

A TOUGH BITCH IN FEDERAL COURT: AN ARGUMENT FOR GAIA STANDING

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INTRODUCTION

Courts have traditionally opened their doors for a wide variety of Earthlings to adjudicate a broad range of disputes.¹ However, ironically, it can be difficult for plaintiffs with an interest in the Earth itself to demonstrate that they have standing to bring their otherwise justiciable claim.² This difficulty is caused in part by the requirement that a plaintiff make a showing of personal injury to have standing to sue.³ Even for environmental advocacy organizations whose explicit goal is to protect natural resources, unless a member of the organization can show the requisite pecuniary, aesthetic, or educational harm, the organization does not have standing to litigate destruction of the environment.⁴

The result in cases denying standing for such plaintiffs is flawed because it is based on an understanding of environmental injuries that does not correspond to reality.⁵ One scientific theory illuminates the inadequacy of the judiciary's myopic approach to standing.⁶ Under Gaia theory, the Earth is functionally a single entity more akin to a unified organism than to

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1. *See generally* *Sierra Club v. Morton*, 405 U.S. 727, 742–43 (1972) (discussing the legal rights afforded to ships and corporations).

2. *See, e.g.*, *Lujan v. Defs. of Wildlife*, 504 U.S. 555, 560–61 (1992).

3. *See id.* at 560–61.

4. *See id.* at 563.

5. *See infra* Part II.

6. *See generally* JAMES LOVELOCK, *GAIA: A NEW LOOK AT LIFE ON EARTH* (1979).

a collection of discrete ecosystems and individuals.⁷ This “organism” is known as Gaia. Human beings, and by extension the environmental advocacy organizations they form, are composed of no other substance but the Earth and are entirely dependent on the effective functioning of the Earth to sustain their lives.⁸ Logic, coupled with a heightened understanding of the consequences of environmental degradation in the post-industrial era, reveals that significant injury to any part of a whole will inevitably harm other parts of the whole, including humans.⁹

A proper understanding of environmental injury and Gaia theory would allow for a more inclusive, honest approach to standing in environmental litigation.¹⁰ A way to accomplish this is by recognizing environmental plaintiffs’ standing based on their relationship to the nonhuman entity Gaia—in short, *Gaia standing*.¹¹

In Part I of this note, Section I.A discusses the confused and meandering development of standing doctrine, particularly as it relates to environmental plaintiffs. Section I.B examines Gaia theory, its predecessors, and its relationship to developments in science and culture. Then, Part II synthesizes the modern understanding of Earth as an interconnected entity and the Supreme Court’s interpretation of constitutional standing requirements, and argues for Gaia standing, a theory of standing that honors both the Constitution and the reality of environmental injury.

I. HISTORY

A. Pure Speculation and Fantasy

Article III of the Constitution confers the federal judicial power to hear “cases” and “controversies” in certain subject matters.¹² Standing, now understood as a threshold requirement for a plaintiff to have a claim heard

7. James Lovelock, *Geophysiology—The Science of Gaia*, in SCIENTISTS ON GAIA 3 (Stephen H Schneider & Penelope J. Boston eds., 1991).

8. ROSEMARY RADFORD RUETHER, *GOD AND GAIA: AN ECOFEMINIST THEOLOGY OF EARTH HEALING* (1992).

9. Wendell Berry, *It All Turns on Affection*, in *IT ALL TURNS ON AFFECTION: THE JEFFERSON LECTURE & OTHER ESSAYS* 9, 18 (2012).

10. *See infra* Part II.

11. *Id.*

12. U.S. CONST. art. III, § 2.

in federal court, emerged in the Court's jurisprudence staking out the contours of the disputes that are considered cases or controversies under Article III.¹³ According to the Court, to have standing, a plaintiff must show that they satisfy three "constitutional" elements, and even so, a federal court may decline to hear the case based on "prudential" factors.¹⁴ The constitutional elements of standing have come to signify the "irreducible constitutional minimum" required to satisfy Article III,¹⁵ while the prudential elements are viewed as more flexible limits, which Congress can override, on the kinds of disputes the judiciary can entertain.¹⁶

The so-called constitutional elements of standing are (1) *injury in fact*, which is "an invasion of a judicially cognizable interest which is (a) concrete and particularized and (b) actual or imminent," (2) *causation*, and (3) *redressability*.¹⁷

The prudential factors used to assess standing are traditionally understood to be (1) the *prohibition on asserting the rights of third parties*,¹⁸ (2) the *prohibition against generalized grievances*,¹⁹ and (3) that the plaintiff be within the statute's intended *zone of interest*.²⁰

Justice Antonin Scalia, whose philosophy and opinions are central to the thesis advanced here, considered standing a vital safeguard of the separation of powers.²¹ However, Professor Gene Nichol argued that this

13. Cass R. Sunstein, *What's Standing After Lujan? Of Citizen Suits, "Injuries," and Article III*, 91 MICH. L. REV. 163 (1992).

14. See, e.g., *Bennett v. Spear*, 520 U.S. 154 (1997) (articulating the constitutional and prudential elements of standing).

15. See *Lujan v. Defs. of Wildlife*, 504 U.S. 555, 560–61 (1992).

16. See generally *Bennett*, 520 U.S. 154, 162 (1997).

17. *Id.*

18. See *United Food & Commercial Workers v. Brown Grp.*, 517 U.S. 544, 557 (1996) (describing the prudential nature of the restriction on third-party standing).

19. See *Warth v. Seldin*, 422 U.S. 490, 499 (1975) ("Apart from this minimum constitutional mandate, this Court has recognized other limits on the class of persons who may invoke the courts' decisional and remedial powers. . . . [W]hen the asserted harm is a 'generalized grievance' shared in substantially equal measure by all or a large class of citizens, that harm alone normally does not warrant exercise of jurisdiction.")

20. *Ass'n of Data Processing Serv. Orgs., Inc. v. Camp*, 397 U.S. 150, 153 (1970) ("The question of standing . . . concerns, apart from the 'case' or 'controversy' test, the question whether the interest sought to be protected by the complainant is arguably within the zone of interests to be protected or regulated by the statute or constitutional guarantee in question."). This requirement comes from the Administrative Procedure Act, 5 U.S.C. § 702 (2018).

21. Antonin Scalia, *The Doctrine of Standing as an Essential Element of the Separation of Powers*, 17 SUFFOLK L. REV. 881, 881 (1983) ("My thesis is that the judicial doctrine of standing is a crucial and inseparable element of [the separation of powers] principle, whose disregard will inevitably

view is not supported by the Constitution or caselaw, contending instead that standing has far more to do with ensuring a plaintiff has sufficient interest in litigating a matter than in the demarcation of authority between the federal government's branches.²² Still others have pointed out that standing doctrine is used strategically to evade reaching the merits of cases when the interests of the parties are onerous to the political views of the judge.²³

Setting aside accusations of less-than-noble motives of adjudicators, standing doctrine is recognized as one of the most confused areas of law and “has not been defined with complete consistency in all of the various cases decided by” the Court.²⁴

Justice Scalia wrote the opinion in the 1992 landmark decision *Lujan v. Defenders of Wildlife*,²⁵ which remains the most significant recent development in standing jurisprudence. There, the plaintiffs attempted to challenge a rule promulgated by the Secretary of the Interior. Section 7 of the Endangered Species Act of 1973 requires federal agencies to consult with the Secretary of the Interior to ensure that the actions they take will not harm endangered species or their habitats.²⁶ Previously, the Department of the Interior's position was that Section 7 applied to actions taken by United States agencies in foreign nations.²⁷ However, the Department's new regulation required consultation only for actions taking place within the United States or on the high seas.²⁸

A provision of the Endangered Species Act stated that “any person may commence a civil suit on his own behalf . . . to enjoin any person, including the United States and any other governmental instrumentality or agency

produce—as it has during the past few decades—an overjudicialization of the processes of self-governance.”).

22. See Gene Nichol, Jr., *Abusing Standing: A Comment on Allen v. Wright*, 133 U. PA. L. REV. 635 (1985).

23. As one commentator put it, “To a political scientist, standing depends on the degree of congruence between the political and ideological goals of the plaintiff and those of the judges who answer the standing question.” See Richard J. Pierce, *Standing: Law or Politics?*, 77 N.C. L. REV. 1741 (1999).

24. *Valley Forge Christian Coll. v. Ams. United for Separation of Church & State*, 454 U.S. 464, 475 (1982).

25. *Lujan v. Defs. of Wildlife*, 504 U.S. 555 (1992).

26. 16 U.S.C. § 1536(a)(2) (2018).

27. *Lujan*, 504 U.S. at 558–59.

28. *Id.*

... who is alleged to be in violation of any provision of this chapter.”²⁹ The provision allowed citizens to act like private attorneys general, functioning as a “mechanism for controlling unlawfully inadequate enforcement of the law.”³⁰ These “citizen-suit” provisions are extremely common in environmental statutes; nearly every major statute provides for citizen standing.³¹

The Court’s analysis in *Lujan* was limited to whether Defenders of Wildlife had standing to bring the action. Despite the apparent congressional grant of jurisdiction, the Court held that the plaintiffs did not satisfy the Constitution’s requirements to have their dispute heard in federal court.³²

The plaintiffs asserted that they had standing because the new rule would “increase[] the rate of extinction of endangered and threatened species.”³³ While the Court agreed that “the desire to use or observe an animal species, even for purely esthetic purposes, is undeniably a cognizable interest for the purpose of standing,”³⁴ it found, relying on *Sierra Club v. Morton*,³⁵ that even though there may be an interest, “the injury in fact test requires more than an injury to a cognizable interest. It requires that the party seeking review be himself among the injured.”³⁶ The plaintiffs, who in their affidavits did not describe any certain plans to visit the areas outside of the United States that would be affected, were not able to convince the Court that they had an injury that was “imminent” despite expressing intentions to return to the areas “someday.”³⁷

The Court snubbed the plaintiffs’ arguments that they were injured by harm to endangered species under three novel theories, including the ecosystem nexus.³⁸ The ecosystem nexus “proposes that any person who uses *any part* of a ‘contiguous ecosystem’ adversely affected by a funded

29. 16 U.S.C. § 1540(g) (2018).

30. Sunstein, *supra* note 13, at 165.

31. *See id.* at n.11.

32. *Lujan*, 504 U.S. at 571.

33. *Id.* at 562.

34. *Id.* at 562–63.

35. *Sierra Club v. Morton*, 405 U.S. 727 (1972).

36. *Lujan*, 504 U.S. at 563 (quoting *Sierra Club*, 405 U.S. at 734–35).

37. *Id.* at 564.

38. *Id.* at 565–66. The other two theories, the animal nexus and the vocational nexus, are interesting in their own right but are less relevant to this paper.

activity has standing even if the activity is located a great distance away.”³⁹ The Court rejected this approach, holding that it is not sufficient to be “in the vicinity” of an area threatened by the challenged activity and that the person bringing suit must be one who actually uses the area.⁴⁰ According to the Court, “it goes beyond the limit . . . and into pure speculation and fantasy, to say that anyone who observes or works with an endangered species, anywhere in the world, is appreciably harmed by a single project affecting some portion of that species with which he has no more specific connection.”⁴¹

In sum, the Court’s decision in *Lujan* requires that a plaintiff seeking redress of an agency’s or government’s failure to act in accordance with the law demonstrate some special or additional particularized harm. Concern for endangered animals and their habitats is not sufficiently injurious for an individual to bring a claim in federal court absent some actual property or aesthetic interest that may be threatened.

The “injury in fact” element of standing, so vital to the Court’s decision in *Lujan*, cannot be found in the plain text of Article III of the Constitution.⁴² The phrase did not make an appearance in any Court opinion until 1970, in *Barlow v. Collins*.⁴³ Of course, standing in general is also unmentioned in the Constitution. It was first referenced as a limit to Article III judicial power in the 1944 case *Stark v. Wickard*.⁴⁴ Early federal courts’ determinations of whether a dispute was a “case or controversy” suitable for adjudication were more straightforward; the inquiry concerned the existence of a common-law or statutorily conferred cause of action, similar to the rule of the English courts most familiar to the Framers.⁴⁵ While standing doctrine has evolved dramatically since the Constitution was ratified, the

39. *Id.* at 565.

40. *Id.* at 565–66.

41. *Id.* at 567.

42. *See generally* U.S. CONST. art. III.

43. *Barlow v. Collins*, 397 U.S. 159 (1970).

44. *Stark v. Wickard*, 321 U.S. 288 (1944); *see also* Sunstein, *supra* note 13, at 168–70 (examining the infrequency of the use of the concept of standing throughout American judicial history).

45. Sunstein, *supra* note 13, at 170–73 (describing the striking similarity of the approach of early American federal courts and English courts in determining if a plaintiff had a right to sue).

Court's decision in *Lujan* set an unprecedented limit on Congress's power to prescribe standing for individuals in federal court.⁴⁶

There are notable exceptions to the general rules. A state may sometimes sue on behalf of the welfare of its citizens under a theory of *parens patriae* for harms that threaten the state's and its residents' roles in the federal system⁴⁷ or that "the State, if it could, would likely attempt to address through its sovereign lawmaking powers."⁴⁸ Though standing is understood to be jurisdictional and therefore not waivable, private citizens are allowed to bring a *qui tam* action on their own behalf and on behalf of the United States to enforce a federal statute—and actually be paid damages—even if the statute has absolutely nothing to do with the plaintiff.⁴⁹

From time to time, the Court also finds reasons to set aside its prudential concerns when it comes to standing. One twist of the prohibition on asserting third-party rights is the uncontroversial acceptance of shareholder derivative suits. Shareholder "[d]erivative suits are the procedural mechanism to enforce state fiduciary duty law."⁵⁰ In this type of litigation, "the corporation is the functional plaintiff—that is, the real party in interest—and the allegations are that the corporation's current or former officers and directors breached their fiduciary duties to the corporation."⁵¹

46. See generally *id.* (tracing the arc of standing doctrine in five distinct phases, beginning with the earliest American law and concluding with the Court's decision in *Lujan*).

47. The Court explained this standard (rather unhelpfully):

[T]o have [*parens patriae*] standing the State must assert an injury to what has been characterized as a "quasi-sovereign" interest, which is a judicial construct that does not lend itself to a simple or exact definition. Its nature is perhaps best understood by comparing it to other kinds of interests that a State may pursue and then by examining those interests that have historically been found to fall within this category.

Alfred L. Snapp & Son, Inc. v. Puerto Rico, 458 U.S. 592, 601 (1982).

48. *Id.* at 607.

49. See Evan Caminker, *The Constitutionality of Qui Tam Actions*, 99 YALE L.J. 341 (1989) ("The *qui tam* action offers an unconventional means by which Congress may enlist the aid of private citizens in enforcing Federal statutory schemes. In such an action, a private person maintains a civil proceeding on behalf of both herself and the United States to recover damages and/or to enforce penalties available under a statute prohibiting specified conduct. The private plaintiff shares any monetary recovery with the United States."); see also *Vt. Agency of Nat. Res. v. United States ex rel. Stevens*, 529 U.S. 765, 770–77 (2000) (Scalia, J.) (explaining that the historical significance of *qui tam* actions justifies an exception to the elements of standing as currently formulated).

50. Jessica Erickson, *Corporate Governance in the Courtroom: An Empirical Analysis*, 51 WM. & MARY L. REV. 1749, 1756 (2010).

51. *Id.*

When a shareholder wins a derivative suit, recovery is given not to the shareholder but is instead “returned to the corporation.”⁵² The right to bring these suits belongs even to an owner who has just one share.

These examples, while perhaps not upending the standing formula entirely, demonstrate that the judiciary’s approach to standing can be pliable in response to the problem before it. Among the many criticisms of Justice Scalia’s approach in environmental cases is that it is blatantly “insensitiv[e] to the holistic nature of environmental injuries.”⁵³ Other commentators have pointed out that, as insistent as he is that they are “value neutral,” Scalia’s decisions, including those concerning standing, openly reflect his political ideology and to a great extent, his religious proclivities.⁵⁴

Some have called for adoption of a more inclusive approach for environmental interests. According to Professor Christopher D. Stone, the Earth should be allowed to assert legal rights in court as other nonhuman entities have.⁵⁵ Justice William Douglas advanced this view in his dissent in *Sierra Club v. Morton*:

The critical question of “standing” would be simplified and also put neatly in focus if we fashioned a federal rule that allowed environmental issues to be litigated before federal agencies or federal courts in the name of the inanimate object about to be despoiled, defaced, or invaded by roads and bulldozers. . . . Contemporary public concern for protecting nature’s ecological equilibrium should lead to the conferral of standing upon environmental objects to sue for their own preservation.⁵⁶

52. *Id.*

53. Peter Manus, *Wild Bill Douglas’s Last Stand: A Retrospective on the First Supreme Court Environmentalist*, 72 TEMP. L. REV. 111, 136 (1999).

54. See Erwin Chemerinsky, *The Jurisprudence of Justice Scalia: A Critical Appraisal*, 22 U. HAW. L. REV. 385, 391 (2000) (“Is it mere coincidence that in virtually every case Justice Scalia discerns from the Constitution the conclusion [that] is consistent with his conservative personal ideology?”); see also Don Ellinghausen, Jr., “*In Standing Is the Preservation of His World*”: *Justice Scalia and the Varieties of Natural-Religious Experience*, 16 MO. ENVTL. L. & POL’Y REV. 474 (2009) (discussing at length the religious influence Scalia revealed in his decisions).

55. See Christopher D. Stone, *Should Trees Have Standing?—Toward Legal Rights for Natural Objects*, 45 S. CAL. L. REV. 450 (1972); see also Ellinghausen, *supra* note 54, at 518 (discussing at length Professor Stone’s proposal to grant standing to the environment).

56. *Sierra Club v. Morton*, 405 U.S. 727, 741–42 (1972) (Douglas, J., dissenting).

The idea of granting standing in federal court to a nonhuman entity may at first glance seem bizarre or unlikely, but it is in fact routine to the point of mundane. As Justice Douglas pointed out, ships and corporations can be parties in litigation, and he argued that natural features, through a guardian, should be allowed to be parties as well.⁵⁷

The Court has never adopted the dissent's approach in *Sierra Club*. However, a recent case indicates that broad environmental interests such as those the Sierra Club sought to protect may still have a place in federal court. In *Juliana v. United States*, the Oregon District Court held that a group of young people and others challenging the federal government's climate change policy had standing to sue.⁵⁸ The Oregon District Court found that the injuries alleged based on damage to their family properties, personal health, or recreational opportunities were cognizable.⁵⁹ While this decision does not go as far as Justice Douglas or Professor Stone may have preferred in terms of giving legal recognition to natural objects, it does show that the concept of injury may be flexible in response to the grave risks posed by environmental catastrophe and climate change.

B. A Tough Bitch

Two decades before Justice Scalia wrote the majority opinion in *Lujan v. Defenders of Wildlife*, a short book brought a concept into mainstream awareness that had been quietly simmering in academic journals for a few years. James Lovelock's *Gaia: A New Look at Life on Earth* advanced a new perspective on the role of biota (living organisms) and abiota (nonliving factors) in the maintenance of a habitable planet.⁶⁰ It argued that the planet functions like a living being, appearing to self-regulate, because of the interaction of specific mechanisms such as temperature, atmospheric composition, and carbon-based lifeforms.⁶¹ Lovelock named his idea—and the entity it described—Gaia.⁶²

57. *Id.* at 742–43.

58. *Juliana v. United States*, 217 F. Supp. 3d 1224, 1242 (D. Or. 2016).

59. *Id.* at 1244.

60. *See generally* LOVELOCK, *supra* note 6.

61. *Id.*

62. Scientists and others who write about this topic variably use “Gaia theory” and “Gaia hypothesis” when referring to the basic framework proposed by Lovelock and refined by others. For

According to Lovelock, understanding this unifying concept of the planet requires a holistic, interdisciplinary approach that had been lacking since the early nineteenth century.⁶³ He blamed the Victorian-era “divorce of the earth and life sciences” for obscuring the emergent properties of Earth, “that is, [that] the whole will be more than the sum of the parts.”⁶⁴ He explained:

When biochemists examine a live animal, they know that many of its reactions and processes can be adequately described by simple deterministic physics and chemistry. But they also accept the legitimacy of physiology. They know that for an intact animal, homeostasis, the automatic regulation of temperature, and chemical composition, although it involves chemistry, are emergent properties. Such properties require physiology for their explanation and understanding. I think the same can be said of the earth. If it is a superorganism, then explaining its reactions and processes requires physiology as well as chemistry and physics.⁶⁵

Conceiving of the Earth as a single living entity, even an organism, was not entirely novel even in the 1970s. Sir Isaac Newton wrote in the seventeenth century that “this Earth resembles a great animall or rather inanimate vegetable, draws in aethereall breath for its daily refreshment & vitall ferment & transpires again with gross exhalations.”⁶⁶ In a lecture before the Royal Society of Edinburgh in 1785, James Hutton, the father of biology, said, “I consider the Earth to be a superorganism and that its proper study should be by physiology.”⁶⁷

the sake of simplicity in the limited scope of this paper, the term “Gaia” will be used to refer to both the theory and the entity.

63. Lovelock, *supra* note 7; see also Lynn Margulis & Gregory Hinkle, *The Biota and Gaia: 150 Years of Support for Environmental Sciences*, in SCIENTISTS ON GAIA 11, 15 (Stephen H. Schneider & Penelope J. Boston eds., 1991) (“The study of Gaia intrinsically involves disciplines as disparate as atmospheric chemistry and microbial physiology. . . . Without such interdisciplinary activities, most Gaian phenomena will remain unstudied.”).

64. Lovelock, *supra* note 7.

65. *Id.* at 4–5.

66. GORDON FISHER, MARRIAGE AND DIVORCE OF ASTRONOMY AND ASTROLOGY: A HISTORY OF ASTRAL PREDICTION FROM ANTIQUITY TO NEWTON 188 (2006) (quoting Newton’s 1670s manuscript “Of nature’s obvious laws and processes in vegetation”).

67. Lovelock, *supra* note 7.

However, the publication of Charles Darwin's *On the Origin of Species* in 1859 signaled a paradigmatic shift.⁶⁸ The frame for analysis in biology became *evolution by adaptation*, a model that focused on life-form speciation through generational response to the environment.⁶⁹ Biologists began to study how beings are shaped by their habitat and competition while ignoring the subtler point, that the habitat is likewise altered by its beings. The study of ecology continued throughout the twentieth century disregarding the advice of scientist Alfred Lotka to “constantly take in view the evolution, as a whole, of the system (organism plus environment)” and neglecting his insight that “[i]t is not so much the organism or the species that evolves, but the entire system, species plus environment. The two are inseparable.”⁷⁰

The famed Russian geochemist Vladimir Vernadsky wrote boldly of the proper understanding of the relationship between humanity and the Earth. He complained that his contemporaries had “consciously failed to reckon with the natural laws of the biosphere, the only terrestrial envelope where life can exist,” and went on to say of the biosphere,

Basically man cannot be separated from it; it is only now that this indissolubility begins to appear clearly and in precise terms before us. He is geologically connected with its material and energetic structure. Actually no living organism exists on earth in a state of freedom. All organisms are connected indissolubly and uninterruptedly, first of all through nutrition and respiration, with the circumambient material and energetic medium. Outside it they cannot exist in a natural condition.⁷¹

Lovelock illustrates this concept in his famous Daisyworld model using a single variable—temperature—to demonstrate how living beings influence and shape the environment.⁷² Daisyworld supposes an imaginary planet with a limited atmosphere, plenty of land, steady output from the sun, and ample water that is well-seeded with daisies of two shades, light and

68. *Id.* at 4.

69. *Id.*

70. ALFRED J. LOTKA, *ELEMENTS OF PHYSICAL BIOLOGY* 16 n.19 (Williams and Wilkins Co. 1925).

71. Vladimir I. Vernadsky, *The Biosphere and the Noösphere*, 33 *AM. SCIENTIST* 4 (George Vernadsky trans., 1945).

72. Lovelock, *supra* note 7, at 5–7.

dark.⁷³ Temperature is controlled primarily by the albedo, or reflectivity, of the planet's surface.⁷⁴ The daisies grow best at a temperature of 22.5 degrees Celsius but can germinate and live at temperatures above five degrees and below forty degrees.⁷⁵ At first, dark daisies, absorbing more solar radiation due to their dark pigment and becoming warmer than the planet's surface, vastly outperform light daisies, which reflect light and are cooler than the planet's surface.⁷⁶ However, over time, dark daisies' proliferation increases the planet's average temperature until it exceeds the ideal 22.5 degrees, causing them to face stiffer competition from light daisies that maintain a lower temperature.⁷⁷ As the light daisy population burgeons, the planet cools until it is below 22.5 degrees again, giving the advantage back to the dark daisies.⁷⁸ This process continues through successive generations until fluctuation is minimal and the optimal population of light and dark daisies is stable, along with the planet's temperature.⁷⁹

Lovelock and others applied the Daisyworld concept to computer models to demonstrate how living organisms interact on a global scale with an abiotic factor.⁸⁰ He developed models that included ten different-colored daisies, and further complicated the system by adding in factors such as rabbits and foxes.⁸¹ In doing so he demonstrated "the remarkable mathematical stability of geophysiological models"⁸² and gave support to his conjecture that "life is a planetary-scale phenomenon" and that evolution of the species and evolution of the environment are "tightly coupled as a single indivisible process."⁸³

Among the difficulties recognized by critics of Gaia is that its development in scientific literature has been marked by a distinct lack of

73. *Id.*

74. *Id.* at 5.

75. *Id.* at 6.

76. *Id.* at 5-7.

77. *Id.*

78. *Id.*

79. *Id.*

80. *Id.* at 6-8.

81. *Id.* at 7-8.

82. *Id.* at 9.

83. *Id.* at 10.

precision in defining of what, exactly, it purports.⁸⁴ James Lovelock himself has characterized and described his ideas using various terms over the years, often defining and redefining his points in response to criticism and continuing research.⁸⁵

Even those responsible for the concept's early development have similarly presented alternate formulations and at times openly disagreed with Lovelock. Lynn Margulis, the renowned scientist best known for her innovations in the understanding of symbiosis in cell biology, as well as a vital figure in the initial conception of Gaia, wrote in her essay "Gaia is a Tough Bitch,"

Lovelock would say that Earth is an organism. I disagree with this phraseology. No organism eats its own waste. I prefer to say that Earth is an ecosystem, one continuous enormous ecosystem composed of many component ecosystems. Lovelock's position is to let the people believe that Earth is an organism, because if they think it is just a pile of rocks they kick it, ignore it, and mistreat it. If they think Earth is an organism, they'll tend to treat it with respect. To me, this is a helpful cop-out, not science. Yet I do agree with Lovelock when he claims that most of the things scientists do are not science either. And I realize that by taking the stance he does he is more effective than I am in communicating Gaian ideas.⁸⁶

One of Gaia's most outspoken critics, James W. Kirchner, offered a helpful spectrum to examine the various ideas that have developed under the name of Gaia theory.⁸⁷ He stratified the various understandings of Gaia along a five-layer continuum from "weak" to "strong" to indicate the "extremity" of each of the contentions.⁸⁸ The weakest, least controversial Gaia hypothesis identified by Kirchner is that "the biota has a substantial

84. "Gaia is a not a hard-and-fast, well-defined concept. It is not a 'set menu.' Rather it is more like a loosely defined smörgåsbord, from which 'diners' can take their pick from a collection of several related hypotheses, often couched in rather vague terms." TOBY TYRELL, *ON GAIA: A CRITICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN LIFE AND EARTH* 4 (2013).

85. *Id.* at 4–5.

86. Lynn Margulis, *Gaia Is a Tough Bitch*, in *THE THIRD CULTURE: BEYOND THE SCIENTIFIC REVOLUTION* 140 (John Brockman ed., 1995).

87. James W. Kirchner, *The Gaia Hypotheses: Are They Testable? Are They Useful?*, in *SCIENTISTS ON GAIA* 38 (Stephen H. Schneider & Penelope J. Boston eds., 1991).

88. *Id.*

influence over certain aspects of the abiotic world, such as the temperature and composition of the atmosphere.”⁸⁹ The strongest, most controversial contention ever advanced concerning Gaia is that “the biota manipulates its physical environment for the purpose of creating biologically favorable, or even optimal, conditions for itself.”⁹⁰

Despite differences among individual scientists, some tenets of the concept remain common across multiple descriptions of Gaia hypotheses.⁹¹ The theory has inspired decades of scientific inquiry to test specific Gaian mechanisms⁹² and catalyzed the development of an entirely new discipline, Earth system science, that can be studied for undergraduate and graduate degrees offered at universities such as Stanford⁹³ and the University of California at Irvine.⁹⁴

While it is by no means unanimous, support for Lovelock and Margulis’s thesis has grown tremendously in the scientific community since it was first introduced.⁹⁵ As one editorial writer put it, “[Gaia theory] made Lovelock . . . a hero not just to the public but also to his fellow scientists. The Gaia theory has gone from heresy to near-orthodoxy in less than four decades and now informs a series of international research programmes.”⁹⁶

89. *Id.* at 38–39.

90. *Id.* Lovelock later disavowed the two strongest forms of Gaia described by Kirchner, “Teleological” (purposive) and “Optimizing Gaia.” He no longer abides the notion that the mechanisms of Gaia’s systems function with intent to make the Earth habitable for life nor that Gaia optimizes the environment for life. See TYRELL, *supra* note 84, at 5.

91. TYRELL, *supra* note 84, at 4. Toby Tyrell’s book carefully examines the evidence supporting three major assertions that are central to the Gaian thesis. *Id.* First, that “Earth is a favorable habitat for life.” *Id.* Second, “it has been so over geologic time as the environment has remained fairly stable.” *Id.* Third, that the stability of the environment “is partly due to life’s role in shaping the environment. For instance, life has influenced the chemical composition of the atmosphere and the sea.” *Id.*

92. See, e.g. Robert J. Charlson, James E. Lovelock, Meinrat O. Andreae & Stephen G. Warren, *Oceanic Phytoplankton, Atmospheric Sulphur, Cloud Albedo and Climate*, 326 NATURE 655 (1987) (discussing the results of a study of emissions of dimethylsulphide from planktonic algae on climate regulation).

93. STANFORD EARTH SYSTEM SCIENCE, <https://pangea.stanford.edu/ess> [<https://perma.cc/P8GF-A3U4>].

94. UCI DEPARTMENT OF EARTH SYSTEM SCIENCE, <https://www.ess.uci.edu/> [<https://perma.cc/D8NF-KT5F>].

95. Editorial, *Earth System Science: From Heresy to Orthodoxy*, GUARDIAN (Jul. 26, 2009), <https://www.theguardian.com/commentisfree/2009/jul/27/climate-change-gaia-theory> [<https://perma.cc/3XT4-U7TH>].

96. *Id.*

Further illustrating this point, in 2001, over a thousand scientists signed a declaration at a worldwide conference in Amsterdam stating, “The Earth System behaves as a single, self-regulating system comprised of physical, chemical, biological and human components.”⁹⁷ Toby Tyrell, a critic of Gaia, pointed out that this “wording almost could have been lifted from one of Lovelock’s books” and acknowledged “the scientific respectability and the continuing prominence” of the theory in the scientific community.⁹⁸ Suffice it to say, Gaia is by no means a fringe concept and plays an important, even central, part in ongoing research of the Earth.

To those outside of scientific academia who have picked up on the notion, Gaia represents not only a model to map the large-scale interaction of abiotic and biotic elements but also a powerful method of interpreting theology, morality, and ethics. For example, in her book *God and Gaia*, theology professor Rosemary Radford Ruether utilizes Gaia to inform her thesis of justice and humanity’s relationship to the rest of nature.⁹⁹ Professor Ruether, describing Gaia as a “living organism of complex interdependencies and biofeedback, linking biota and its ‘environment’ of soil, air, and water,” points out the “falsity of the human concept of ‘competition’” that “imagines the other side as an ‘enemy’ to be ‘annihilated,’ rather than an essential component of an interrelationship upon which it itself interdepends.”¹⁰⁰ She calls for human ethics to mirror this “natural interdependency” in increased compassion and cooperation with other “members of the biotic community upon which we depend for our own life.”¹⁰¹

Gaia implicates a distinctly non-anthropocentric worldview.¹⁰² This perspective, that human beings are not the most important or central element

97. See TYRELL, *supra* note 84, at 3 (emphasizing the significance of this statement as reflective of the legitimacy of Gaia theory).

98. TYRELL, *supra* note 84, at 3.

99. RUETHER, *supra* note 8.

100. *Id.* at 56.

101. *Id.* at 57.

102. “The Gaia hypothesis is a biological idea, but it’s not human-centered. Those who want Gaia to be an Earth goddess for a cuddly, furry human environment find no solace in it. They tend to be critical or to misunderstand.” Margulis, *supra* note 86; see also Thomas J. Donahue, *Anthropocentrism and the Argument from Gaia Theory*, ETHICS & ENV’T, Fall 2010, at 51, 72 (explaining after thoroughly contending with a list of twelve premises of Gaia, “it appears that the truth of Gaia theory would make it more probable than not that anthropocentrism is false[. s]o accepting Gaia theory would give you a strong reason for rejecting anthropocentrism”).

of existence, may be read as incompatible with the capitalistic neoliberal attitude of the West.¹⁰³ However, it is not out of step with philosophies found in world religions. For example, the Earth-human relationship understood by Buddhist writers and thinkers reflects a recognition of the inherent moral value of nature and rejects the view that human beings are superior to other living beings.¹⁰⁴ This attitude rejects anthropocentrism and calls for a restoration of harmony among beings, not unlike the Gaian concept of homeostasis.¹⁰⁵

Other philosophies not specifically associated with a particular religion also accord well with the scientific model of Gaia. For example, Norwegian philosopher Arne Naess developed the concept of “deep ecology,” which he described as the component in ethics and religion that required people to “valu[e] nature for its own sake.”¹⁰⁶ Gaia’s emphasis on the inextricable connection of humans to the natural world lends itself easily to this perspective.

This idea is also found in art and philosophy in North America. Kentucky farmer and author Wendell Berry wrote in his essay “It All Turns on Affection,”

Industrialists and industrial economists have assumed, with permission from the rest of us, that land and people can be divorced without harm. . . . But land abuse *cannot* brighten the human prospect. There is in fact no distinction between the fate of the land and the fate of the people. When one is abused, the other suffers. The penalties may come quickly to a farmer who destroys perennial cover on a sloping field. They *will* come sooner or later to a land-destroying civilization such as ours.”¹⁰⁷

Famed forester and environmental writer Aldo Leopold described in his essay “Thinking Like a Mountain” the importance of considering the consequences to the broader ecosystem before taking an action that may

103. See generally Judith E. Koons, *Earth Jurisprudence: The Moral Value of Nature*, 15 PACE ENVTL. L. REV. 263 (2008).

104. See generally Ellinghausen, *supra* note 54, at 496–507 (quoting from the teachings of the Dalai Lama and other noted Buddhist writers).

105. *Id.*

106. David L. Barnhill & Roger S. Gottlieb, *Introduction to DEEP ECOLOGY & WORLD RELIGIONS: NEW ESSAYS ON SACRED GROUNDS 1* (Barnhill & Gottlieb, eds., 2001).

107. Berry, *supra* note 9.

upset the natural balance requisite to its continued viability—in that instance, killing wolves so that theoretically there may be more deer.¹⁰⁸ Leopold also wrote of the importance of acting with an eye toward what he called a “land ethic,” stating, “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.”¹⁰⁹

It is clear from such examples that a holistic view of the relationship between humanity and nature is not unusual. Gaia, while basically a scientific idea, unifies themes of interdependence also seen in theology, philosophy, ethics, and art.

Theories in science are not meant to be proven true or false, but rather are subject to iterative research and testing to show whether they are supported or unsupported by subsequent results. The theory of Gaia, however, rings “true” across disciplines and informs a wide range of ideas. This thesis of interconnectedness may prove incredibly useful in inspiring fundamental change to the human way of being, as time is running out to forge a path away from destruction.¹¹⁰

II. ANALYSIS: THE UNFORECLOSED POSSIBILITY

I am not willing to foreclose the possibility [] that in different circumstances a nexus theory similar to those proffered [in Lujan] might support a claim to standing.

—Justice Anthony Kennedy¹¹¹

As others have pointed out, a major flaw of Justice Scalia’s attitude toward plaintiffs in environmental cases is that it ignores the “holistic nature of environmental injuries”¹¹² and this tendency is seen clearly in his treatment of standing. Scalia, writing for the majority in *Lujan v. Defenders*

108. ALDO LEOPOLD, *Thinking Like a Mountain*, in A SAND COUNTY ALMANAC 129–33 (1949).

109. ALDO LEOPOLD, *The Land Ethic*, in A SAND COUNTY ALMANAC 224–25 (1949).

110. See Umair Irfan, *Report: We Have Just 12 Years to Limit Devastating Global Warming*, VOX, (Oct. 8, 2018, 9:10 AM), <https://www.vox.com/2018/10/8/17948832/climate-change-global-warming-un-ipcc-report> [<https://perma.cc/BZ8B-TGPM>] (discussing the new United Nations Intergovernmental Panel on Climate Change report that urges drastic changes in energy and fossil fuel policy to mitigate some of the devastating effects of global warming).

111. *Lujan v. Defs. of Wildlife*, 504 U.S. 555, 579 (1992) (Kennedy, J., concurring).

112. See Manus, *supra* note 53, at 136.

of *Wildlife*, flatly dismissed the plaintiffs' "novel standing theor[y]" of an ecosystem nexus whereby "any person who uses *any part* of a 'contiguous ecosystem' adversely affected . . . has standing even if the activity is located a great distance away."¹¹³ In short, Scalia's view is that hurting part of Earth cannot injure someone else who is not in some way interested in the specific place that is being hurt.

Perhaps Justice Scalia was not wrong in how he characterized the Constitution's requirements for a plaintiff to have standing to sue in federal court.¹¹⁴ What he was most certainly wrong about is much more fundamental—he was wrong about what a person is.

Gaia has obvious implications for the Court's conception of Article III standing. In general, personal injury such as is required to establish standing involves, tautologically, injury to a person. The paradigmatic assumption in litigation that concerns the environment is that there is a dichotomy between "persons" and "the environment," as if the planet we happen to live on is "a stage, and all the men and women merely players."¹¹⁵ However, as Gaia illustrates, the distinction between humans and Earth is entirely illusory. Human beings are part of a single, interconnected entity, and damage to a part is damage to the whole. Humans have a real injury when the Earth is damaged not because they *own* it, but because they *are* it.

Justice Scalia wrote that standing provides "an answer to the very first question that is sometimes rudely asked when one person complains of another's actions: 'What's it to you?'"¹¹⁶ The answer to that question for plaintiffs bringing a claim because of damage to the Earth is, simply, "everything." The totality of a person's interests in life, liberty, and property are inextricably connected to the integrity of the Earth.

There must be a way to integrate a modern scientific understanding of the human-Earth relationship with standing doctrine. I propose a new theory of standing called *Gaia standing*, which allows aggrieved persons to sue under such mechanisms as the citizen-suit provisions of environmental

113. Lujan, 504 U.S. at 565.

114. He could be wrong, but in this author's opinion it is not very meaningful to be wrong about something that is essentially a fiction. See Sunstein, *supra* note 13, at 185 ("One might well ask: What was the source of the injury-in-fact test? Did the Supreme Court just make it up? The answer is basically yes.")

115. WILLIAM SHAKESPEARE, AS YOU LIKE IT act 2, sc. 7.

116. Scalia, *supra* note 21, at 882.

statutes based on the inextricable relationship between human wellbeing and a stable Earth system. This type of standing should be limited to cases concerning environmental injury because of its uniquely holistic character.

Standing after *Lujan* requires a plaintiff to show an injury that is concrete and particularized.¹¹⁷ In cases about the environment, courts should look no further than the injury the defendant's purported actions have on Gaia. Gaia is, after all, the entity that is really at interest in such cases,¹¹⁸ and every plaintiff, by their very existence, has a stake in the wellbeing of Gaia.

Even so, when a plaintiff makes a claim based on Gaia standing, the grievance is not generalized.¹¹⁹ Environmental injury from a Gaian perspective affects many, but "[t]he fact that an injury may be suffered by a large number of people does not of itself make that injury a nonjusticiable generalized grievance."¹²⁰ Gaia injury is *to the plaintiff* because the plaintiff is an inextricable *part of* Gaia.

Gaia standing is not a wily way of sneaking an unconstitutional plaintiff into court; rather, it is a way of setting right the wrongs caused by the judiciary's lack of understanding of environmental injury. Gaia standing does not grant "legal rights" to the environment generally. Courts are decidedly human contrivances. Accepting Gaia does not necessarily mean that we should open the doors to the rivers and forests, as Christopher Stone and Justice Douglas advocated.¹²¹ Rather, Gaia requires more properly a reexamination of the validity of the distinction between human beings and the environment. There is no need to give standing to "the environment"; under Gaia, "the environment" has been in court all along in the form of human beings.

117. See generally Sunstein, *supra* note 13 (documenting the effect of the *Lujan* decision on standing doctrine).

118. See Stone, *supra* note 55, for a thorough explanation of the centrality of the natural object's interests in environmental litigation.

119. Cf. *supra* note 19 and accompanying text (introducing the "generalized grievance" concept as a prudential restriction on standing).

120. *Spokeo, Inc. v. Robins*, 136 S. Ct. 1540, 1548 n.7 (2016). The Court continued, "The victims' injuries from a mass tort, for example, are widely shared, to be sure, but each individual suffers a particularized harm." *Id.*

121. *Sierra Club v. Morton*, 405 U.S. 727, 741-42 (1972) (Douglas, J., dissenting) (citing with approval Stone, *supra* note 55).

Like the judiciary's current approach, a "guardianship" approach as described by Professor Stone¹²² as a means of granting standing to nonhuman natural objects also does not comport with biological reality and only reinforces a paternalistic attitude toward nature that may be in part a source of the crisis we face today.¹²³ There is a world of difference between a plaintiff stating "I am injured because I love this natural feature" and "I am injured because the integrity of this natural feature is directly connected to the wellbeing of a whole of which I am a part." The latter has a strong analogy in shareholder derivative suits wherein the shareholder is entitled to bring suit because they have a personal interest in the organization even when specific actions of specific executives cannot be traced directly to financial harm to the shareholder's stock.

The principal advantage of Gaia standing over Professor Stone's guardianship approach is that Gaia standing changes nothing about the way courts handle environmental litigation procedurally. For example, there is no inquiry into the adequacy of a "guardian" to bring a claim on behalf of a natural feature; with Gaia standing, plaintiffs speak for themselves. Gaia standing only requires the court to see plaintiffs as they really are: constituents of a much greater entity, the beauty, integrity, and stability¹²⁴ of which is directly connected to plaintiffs' own interests.

A critic of Gaia standing may point out that minor damage to the Earth would not actually affect a remotely located in the manner contemplated. For example, while a private landowner burning large swaths of the rainforest to graze cattle presents an obvious problem to an interest shared

122. Stone, *supra* note 55, at 464 ("One ought, I think, to handle the legal problems of natural objects as one does the problems of legal incompetents The guardian . . . represents the incompetent in his legal affairs. Courts make similar appointments when a corporation has become 'incompetent'—they appoint a trustee in bankruptcy or reorganization to oversee its affairs and speak for it in court when that becomes necessary.").

123. A longer discussion of the problematic implications of a view of nature that places human beings in a position of authority over nature can be found in Ellinghausen, *supra* note 54, at 482 ("Justice Scalia's eco-phobic mindset reflects four philosophical influences that serve to rationalize humankind's 'taming' and developing nature. These are a Cartesian paradigm, in which man alone possesses consciousness; a Christian theological universe, in which man must escape the snares of his earthbound existence to achieve salvation; an emerging alliance of fundamentalist faith and globalized corporatism; and an urban-centric intellectual perspective that denies nature any spiritual presence capable of counteracting a triumphant industrialism."). Suffice it to say that a view of humanity as the authority or guardian of nature implies a capitalistic notion of nature as a force to be conquered and commodified.

124. See LEOPOLD, *supra* note 109 (articulating the land ethic).

by the whole Earth, the damage caused by an individual polluting a stream on her rural farm has far less potential to reverberate.

To such a complaint, the analogy to shareholder derivative suits is apropos. It does not matter if the shareholder has only one share, a tiny pecuniary interest in the corporation; her relationship to the entity is what gives her standing, not the magnitude of potential harm to her wallet. Furthermore, to assert that any harm to the environment does not *necessarily* harm the plaintiff is beyond the function of standing as a threshold inquiry and comes too close to the merits. The proper inquiry for standing purposes is not how severe the damage to the plaintiff is but whether the plaintiff has a legitimate interest in the subject of litigation, which was harmed because of the defendant's behavior.

Finding that a plaintiff has standing does not mean that the plaintiff prevails in a lawsuit; it simply means that the case can be heard. Under the law, humans have the right to harm the Earth to some extent. Without such allowances, industry and agriculture could not take place. But when a human has harmed or will harm the Earth in a way that is not lawful, such as when their business operations have polluted beyond the regulatory standards, one should not have to be immediately proximate to the violation just to adjudicate the claim.

In fact, expanding the pool of potential plaintiffs may allow for superior accountability than reliance on private property owners or others with personal ties to a certain area to sue. As Professor Stone pointed out, the cost of litigation for plaintiffs downstream from a polluter is often so much greater than the individual's damage that the individual is not incentivized to sue for violations even if the aggregate damage of several downstream parties is significant and the harm to the local ecosystem is severe.¹²⁵ Gaia standing would allow well-funded organizations such as the Sierra Club or Friends of the Earth to sue for such violations under the citizen-suit provisions of environmental statutes because members of such organizations are, like all human beings, parts of Gaia.

Another critique, applicable to both Professor Stone's thesis and Gaia standing, is that there would be some difficulty in determining what Gaia "wants" or is in Gaia's best interest.¹²⁶ Unlike a corporate officer's

125. See Stone, *supra* note 55, at 459–60.

126. *Id.* at 471.

fiduciary duty to shareholders to act in the best financial interest of the corporation, the responsibility that a Gaia-standing plaintiff has to the “Gaian corporation” is not immediately obvious. However, as Professor Stone wrote,

[N]atural objects can communicate their wants (needs) to us, and in ways that are not terribly ambiguous. I am sure I can judge with more certainty and meaningfulness whether and when my lawn wants (needs) water, than the Attorney General can judge whether and when the United States wants (needs) to take an appeal from an adverse judgment by a lower court.¹²⁷

To this point I will add that, for example, personal-injury plaintiffs are not required to have advanced medical degrees or even completely understand their injuries with precision when bringing a suit. They are permitted to rely on expert testimony and doctors’ notes to establish harm. Likewise, a Gaia-standing plaintiff can employ the talents of an ecologist or even a Stanford-trained Earth system scientist¹²⁸ to offer clues as to an appropriate remedy.

Shareholders with even a minuscule pecuniary interest in a corporation are welcomed into court to litigate their claims, but the interest of parties in environmental litigation is far more extreme. Gaia provides a framework for viewing the Earth as a single living entity, and serious injury to a part of it can lead to judicially cognizable injury to the whole of it. Gaia standing would bring an end to the specious parsing of the injury requirement to deny standing to environmental advocates.

Standing doctrine reflects choices made by judges who wrote opinions without incorporating what science teaches about Earth as an interconnected, completely indivisible biological system.¹²⁹ Despite what the Court has held concerning injury-in-fact, the injury exacted on the biosphere by land abuse and industrial activity may prove to be not only concrete, but fatal, at least so far as humanity is concerned.¹³⁰

127. *Id.*

128. *See supra* note 93.

129. *See* Ellinghausen, *supra* note 54, at 478 (“Scalia pointedly refuted the foundational environmental concept of interconnectedness, in which all elements of a natural region ‘are ecologically interrelated such that harm to any of that area injures all of it.’” (citations omitted)).

130. *See* Irfan, *supra* note 110 (discussing the U.N. report on global warming).

That courts may someday hear cases brought by plaintiffs under a theory of Gaia standing seems at the moment unlikely or even impossible, but it is not. Courts have changed course regarding standing many times before, sometimes drastically, shifting to allow standing for people that had previously been categorically denied it, such as children, married women, and Chinese people.¹³¹ Gaia standing may be novel, but it is at least based on an empirical understanding of reality, unlike the current formulation which was simply made up. Already we see that courts can be open to the idea of litigating broad environmental interests. For example, the court in the *Juliana* case found standing where plaintiffs “allege[] that defendants’ actions and inactions . . . have so profoundly damaged our home planet that they threaten plaintiffs’ fundamental constitutional rights to life and liberty.”¹³²

Lynn Margulis, lamenting the reluctance of some scientists to engage her now widely accepted theory of symbiogenesis giving rise to eukaryotic cells, said, “The only way behavior changes in science is that certain people die and differently behaving people take their places.”¹³³ Perhaps the same can be said of law, but it need not be so. Judges are free to learn new information and take up new arguments and adjust their approach to account for improvements in their own understanding.

Humanity must make drastic changes in the way we as a species and society relate to the natural world before it becomes our undoing.¹³⁴ As Margulis teased, “Gaia is a tough bitch—a system that has worked for over three billion years without people. This planet’s surface and its atmosphere and environment will continue to evolve long after people and prejudice are gone.”¹³⁵ Our federal courts must become sensitive to the broad but concrete injuries brought to humanity by environmental harms and deal with them accordingly. There is no time left to do otherwise.

131. See Stone, *supra* note 55, at 451, 453–57.

132. *Juliana v. United States*, 217 F. Supp. 3d 1224, 1261 (D. Or. 2016).

133. See Margulis, *supra* note 86.

134. See Irfan, *supra* note 110 (discussing the U.N. report on global warming).

135. Margulis, *supra* note 86.

