to everything else—what moral ground is gained? Because quantum physics challenges the worldview of separation of humanity and nature, its findings also challenge any moral assertion that harm done to one part of nature does not harm another part of the world. Quantum theory suggests, as Chief Seattle is reputed to have said, that human beings did not weave the web of life—we are “merely a strand in it.” What we do to the web, we also do to ourselves.<sup>186</sup>

Even accepting the truth of a principle of interconnectedness, other moral questions remain. Are not human beings, as sentient, conscious moral agents, entitled to moral standing apart from the web of living and non-living matter to which we are connected?

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181. *Id.* at 313; see also ROSENBLUM, *supra* note 175, at 7.

182. CAPRA, *supra* note 176, at 310, 313 (noting, too, that the hidden variables in classical physics are local mechanisms, while those in quantum physics are nonlocal connections).

183. BERRY, EVENING, *supra* note 61, at 57, 85 (“Through the principle of nonlocal causality, every atom in the universe is in contact with and influencing every other atom in the universe.”).

184. ROSENBLUM, *supra* note 175, at 4.

185. *Id.*

186. In 1854, at a reception for the Governor who was trying to buy the Puget Sound lands from the Native Americans, Chief Seattle delivered a speech in his Duwamish language in which he is reported to have said: “Man did not weave the web of life; he is merely a strand in it.” *E.g.*, Ross Anderson, *Myth-Quoted: Words of Chief Seattle Were Eloquent But Not His*, SEATTLE TIMES, July 1, 1991, at A1 (recounting events surrounding the transcription of the speech, its historical elaboration, and the discovery that the speech now popularly attributed to Chief Seattle was likely written by a television scriptwriter in 1971); see also Jeanne Grinstead, *Putting Words into the Mouth of Chief Seattle*, ST. PETERSBURG TIMES, Nov. 10, 1991, at 3D.

That inquiry raises the next principle: that of the relationship of the parts of the web to the whole.

## B. A Principle of the Whole-Part

Evolution biologists and quantum physicists also agree that the universe is not only interconnected, it is structured in a way that relates its parts to the whole. Looking at a bracken fern frond, for example, one can see that the whole of the frond is composed of a pattern of central stem and branching veins, which is repeated over and over, at smaller and smaller levels.<sup>187</sup> Each part within the frond is both a part of a substructure as well as a part of the whole frond.<sup>188</sup>

Nature is aptly described as “multiplicity within unity.”<sup>189</sup> Nature arranges itself in complex shapes that are repetitions of the same patterns at different levels of scale so that the parts have a similar shape to the whole.<sup>190</sup> This phenomenon has been called the “fractal geometry of nature” as well as “holons in holarchy.”<sup>191</sup> Fractals were illustrated by mathematician Benoît Mandelbrot, who broke a head of cauliflower into smaller and smaller pieces, each resembling the whole head.<sup>192</sup> A holon was described by scientist Arthur Koestler to be a whole made of parts, yet also making up a larger whole.<sup>193</sup> A universe of holons is a holarchy, an original whole that is formed by nesting smaller and smaller wholes within itself.<sup>194</sup> Our solar system is a holon within which is the smaller holon of Earth.<sup>195</sup> Similarly, our human bodies are holons composed of smaller holons of organ systems, organs, and cells.<sup>196</sup>

To the structural pattern of fractals and holons, quantum theorists have added a dynamic dimension. For example, in considering the EPR experiment, discussed in the foregoing section,

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187. CULLINAN, *supra* note 2, at 171.

188. *Id.*

189. ERNESTO CARDENAL, *ABIDE IN LOVE*, as reprinted in BRUSSAT, *supra* note 173, at 131.

190. CULLINAN, *supra* note 2, at 171.

191. *Id.* at 171-72.

192. *Id.*

193. *Id.* at 174.

194. SAHTOURIS, *supra* note 163, at 26.

195. *Id.* at 26, 82 (“In a sense, the whole Earth is a giant cell within whose boundary membrane other smaller cells evolve, multiply, die, and are recycled. . .”).

196. As Leonardo da Vinci observed five hundred years ago, Earth is a macrocosm of a human body, just as a human body is a microcosm of Earth. LOVELOCK, *supra* note 8, at xv.

quantum scientists asserted that the two-particle system is an indivisible whole.<sup>197</sup> Contrasting this notion from classical physics, which viewed the properties and behavior of the parts to determine the whole, the quantum theorists proposed just the reverse.<sup>198</sup> In quantum physics, *the whole determines the behavior of the parts*.<sup>199</sup>

If the principle of the whole-part is accurate, what moral premises can be drawn? Two premises present themselves. First, a human being may be seen as a holon within a holarchy, just as the human species may be viewed as a holon within the holarchy of Earth. Humanity has assigned moral status to itself, a part of the whole. It may be argued that if a part is to be morally considered, so must the whole.

Second, a great percentage of humanity has been behaving in ways that are at odds with being “part of a whole.”<sup>200</sup> Instead of attending to the relationship of our part to the whole, the bulk of humanity has been acting as a whole within itself, the center of the universe.<sup>201</sup> As a normative matter, it may be asserted that human beings ought to conduct themselves in ways befitting a part of a whole, such as being respectful of the whole of nature.<sup>202</sup>

This type of approach is compatible with the insights of environmental scholars who propose an ecosystem basis for ethics and governance.<sup>203</sup> Other philosophers disagree. Animal rights activists criticize ecocentric approaches as sacrificing the good of individual beings for the good of a community.<sup>204</sup> Philosophers following Bentham would draw the moral line between sentient

197. CAPRA, *supra* note 176, at 313.

198. *Id.* at 310, 313.

199. *Id.*

200. CULLINAN, *supra* note 2, at 112-113.

201. *Id.*

202. NASH, *supra* note 5, at 67 (noting that Leopold “had argued for an ethical relationship to the community’s component parts and to the whole”).

203. *E.g.*, Bradley Karkkainen, *Collaborative Ecosystem Governance: Scale, Complexity, and Dynamism*, 21 VA. ENVTL. L.J. 189 (2001-2002); Oliver Houck, *Are Humans Part of Ecosystems?*, 28 ENVTL. L. 1 (1998). Aldo Leopold, for example, advised that ethical reflection required “thinking like a mountain.” LEOPOLD, *supra* note 115, at 129; *see also* NASH, *supra* note 5, at 70 (characterizing Leopold’s ethics as holistic).

204. *E.g.*, NASH, *supra* note 5, at 159 (quoting animal liberation activist Tom Regan as characterizing holistic philosophies as “environmental fascism” in which “the good of the community . . . superceded that of the individual”); *see also* Emmenegger, *supra* note 26, at 577-79 (defining four non-anthropocentric paradigms—holism, physiocentrism, biocentrism, and ecocentrism—and denoting biocentrism as “the most appropriate approach”).

and non-sentient beings.<sup>205</sup> Rationalists would mark the line at a “higher” level, based on consciousness.<sup>206</sup> Other philosophers would open the moral circle to include all living beings, while some would widen it to all of nature, animate and inanimate.<sup>207</sup>

Is the threshold for moral consideration to be crossed at life, sentience, or being, whether animate or inanimate? Is the moral threshold thick and exclusive or porous and weighing? To probe the scope, depth, and texture of moral consideration takes us into the domain of moral philosophy that focuses on deeper meaning by asking, “what is true?”

#### IV. WHAT IS TRUE?: MORAL CONSIDERATION AND CONSCIOUSNESS

*Glory be to God for dappled things—  
For skies of couple-colour as a brinded cow;  
For rose-moles all in stipple upon trout that swim;  
Fresh-firecoal chestnut falls; finches' wings;  
Landscape plotted and pieced—fold, fallow, and plough;  
And all trades, their gear and tackle and trim.  
All things counter, original, spare, strange . . .*<sup>208</sup>

In thinking about what is true, the ensuing inquiry is what beings, entities, qualities, and values can be relied on to support moral standing.<sup>209</sup> While thoughtful arguments are made that the boundary for moral consideration is marked by sentience, human life, or all life, one of the major justifications for denying moral consideration to nature is that, unlike human beings, other beings and entities in nature lack consciousness.<sup>210</sup> In this argument, consciousness is constitutive of a moral being.<sup>211</sup>

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205. NASH, *supra* note 5, at 23, 157.

206. *Id.* at 134, 149, 157.

207. *Id.* at 153-55.

208. Gerald Manley Hopkins, *Pied Beauty*, in THE NORTON ANTHOLOGY OF MODERN POETRY 102 (Richard Ellmann & Robert O'Clair eds., 1988).

209. Truth claims often rest on theological premises, which are not pursued in this article. *E.g.*, Potter 1986, *supra* note 10, at 113-14 (identifying the biblical tradition, raising issues of the meaning and ultimate purpose of life, as one of four moral languages); *see also* NASH, *supra* note 5, at 67 (discussing the “oldest defense” of the rights of other-than-humans: nature is God's creation and God wants to nature to flourish).

210. *E.g.*, NASH, *supra* note 5, at 134, 149, 157 (referring to the thought of philosophers P.S. Elder, Scott Lehman, and William K. Frankena).

211. *E.g.*, Richard A. Watson, 1 ENVTL. ETHICS 99 (1979) (discussing requirements for moral agency, including self-consciousness).



Because this premise constructs one of the most deeply rooted barriers to moral consideration of nature, this section of the article will inquire into the nature of consciousness and ask, “what is and has consciousness?” As an epistemological or ontological matter, can we justifiably rely on the principle that nature lacks requisite consciousness to be given moral consideration? To consider these questions, I will first discuss some guiding principles for moral considerableness.

### A. Moral Consideration

Truth claims may be framed in terms of the moral considerableness of natural systems, species, and individuals—human and other-than-human—present and future.<sup>212</sup> The notion of “moral considerableness” was first used in the environmental context by ethicist Kenneth Goodpaster in 1978.<sup>213</sup> By that phrase, Goodpaster meant that “something falls within the sphere of moral concern, that it is morally relevant, that it can be taken into account when moral decisions are made.”<sup>214</sup> Of importance to our discussion, Goodpaster contrasted moral considerableness with the idea of moral significance,<sup>215</sup> which he held to encompass comparative judgments of moral weight to be given to factors in cases of conflict.<sup>216</sup> Goodpaster also contrasted *operative* and *regulative* thresholds of moral sensitivity: moral considerability is operative only where it can be acknowledged by a moral agent and is regulative where it is defensible on grounds independent of operativity.<sup>216</sup>

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212. In 1985, Christopher Stone revisited his argument for the legal rights of nature in an article that evaluated legal and moral considerateness of a range of things, from contemporary persons to remote persons, sentient non-persons, non-sentient entities, and membership entities such as tribes, species, cultures, corporations, and nations. Stone 1985, *supra* note 16, *passim*. From a perspective of moral pluralism, Stone argued that moral claims of beings, entities, and things could be considered within and across a multi-planar framework. *Id.*

213. Goodpaster, *On Being*, *supra* note 157, at 308 (starting with the formulation of G.J. Warnock, *THE OBJECT OF MORALITY* 148 (1971) that principles of morality apply from the standpoint “not of the agent, but of the ‘patient’”); *see also* CLARE PALMER, *ENVIRONMENTAL ETHICS AND PROCESS THINKING* 63 (1998) (discussing the contribution to moral thought of Goodpaster).

214. Palmer, *supra* note 213, at 63; *see also* Goodpaster, *On Being*, *supra* note 157, at 309 (construing moral consideration “broadly to include the most basic forms of practical respect”).

215. Goodpaster, *On Being*, *supra* note 157, at 311.

216. *Id.* at 313.

Moral considerableness is a quality that is broader than moral rights.<sup>217</sup> To have moral considerableness is “like showing up on a moral radar screen—how strong the signal is or where it is located on the screen are separate questions.”<sup>218</sup> Moral valuing may be thought of as “scalar” in that important or unique interests may be given greater weight than aesthetic or replaceable interests.<sup>219</sup> In complex moral decisions, many factors are at play, and the moral significance to be given particular factors is subject to articulation and contestation.<sup>220</sup> No worthy moral system permits moral agents to avoid the difficult task of moral balancing.<sup>221</sup>

Goodpaster asserted the condition of “being alive” as the necessary and sufficient criterion for moral considerability.<sup>222</sup> Within the sweep of that condition, Goodpaster brought not only all living beings, but also biosystems.<sup>223</sup> The scope of Goodpaster’s moral circle triggered significant debate, similar in many respects to that which was unleashed six years earlier by Christopher Stone with his argument that natural entities such as trees, rivers, and lakes have rights that should be recognized at law.<sup>224</sup> At the time, criticisms were lodged that Goodpaster was merging descriptive and prescriptive realms, while Stone’s proposal was “ludicrous” and “unthinkable.”<sup>225</sup> However, other scholars entered the colloquy and suggested that “mere things” have moral considerableness.<sup>226</sup> This proposition was met with the rejoinder that inanimate things have no “interests” that are capable of being harmed or benefitted.<sup>227</sup>

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217. W. Murray Hunt, *Are Mere Things Morally Considerable?*, 2 ENVTL. ETHICS 59, 60 (1980).

218. Gruen, *supra* note 156, at 7.

219. *Id.* at 9.

220. See generally Stone 1985, *supra* note 16, at 154 (“How, then, can we dismiss out of hand the suggestion that nonpersons can be morally considerate? That some of our actions toward them can be, if not mandatory or impermissible, at least morally welcome or unwelcome.”).

221. *Id.* at 151.

222. Goodpaster, *On Being*, *supra* note 157, at 310, 313, 323.

223. *Id.* at 310, 323.

224. Christopher Stone, *Should Trees Have Standing? Toward Legal Rights for Natural Objects*, 45 S. CAL. L. REV. 450, 456 (1972).

225. Watson, *supra* note 211, at 107 (critiquing claim that living things have a right to exist as deriving value from fact); Luther L. McDougal, Review, *Should Trees Have Standing?*, 49 TUL. L. REV. 265 (1974) (recounting the initial reactions of many readers to Stone’s proposal, as well as to the expansion of legal rights to women, African-Americans, and prisoners).

226. Hunt, *supra* note 217, at 61, 64.

227. Joel Feinberg, *The Rights of Animals and Unborn Generations*, in PHILOSOPHY AND ENVIRONMENTAL CRISIS 51 (William T. Blackstone ed., 1978) (arguing that “a be-

With this background, the article next turns to the subject of consciousness, which may be the “most challenging” source of questions in the field of philosophy.<sup>228</sup> To navigate our way through this heady challenge, I will invite interlocutors from the fields of philosophy and science to offer their insights.

## B. What is / has Consciousness?

Although the consciousness of human beings seems self-evident, the nature of consciousness becomes muddled when considering questions of definition. For example, two human beings have consciousness, but is my consciousness like yours?<sup>229</sup> How culture-bound is consciousness?<sup>230</sup> Moreover, how species-bound is consciousness?<sup>231</sup>

Consciousness is commonly understood to include an awareness of one’s environment and one’s sensations, thoughts, and existence.<sup>232</sup> To evaluate whether and the degree to which beings, entities, and systems in nature may warrant moral consideration, I shall review some scientific findings regarding the awareness, sentience, thinking, and self-consciousness of nature.

The first consideration is an awareness of environment. In a phenomenon called photoconsciousness, single cell organisms such as paramecia exhibit responsiveness to and awareness of their environment.<sup>233</sup> In other words, single cell organisms that lack neurons and synapses still show a responsiveness to their environment that can be considered a type of consciousness.<sup>234</sup> Similarly, the behavior of many insects changes with alteration of their surroundings.<sup>235</sup>

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ing without interests is a being that is incapable of being harmed or benefitted, having no good or ‘sake’ of its own . . . a being without interests has no ‘behalf’ to act in, and no ‘sake’ to act for”).

228. BLACKBURN, *supra* note 18, at 76.

229. *Id.*

230. Krakoff, *supra* note 50, at 421 (observing that human beings’ relationship with nature is “inescapably social”).

231. NASH, *supra* note 5, at 137-38, 153 (relaying Peter Singer’s charge of “speciesism” to those who disagreed with the ethical approach of animal liberation).

232. “Consciousness” is defined as “[t]he state or condition of being conscious,” while “conscious” is defined as “[h]aving an awareness of one’s environment and one’s own existence, sensations, and thoughts.” AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE 400-01 (Anne H. Soukhanov et al. eds., 3d ed. 1992).

233. Jack A. Tuszynski & Nancy Woolf, *The Path Ahead*, in THE EMERGING PHYSICS OF CONSCIOUSNESS 3 (Jack A. Tuszynski ed., 2006).

234. *Id.*

235. *E.g.*, SAHTOURIS, *supra* note 163, at 177.

Insects and animals also demonstrate significant spatial awareness, such as constructing “cognitive maps” of their environment.<sup>236</sup> Bees, for example, create “mental maps” in which they picture where they are in order to navigate in their environs.<sup>237</sup> Lions that stand downwind of prey are not simply aware of the prey, they are also locating themselves in physical space with respect to the prey.<sup>238</sup> Dolphins that are blindfolded can find coins on the bottom of pools.<sup>239</sup> Polar bears “consistently travel directly to aggregations of seals; they return to core denning and breeding areas every year; and they find their way unerringly to the coast from hundreds of miles offshore.”<sup>240</sup> Furthermore, polar bears also take “shortcuts” around areas of bad ice or open water: “To take a shortcut, a creature must have a map in its head of where it is—memory is no help.”<sup>241</sup>

In addition, insects and animals have capacity to locate themselves in social spaces. Animals who become submissive upon the arrival of dominant animals are adapting to social location.<sup>242</sup> For example, chimpanzees and dolphins exhibit keen awareness of the identity and status of other group members; in order to get along, they view themselves in relation to other members of their groups.<sup>243</sup> Many species of animals use ritual dances, warning signals, and fighting behavior to protect homes, nests, and mates.<sup>244</sup> These patterns of behavior operate “like a system of rules for living together in reasonable peace.”<sup>245</sup>

Species of insects also manifest complex social organization skills. A number of insect societies live as highly organized com-

236. Gruen, *supra* note 156, at 3.

237. Education Broadcasting Corporation, *Inside the Animal Mind*; *Nature: Socially Aware* (Education Broadcasting Corporation broadcast 2002), available at <http://www.pbs.org/wnet/nature/animalmind/consciousness.html> [hereinafter *Inside Animal Mind*].

238. Christine M. Korsgaard, Facing the Animal You See in the Mirror 6, Lecture at the Annual Harvard Review of Philosophy Panel: Facing Animals (Apr. 24, 2007), (transcript available at <http://www.hcs.harvard.edu/~hrp/lectures.htm>).

239. The Animal Communication Project, *Dolphins*, <http://acp.eugraph.com/cetaceans/index.html> (last visited Aug. 1, 2007) [hereinafter Animal Communication].

240. BARRY LOPEZ, ARCTIC DREAMS 98 (1986). While their navigation would be remarkable if it were only done on land, polar bears also navigate at sea “where a frozen landscape is created anew each year, where . . . bears may travel for weeks without seeing a break in the continuity of the sharp blue line of the horizon . . .” *Id.*

241. *Id.*

242. Korsgaard, *supra* note 238, at 6.

243. *Inside Animal Mind*, *supra* note 237.

244. SAHTOURIS, *supra* note 163, at 178-79.

245. *Id.* at 179.

munities.<sup>246</sup> In anthills that have been damaged, for example, worker ants go into action to restore the dome and to prevent sunlight from streaming into the “cortex of cool, dark tunnels,” while soldier ants guard the workers and the nest.<sup>247</sup> Phenomena such as this puzzle scientists, who ask how commands are relayed from the queen: “How was it that termites everywhere could build such marvellously complex structures with underground gardens, sophisticated ventilation systems, and a staggering degree of social organisation?”<sup>248</sup> Without question, single-cell beings, insects, and mammals all exhibit types of “consciousness” of their environment.

The second consideration is awareness of sensation. In response to bodily injuries, many animals express pain responses such as squealing, cowering, nursing injuries, and learned avoidance.<sup>249</sup> In describing the pain of a harpoon strike on a bowhead whale, the harpooner reported that the whale “dived so furiously that it took out 1200 yards of line in three and a half minutes before crashing into the ocean floor, breaking its neck and burying its head eight feet deep in blue-black mud”.<sup>250</sup>

Moreover, mammals are not the only beings that have capacity for pain. There is evidence that fish suffer from pain and that even insects may, as well.<sup>251</sup> In addition, mice have demonstrated signs of empathy when other mice with whom they have lived are injured.<sup>252</sup>

Despite the teachings of Utilitarians, avoidance of pain is not the only thing that is relevant to animals.<sup>253</sup> As “complex centers of subjectivity,” many animals not only experience pain and pleasure, but also “fear and hunger, joy and grief, attachments to par-

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246. *Id.* at 181-82.

247. CULLINAN, *supra* note 2, at 25.

248. *Id.*

249. Colin Allen, *Animal Consciousness*, STAN. ENCY. OF PHIL. 14 (2006), available at <http://plato.stanford.edu/entries/consciousness-animal>; see also Patricia Herzog, Facing Animals at Harvard, Lecture at the Annual Harvard Review of Philosophy Panel: Facing Animals (Apr. 24, 2007), (transcription available at <http://www.hcs.harvard.edu/~hrp/lectures.htm> (viewing experiments on animals that cause severe pain as torture under The United Nations Convention Against Torture)).

250. LOPEZ, *supra* note 240, at 4 (relaying the 1856 account of a harpooner aboard the *Truelove*).

251. THOMAS EISNER, FOR LOVE OF INSECTS 249-53 (2003); Korsgaard, *supra* note 238, at 4.

252. Martha Nussbaum, Facing Animal Complexity 4-5, Lecture at the Annual Harvard Review of Philosophy Panel: Facing Animals (Apr. 24, 2007), (transcription available at <http://www.hcs.harvard.edu/~hrp/lectures.htm>).

253. *Id.* at 8.

ticular others, curiosity, fun and play, satisfaction and frustration, and the enjoyment of life.”<sup>254</sup> Chimpanzees experience intense grief at the loss of their children and mothers.<sup>255</sup> Elephants, coyotes, killer whales, and dogs also mourn the loss of a member of their groups.<sup>256</sup> It is not only domesticated animals who play. Young muskox calves chase each other through their herds and play “king of the mountain,” perching on tussocks like mountain goats.<sup>257</sup> Adult muskoxen, who are generally “stolid” in demeanor, also “seem to delight” in romping through creeks and rivers in Arctic summers.<sup>258</sup> Indeed, an abundance of animals experience “joy, playfulness, and a great deal of sex.”<sup>259</sup>

The third, somewhat overlapping consideration is capacity for thought. Humans and other animals have many neurological similarities and “share the same basic brain anatomy,” which is why so many experiments of relevance to human pain and disease are conducted on mice and other animals.<sup>260</sup> Animals engage in a wide range of communication, from toadfish who hum to attract mates, cuttlefish who control the pigment in their skin and flash messages in colorful splotches, male spiders who pluck mating songs on the strings of a female’s web, and frogs who signal their species and availability for mating with different decibels and “dialects” of calls.<sup>261</sup> Caterpillars and ants engage in cross-species protective communication through vibrations.<sup>262</sup> Honeybees use a complex symbolic communication system of distance and direction to pollen sources through dances resembling the “hootchy-kootchy.”<sup>263</sup>

Not only do animals and insects engage in simple to sophisticated modes of communication, those who inhabit the air and the sea also show a capacity to “think in three dimensions,” something

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254. Korsgaard, *supra* note 238, at 3.

255. Gruen, *supra* note 156, at 2.

256. *Id.* at 2-3; *see also* Nussbaum, *supra* note 252, at 4.

257. LOPEZ, *supra* note 240, at 60.

258. *Id.*

259. Gruen, *supra* note 156, at 3.

260. Allen, *Animal Consciousness*, *supra* note 249, at 12.

261. *See generally* The Animal Communication Project, <http://www.acp.eugraph.com> (last visited May 24, 2008), *supra* note 239 (discussing Fish and Sound, Cephalopods, Web-Spinning Spiders, and Frog Calls).

262. *Id.*

263. “They would hootchy-kootchy in a straight line, then circle back to the beginning—first circling left, then right.” *Id.* (relating that the speed of honeybees’ waggle and the angle of the line communicated distance and direction to sources of nectar).

that terrestrial humans don't often do.<sup>264</sup> Among animals who engage in complex problem-solving, female polar bears make denning decisions based on the unique food and weather circumstances of each season.<sup>265</sup> In constructing maternity dens, bears learn from the mistakes of the past so that the exchange of gases in the dens, conservation of heat, and expansion of the dens for the cubs are done more proficiently.<sup>266</sup> When they encounter predators or obstacles, leaders of muskox herds display motive, invention, and knowledge of other animals' personalities in making decisions about herd movement.<sup>267</sup>

Yet, little of the foregoing indicia of consciousness in animals reflects the fourth consideration, capacity for *self*-consciousness.<sup>268</sup> Human self-consciousness has sometimes been described in terms of a theater of experience and thoughts where there is an "I," or a self, who is the spectator of the theater.<sup>269</sup> While such a description may seem to capture aspects of human self-consciousness, consider how it also reflects limitations. In human consciousness that dominates western developed societies, many human beings have an awareness of living "in a linear past, present, and future, in which there is cause and effect."<sup>270</sup> The spectator sits in her theater, comfortably watching the linear reel of her life go past while the clock on her wrist counts out the time that is marching by.

Quantum theory challenges what we think we know about consciousness.<sup>271</sup> Instead of the metaphor of a spectator-in-a-theater, consciousness may be better described in terms of a "relatively undirected whirl of cerebral activity."<sup>272</sup> Moreover, the subject-object view of reality is undermined by quantum theory, as are classical views of cause and effect.<sup>273</sup> Instead of a mechanical universe

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264. LOPEZ, *supra* note 240, at 20.

265. *Id.* at 89-90.

266. *Id.* at 90.

267. *Id.* at 63.

268. NASH, *supra* note 5, at 140; *see also* Allen, *Animal Consciousness*, *supra* note 249, at 3 (noting the controversy surrounding self-consciousness in animals, focusing primarily on chimpanzees and, to a lesser extent, other great apes).

269. BLACKBURN, *supra* note 18, at 77.

270. SAHTOURIS, *supra* note 163, at 180.

271. ROSENBLUM, *supra* note 175, at 3.

272. BLACKBURN, *supra* note 18, at 77.

273. For example, a simplified version of a thought experiment in which a cat is placed in a box with poison suggested that the cat is both alive and dead until the box is opened and the cat is observed. Tuszynski, *supra* note 233, at 4-5 (discussing an experiment by quantum theorist Erwin Schrödinger). In other words, consciousness is not observing reality; consciousness is selecting reality. *Id.* at 5.

composed of independent elements that are spatially separated, physicists observe patterns of organic energy that appear as a network of relations.<sup>274</sup>

Some scientists propose that quantum theory has “encountered consciousness.”<sup>275</sup> Experiments in quantum mechanics undermine western views of the mind and a reality that is “out there.”<sup>276</sup> In some experiments, for example, quantum theory suggests that consciousness does not perceive reality, but instead plays some role in creating it.<sup>277</sup> Moreover, in quantum experiments on particles and waves, the findings suggest that there are not clear distinctions between motion and matter.<sup>278</sup> Consequently, distinctions between mind and matter may also be blurred.<sup>279</sup> In an ecological model, “hard lines cannot be drawn between matter and energy, the organic and the inorganic, the mind and the body, human beings and other forms of life.”<sup>280</sup>

To acknowledge the limitations of our understanding of consciousness, a companion step is to consider that other species in nature may be endowed with capacities that count as forms of consciousness. There are distinct forms of “species consciousness” that seem to have evolved gradually and that have become more complex in species with bigger brains, such as the cetaceans.<sup>281</sup>

274. CAPRA, *supra* note 176, at 1330. To quantum theorists, the universe does not exist in physical, deterministic form, but rather according to principles of uncertainty and probability. *E.g.*, Jan Hilgevoord & Jos Uffink, *The Uncertainty Principle*, STAN. ENCY. OF PHIL. 1-2, 10 (2006), available at <http://plato.stanford.edu/entries/qt-uncertainty> (discussing Werner Heisenberg’s Uncertainty Principle that, unlike classical physics, denies that simultaneous values can be assigned to physical qualities as, for example, the position and momentum of an electron: “the more precisely the position (momentum) of a particle is given, the less precisely can one say what its momentum (position) is”).

275. ROSENBLUM, *supra* note 175, at 5; see also CAPRA, *supra* note 176, at 321 (suggesting that “consciousness may be an essential aspect of the universe”).

276. ROSENBLUM, *supra* note 175, at 4.

277. *E.g.*, Manjit Kumar, *Quantum Reality* 5 (1999), <http://www.prometheus.demon.co.uk/02/02kumar.htm> (discussing Neils Bohr’s interpretation of wave-particle duality that suggests “observation constructs reality”); see also CAPRA, *supra* note 176, at 331 (noting the epistemological premise drawn from quantum physics that observer and observed cannot be separated).

278. Kumar, *supra* note 277, at 2-5 (tracing physicists’ understandings of light as a wave phenomenon, light as composed of particles, and light as having a dual particle-wave character); see also Hilgevoord, *supra* note 274, at 14-15 (discussing experimental evidence that light and matter “demand a wave picture in some cases, and a particle picture in others”).

279. CAPRA, *supra* note 176, at 320 (relaying views of mind and matter as “interdependent and correlated”).

280. McFAGUE, *supra* note 8, at 11.

281. SAHTOURIS, *supra* note 163, at 176.



Dolphins not only have a complex language system, they also have personal names, create distinctive whistles, and recognize themselves in mirrors, suggesting that they have a “self” with whom they identify.<sup>282</sup> In mirror experiments with an Asian elephant, “Happy,” in which her head was marked with a visible X, Happy studied her reflection in the mirror and then scrubbed the mark with her trunk.<sup>283</sup> Researchers concluded that Asian elephants, along with apes and humans, are capable of forming a conception of the self.<sup>284</sup> Some animals, then, are manifestly aware of their own subjectivity.<sup>285</sup>

Furthermore, a number of philosophies have long recognized that animals have souls. Early in European thought, the term *anima* was held to mean a living or animated being.<sup>286</sup> Consequently, the word *animal* “will forever indicate an *ensouled* being.”<sup>287</sup> Monarch butterflies, that are called *las palomas* by people in Mexico, are considered to be “the souls of children who died during the past year, fluttering on their way to heaven.”<sup>288</sup> Animals are viewed as sacred beings by many cultures: “The singing of the whales has become for many people a paradigmatic experience of the sacred, an encounter with another species living in a totally different medium, suddenly known as a kin rather than as a stranger.”<sup>289</sup>

Although there is abundant evidence that insects and animals possess qualities of awareness of environment, sensation, thought, and subjectivity to qualify as consciousness, some philosophers point to a key distinction. Due to the reflective structure of our consciousness, only humans are capable of normative self-consciousness.<sup>290</sup> With normativity, human beings are able to step back from our desires and ask ourselves whether the desires are

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282. *Id.*; Animal Communication, *supra* note 239 (noting that dolphins develop individual whistles and learn the “signature whistles of every other dolphin in the group”); *Inside Animal Mind*, *supra* note 237.

283. Nussbaum, *supra* note 252, at 3.

284. *Id.*

285. Korsgaard, *supra* note 238, at 6 n.4.

286. BERRY, EVENING, *supra* note 61, at 40; *see also* HENRY DAVID THOREAU, WALDEN 117 (Brooks Atkinson ed., Random House 1992) (1854) (describing whip-poor-wills chanting vespers).

287. BERRY, EVENING, *supra* note 61, at 40.

288. DIANE ACKERMAN, THE RAREST OF THE RARE, *as reprinted in* BRUSSAT, *supra* note 173, at 205.

289. BRUSSAT, *supra* note 173, at 170 (quoting writer Catherine Bateson).

290. *E.g.*, Gruen, *supra* note 156, at 43; Korsgaard, *supra* note 238, at 7-8.

reasons for action.<sup>291</sup> In contrast, animals do not seem to have the capacity to evaluate reasons for decisions and actions.<sup>292</sup> It is on this basis that some moral philosophers have ruled out moral consideration for animals.<sup>293</sup>

However, a number of members of the human species—infants and persons with cognitive disabilities—do not have the capacity for rational self-reflection. Such incapacity does not disqualify these human beings from moral standing.<sup>294</sup> Consequently, requiring normative self-reflective consciousness as the basis for moral consideration has been criticized as reflecting underlying “speciesism.”<sup>295</sup>

Approached from another perspective, however, it is possible to consider human self-consciousness as “the most recent achievement of the immense evolutionary journey.”<sup>296</sup> Human consciousness is the latest evolutionary event, through which Earth “becomes conscious of itself in a special mode of reflective self-awareness.”<sup>297</sup> In other words, human consciousness may be thought of as an evolutionary gift, opening into a type of consciousness in which Earth, through one of its species, is able to reflect on itself.<sup>298</sup> Far from a barrier to the moral community, human consciousness is an evolutionary blessing—an “experiment”—to be shared as self-understanding with the Earth community.<sup>299</sup>

To shift into consideration of natural matter—or nature that is not animal and not “alive”—what qualities does natural matter evince that may affect moral consideration?<sup>300</sup> In many accounts,

291. Gruen, *supra* note 156, at 43.

292. *Id.* at 4.

293. *Id.*

294. *Id.* at 5.

295. NASH, *supra* note 5, at 138 (referring to philosopher and activist Peter Singer); see also Gruen, *supra* note 156, at 2 (arguing that species membership is morally irrelevant (like being born male or Malaysian) and should not be the controlling criterion for moral standing).

296. BERRY, EVENING, *supra* note 61, at 71.

297. *Id.*

298. *Id.*; see also LOVELOCK, *supra* note 8, at xiv (proposing that humans are, “through our intelligence and communication, the nervous system of the planet”).

299. SAHTOURIS, *supra* note 163, at 311.

300. Andrew Brennan, *The Moral Standing of Natural Objects*, 6 ENVTL. ETHICS, at 35, 39, 52, 64 (Spring 1984) (discussing moral consideration of “nonliving existents” such as deserts, mountains, rocky crests, and oceans). While I focus on the moral considerability of natural entities, philosophers have accorded cultural objects such as artwork some level of moral respect. *Id.* at 44-48 (noting that Hegel attributed higher value to art than to nature). Christopher Stone posited that the question is less about

nonliving natural objects are denied moral standing because they are considered to lack any interests that are capable of being harmed or benefitted.<sup>301</sup> That natural entities may not currently hold cognizable legal interests should not be confused with moral interests.<sup>302</sup> And, while things in nature may not have preferences or capacity to express preferences, they may have interests not currently appreciated by human beings, who may be smuggling human preferences into moral valuing.<sup>303</sup> To apply Goodpaster's framework, moral considerableness for things in nature may exist as a *regulatory* matter, despite the inability (or moral insensitivity) of humans to perceive it.<sup>304</sup>

Things in nature have interests in being.<sup>305</sup> A lake has an interest in existing as a healthy part of the Earth community and, consequently, in "whether it is clear and full of fish or muddy and lifeless."<sup>306</sup> To those who object that such formulation derives value from fact, in violation of Hume's invocation,<sup>307</sup> I agree that the ways of nature (the "is") do not "translate so directly or easily into the 'ought' of human ethical norms."<sup>308</sup> In addition, I offer an approach of Thomas Berry:

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the qualities of the moral entity and more about the nature of the good. Stone 1985, *supra* note 16, at 47.

301. *E.g.*, Feinberg, *supra* note 227, at 51.

302. Stone 1985, *supra* note 16, at 38-39. Also, that human beings are morally considerable does not negate the moral considerateness of other beings and entities. Gruen, *supra* note 156, at 7 ("Being morally considerable is like showing up on a radar screen—how strong the signal is or where it is located on the screen are separate questions.")

303. Stone 1985, *supra* note 16, at 28, 31.

304. Goodpaster, *On Being*, *supra* note 157, at 311. Note, however, that Goodpaster drew the line of moral considerability at "being alive." Kenneth E. Goodpaster, *On Stopping at Everything: A Reply to W.M. Hunt*, 3 ENVTL. ETHICS, FALL 1980, at 281, 284 (Fall 1980) [hereinafter Goodpaster, *Reply*].

305. Hunt, *supra* note 217, at 61.

306. Stone 1985, *supra* note 16, at 26, 41 (discussing legal consideredness, in which the lake is characterized as indifferent, but also noting that the law may presume a particular state of the lake to be its protected state).

307. *E.g.*, Watson, *supra* note 211, at 107. The problem of the "is - ought" was expressed by Hume as follows: "In every system of morality . . . the author proceeds for some time in the ordinary ways of reasoning . . . when all of a sudden I am surprised to find, that instead of the usual copulations of propositions, *is*, and *is not*, I meet with no proposition that is not connected with an *ought*, or an *ought not*. For as this *ought*, or *ought not*, expresses some new relation or affirmation, 'tis necessary that it should be observed and explained . . . ." DAVID HUME, A TREATISE OF HUMAN NATURE III.I.I.26 (David Fate Norton & Mary J. Norton eds., Clarendon Press 2000) (1739).

308. FREYFOGLE, *supra* note 6, at 59.

While the nonliving world does not have a living soul as a principle of life, each member of the nonliving world does have the equivalent as its inner principle of being. This is an inner form that communicates a power, an enduring quality, and a majesty that even the living world cannot convey. In a more intimate way the nonliving world provides the mysterious substance that transforms into life.<sup>309</sup>

This kind of thinking challenges the dualisms of spirit vs. matter, subject vs. object, and culture vs. nature that have constructed ethical, theological, and philosophical barriers between human beings and the rest of nature.<sup>310</sup>

Without doubt, natural matter has the capacity to organize itself.<sup>311</sup> There is observable continuity between living and nonliving matter, as the same atoms are passed back and forth between animate and inanimate states.<sup>312</sup> Furthermore, matter may also have attributes of consciousness, by also operating as a wave at a sub-atomic level.<sup>313</sup> Finally, and from a different perspective, even if an entity is held to lack "interests," that should not foreclose the entity from moral consideration.<sup>314</sup>

However, looking at the moral issue from the bottom-up misses the lessons that may be drawn from the top-down.<sup>315</sup> From this vantage point, the question arises of the moral considerableness of Earth as a whole. This question may be appreciated through the lens of Gaia theory.

### C. Gaia Theory: The Hills Are Alive

Gaia theory was developed by scientist James Lovelock in the early 1980s to articulate a "view of the Earth as a self-regulating system" that is composed of all of Earth's organisms, the surface

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309. BERRY, EVENING, *supra* note 61, at 40; *see also* NASH, *supra* note 5, at 65-66 (discussing the views of Russian philosopher Peter D. Ouspensky, a contemporary of Aldo Leopold, that nothing is dead in nature and that the universe has both a phenomenal appearance and a noumenal essence).

310. SHARON THERESE ZAYAC, O.P., EARTH SPIRITUALITY: IN THE CATHOLIC AND DOMINICAN TRADITIONS 45, 50-51 (June 2003); *see also* McFAGUE, *supra* note 8, at 4, 8.

311. *E.g.*, SAHTOURIS, *supra* note 163, at 33-34; CULLINAN, *supra* note 2, at 87.

312. SAHTOURIS, *supra* note 163, at 118; CULLINAN, *supra* note 2, at 146.

313. Hilgevoord, *supra* note 274, at 14-15; CAPRA, *supra* note 176, at 331; BERRY, GREAT WORK, *supra* note 6, at 25-26 (describing mind and matter as "two dimensions of the single reality that comes into being in an immense diversity of expression throughout the universe").

314. Stone 1985, *supra* note 16, at 53-54.

315. FREYFOGLE, *supra* note 1, at 57.

rocks, the ocean, and the atmosphere.<sup>316</sup> Named after the goddess of Greek mythology,<sup>317</sup> "Gaia" is the 100-mile spherical shell of land and water that surrounds the incandescent interior of Earth as well as the atmosphere surrounding it.<sup>318</sup> According to Gaia theory, the self-regulating system of Earth has a goal: "the regulation of surface conditions so as always to be as favourable as possible for contemporary life."<sup>319</sup>

Through Gaia theory, Lovelock looked upon Earth as though, metaphorically, it were alive in that it regulates its climate and the composition of its surface to accommodate the inhabiting forms of life.<sup>320</sup> As Gaia theory began circulating, some New Age travelers jumped on the bandwagon, causing some "otherwise sensible scientists" to jump off.<sup>321</sup> However, when the central idea of Gaia theory was articulated in the 2001 Amsterdam Declaration on Global Change, many scientists jumped back on.<sup>322</sup> The Amsterdam Declaration stated: "The Earth system behaves as a sin-

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316. LOVELOCK, *supra* note 8, at 162. The predecessor to Gaia theory was the Gaia hypothesis, developed in the early 1970s, to postulate that Earth keeps its surface conditions favorable for its present life-forms. *Id.* at 162. That hypothesis deviated from conventional Darwinian wisdom that "life adapted to planetary conditions as it and they evolved in their separate ways." *Id.* at 23, 162. Over the span of ten years, the hypothesis matured into a theory in which "Gaia was the whole system—organisms and material environment coupled together—and it was this huge Earth system that evolved self-regulation, not life or the biosphere alone." *Id.* (noting, too, that conventional wisdom evolved into "Earth Systems Science," which differs from Gaia theory chiefly in the recognition by the latter that "self-regulation requires a goal").

317. "[T]he name Gaia was never intended to suggest that the Earth is a female being, the reincarnation of the Great Goddess or Mother Nature herself, nor to start a new religion. . . . It was intended simply to designate the concept of a live Earth, in contrast to an Earth with life on it." SAHTOURIS, *supra* note 163, at 5.

318. LOVELOCK, *supra* note 8, at 15.

319. *Id.* at 162; see also Fred P. Bosselman & A. Dan Tarlock, *The Influence of Ecological Science on American Law: An Introduction*, 69 CHI-KENT L. REV. 847, 848, 869 (1994) (tracing the history of ecology's influence on law and noting the displacement of the equilibrium model of ecosystems with a non-equilibrium understanding in which "[c]hange and instability are the new constants").

320. LOVELOCK, *supra* note 8, at xiii; see also BERRY, *GREAT WORK*, *supra* note 6, at 170 ("This story of the emergent universe is now our dominant sacred story."); HENRY DAVID THOREAU, 3 THE WRITINGS OF HENRY THOREAU 165 (Bradford Torrey ed., 1906) ("The earth I tread on is not a dead, inert mass; it is a body, has a spirit, is organic and fluid to the influence of its spirit.").

321. LOVELOCK, *supra* note 8, at xvi.

322. *Id.*; see also Berrien Moore, III, et al., *The Amsterdam Declaration on Global Change*, available at [http://www.sciconf.igbp.kva.se/Amsterdam\\_Declaration.html](http://www.sciconf.igbp.kva.se/Amsterdam_Declaration.html) (last visited Sept. 18, 2007).

gle, self-regulating system, comprised of physical, chemical, biological and human components.”<sup>323</sup>

As a self-regulating system, for example, the Earth continually renews and adjusts the balance of chemicals in the atmosphere, oceans, and soil.<sup>324</sup> The chemical composition of the atmosphere is 78 percent nitrogen, 21 percent oxygen, 0.9 percent argon, and 0.03 percent carbon dioxide.<sup>325</sup> That percentage of oxygen is perfect for life—above 21 percent would increase the prevalence of fires.<sup>326</sup>

The planetary regulation of temperature is another instance of a self-regulating system of Earth. For example, after discussing complex planetary systems, the National Aeronautics and Space Administration noted: “These remarkable factors have contributed to Earth’s maintaining a temperature range conducive to the evolution of life for billions of years. The great circulation systems of Earth—water, carbon and the nutrients—replenish what life needs and help regulate the climate change.”<sup>327</sup> Even NASA recognized that the mechanical view of the planet as “Spaceship Earth” was an inappropriate metaphor.<sup>328</sup>

Due to the regulation of chemistry and climate by which Earth has kept its biosphere habitable for life for over three billion years, Lovelock considered Gaia to be a “physiological system” made up of animate and inanimate parts.<sup>329</sup> Other scientists have noted the Earth system as an “autopoietic” process that is self-producing and self-creating.<sup>330</sup> Pointing to this kind of scientific

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323. Amsterdam Declaration, *supra* note 322; see also LOVELOCK, *supra* note 8, at xvi.

324. SAHTOURIS, *supra* note 163, at 5; see also Stern, *supra* note 63, at xi (discussing the absorption capacity of Earth, five gigatonnes of carbon dioxide equivalent (5 GtCO<sub>2</sub>e), which is being greatly exceeded by current annual emissions).

325. Dennis L. Derr, *Air, Gases in the Atmosphere* (2007), [http://encarta.msn.com/text\\_1741500785\\_\\_\\_0/Air.html](http://encarta.msn.com/text_1741500785___0/Air.html) (noting that “the remaining 0.07 percent is a mixture of hydrogen, water, ozone, neon, helium, krypton, xenon, and other trace components”).

326. LOVELOCK, *supra* note 8, at 20 (also advising that “[b]elow 13 percent there are no fires”).

327. National Aeronautics and Space Administration, *Earth Science Enterprise Strategy 7* (Oct. 1, 2003), available at [http://science.hq.nasa.gov/strategy/ESE\\_Strategy2003.pdf](http://science.hq.nasa.gov/strategy/ESE_Strategy2003.pdf).

328. Chris Jones, *1960s’ Man Behind the Dome: Inventor-Guru Buckminster Fuller Inspires One-Man Show*, CHI. TRIB., Feb. 9, 2001, at C5 (reviewing show about Buckminster Fuller, who popularized “Spaceship Earth”); see also BERRY, GREAT WORK, *supra* note 6, at 26 (observing a “new poetic splendor” among astronauts who “came home stunned with the immensity and beauty” of Earth).

329. LOVELOCK, *supra* note 8, at 15.

330. SAHTOURIS, *supra* note 163, at 33, 39-40; CULLINAN, *supra* note 2, at 86.

approach, some philosophers have asserted that Earth, as a whole, possesses qualities necessary and sufficient for moral consideration.<sup>331</sup> Moreover, morally-considerable consciousness may not be narrowly drawn. Qualities such as creativity and capacity for self-ordering and -regulating may warrant, as an epistemological matter, moral consideration.<sup>332</sup>

From a holistic perspective, humanity is just one part of a much grander whole: "the rocks and waters, atmosphere and soil, plants, animals, and human beings interact in dynamic, mutually supportive ways that make all talk of atomistic individualism indefensible."<sup>333</sup> Taking a holistic moral stance means regarding the relationships among the Earth community's component parts as well as to the whole as ethical relationships.<sup>334</sup> Human beings are ethically bound to give moral regard to all members of the Earth community.<sup>335</sup>

Holistic approaches have been criticized on several fronts, including the lack of consciousness and sentience of "the whole" and the illusory harmony of holism.<sup>336</sup> While, like all ethical claims, holism has its recessive weaknesses, many holistic philosophers also recognize conflict—the "tooth-and-claw" of predator relationships—as part of the unity of Earth.<sup>337</sup> Moreover, Earth might be a single reality, but it is composed of immense diversity, based on an emergent, creative nature that is supported by its underlying tendency of differentiation.<sup>338</sup> As recognized by Thomas Berry, "[t]he universe has a violent as well as harmonious aspect, but is

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331. *E.g.*, NASH, *supra* note 5, at 157 (discussing Gaia theory, which "implied that the planet possessed the traditional requirements for ethical considerability").

332. BERRY, *GREAT WORK*, *supra* note 6, at 26, 31 (noting a tendency in the universe toward self-organization at every level—physical, biological, and reflexive-consciousness); SAHTOURIS, *supra* note 163, at 310-11 (describing Gaian system as "intelligent").

333. McFAGUE, *supra* note 8, at 8.

334. NASH, *supra* note 5, at 67 (discussing Leopold's land ethic).

335. BERRY, *GREAT WORK*, *supra* note 6, at 105 (advising that "[w]hen we discuss ethics we must understand it to mean the principles and values that govern [the] comprehensive community," referring to the Earth community).

336. In a taxonomy of non-anthropocentric ethical approaches, Susan Emmenegger identified holism, physiocentrism, biocentrism, and ecocentrism, and cited biocentrism as the preferable approach because it recognizes diversity, equality, and competition among living entities. *E.g.*, Emmenegger, *supra* note 26, at 577-78 (noting, too, that "[i]n holism, there is only one interested entity, the world, with only one unitary interest; situations of conflicting interests are impossible").

337. BERRY, *EVENING*, *supra* note 61, at 52, 145 (noting the "creative disequilibrium" and violent aspects of the universe); *but see* NASH, *supra* note 5, at 134 (referring to Mark Sagoff's criticism of notions of equality in nature).

338. BERRY, *GREAT WORK*, *supra* note 6, at 26, 31, 169.

consistently creative in the larger arc of its development.”<sup>339</sup> That arc, to Berry, also is one of “intimacy” between Earth and its component parts.<sup>340</sup>

Furthermore, in this metaethical approach, no one moral language (or consideration of the good, such as that based on anthropocentric welfare) blocks consideration of other moral claims. Moral decision-making is enhanced when perspectives on the good, the fitting, and the truth of moral claims of beings, things, and systems are included.<sup>341</sup> Thoughtfulness in moral consideration is also aided where the moral frame is widened and given texture by using faculties of memory, intuition, empathy, imagination, and contemplation.<sup>342</sup> Given the limits of human understanding, the appropriate epistemological stance for engaging the truth claims of Earth and other morally considerable beings, entities, and systems is humility.<sup>343</sup>

Adjudicating conflicts between and among individuals, entities, habitats, and groups is at the heart of the ethical enterprise. To give guidance to that endeavor, the article moves into a discussion of the next moral question: “what is right?”

## V. WHAT IS RIGHT?: THE “OUGHT” OF MORAL AGENTS

*The cold view to take of our future is that we are therefore headed for extinction in a universe of impersonal chemical, physical, and biological laws. A more productive, certainly more engaging view, is that we have the intelligence to grasp what is happening, the composure not to be intimidated by its complexity, and the courage to take steps that may bear no fruit in our lifetimes.*<sup>344</sup>

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339. BERRY, EVENING, *supra* note 61, at 145.

340. Distance, coupled with intimacy, reflects the integrity of the universe. BERRY, GREAT WORK, *supra* note 6, at 98 (“There is such a thing as considering the curvature of space as an intimacy of the universe with every being in the universe.”).

341. Potter 1986, *supra* note 10, at 115, 125.

342. Stone 1985, *supra* note 16, at 31 (noting the capacity of intuition “to provide us with coherent notions about the essence of things”); LOPEZ, *supra* note 240, at 13 (considering the influence of landscape on imagination); CULLINAN, *supra* note 2, at 205 (pleading for governance with “a quality of depth, connection, and emotional and intellectual substance” that is known as “soul”).

343. THICH NHAT HAHN, BEING PEACE 34 (1987) (“We are not capable of understanding each other, and that is the main source of human suffering.”); Thomas Berry, Foreword in CULLINAN, *supra* note 2, at 15 (“It is time to replace our arrogance toward the Earth with a becoming humility.”).

344. LOPEZ, *supra* note 240, at 52.



Major approaches to explicate the “right” in moral discourse include natural law<sup>345</sup> and natural rights,<sup>346</sup> Aristotelian virtue ethics,<sup>347</sup> and Kantian deontology.<sup>348</sup> The deontological question of what is right is a different moral question than the question of the good, which is a teleological inquiry, than the fitting, which is a relational question, and than the true, which is an epistemological and ontological issue.<sup>349</sup> As a moral language, deontology also orients toward responsibilities of moral agents.<sup>350</sup>

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345. ST. THOMAS AQUINAS, *SUMMA THEOLOGICA*, pt. 2, question 9, art. 2, as reprinted in MELDEN, *supra* note 29, at 192-97 (distinguishing among eternal, divine, natural, and human law and arguing that “all things partake in some way in the eternal law”); CULLINAN, *supra* note 2, at 74, 84-92 (proposing that Earth Jurisprudence is derived from and consistent with the “Great Jurisprudence,” which “is manifest in the universe itself”). Some proponents of natural law assert that no external referent for the validation of natural law is possible or necessary, exposing its regressive edge of biological determinism, which has been oppressive to outsider groups. *E.g.*, Mary Hawkesworth, *Confounding Gender*, 22 *SIGNS* 649, 680-81 (critiquing the “natural attitude” toward gender and its links to “an ideology of procreation”). Thomas Berry points to Earth, itself, as the referent for human affairs. BERRY, *EVENING*, *supra* note 61, at 81, 84.

346. John Locke, *The Second Treatise of Government*, as reprinted in GEORGE C. & PATRICK H. MARTIN, *JURISPRUDENCE* 239, 240-44, 255-57 (2d ed. 1995) (reasoning that men were “by nature free, equal, and independent” and possessed natural rights of life, liberty, and estate which preceded society); see also DORE, *supra* note 11, at 336-343. Since the advent of critical legal studies, a significant critique has gone forward of rights-based approaches, including their representing “state-sponsored bone-tossing,” being defined by the prevailing political sensibility, and being “reified” and deflecting attention away from the necessity for social and political restructuring. *E.g.*, HAYMAN, *supra* note 111, at 403-04. In their vision of Earth Jurisprudence, Thomas Berry and Cormac Cullinan embrace a wider notion of rights, reflecting the principle that humans and natural entities “are entitled to fulfill their role within the Earth Community.” CULLINAN, *supra* note 2, at 108, 110 (quoting Thomas Berry at the Airlie meetings in April 2001 and noting limitations of language and legal thinking); BERRY, *EVENING*, *supra* note 61, at 149 (noting, as part of “Ten Principles for Jurisprudence Revision” that “[e]very component of the Earth community, both living and nonliving has three rights: the right to be, the right to habitat or a place to be, and the right to fulfill its role in the ever-renewing processes of the Earth community.”).

347. NICOMACHEAN ETHICS, *supra* note 102, at 33-34 (proposing that virtues are “preserved by the mean” between deficiency and excess).

348. RHODE, *supra* note 14, at 23-24 (discussing Immanuel Kant and deontological ethical theory, in which “actions are morally right when they conform to a universal, generalizable principle of obligation, irrespective of their consequences”).

349. *Id.*; see also Potter 1979, *supra* note 10, at 146-47 (arguing that different moral languages have contrasting sets of “logic, criteria or adequacy, prospect of criticism, and possibility of ‘improvement’”).

350. Onora O'Neill, *Commentary on Kant's Theory*, as reprinted in MORTIMER D. SCHWARTZ ET AL., *PROBLEMS IN LEGAL ETHICS* 24 (7th ed. 2005) (observing that Kant's theory is one of “human obligations; therefore it is wider in scope than a theory of human rights”).

In this section of the article, I will take a distinctly normative turn and ask the perennial ethical question, “how ought we to live?”<sup>351</sup> In other words, how ought moral agents act in contested matters involving nature and humanity?<sup>352</sup> One pressing site of global conflict is formed by biotechnology and genetically modified seed.<sup>353</sup> To consider the roles of nature and moral agents in that conflict, I shall first provide an overview of moral responsibility, followed by a survey of genetic modification of food, the conflicts implicated in monoculture, and moral responsibility to and for nature.

### A. Moral Responsibility

Arising out of the notion of free will, moral agency is the condition of being able to choose one’s action.<sup>354</sup> In an Aristotelian sense, moral agency has both cognitive and affective components, providing moral agents with the capacity for choosing how to think and how to feel.<sup>355</sup> From a Kantian perspective, freedom is the basis for morality.<sup>356</sup> Consequently, the correlative of free will for a moral agent is moral responsibility.<sup>357</sup>

In classical Kantian ethics, moral agency is viewed as an individual matter.<sup>358</sup> However, in this section of the article, I will widen the frame of moral agency to include collective entities. Because a group is capable of purposive action and grave harm, I propose that it is just to hold groups morally responsible for their wrongs.<sup>359</sup> Moral responsibility of groups is especially cogent in an

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351. Potter 1986, *supra* note 10, at 111; *see also* FREYFOGLE, *supra* note 6, at 15, 38.

352. Stephen R. Perry, *Loss, Agency, and Responsibility for Outcomes: Three Conceptions of Corrective Justice*, in JOEL FEINBERG & JULES COLEMAN, *PHILOSOPHY OF LAW* 439, 442 (2000) (defining the “Kantian / Hegelian understanding of moral agency” in terms of self-determining agents governed by normativity, which inheres in the concept of free will).

353. *E.g.*, Dov Fox, *Safety, Efficacy, and Authenticity: The Gap Between Ethics and Law in FDA Decisionmaking*, 2005 MICH. ST. L. REV. 1135, 1139, 1192 (2005) (noting unexamined questions as to whether and how genetic engineering may threaten the moral status of nature in the approval process of the Food and Drug Administration).

354. Perry, *supra* note 352, at 442.

355. DIANA FRITZ CATES, *CHOOSING TO FEEL: VIRTUE, FRIENDSHIP, AND COMPASSION FOR FRIENDS* 12-13 (1997) (discussing Aristotle’s definition of character virtue).

356. HAYMAN, *supra* note 111, at 8.

357. *Id.*

358. Marion Smiley, *Collective Responsibility*, STAN. ENCY. OF PHIL. 14 (2005), available at <http://plato.stanford.edu/entries/collective-responsibility>.

359. *Id.* at 9; *see also* Alasdair MacIntyre, *Social Structures and Their Threats to Moral Agency*, 74 PHIL. 311, 329 (July 1999), available at <http://www.royalinstitutephilosophy.org/articles> [hereinafter MacIntyre, *Social Structures*] (discussing imputation of responsibility beyond individuals to social and cultural order).

ethical discourse about nature because the most significant decisions are being made by collective entities, such as the governing bodies of corporations and nation states.<sup>360</sup>

Why should individual and collective moral agents recognize the moral considerableness of nature in their decisions and actions? For guidance in this inquiry, I will again turn to science, where biotechnology points the way.

## **B. The Science and Globalization of Food: A Seed that Feeds the World<sup>361</sup>**

In the nineteenth century, Augustinian monk Gregor Mendel laid the groundwork for the science of genetics with his work on dominant and recessive genes in pea plants.<sup>362</sup> Mendel's work was re-discovered in the early twentieth century by plant breeders, who applied it in the United States to selective breeding of traits in crops.<sup>363</sup> Mendelian genetics advanced experimentation in hybridization, in which particular characteristics in exotic plants (such as disease resistance and higher yield) were cross-bred into existing varieties of plants.<sup>364</sup> The first major hybrid success in the United States was corn, which from the late 1930s showed greater yield and better disease resistance.<sup>365</sup> However, a disadvantage of hybrids has been the inability to transfer the vigor of the hybrid to the next generation, interrupting the farming practice of saving and replanting seed.<sup>366</sup>

With the development of genetically modified organisms (GMOs), biotechnology took the science of genetics into a new realm.<sup>367</sup> While hybrids were developed by accessing a preferred

360. BERRY, *GREAT WORK*, *supra* note 6, at 119; *see also* CULLINAN, *supra* note 2, at 69-72 (critiquing corporations as "fictional, incorporeal beings" with enormous power to harm the Earth and limited responsibility).

361. Keith Aoki, *Malthus, Mendel, and Monsanto: Intellectual Property and the Law and Politics of Global Food Supply: An Introduction*, 19 J. ENVTL. L. & LITIG. 397, 414 (2004) [hereinafter Aoki 2004] ("The vision of 'one seed that feeds the world' may lead to dystopian results.").

362. *Id.* at 401 n.8; *see also* Sara M. Dunn, *From Flav'r Sav'r to Environmental Saver? Biotechnology and the Future of Agriculture, International Trade, and the Environment*, 9 COLO. J. INT'L ENVT. L. & POL'Y 145, 148-49 (1998).

363. Keith Aoki, *Weeds, Seeds, & Deeds: Recent Skirmishes in the Seed Wars*, 11 CARDOZO J. INT'L & COMP. L. 247, 268 (2003) [hereinafter Aoki 2003].

364. *Id.*

365. *Id.* at 272.

366. Dunn, *supra* note 362, at 149.

367. *Id.*; Ved P. Nanda, *Genetically Modified Food and International Law—The Biosafety Protocol and Regulations in Europe*, 28 DENV. J. INT'L L. & POL'Y 235, 236 (2000) (describing genetic modification through "[i]n vitro nucleic acid techniques"

gene pool through cross-breeding of plants, GMOs were created by inserting into the cell of one plant the gene material (or germplasm) from another plant or organism.<sup>368</sup> Cellular genetic engineering introduced desired qualities more “quickly, precisely, and economically” than cross-breeding of organisms.<sup>369</sup> Because traits were incorporated into the genetic material of a plant, the favorable characteristics were transmitted to successive generations.<sup>370</sup>

Scientists in California performed the first documented transfer of genetic material from one organism to another in 1973.<sup>371</sup> Twenty years later, the first genetically engineered crop—the “Flav’r Sav’r Tomato”—was approved for sale in the United States.<sup>372</sup> By 1997, twenty-two other genetically engineered foods had been approved by the Food and Drug Administration.<sup>373</sup>

Genetic modification of seed has taken two tracks. In the first, “enhanced seed” systems are produced in which seeds are designed to work with chemicals, such as pesticides and herbicides.<sup>374</sup> In the second, “transgenic seed” systems produce plants that are designed to kill particular predators, to resist certain her-

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and “[f]usion of cells beyond the taxonomic family” as defined by the Biosafety Protocol); see also Final Draft of Biosafety Protocol Approved at Montreal Meeting on Biological Diversity Convention, art. 3 (Jan. 29, 2000), 23 INT’L ENVTL. REP. (BNA), No. 3, 125, available at <http://www.cbd.int/biosafety/protocol.shtml> [hereinafter Biosafety Protocol] (defining “living modified organism” and “modern biotechnology”).

368. Aoki 2003, *supra* note 363, at 249 n.3 (defining germplasm as “the complement of genes that determine an organism’s characteristics”); Mohsen Al Attar Ahmed, *Monocultures of the Law: Legal Sameness in the Restructuring of Global Agriculture*, 11 DRAKE J. AGRIC. L. 139, 159 n. 131 (2006) (defining germplasm as “the protoplasm of the germ cells that contains chromosomes and gene [sic] that are used to determine an organism’s characteristics”); see also Aoki 2004, *supra* note 361, at 403 n.15 (discussing technology of “DNA Gun”). With advances in genetic biotechnology, “genes from viruses, bacteria and animals may be planted in grains, fruits and vegetables.” Nanda, *supra* note 367, at 236; see also Barry S. Edwards, “... and on his farm he had a geep”: *Patenting Transgenic Animals*, 2001 MINN. INTELL. PROP. REV. 3, 3 n.1 (2001) (noting that a “geep” is “a transgenic cross between a goat and a sheep”).

369. Dunn, *supra* note 362, at 149.

370. *Id.*

371. *Id.*

372. *Id.* at 146; see also Jim Chen, *Biodiversity and Biotechnology: A Misunderstood Relation*, 2005 MICH. ST. L. REV. 51, 70-71(2005) (proffering that the genetic modification produced Flav’r Sav’r tomatoes with a longer shelf life).

373. Dunn, *supra* note 362, at 146, 150 (noting, too, that “[w]idespread commercial production of genetically altered cotton, soybeans, corn, canola, and potatoes in the United States occurred [sic] in 1996”).

374. *Id.* at 150.

bicides, or to enhance properties such as oil or sugar content.”<sup>375</sup> A leading example of the enhanced seed system is “Roundup Ready” soybean seeds, produced by Monsanto.<sup>376</sup> The seeds are engineered to be resistant to the active ingredient in Monsanto’s Roundup Ultra herbicide.<sup>377</sup> An example of the transgenic seed system is *Bacillus thuringiensis* (Bt) corn, in which the Bt gene from the soil bacterium is transferred into corn plant tissue to leave the plant resistant to particular insects such as the European Corn Borer.<sup>378</sup>

Consumer response to genetic modification (GM) in food has been mixed in the United States and negative in the European Union.<sup>379</sup> Common concerns include food security and safety, the development of resistant plants and insects,<sup>380</sup> and loss of biodiversity.<sup>381</sup> To enable a more focused evaluation of the bioethical aspects of the controversy requires an appreciation of its historic setting, including the role of the Green Revolution in the context of globalization.

Sweeping the globe in the 1970s, the Green Revolution was an agricultural modernization program sponsored by private agricultural research centers in the global North.<sup>382</sup> The stated goal of the Green Revolution was to forestall hunger in the world by de-

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375. *Id.* (quoting Ronald E. Yates, *Genetic Engineering Moves into Corn, Soy Belts “Break-through” Seeds Likely to Boost Yields, Transform Industries*, CHI. TRIB., Mar. 17, 1996, at 1).

376. *Id.* at 151.

377. *Id.*; see also Nanda, *supra* note 367, at 237 (reporting that, in 1999, fifty percent of soybeans, one-third of corn crops, and “almost all canola oil” in the U.S. came from GM seed).

378. Dunn, *supra* note 362, at 151 (noting that “EC Borers are present in approximately seventy-five percent of US cornfields and are responsible for an estimated \$1 to \$2 billion of lost farm revenue each year.”); see also David Barsamian, *Monocultures of the Mind, An Interview with Vandana Shiva*, Z MAG., Dec. 2002, available at [http://www.thirdworldtraveler.com/Vandana\\_Shiva/Monocultures\\_Mind.html](http://www.thirdworldtraveler.com/Vandana_Shiva/Monocultures_Mind.html) (quoting environmental activist Vandana Shiva, who observed that the worms developed “rapid resistance” to the toxin produced by Bt corn).

379. Dunn, *supra* note 362, at 153; see also Nanda, *supra* note 367, at 237-38.

380. Dunn, *supra* note 362, at 155.

381. *Id.* “Biological diversity” is defined by the Convention on Biological Diversity as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” United Nations Conference on Environment and Development: Convention on Biological Diversity 31 I.L.M. 818, 823 art. 2 (1992), available at <http://www.cbd.int/convention/convention.shtml> [hereinafter Conv. Bio. Diversity].

382. Ahmed, *supra* note 368, at 144; Carmen Gonzalez, *Markets, Monocultures, and Malnutrition: Agricultural Trade Policy through an Environmental Justice Lens*, 14 MICH. ST. J. INT’L. L. 345, 359 (2006); see also Aoki 2003, *supra* note 363, at 305-06

veloping and disseminating high yield grain.<sup>383</sup> The understated goal was to forestall populist unrest and communist revolutions in Asia and Latin America by increasing production of food.<sup>384</sup> In so doing, institutions in the North “offered a technological solution to a social and political problem.”<sup>385</sup> By spreading northern agricultural practices to the developing world, the Green Revolution unleashed a firestorm of protest and a complex web of social, political, economic, and environmental problems.<sup>386</sup>

Of particular significance to this examination of the moral value of nature, the Green Revolution opened the door to transform farming practices in the South from diversified agriculture to monoculture.<sup>387</sup> At the core of northern agribusiness is monocropping, in which one type of crop or one type of seed is intensively farmed on land.<sup>388</sup> In contrast, subsistence farming in the global South is based on intercropping, crop rotation, and field fallow, all of which allow the land to recover from prior harvests.<sup>389</sup>

The only seeds that are suitable for global monoculture are genetically modified seeds that have been patented by large northern agrobusinesses.<sup>390</sup> Through biotechnology that has altered plants by the modification of single genes and the patenting of the resulting seed, a handful of transnational corporations have come to control food, and the means for propagating food, worldwide.<sup>391</sup>

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(discussing politics of germplasm in terms of the industrialized countries of the Northern hemisphere and the developing countries of the Southern hemisphere).

383. Ahmed, *supra* note 368, at 144 n.32.

384. *Id.*; see also Gonzalez, *supra* note 382, at 360.

385. Ahmed, *supra* note 368, at 144 n.32 (citing CARY FOWLER & PAT MOONEY, SHATTERING: FOOD, POLITICS, AND THE LOSS OF GENETIC DIVERSITY 59 (1990)).

386. Gonzalez, *supra* note 382, at 359-60; Barsamian, *supra* note 378, at 2 (interviewing Vandana Shiva, who advised that the Green Revolution “left farmers impoverished . . . [and] was about selling more chemicals”).

387. Ahmed, *supra* note 368, at 143-45.

388. *Id.*

389. *Id.* at 143, 147 (describing subsistence farming in terms of growing staple foods for local consumption).

390. *Id.* at 150.

391. In a global economic context, the growth and consolidation of agrochemical companies were supported by trade liberalization policies and the northern legal regime of protection of private property, including ownership and patenting of intellectual property. Gonzalez, *supra* note 382, at 346; Ahmed, *supra* note 368, at 150 (noting that “the top three agrochemical companies—DuPont-Pioneer, Monsanto and Novartis—are also the top three seed controlling companies worldwide”). As agrochemical companies engaged in genetic engineering, they also sought and obtained patents on genetically modified seeds. Aoki 2003, *supra* note 363, at 286-304 (discussing major cases in the “seed wars,” including the leading case of *Diamond v. Chakrabarty*, 447 U.S. 303 (1980), which held that genetically altered organisms, *i.e.* genetically engineered oil-eating bacteria, were patentable subject matter). Germ-

The ethical discussion of global monoculture as it affects biodiversity takes place in this charged setting.

### C. Of Monocultures and Many Conflicts

In this section of the article, I will first focus on monoculture as it affects farming practices and biological diversity. Then I will then widen the lens to consider the global cultural contest over genetically modified seed.

#### 1. Monocropping, Farming, and Biological Diversity

The major positive benefit of the industrial model of agriculture has been higher yield in crops, which was intended to result in increased production of food and decreased hunger.<sup>392</sup> Critics assert that greater food production has not alleviated the problem of hunger in the world.<sup>393</sup> Crops that are produced are not “staple foods” that are the basis of traditional subsistence farming for local consumption, but export-oriented “cash crops,” including coffee, cotton, rubber, and tobacco.<sup>394</sup> Consequently, after the “magic” of increased production of food in the Green Revolution wore off, consumers in developing countries faced poverty and hunger that was aggravated by the substitution of monoculture for land reform and redistributive measures.<sup>395</sup>

Since monocropping is dependent on genetically modified seed and chemical inputs, the impact on farming has been considerable.<sup>396</sup> In tandem with using genetically altered seed, monocropping farmers discovered that high yield crops required irrigation and fertilizers, which nourished weeds as well as crops, thereby creating the need for herbicides.<sup>397</sup> Insects were attracted to the

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plasm that was genetically modified by agrochemical companies became the paradigm of intellectual property. Ahmed, *supra* note 368, at 159. In this process, seeds were reclassified from being products of nature to products of industry. *Id.*

392. Nanda, *supra* note 367, at 236; Ahmed, *supra* note 368, at 151 (discussing “[p]seudo-benefits of industrial agriculture”).

393. Gonzalez, *supra* note 382, at 355, 359-60.

394. Ahmed, *supra* note 368, at 147-48.

395. Gonzalez, *supra* note 382, at 359-60; Sarah Ruth van Gelder & Vandana Shiva, *Earth Democracy - An Interview with Vandana Shiva*, YES! MAG., Winter 2003, available at <http://www.yesmagazine.org/article.asp?ID=570>.

396. Ahmed, *supra* note 368, at 148.

397. *Id.* at 149 (citing CARY FOWLER & PAT MOONEY, SHATTERING: FOOD, POLITICS, AND THE LOSS OF GENETIC DIVERSITY 58 (1990)).

uniformity of new varieties, triggering the need for insecticides as well.<sup>398</sup>

The heavy use of chemical fertilizers, pesticides, and herbicides also led to deteriorating environmental conditions.<sup>399</sup> Runoff from the chemicals polluted rivers and lakes.<sup>400</sup> Chemicals degraded the soil, which was also stripped of its nutrients by continued farming of the same crops.<sup>401</sup> Furthermore, water stress in people was elevated by excessive use of freshwater for irrigation.<sup>402</sup> Physicist and environmental activist Vandana Shiva advised: “The shift from prudent irrigation, agriculture that depends on rain, drought-resistant crops, nutritious millets, have all been replaced by monocultures of thirsty wheat and rice varieties that have ruined not just India’s aquifers, but also aquifers around the world.”<sup>403</sup>

At the heart of the controversy about monoculture has been seed-saving that has been the practice of subsistence farmers for thousands of years.<sup>404</sup> Farmers have saved their seed for subsequent planting and have freely exchanged seed with neighbors (in a practice called “brown bagging”).<sup>405</sup> One feature of monocropping with genetically modified seed is the prohibition of seed-saving by agribusiness; farmers have become “licensees” of patented seed.<sup>406</sup> One agrichemical company was so intent on interrupting

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398. *Id.* In addition to the chemical- and capital-intensity of monoculture, it required skills—such as harvest storage and management, marketing, and finance—that traditionally have not been needed by subsistence farmers. *Id.* at 160. Farmers in the South found that they could not compete with cheap corn that was subsidized by the United States. Gonzalez, *supra* note 382, at 345. Due to factors such as these, a number of farmers in the South accumulated debt (underwritten by seed companies), lost their farms and then their livelihoods. Barsamian, *supra* note 378, at 3. Monoculture has been criticized as spurring the loss of small-scale subsistence farms and their consolidation into large-scale agribusiness. Gonzalez, *supra* note 382, at 346.

399. Aoki 2004, *supra* note 361, at 402; FREYFOGLE, *supra* note 6, at 131.

400. Gonzalez, *supra* note 382, at 349-50.

401. Ahmed, *supra* note 368, at 143.

402. Barsamian, *supra* note 378, at 1-2.

403. *Id.*

404. Aoki 2003, *supra* note 363, at 255; Carol B. Thompson, *International Law of the Sea / Seed: Public Domain versus Private Commodity*, 44 NAT. RESOURCES J. 841, 850 (2004).

405. Nic Paget-Clarke, *Interview with Vandana Shava, The Role of Patents in the Rise of Globalization*, IN MOTION MAGAZINE 4 (Mar. 28, 2004), available at [http://www.inmotionmagazine.com/global/vshiva4\\_int.html](http://www.inmotionmagazine.com/global/vshiva4_int.html).

406. Aoki 2003, *supra* note 363, at 253-54, 293 (discussing *Monsanto Canada, Inc. v. Schmeiser*, T-1593-98 (Mar. 29, 2001) [FCT] 256, available at <http://decisions.fct-cf.gc.ca/fct/2001/2001fct256.html> in which a Canadian farmer was found liable for patent infringement when pollen from Monsanto’s patented canola seed was carried by the wind onto his crops and mixed with his non-genetically modified canola



the practice of seed-saving that it engineered a “terminator” seed that produced crops bearing infertile seed.<sup>407</sup>

Accompanying monocropping is the loss of genetic diversity. Diverse crop mixtures in farming have become obsolete.<sup>408</sup> Moreover, of the crops that are produced, the genetic base has become very narrow.<sup>409</sup> For generations, subsistence farmers have gathered wild plants, cultivated traditional crops, and developed “rich repositories of crop genetic diversity.”<sup>410</sup> The heterogeneous base of subsistence farming has been one of its greatest strengths. Such diversity has allowed for adaptation to changing conditions, such as drought and insect-borne diseases.<sup>411</sup>

Genetic diversity in crops operates as a form of “insurance policy” against crop devastation that threatens food security and a community’s survival.<sup>412</sup> Corn blight in the 1970s obliterated fifteen percent of the harvest in the U.S. Midwest.<sup>413</sup> That the crops were uniform genetically rendered the crops more vulnerable to the disease.<sup>414</sup> A more dramatic illustration of the effect on humans of genetic uniformity in plants is the nineteenth century potato famine in Ireland.<sup>415</sup> Irish farmers relied on a potato plant that was genetically uniform and vulnerable to the mold *Phytophthora infestans*.<sup>416</sup> One in ten Irish citizens starved in that famine, and the population of Ireland dropped by 2.5 million people due to death and emigration.<sup>417</sup>

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plants); *see also* THE FUTURE OF FOOD (Lily Films 2004) (interviewing Percy Schmeiser).

407. Aoki 2003, *supra* note 363, at 255; *see also* News Release, Monsanto Company, Monsanto Company Completes Divestiture of Stoneville and NexGen Businesses, Begins Combining Delta and Pine Land Business (June 19, 1999) (on file with author) (reaffirming its policy “not to develop or utilize sterile seed technology”); *but see* News Release, Organic Consumers Association, Monsanto Breaks Promise to Abandon Terminator Technology (Apr. 23, 2003) (on file with author).

408. Aoki 2004, *supra* note 361, at 402 n.12.

409. *Id.*

410. Ahmed, *supra* note 368, at 156.

411. *Id.*

412. Aoki 2003, *supra* note 363, at 307.

413. *Id.*

414. *Id.*

415. Dunn, *supra* note 362, at 157.

416. *Id.*

417. *Id.*; *see also* THE FUTURE OF FOOD (Lily Films 2004) (reporting that only four varieties of potatoes are currently widely grown).

## 2. North, South: A Global Cultural Conflict

To widen the analysis to the broader effects of the loss of biodiversity requires an appreciation of the historic interplay between North and South.<sup>418</sup> Earth emerged from the Ice Age with a marked geographical disparity in biological riches.<sup>419</sup> Genetic and biological resources predominated in the global South, in contrast to the resource-poor global North.<sup>420</sup> Indigenous people in the South nurtured their biological wealth by preserving varieties of seeds, improving them for local use, and freely exchanging them with information about their uses for food and medicine.<sup>421</sup> The free exchange of seed and information led to global biodiversity and enhanced food security in the world.<sup>422</sup>

Since the seventeenth century, northern countries have been enthusiastic participants in exotic plant prospecting.<sup>423</sup> The significance of the free exchange of plants to the agricultural base of the United States is apparent when considering that American wheat owes its resistance to stripe rust to a Turkish land race, sorghum is resistant to greenbug due to contributions from India, and soybean that uses germplasm from Korea saves American agriculture between \$100 and \$500 million in annual processing costs.<sup>424</sup> From a global perspective, none of the twenty most important food crops is indigenous to North America. Countries in the South, especially those in the West Central Asiatic and Latin American regions, historically have made “the largest genetic contribution to feeding the world.”<sup>425</sup>

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418. *E.g.*, Aoki 2003, *supra* note 363, at 306 (referring to the industrialized countries of the Northern Hemisphere and the developing countries of the Southern Hemisphere).

419. Aoki 2004, *supra* note 361, at 407.

420. Chen, *supra* note 372, at 53.

421. Thompson, *supra* note 404, at 850.

422. *Id.*; Andrew Pollack, *Patenting Life: A Special Report*, N.Y. TIMES, Nov. 26, 1999, at A1 (discussing seed exchanges and food security).

423. Aoki 2003, *supra* note 363, at 261-63 (citing JACK KLOPPENBERG, JR., *FIRST THE SEED: THE POLITICAL ECONOMY OF PLANT BIOTECHNOLOGY*, 1492-2000 (1988)).

424. *Id.*; see also Sanjeev Saxena & Anurudh K. Singh, *Revisit to Definitions and Need for Inventorization or Registration of Landrace, Folk, Farmers' and Traditional Varieties*, 91 CURRENT SCI. 1451 (Dec. 2006) (noting that landrace “generally has been used to designate all the genetic material collected from cultigens” in farmers’ fields and, at other times, landrace refers to folk variety, farmers’ variety, or traditional variety).

425. Aoki 2003, *supra* note 363, at 305 (quoting KLOPPENBERG, *supra* note 180 (1988)).

Moreover, plants are more than food.<sup>426</sup> For thousands of years, human beings have interacted with plants, discovered their properties, and nurtured that knowledge with a wide variety of species.<sup>427</sup> In this sense, plants are repositories of evolutionary data that are vital to the physical survival of humanity.<sup>428</sup> Plants and human beings evolved together, over the span of millennia.<sup>429</sup> Consequently, plants embody the history as well as identity of cultures.<sup>430</sup> Until the 1980s, countries throughout the world exchanged seed and knowledge as a “common heritage of (hu)mankind.”<sup>431</sup> Since that time, the combination of genetic engineering and intellectual property rights has operated to enclose the commons.<sup>432</sup>

Two international treaties offer good examples of the issues that are implicated in genetic modification of seed and patenting of genetic resources. In 1992, the United Nations Conference on Environment and Development held in Rio de Janeiro (commonly called the 1992 Rio Earth Summit) adopted the Convention on Biological Diversity (CBD).<sup>433</sup> While affirming the intrinsic value of biological diversity and the common concern of its conservation, the CBD placed the governance of biological diversity squarely under national sovereignty.<sup>434</sup> In this respect, the CBD embraced a norm that was at odds with the historical view of plant germplasm as “common heritage” and, therefore, freely accessible to farmers and plant breeders around the world.<sup>435</sup>

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426. Ahmed, *supra* note 368, at 146.

427. Thompson, *supra* note 404, at 850; *see also* ROSITA ARVIGO, SASTUN: MY APPRENTICESHIP WITH A MAYA HEALER (1994) (relaying the story of Mayan healer Don Elijo and the Belize Ethnobotany Project).

428. Ahmed, *supra* note 368, at 156.

429. *Id.* at 160.

430. *Id.*

431. Aoki 2003, *supra* note 363, at 305-12; Thompson, *supra* note 404, *passim* (discussing the seabed as the common heritage of humanity under the international law of the sea and urging the same philosophy for the “international law of the seed”).

432. Thompson, *supra* note 404, at 853.

433. Conv. Bio. Diversity, *supra* note 381. There are currently 190 parties to the convention, with 168 signatures. *Id.* The United States has signed, but has not ratified the CBD. Kirsten N. Jabara, *The Biosafety Protocol*, 8 U. BALT. J. ENVTL. L. 121, 129 (2001).

434. Conv. Bio. Diversity, *supra* note 381, at pmbl., art. 3, art. 15.

435. Aoki 2004, *supra* note 361, at 427-443 (discussing the common heritage standard in the nonbinding 1983 International Undertaking on Plant Genetic Resources, which became the binding 2004 International Treaty on Plant Genetic Resources, and more comprehensive treatment of farmers’ and breeders’ rights without effective vindication of those rights).

Counterposed to the CBD is the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs)<sup>436</sup> that was formulated with the creation of the World Trade Organization as part of the 1995 amendment of the General Agreement on Tariffs and Trade (GATT).<sup>437</sup> Introducing intellectual property rules into multilateral trading, TRIPs required all members of GATT to provide a minimum level of intellectual property protection for “any inventions, whether products or processes, in all fields of technology, provided they are new, involve an inventive step and are capable of industrial application.”<sup>438</sup> Article 27 of TRIPs required the intellectual property regimes of member states to include protection of plant genetic resources.<sup>439</sup> Plant varieties must be protected either by patent or by a *sui generis* system.<sup>440</sup>

One complaint that has been posed by developing countries about TRIPs is that the intellectual property system of the North is having a devastating effect on the biological diversity of the South.<sup>441</sup> Passionate arguments have been made that, through

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436. General Agreement on Tariffs and Trade—Multilateral Trade Negotiations (the Uruguay Round): Agreement of Trade-Related Aspects of Intellectual Rights, Dec. 15, 1993, 33 I.L.M. 81 (1994) [hereinafter TRIPs].

437. World Trade Organization, *Understanding the WTO* 10, 39 (2007), available at <http://www.wto.org/english/thewto> [hereinafter *Understanding the WTO*]. The Uruguay Round, which lasted from 1986 to 1994, expanded GATT to cover trade in services, inventions, and intellectual property. *Id.* at 10.

438. TRIPs, *supra* note 436, at art. 27; see also *Understanding the WTO*, *supra* note 437, at 10, 39; Muria Kruger, *Harmonizing TRIPS and CBD: A Proposal from India*, 10 MINN. J. GLOBAL TRADE 169, 179-80 (2001) (noting, too, a twenty-year minimum period for protection of patents and criminal sanctions for infringements under TRIPs).

439. TRIPs, *supra* note 436, at art. 27(1); Aoki 2004, *supra* note 361, at 426.

440. TRIPs, *supra* note 436, at art. 27(3)(b); Amy Nelson, *Is There an International Solution to Intellectual Property Protection for Plants?*, 37 GEO. WASH. INT'L REV. 997, 1019 (discussing problems with differing forms of plant protection in different countries).

441. Ahmed, *supra* note 368, at 150. Another complaint is that the understanding of intellectual property rights at the core of TRIPs irreconcilably conflicts with communal understandings of knowledge that are at the heart of the cultures of many countries in the South. Chen, *supra* note 372, at 53. Because developing countries cannot forego membership in GATT to protest a particular treaty, they are forced to comply with TRIPs and to adopt a legal regime that is at odds with cultural norms. Kruger, *supra* note 438, at 182 (relaying the charge that northern countries circumvented U.N.'s established World Intellectual Property Organization and used GATT as the platform for international intellectual property agreements as a means of forcing developing countries to comply with TRIPs); Remigius N. Nwabueze, *Ethnopharmacology, Patents and the Politics of Plants' Genetic Resources*, 11 CARDOZO J. INT'L & COMP. L. 585, 591-92 (2003). Taking advantage of the economic vulnerability of developing countries, TRIPs imposes northern standards as universal norms. Ahmed, *supra* note 368, at 154-55 (noting that intellectual property norms

patenting of genetically modified seed, agricultural diversity "is being obliterated."<sup>442</sup> Biological diversity is essential for the health of the planet's agricultural ecosystems and, consequently, for the integrity of the world's food supply.<sup>443</sup> Some commentators argue that TRIPs provides incentives not only for research, but also to preserve biodiversity.<sup>444</sup> Against such claims, others contend that the intellectual property regime that dominates international trade relations creates "the legal and economic infrastructure necessary for the proliferation of monocultures, successfully crowding out non-conforming agricultural systems."<sup>445</sup>

While TRIPs has mandated protection of engineered seed, it has left wild races that are used by indigenous communities, along with the knowledge of the healing properties of the plants, to common ownership.<sup>446</sup> As a consequence, genetic resources and informal innovations from the South have been used by companies in the North to produce altered germplasm, which has gained protection as private intellectual property without any benefits going to the communities that nurtured the seed and developed the ethnobotanical knowledge.<sup>447</sup> Recognizing that the majority of the re-

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dictate the language of the debate, disallowing any opposition that is not framed in private property terms); *but see* Kruger, *supra* note 438, at 181 (noting problem of industries based on counterfeiting in some developing countries). Global IP norms, therefore, "actively reorganize the social order of cultures by altering perceptions of knowledge and property, effectively transforming internal systems and practices." Ahmed, *supra* note 368, at 154. As a result, not only biological diversity, but also cultural diversity, is lost. *Id.* at 160-63.

442. Ahmed, *supra* note 368, at 146.

443. Gonzalez, *supra* note 382, at 357.

444. Nwabueze, *supra* note 441, at 606 (suggesting that compensation to accompany intellectual property protection would provide incentives to conserve biodiversity); Aoki 2004, *supra* note 361, at 433-34 (observing that the CBD sought to provide economic incentives "for developing countries to conserve their biodiversity rather than seek quick gains through activities, such as deforestation, that result in the destruction of biodiversity."); *see also* Valentina Tejera, *Tripping Over Property Rights: Is it Possible to Reconcile the Convention on Biological Diversity with Article 27 of the TRIPS Agreement?*, 33 NEW ENG. L. REV. 967, 987 (1999) (arguing that intellectual property protection is necessary to support "economic incentives for spending millions of dollars on research for a new cure").

445. Ahmed, *supra* note 368, at 153.

446. Aoki 2003, *supra* note 363, at 313, 329; Nwabueze, *supra* note 441, at 595 (advising that "TRIPS establishes a system of private property which conceptually excludes ethnobotanical knowledge and informal innovation, characterized by common ownership and free access.").

447. Chen, *supra* note 372, at 55. Developing countries have accused northern countries of "biopiracy"—taking the biological diversity of southern countries to produce huge profits, none of which has been shared with the countries that nurtured the

search in plant genetic resources arose out of traditional knowledge of indigenous communities, the CBD stepped into the breach and sought to ensure that indigenous communities would be compensated for their knowledge and innovations.<sup>448</sup>

There are many stakeholders who advance powerful conflicting claims in this worldwide seed - gene war.<sup>449</sup> The problem of genetic vulnerability in the North is matched by the problem of genetic erosion in the South.<sup>450</sup> Nation states have interests in public safety, food security, economic stability, trade balances, debt adjustments, and cultural heritage.<sup>451</sup> India, for example, was slow to recognize any danger to its basmati rice, which became the subject of twenty patent applications by a Texas rice company.<sup>452</sup> In addition, the reality of international debt and trade policies left a number of developing countries with little choice but to accept the industrial agricultural model of monoculture.<sup>453</sup> For example, many developing countries emerged out of the oil and debt crisis of the 1980s with structural adjustment programs to repay debt by increasing agricultural exports, as a prac-

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plants. *Id.* at 55. In the eyes of indigenous people in the South, plants are sources of "ethnobiographical knowledge" that is being threatened by practices in the industrial North. *Id.* at 56; see also ARVIGO, *supra* note 427, *passim* (relaying the healing properties of plants offered by Mayan healers as part of the Belize Ethnobotany Project).

448. Conv. Bio. Diversity, *supra* note 381, at art. 8(j). However, protection and compensation would seem to be unavailable through patenting of the innovations of indigenous communities because intellectual property rests on individual, rather than communal rights. *E.g.*, Kruger, *supra* note 438, at 203. The CBD seems to contemplate the practice of "bioprospecting," in which contractual relationships are formed between holders of traditional knowledge and biotechnology firms. *E.g.*, Dunn, *supra* note 362, at 159 (noting the example of the agreement of drug manufacturer Merck to support the research staff of INBio, a non-profit organization in Costa Rica, in return for the exclusive use of extracts of plants, insects, and microorganisms). In addition, a criticism of the "hidden objectives" of the CBD is that it ensures "a steady, unhindered and available supply of South's biological resources . . . for the pharmaceutical and biotechnological needs of developed countries, in exchange for a clearly delineated and limited technological consideration." Nwabueze, *supra* note 441, at 603.

449. Thompson, *supra* note 404, at 856; Aoki 2003, *supra* note 363, at 248 (referring to KLOPPENBURG, *supra* note 424, at 152).

450. Aoki 2003, *supra* note 363, at 306.

451. *E.g.*, Gonzalez, *supra* note 382, *passim* (discussing food security and trade injustice); Ahmed, *supra* note 368, at 161 (noting that "food is fundamental in the defining of cultural identity.").

452. Saritha Rai, *India-U.S. Fight on Basmati Rice Is Mostly Settled*, N.Y. TIMES, Aug. 25, 2001, at C1 (reporting the initial grant of a broad patent to Ricetec, followed by an outcry, the withdrawal of 15 claims, and the patenting of three varietal strains).

453. Gonzalez, *supra* note 382, at 363-64.

tical matter, through monocropping.<sup>454</sup> Furthermore, the North-South nature of the struggle serves to obscure class and economic divisions within each country, to the ongoing detriment of the poor.<sup>455</sup>

Northern stakeholders such as scientists, research centers, drug companies, and universities argue that restricting access to plants in the South endangers research projects that might support breakthroughs in medicine, advances in agriculture, and preservation of endangered species.<sup>456</sup> Drug companies argue that countries in the South overestimate the value of raw genetic material and underestimate the resources necessary to develop a drug.<sup>457</sup> For example, it may take fifteen years and an investment of \$500 million to bring a product using modified germplasm into use on the market.<sup>458</sup> To commit such resources, companies argue that they need legal protection of their intellectual property.<sup>459</sup> Furthermore, the link between drugs and plants may be very indirect. Scientists at Abbott Laboratories were inspired to develop a painkiller after reading a paper on the painkilling properties of secretions from Ecuadorian frogs.<sup>460</sup> But, according to an Abbott representative, "We've never seen the frog. We've never touched the frog."<sup>461</sup>

Research in gene therapy, some of which is dependent on access to plants and animals in the South, holds promise for identifying causes of blight and debilitating diseases such as Huntington's disease and cystic fibrosis.<sup>462</sup> Cancer-fighting drugs have long been developed out of insights and chemicals from exotic plants. In the 1950s and 1960s, Eli Lilly and Company devel-

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454. *Id.* (advising that, by the mid-1980s, almost three-quarters of Latin American countries and two-thirds of African countries were operating under structural adjustment programs overseen by the World Bank and the International Monetary Fund); Ahmed, *supra* note 368, at 148 (critiquing "export-driven monocropping").

455. Ahmed, *supra* note 368, at 149 (noting the disruption of farming communities "by entrenching economic and class divisions"). The result of the CBD, some assert, has left indigenous communities and their knowledge to be exploited by their own states. Kruger, *supra* note 438, at 179.

456. Pollack, *supra* note 422, at A1.

457. *Id.*

458. *Id.*

459. Harish Mehta, *Biodiversity Gains Must Be Equitably Distributed*, BUS. TIMES SINGAPORE, Mar. 11, 2005, at BT.

460. Pollack, *supra* note 422, at A1.

461. *Id.* (quoting Abbott vice president Michael Williams).

462. *Id.*; see also Andrew Trew, *Regulating Life and Death: The Modification and Commodification of Nature*, 29 TOL. L. REV. 271, 315-20 (1998) (posing ethical questions arising out of gene therapy, including "back door eugenics").

oped the cancer drugs vincristine and vinblastine from the rosy periwinkle of Madagascar.<sup>463</sup> Furthermore, barley collected from Ethiopia was cross-bred with California's crop in the 1950s, saving it from the yellow dwarf virus.<sup>464</sup> Hundred of millions of dollars were saved, of which nothing was returned to Ethiopia.<sup>465</sup> But, according to the general manager of the Ethiopia Environmental Protection Agency, "That was before fairness in this line became an issue."<sup>466</sup> That was when genetic interdependence was the unspoken understanding of agriculture and scientific research.<sup>467</sup> That was before biotechnology produced genetic modification of seed and TRIPs produced protection for germplasm as intellectual property.<sup>468</sup>

Is genetic biodiversity "the common heritage of humankind" or a "species" of property, to be privately enclosed?<sup>469</sup> Or are both frameworks inadequate? In the next section of the article, I will usher the discussion further to evaluate how the role of nature may alter the moral balance.

#### D. Moral Responsibility to and for Nature

What is the role of nature in this contestation? In this complex and heated contest, should moral agents extend the bounds of the debate to consider effects on nature? As a fundamental and fairly pedestrian principle, moral agents are held to moral responsibility for actions they take that affect others.<sup>470</sup> It is not a stretch to propose that species and living systems in nature qualify for moral consideration.<sup>471</sup> It is also not a stretch to propose that moral agents, including agribusiness corporations and nation states, be considered morally responsible for their decisions and actions that have harmed nature.<sup>472</sup> Furthermore, corporations

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463. Pollack, *supra* note 422, at A1.

464. *Id.*

465. *Id.*

466. *Id.* (quoting Tewolde Berhan Gebre Egziabher, general manager of the Ethiopian Environmental Protection Agency).

467. Aoki 2003, *supra* note 363, at 305.

468. *E.g.*, Ahmed, *supra* note 368, at 150, 159.

469. Thompson, *supra* note 404, at 853.

470. NASH, *supra* note 5, at 155 (discussing the philosophy of Paul W. Taylor that human beings, as the moral agents in the biosphere, are obligated to restrain our impact on nature).

471. *See* discussion at section IV. A., *supra*.

472. MacIntyre, *Social Structures*, *supra* note 359, at 10.



and governing states have the moral responsibility to consider how actions that are only proposed may affect nature.<sup>473</sup>

What type of harms has monoculture created in nature, *qua* nature, and not as derivative of human harm?<sup>474</sup> The U.N. Millennium Ecosystem Assessment Report notes that the global intensification of agriculture has had three major environmental impacts: loss of habitat, loss of biodiversity, and degradation of nature through oversupply of synthetic nutrients.<sup>475</sup> First, in considering the loss of habitat, most terrestrial ecosystems have been affected over the past two decades by the conversion of land to agricultural uses.<sup>476</sup> Of the fourteen different terrestrial ecosystem types, nine of them have been affected by a twenty to fifty percent conversion to human (mostly cultivated) use.<sup>477</sup> One-quarter of Earth is now covered by cultivated systems.<sup>478</sup> In seventy percent of the countries, land committed to agriculture is expanding.<sup>479</sup> The chief consequences of the expansion of agriculture are the destruction and fragmentation of habitat, both of which cause serious reductions in species and populations.<sup>480</sup>

Deforestation to accommodate agribusiness is taking place at an alarming rate. According to the U.N. Millennium Ecosystem Assessment Report: "Forests have effectively disappeared in 25

473. "Because [hu]mankind can circumvent evolutionary law, it is incumbent upon him, say evolutionary biologists, to develop another law to abide by if he wishes to survive, to not outstrip his food base. He must learn restraint. He must derive some other, wiser way of behaving toward the land." LOPEZ, *supra* note 240, at 38.

474. *E.g.*, Emmenegger, *supra* note 26, at 550, 558 (tracing stages of development of environmental ethics, from valuing only human self-interest in protecting environment to recognizing the intrinsic value of nature).

475. United Nations Millennium Ecosystem Assessment Board, *The Millennium Ecosystem Assessment Report Series, Ecosystems and Human Well-being: Current State and Trends* 831 (2005), <http://www.millenniumassessment.org> [hereinafter *Millennium Assessment*].

476. *Id.* at 14; *see also* United Nations Millennium Ecosystem Assessment Board, *The Millennium Ecosystem Assessment, Ecosystems and Human Well-being: Biodiversity Synthesis* 8 (2005), <http://www.millenniumassessment.org> [hereinafter *Biodiversity Synthesis*].

477. *Millennium Assessment*, *supra* note 475, at 14; *Biodiversity Synthesis*, *supra* note 476, at 2, 8 (describing cultivated systems as "areas where at least 30% of the landscape is in croplands, shifting cultivation, confined livestock production, or freshwater aquaculture").

478. *Biodiversity Synthesis*, *supra* note 476, at 28. One-fifth of the world's cultivated area is irrigated, which has increased pressure on inland water ecosystems, which are in the poorest condition of any broad ecosystem type. *Millennium Assessment*, *supra* note 475, at 14, 18. By 1985, up to sixty-five percent of freshwater wetlands had been drained for agriculture in North America and Europe. *Id.* at 14.

479. *Millennium Assessment*, *supra* note 475, at 96.

480. *Id.* at 5-6, 96.

countries, and more [than] 90% of the former forest cover has been lost in a further 29 countries.”<sup>481</sup> While forest cover is increasing in some areas, the world as a whole is losing forest area at a rate of 9.4 million hectares per year.<sup>482</sup> The main locus of deforestation is in the tropics, which has lost over 12 million hectares of forests per year for the past two decades.<sup>483</sup> For example, in Brazil, plans to develop the Amazon rainforest—including completing the Transamazon Highway—is predicted to leave only five percent of the rainforest intact by 2020.<sup>484</sup> Between 2003 and 2004, development activities in Brazil caused the loss of 10,000 square miles of rainforest, an area the size of Massachusetts.<sup>485</sup> Clear-cutting and tree-burning are making way for mega-farms, all of which add to the global warming crisis that endangers the species and biosystems on Earth.<sup>486</sup>

Destruction and fragmentation of habitat, primarily arising out of the conversion of land to agriculture, is the most significant driver of the second major impact of industrial agriculture: loss of biodiversity.<sup>487</sup> The U.N. Millennium Ecosystem Assessment Report observes that “[it] is *well-established* that losses in biodiversity are occurring globally at all levels, from ecosystems through species, populations, and genes.”<sup>488</sup> The clear trend is one of conversion of “naturally occurring, species-rich ecosystems into more intensively managed habitats with reduced biodiversity.”<sup>489</sup> The “Living Planet Index,” which serves as an indicator of the world’s biodiversity, showed a forty percent decline in terrestrial species and a fifty percent decline in freshwater species between 1970 and 2000.<sup>490</sup>

The transformation of agriculture in the wake of the Green Revolution has resulted in a significant decline in genetic diver-

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481. *Id.* at 16.

482. *Id.* (noting that, after centuries of extreme deforestation, the forest cover increased in North American, Europe, and North Asia from 1990-2000).

483. *Id.*

484. Alex Bellos, *Roads Plan Could Destroy Brazilian Amazon by 2020*, GUARDIAN (LONDON), Jan. 20, 2001, at 18.

485. Indira A.R. Lakshmanan, *Amazon Highway is Route to Strife in Brazil*, BOSTON GLOBE, Dec. 27, 2005, at A1.

486. *Id.* In addition, the Amazon rainforest is drying up. Stern, *supra* note 63, at vii. With warming of two to three degrees Celsius, the rainforest could be significantly, if not irrevocably, damaged. *Id.*

487. *Biodiversity Synthesis*, *supra* note 476, at 8.

488. *Millennium Assessment*, *supra* note 475, at 834 (emphasis in original).

489. *Id.*

490. *Biodiversity Synthesis*, *supra* note 476, at 47 fig. 3.7 (reflecting data on 555 terrestrial, 323 freshwater, and 267 marine species).

sity in agricultural systems, with a concomitant reduction in resilience and adaptability of species that are domesticated.<sup>491</sup> Industrial agriculture is depleting the diversity of plant life.<sup>492</sup> Because it is based on intensive and repeated farming of one plot of land with one type of seed or one type of crop, industrial agriculture relies on genetic uniformity as the basis for profit.<sup>493</sup> Diversity of plant life through multicropping promotes land health, while uniformity of plant life through monocropping does not.<sup>494</sup> The wide varieties in Earth's gene pool have intrinsic value, independent of any human use.<sup>495</sup>

Moreover, diversity of animal and insect life is likely being threatened by the genetically altered seed upon which monoculture depends.<sup>496</sup> For example, in recent studies on the impact of GM seed on insects, scientists noted that caterpillars of the monarch butterfly were killed by pollen of genetically altered corn.<sup>497</sup> Furthermore, ladybirds who were fed aphids that lived on GM crops had shortened lives.<sup>498</sup> In addition, lacewings, which are natural predators of a number of insects, perished when they were fed corn borer worms that had been raised on genetically altered corn plants.<sup>499</sup>

The third major environmental impact of industrial agriculture is chemical degradation. Over the past fifty years, nutrient loading has been one of the most significant drivers of changes in a number of ecosystems, from terrestrial to freshwater and coastal.<sup>500</sup> Since 1960, the flow of reactive nitrogen in terrestrial ecosystems has doubled and the flow of phosphorous has trip-

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491. *Id.* at 4-5.

492. Ahmed, *supra* note 368, at 146.

493. *Id.* at 143-44.

494. *Id.* at 147; *see also* Gonzalez, *supra* note 382, at 356.

495. *E.g.*, Thompson, *supra* note 404, at 865 n. 99 (citing an initiative among non-governmental organizations that the "intrinsic value of the Earth's gene pool . . . precedes its utility and commercial value"). Moreover, nature, itself, "abhors uniformity." BERRY, *GREAT WORK*, *supra* note 6, at 149.

496. Nanda, *supra* note 367, at 237 n.12 (citing Robert C. Cowen, *New Findings Say Genetically Altered Corn Can Poison the Soil*, CHRISTIAN SCI. MONITOR, Dec. 2, 1999, at 2 and Paul Brown, *From Gung-ho to Acceptance of Legitimate Concerns*, GUARDIAN (LONDON), Feb. 28, 2000, at 6).

497. *Id.*

498. *Id.*

499. *Id.*

500. *Biodiversity Synthesis*, *supra* note 476, at 8.

led.<sup>501</sup> The chemical basis of industrial agriculture threatens plant and animal life, spurring increased extinction.<sup>502</sup> Massive quantities of chemical runoff into rivers, lakes, and oceans are polluting the water supplies and habitats of animals and marine life.<sup>503</sup> In addition, the chemical intensity of the agriculture threatens Earth itself, with contamination of water, soil, and atmosphere.<sup>504</sup> Soil, for example, is a living system.<sup>505</sup> Healthy soil, without agrochemicals, contains large numbers of a diverse array of microorganisms.<sup>506</sup> In one gram of healthy soil, there are typically 600 million bacteria, composed of approximately 15,000 - 20,000 different species.<sup>507</sup> Lacking digestive systems, plants rely on the "rich microbial communities" around their roots.<sup>508</sup> Monocropping, with its associated chemical inputs, is damaging the life-support system of the soil.<sup>509</sup>

I am suggesting, too, that moral agents not only bear responsibility *for* harms perpetrated on nature, but also have responsibility *to* nature. The responsibility of moral agents to nature is best reflected in the notion of respect of one subject for the subjectivity (or moral considerableness) of another.<sup>510</sup> Such respect is necessary when contemplating the epistemological gulf between human subjectivities and cultures, which is widened manifold

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501. United Nations Millennium Ecosystem Assessment Board, *The Millennium Ecosystem Assessment, Ecosystems and Human Well-being: Synthesis 2* (2005), <http://www.millenniumassessment.org> [hereinafter *Millennium Synthesis*].

502. *Millennium Assessment*, *supra* note 475, at 834; *see also* CARSON, *supra* note 141, at 93 (describing the devastating effects on the ecological chain of life of chemical spraying).

503. *Biodiversity Synthesis*, *supra* note 476, at 9.

504. BERRY, EVENING, *supra* note 61, at 98-99; *see also* CARSON, *supra* note 141, *passim*.

505. Soil Association, *Policy Document: Soil—The Importance and Protection of a Living Soil* (Dec. 1, 2005), available at <http://www.soilassociation.org/web/sa/saweb.nsf> [hereinafter *Soil Association*]; *see also* HENRY DAVID THOREAU, WALDEN 147 (Brooks Atkinson ed., Random House 1992) (1854) (describing his work as "making the yellow soil express its summer thought in bean leaves . . . rather than in wormwood").

506. Soil Association, *supra* note 505; *see also* CARSON, *supra* note 141, at 53-61 ("The soil community, then, consists of a web of interwoven lives.").

507. Soil Association, *supra* note 505.

508. *Id.*

509. West Bengal State, *Biodiversity Strategy and Action Plan: Soil Biodiversity* 108 (2002), [www.wbenvironment.nic.in/html/bio\\_div/nbsap/K-TEXT%2005.doc](http://www.wbenvironment.nic.in/html/bio_div/nbsap/K-TEXT%2005.doc) (advising that, in West Bengal, monocropping exhausts "the total carbohydrate fraction of soil organic carbon . . . resulting in reduction of macroaggregates, the habitat of microbial population").

510. MCFAGUE, *supra* note 8, at 11.

when considering the chasm between species, life forms, and things.<sup>511</sup>

Respect of humanity for nature is mandated, too, by the enormous debt humanity owes nature.<sup>512</sup> Earth has provided humanity a home, nurturance, and shelter.<sup>513</sup> Earth produces the air we breathe, the water we drink and in which we wash and play. Nothing feeds itself.<sup>514</sup> We have fed on the bounty of the plants, animals, and waters of Earth. With nature, we have produced such delights as “kimchi, bread, and beer.”<sup>515</sup>

Nature inspires us, feeding our minds, imaginations, and spirits. Art, music, and literature find their originating source in nature. When we would re-create ourselves, we seek communion with nature.<sup>516</sup> To Thoreau, nature was a “hypæthral” book, a book that opens to the sky.<sup>517</sup> As teacher, Earth imparts lessons of stillness, suffering, limitation, and freedom.<sup>518</sup> The symbol of freedom in the United States lies in the piercing gaze of an eagle. Thoughts of cathedrals and skyscrapers were gifts of birds, mountains, and waves.<sup>519</sup> Dandelion puffs became parachutes; jellyfish motion became jet propulsion; cockleburs became velcro; beetle

511. BERRY, EVENING, *supra* note 61, at 145 (characterizing differentiation as one of the basic tendencies of the universe); YOUNG, INCLUSION, *supra* note 13, at 221-22 (proposing “differentiated solidarity” based on respect as an ideal for social and inclusion); STEPHANIE KAZA, THE ATTENTIVE HEART, *as reprinted in* BRUSSAT, *supra* note 173, at 147 (“I can only guess at the shape of a tree’s mind and what it knows about life on the edge of a pond.”).

512. MCFAGUE, *supra* note 8, at 8.

513. Earth Charter Steering Committee and International Secretariat, The Earth Charter, pmbl. (2000), *available at* <http://www.earthcharterinaction.org> (“Earth, our home, is alive with a unique community of life.”); *see also* FERRERO & HOLLAND, *supra* note 136, at 42-45 (relaying the origin of the Earth Charter Initiative following the 1992 United Nations Earth Summit in Rio de Janeiro and the inclusion of central ideas of the Earth Charter in the 2002 Johannesburg Declaration).

514. BERRY, EVENING, *supra* note 61, at 150 (noting, in Ten Principles for Jurisprudence Revision, that “[n]o living being nourishes itself”).

515. Aoki 2004, *supra* note 361, at 414.

516. “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 647 (Brooks Atkinson ed., 1992) (1862).

517. HENRY DAVID THOREAU, SUMMER: FROM THE JOURNAL OF HENRY DAVID THOREAU 261 (H.G.O. Blake ed., 1884) (Jun. 29, 1851), *available at* <http://books.google.com/books?id=SB4AAAAQAAJ&dg> (May 16, 2006).

518. EARTH PRAYERS FROM AROUND THE WORLD, *Ute Prayer* (Elizabeth Roberts & Elias Amidon ed. 1991), *as reprinted in* BRUSSAT, *supra* note 173, at 161-62.

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

bugs became Volkswagens; and a Japanese fungus became a drug for lowering cholesterol.<sup>520</sup>

When we are born, we are wrapped in cloth from Earth. Throughout our lives, we are attended by plants and animals. Without plants, we would have neither oxygen nor beauty. Without animals, we would “die of loneliness.”<sup>521</sup> When we die, our bodies are received back into Earth.<sup>522</sup> We are returned to organic matter, to nourish all that comes after.<sup>523</sup>

In terms of the right, Nicomachean ethics charges moral agents to do the right thing, in the right way, at the right time.<sup>524</sup> In considering the right time, the time for recognizing the moral responsibility of humanity to nature is now. Fortunately, a great shift of consciousness is underway.<sup>525</sup> Not long ago, global warming was a scientific theory occupying footnotes.<sup>526</sup> Now, it is a household term and has become “as rooted in our public consciousness as Madonna or microwave cooking.”<sup>527</sup> The prevailing “buzzwords” for the American public are all “green.”<sup>528</sup> No longer is “green” simply synonymous with biodegradable goods or recycling.<sup>529</sup> Now green approaches include “sustainable production, fair trading, energy efficiency and local provenance.”<sup>530</sup> In some communities, green thinking has produced “localvores” who eat within their “foodsheds.”<sup>531</sup>

520. *Id.*; see also Pollack, *supra* note 422, at A1 (discussing Mevacor, a drug for lowering cholesterol that was developed from a fungus located on a golf course in Japan).

521. BERRY, EVENING, *supra* note 61, at 33, 42 n.1 (citing the “likely apocryphal” passage attributed to Chief Seattle).

522. “I thought the earth / remembered me, she / took me back so tenderly . . .” Mary Oliver, *Sleeping in the Forest*, in NEW AND SELECTED POEMS 181 (1992).

523. “One day I suddenly saw that the sun is my heart, my heart outside of this body.” THICH NHAT HAHN, *supra* note 343, at 68.

524. ARISTOTLE, NICOMACHEAN ETHICS VI.12, as reprinted in MELDEN, *supra* note 29, at 126 (“for virtue makes us aim at the right mark, and practical reason makes us take the right means”).

525. BERRY, GREAT WORK, *supra* note 6, at 200.

526. Fiona Harvey, *Sleek, Stylish and Sustainable Eco-properties Are Coming of Age*, FIN. TIMES (LONDON), Oct. 15, 2005, at House & Home 1 [hereinafter Harvey 2005].

527. Frank Davies, *Smithsonian Tackles Global Warming*, ORL. SENTINEL, Apr. 15, 2006, at A4 (quoting NASA web editor John Weier).

528. Lynette Evans, *The Buzzwords for 2007 Are All Synonymous With Green*, SAN. FRAN. CHRONICLE, Dec. 30, 2006, at F1.

529. *Id.*

530. *Id.*

531. *Id.*

Citizens are not only concerned about cutting down on their environmental impacts, or reducing carbon footprints (as currently is the jargon).<sup>532</sup> The public is also forcing businesses to examine their policies, practices, and products. Most architects now rely on green credentials, including following principles of energy conservation in buildings, generating power from solar collectors, reusing waste heat, discouraging automobiles, banning chlorofluorocarbons, and using recycled materials.<sup>533</sup>

Forward-thinking businesses are seeing the economic advantage of adopting environmentally responsible practices. A major Florida law firm recently announced that it is "going green" though a five-component plan that includes energy efficiency, responsible procurement, waste reduction, sustainable business practices, and community education.<sup>534</sup> General Electric decided in 2005 that it would sell products that are environmentally sound.<sup>535</sup> In May of 2006, the company announced that revenues from products and services under its "Ecoimagination brand" had gone from \$6.2 billion in 2004 to \$10.1 billion in 2005, with a backlog of advance orders of \$17 billion.<sup>536</sup>

Stockholders of several major U.S. corporations entered the debate on GM food by calling for their companies to adopt moratoria on the production and sale of GM crops until they are tested and shown to be safe for humans and nature.<sup>537</sup> In Oregon, the Governor recently signed into law an act that permits the articles of incorporation of a corporation to direct that its business be conducted "in a manner that is environmentally and socially responsible."<sup>538</sup> With the amendment to its Business Corporation Act,

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532. Harvey 2005, *supra* note 526, at House & Home 1.

533. John Vidal, *Society: Environment: The Sky's the Limit*, GUARDIAN (London), Dec. 12, 2001, at 8 ("[S]uch has been the shift in consciousness about ecology and environmental health that almost every major architect today now espouses some green credentials.").

534. Theresa E. Davis, *Carlton Fields Goes Green*, FLA. BAR NEWS, June 15, 2007, at 10.

535. Fiona Harvey, *Scientific Argument Settled Climate Change*, FIN. TIMES (London), Jan. 24, 2007, at 8 [hereinafter Harvey 2007].

536. *Id.*

537. James Cox, *Firms Face Battle Over Altered Food*, U.S.A. TODAY, Feb. 14, 2000, at A1; see also Mary Dejevsky, *Big US Firms Face Investors' Revolt Over GM Foods*, INDEPENDENT (London), Feb. 15, 2000, at 13.

538. 2007 Or. Laws H.B. 2826 (Enrolled) (amending OR. REV. STAT. § 60.047).

Oregon became the first state “to expressly acknowledge the goal of sustainable business practices” in its corporate code.<sup>539</sup>

The Stern Review underscored that now is the time to make the shift to Earth-centered corporate practices. According to the report, the present cost of reducing carbon emissions would be one percent of the global gross national product (GNP), but the cost of inaction would be between five and twenty percent of the global GNP.<sup>540</sup> In other words, taking “strong, early action” to reduce emissions not only is the right thing to do, it makes economic sense.<sup>541</sup>

To think about the “right way,” the precautionary principle points the way through the biotechnology conflict.<sup>542</sup> The precautionary principle urges “taking early policy action to avoid uncertain or poorly understood risks, particularly in situations where the consequences may be catastrophic.”<sup>543</sup> First endorsed internationally in the World Charter for Nature, adopted by the United Nations in 1982, the precautionary principle has since been incorporated in a number of international conventions.<sup>544</sup> The Convention on Biological Diversity (CBD) was the first international convention to include the precautionary approach in an operative provision of a treaty.<sup>545</sup> Following the CBD, the parties adopted the 2000 Cartagena Protocol on Biodiversity to regulate global trade of GMOs.<sup>546</sup> The Biodiversity Protocol seeks to protect global biodiversity by explicitly embracing “a strong version” of

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539. Press Release, Oregon Lawyers for a Sustainable Future, New Law Embeds “Sustainability” in Oregon Business Corporation Act (June 1, 2007) (on file with author).

540. Stern, *supra* note 63, at x, xiv; *see also* Harvey 2007, *supra* note 535, at 8.

541. Stern, *supra* note 63, at ii; *but see* Lomborg, *supra* note 92 (arguing that the spending required for drastic reductions in carbon emissions would not be cost-efficient).

542. BERRY, EVENING, *supra* note 61, at 98.

543. ZYGMUNT J.B. PLATER ET AL., ENVIRONMENTAL LAW AND POLICY: NATURE, LAW, AND SOCIETY 101 (2004).

544. *E.g.*, Jan Bohanes, *Risk Regulation in WTO Law*, 40 COLUM. J. TRANSNAT’L L. 323, 330 n. 22 (listing conventions and declarations adopting the precautionary principle). In 1992, the United Nations Conference on Environment and Development adopted the precautionary principle in Principle 15 of its “Rio Declaration.” United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, June 14, 1992, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/5Rev.1 (June 13, 1992), *reprinted in* 31 I.L.M. 874, 879 (1992).

545. Conv. Bio. Diversity, *supra* note 381, at art. 8(g).

546. Article 19 of the CBD called for the contracting parties to consider the need for a protocol regulating living modified organisms “that may have an adverse effect on the conservation and sustainable use of biological diversity.” *Id.* at art. 19; *see also* Biosafety Protocol, *supra* note 367.



the precautionary principle that allows, for example, nations to restrict importing genetically modified products.<sup>547</sup>

The precautionary principle is a standard of international law that, although still controversial, may be considered a “common-sense approach of caution (risk aversion) in situations where the existence of environmental and health risk is ambiguous and scientific knowledge is incomplete.”<sup>548</sup> Yet, the precautionary principle also has been attacked as vague and, in the context of GMOs, as encouraging protectionism to gain a competitive advantage in international trade under the pretext of environmental and health concerns.<sup>549</sup>

Concerns about the meaning and application of the precautionary principle may be best addressed through the lens of the Wingspread Statement on the Precautionary Principle, which brings together four key elements in its reprise of the principle.<sup>550</sup> First, decision-makers should act on “early evidence of harm.”<sup>551</sup> Second, the burden of proof should be shifted to the party seeking to carry out the activity.<sup>552</sup> Third, democracy and transparency must be exercised in decision-making.<sup>553</sup> Finally, decision-makers

547. Biosafety Protocol, *supra* note 367, at art. 1, 6, 10, 11; *see also* Jabara, *supra* note 433, at 134.

548. Bohanes, *supra* note 544, at 328, 334; Stephen G. Wood et al., *Whither the Precautionary Principle? An American Assessment from an Administrative Law Perspective*, 54 AM. J. COMP. L. 581, 596-97 (2006) (relaying disagreement among American authors about the legal status of the principle).

549. Wood, *supra* note 548, at 589-607 (surveying critiques by American authors); *see also* Julie Teel, *Rapporteur's Summary of the Deliberative Forum*, 13 COLO. J. INT'L ENVTL. L. & POL'Y 137 (2002) (noting attack on the precautionary principle by proponents of GMOs).

550. The Wingspread Consensus Statement on the Precautionary Principle (Jan. 26, 1998), *available at* <http://www.sehn.org>; *see also* Nancy J. Myers, *Introduction*, in PRECAUTIONARY TOOLS FOR RESHAPING ENVIRONMENTAL POLICY 14-15 (Nancy J. Myers & Carolyn Raffensperger eds., 2005) [hereinafter Myers] (providing examples of the use of the precautionary principle by community groups, local governments, and commercial enterprises).

551. Myers, *supra* note 550, at 14 (citing the Wingspread Statement for the following principle: “When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.”).

552. *Id.* (“In this context the proponent of the activity, rather than the public, should bear the burden of proof.”); *see also* Russell Unger, *Brandishing the Precautionary Principle Through the Alien Tort Claims Act*, 9 N.Y.U. ENVTL. L.J. 638, 681 (2001).

553. Myers, *supra* note 550, at 14 (“The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties.”); *see also* Bohanes, *supra* note 544, at 365, 389 (proposing for World Trade Organization deliberations an extended version of the principle that would add

must consider a full range of options where there are threats of harm to the environment, even where causal relationships and risks are not fully established, in a scientific sense.<sup>554</sup> As public consciousness about environmental health continues to shift, decision-makers must also shift from a monetized utilitarian approach that heavily weighs commercial interests to a precautionary approach that considers the value of nature and the uncertainty of our scientific knowledge.<sup>555</sup>

In considering the “right thing,” individuals may ask, “what is my moral responsibility in this conflict?” Is it to learn more about the effects of business practices on nature? To share what I have learned through writing and teaching? To join in democratic processes at the local, ecosystem, national, or international levels? To recognize, each time I step in my car or buy bottled water, my complicity in the degradation of Earth?<sup>556</sup> To acknowledge, each time I take cholesterol-fighting Mervacor or any other drug developed from nature’s germplasm, my debt to Earth?<sup>557</sup>

According to Thoreau, “life is startlingly moral. There is never an instant’s truce between virtue and vice.”<sup>558</sup> Because “life is lived in the details,” Sister Sharon Zayac advises:

I can’t preach against industries’ pouring toxins into the air and water unless I refuse to pour even the smallest amount down the bathroom drain. I can’t bewail the landslide of plastic, which is literally burying us, without trying to keep every piece I can out of the landfill. I can’t be aware of the poisoning of our food supply and the horrendous treatment of the animals who become our food, without making serious choices about what I consume.<sup>559</sup>

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procedural processes to a country’s scientific analysis of risk so that issues of risk assessment and risk management are subject to greater democratic accountability).

554. Myers, *supra* note 550, at 14 (“The process of applying the Precautionary Principle . . . must also involve an examination of the full range of alternatives, including no action.”).

555. *Id.* at 9; Wood, *supra* note 548, at 613.

556. *E.g.*, Editorial, *In Praise of Tap Water*, N. Y. TIMES, Aug. 1, 2007, available at <http://www.nytimes.com/2007/08/01/opinion/01wed2.html> (observing that 1.5 million barrels of oil are consumed each year to make water bottles for Americans, only twenty-three percent of the bottles are recycled, and that the United States “has some of the best water supplies in the world”).

557. Pollack, *supra* note 422, at A1 (reporting that Mervacor was “derived from a fungus on a Japanese golf course”).

558. HENRY DAVID THOREAU, WALDEN 206 (Brooks Atkinson ed., Random House 1992) (1854).

559. ZAYAC, *supra* note 310, at 9-10.

For collective entities, the “right thing” requires a readjustment of “a microphase sense of responsibility” with “macrophase power.”<sup>560</sup> The well-being of Earth and its component parts must be given moral and legal significance by political and corporate governing bodies. For approaches to governance, a collaborative ecosystem-based model holds promise for structuring governance around localized knowledge of ecosystems.<sup>561</sup> Moreover, such an approach could serve as a basis for managing human affairs to minimize “the worst anthropogenic insults to ecosystem function” and to repair the damage that already has been done.<sup>562</sup> Short-term human welfare must be bracketed when considering long-term effects on ecosystems.<sup>563</sup>

Corporations must recognize their responsibility to be good citizens of their communities, including the Earth community. Economic welfare in the form of quarterly profit returns must not be the criterion for corporate action, but must be joined with considerations of sustainability.<sup>564</sup> However, the purpose of this article is not to engage in a moral thrashing of industry and technology. I do not seek a return to a pre-industrial age.<sup>565</sup> We cannot go back in time.<sup>566</sup> Yet, those who launched the industrial era only saw the bright side: “Many who built the roads, structures, and dams saw them as glorious ways into the future. Now we see the damage dams can do, the damage of irrigation processes, the damage the automobile is causing.”<sup>567</sup> Now we are seeing “the dark side of the industrial world.”<sup>568</sup>

There is a place in our future for industry and human inventiveness such as advanced technology.<sup>569</sup> Humanity will continue

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560. BERRY, *GREAT WORK*, *supra* note 6, at 101.

561. *E.g.*, Karkkainen, *supra* note 203, 211 (contemplating a “nationwide system of localized ecosystem-based governance arrangements”).

562. *Id.* at 210 n. 47.

563. Houck, *supra* note 203, at 6, 11 (suggesting that ecosystems be defined apart from humans and management because “once you put people into the equation, there is no equation. Humans come in and consume.”).

564. *E.g.*, 2007 Or. Laws H.B. 2826 (Enrolled) (amending Oregon Business Corporation Act to permit articles of incorporation to include a provision “directing the corporation to conduct the business of the corporation in a manner that is environmentally and socially responsible”).

565. CULLINAN, *supra* note 2, at 55-56 (contrasting views of “Planet Fetishers” with “developing a new vision of self-regulation for post-industrial human societies in the 21st century that is capable of practical implementation”).

566. *Id.*

567. BERRY, *EVENING*, *supra* note 61, at 29.

568. *Id.*; *see also* Aoki 2004, *supra* note 361, at 414.

569. CULLINAN, *supra* note 2, at 56.

to use Earth, in all of its spheres, to support our life. However, business and technology must be reconceived to fit into the Earth community of the present for the future.<sup>570</sup> To re-envision business and technology means more than designing and making products to minimize their natural impacts. It means that the purpose of business and technology must be aligned with the centrality of Earth as the source, ground, basis, and direction for all human activity.<sup>571</sup> Earth is the referent for moral responsibility, not humanity.<sup>572</sup>

## VI. CONCLUSION

*What will we do as the wisdom of our past bears down on our future? It is a story of ageless conversation, not only conversation among ourselves about what we mean and wish to do, but a conversation held with the land—our contemplation and wonder at a prairie thunderstorm, or before the jagged line of a young mountain, or at the sudden rise of ducks from an isolated lake.*<sup>573</sup>

In this article, I have proposed that the necessary normative change is from human-centered to Earth-centered morality. A wholesale moral realignment is necessary because the major human institutions, including law and commerce, have failed their basic purpose.<sup>574</sup> Premised on a discontinuity between humanity and Earth, our chief institutions have denoted value only in the human species.<sup>575</sup> From humanity's position of moral transcendence, the other-than-human world has been given reality and assigned value only through its usefulness to humanity.<sup>576</sup> We are witnessing the devastating consequences on Earth of human-centered law, economics, and morality.

Earth Jurisprudence calls us into a conversation about the future of humanity and Earth.<sup>577</sup> This article seeks to contribute to that conversation by offering a metaethical and normative analysis of the bearing of the good, the fitting, the true, and the right on the moral standing of nature. In approaching the good, the analy-

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570. *Id.* at 72.

571. BERRY, GREAT WORK, *supra* note 6, at 56-57, 80-81.

572. BERRY, EVENING, *supra* note 61, at 81, 84.

573. LOPEZ, *supra* note 240, at xxviii.

574. BERRY, GREAT WORK, *supra* note 6, at 72.

575. *Id.*

576. *Id.*

577. LOPEZ, *supra* note 240, at xxviii.

sis has shown that short-term considerations of human welfare must cede to long-term interests of the health of the land. The good of humanity is linked to the good of the planet, expressed minimally in terms of not exceeding Earth's carrying capacity.<sup>578</sup>

In considering the fitting, we have observed humankind as an intimately connected part of a greater whole.<sup>579</sup> As a part—a significant part, but still only a part—humanity must not claim moral status for ourselves, while denying it to the rest of the community in which we are embedded. For relational, functional, and prudential reasons, the interconnectedness of the Earth community mandates the widening of the moral community.

In meditating about the true, I have suggested that in our eagerness to grant moral significance to human welfare, we overlooked the threshold question of considerability. The moral considerableness of nature persists, as a regulative matter, despite weaknesses in the moral perceptions of humanity.<sup>580</sup> Moreover, I have suggested that the epistemological capacity in human beings of normative reflective self-consciousness should also be the very basis for pushing us to recognize the moral value of all of our fellow travelers on this globe—for all the “dappled things” that are “original, spare, strange.”<sup>581</sup> The moral standing of humanity is debased by assuming moral superiority.

Finally, in thinking about the right in terms of the global calamities associated with monoculture, we come to the ground under our feet to consider how moral agents, individual and collective, ought to conduct ourselves. The time for the shift in consciousness and considered action is now. The way to proceed is with resolve, discipline, and humility. And, for the right way to live, we may gain some insight from the property law notion of

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578. FREYFOGLE, *supra* note 6, at 141 (“In the end, communities simply must have the power to halt harmful activities and to protect the land’s carrying capacity.”).

579. BERRY, *GREAT WORK*, *supra* note 6, at 61 (discussing the “components of the Earth” as expressing “the Great Commons of the planet Earth”).

580. Goodpaster, *On Being*, *supra* note 157, at 313.

581. Hopkins, *supra* note 208, at 102; BERRY, *GREAT WORK*, *supra* note 6, at 173 (advising that “our responsibility to the Earth is not simply to preserve it, it is to be present to the Earth in its next sequence of transformations.”); Patricia Siemen, *Weaving an Ethic of Right Relationships for the Earth Community*, in 3 *WOMEN MOVING FORWARD* 63, 78 (Judith Barr Bachay & Raúl Fernández-Calienes, eds., 2008) (suggesting that humans “must now consciously involve ourselves in efforts of immense spiritual and ethical maturation so as to insure the integral functioning and well being of the planet into the future.”).

*usufructus*.<sup>582</sup> As tenants—or perhaps only short-term guests—we may use, but not destroy Earth.

In this Earth ethic, the role of humanity changes “from conqueror of the land-community to plain member and citizen of it.”<sup>583</sup> To recognize Earth as the center of the moral community will also produce a shift in law and governance.<sup>584</sup> Human actions and institutions will be assessed on how well they fit into their role and purpose within the Earth community.<sup>585</sup> With Earth as the referent, the purpose of humanity will be not simply to serve ourselves.<sup>586</sup> Nature teaches us that life is not just for itself, but also for others.<sup>587</sup>

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582. FREYFOGLE, *supra* note 6, at 145 (discussing rights of temporary use, an idea dating back to the Roman law notion of usufructory, defined as “a right to enjoy the fruits of an asset but not to damage or consume the asset itself.”).

583. LEOPOLD, *supra* note 115, at 204.

584. Patricia Smith, *Introduction: Feminist Jurisprudence and the Nature of Law*, in *FEMINIST JURISPRUDENCE* 11 (Patricia Smith ed., 1993) (describing cultural revolutions as profound changes in “what people think, their basic assumptions about what is normal. So, cultural revolutions are inevitable because they follow from a change of worldview . . . . At a certain point in time, certain ideas become part of history, and they cannot be reversed.”).

585. CULLINAN, *supra* note 2, at 117 (proposing that “the starting point for humans is the principle that each member of the Earth community should be at liberty to fulfill its role within the Earth community”); see also Earth Jurisprudence, <http://www.earthjurisprudence.org> (last visited Oct. 12, 2007) (advising, on the website sponsored by the London-based Gaia Foundation, that “Earth jurisprudence means looking at the actual philosophy and value systems that underpin most legal and governance systems, and making sure that they support, rather than undermine, the integrity and health of the Earth.”).

586. BERRY, *GREAT WORK*, *supra* note 6, at 173.

587. “Plants tell us that life must live not only for itself, but also for others. The trunk and the branches are for self, but the blossoms are for a generation yet unborn. The lesson of altruism is hidden in every blossom.” Bishop Fulton Sheen, in BRUSSAT, *supra* note 173, at 157 (quoting Bishop Fulton Sheen).