ARTICLES

ATMOSPHERIC RECOVERY LITIGATION: MAKING THE FOSSIL FUEL INDUSTRY PAY TO RESTORE A VIABLE CLIMATE SYSTEM

BY

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At its core, the public trust principle encompasses the reserved and inalienable rights of citizens to a healthy environment. The principle imposes a sovereign duty on government to protect crucial natural resources for the benefit of present and future generations of citizens. The climate system and atmosphere support all life on Earth, yet governments worldwide continue to allow carbon dioxide pollution that propels climate disruption. Scientists have made clear that such pollution imperils the habitability of Earth and jeopardizes the stability of human civilization, yet governments do vanishingly little to force major carbon polluters to change their ways. Irreversible tipping points loom dangerously ahead. The public trust commands governments to protect a viable climate system and authorizes citizens to turn to the courts when government fails.

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Leading scientists have developed a climate stabilization strategy consisting of two parts: 1) aggressive emissions reduction, and 2) natural removal of carbon dioxide from the atmosphere. Global public trust litigation called Atmospheric Trust Litigation is underway to force governments to lower carbon emissions within their jurisdictions. Spearheaded by the organization Our Children's Trust, Atmospheric Trust Litigation seeks judicial remedies in domestic courts requiring governments to develop and implement climate recovery plans that accomplish necessary emissions reduction.

This Article focuses on the second part of the climate stabilization strategy, which calls for the drawdown of atmospheric carbon dioxide through natural methods. Projects aimed toward reforestation, soil sequestration, mangrove restoration, and regenerative grazing can be planned in targeted areas throughout the world to achieve the necessary drawdown, but such projects require significant funding. Invoking the public trust principle, this Article proposes a legal strategy of Atmospheric Recovery Litigation to hold the major fossil fuel corporations liable for funding such natural sequestration. Public trust law traditionally holds polluters liable for natural resource damages to public trust assets. Sovereign trustees are obligated to seek recovery of such damages and apply them toward restoration of the asset. While ecosystem recovery on a global scale is unprecedented, the underlying legal principles and approach bear striking similarity to those traditionally applied to discrete resources. With respect to both parts of the climate stabilization strategy, domestic courts in nations throughout the world may prove indispensable to forcing effective action before it is too late.

I. INTRODUCTION 261
II. THE CLIMATE PRECIPICE AND THE SCIENTIFIC PRESCRIPTION TO RESTORE ATMOSPHERIC EQUILIBRIUM 265
III. RECOVERY OF NATURAL RESOURCE DAMAGES UNDER THE PUBLIC TRUST DOCTRINE 272
A. The Trust Frame 272
1. The Constitutional Force of the Public Trust Doctrine 273
2. A Doctrine Organic to Government Itself 277
3. The Relationship of the Public Trust Doctrine to Statutory Law 278
a. A Macro Focus 282
b. An Active Duty 282
c. Limited Discretion 283
d. A Separate Set of Obligations 284
B. The Trust Res 284
C. A Sovereign Co-Trusteeship 287
D. Fiduciary Duties: Asset Protection and Recovery for Damages 289

1. The Duty of Protection and Restoration.....289
2. The Recovery of Natural Resource Damages.....290
a. Basis for Recovery: Statutory Law and Common Law.....293
b. Elements of a Natural Resources Damages Claim.....295
c. Defenses.....295
d. Valuation of Natural Resource Damages.....296
IV. RECOVERY OF NATURAL RESOURCE DAMAGES TO THE ATMOSPHERIC TRUST.....297
A. Atmosphere as Trust Res.....300
B. Trustees and Beneficiaries.....302
C. Fiduciary Authority and Duty to Recover Damages.....304
D. Liable Parties and Causation.....306
E. Jurisdiction.....314
F. Defenses.....316
G. Quantifying the Damages.....319
V. ATMOSPHERIC RECOVERY IMPLEMENTATION.....320
A. Atmospheric Recovery Plan.....321
B. Financing the Atmospheric Recovery Fund.....322
C. Atmospheric Recovery Litigation Partnerships.....326
1. The Sovereign Advantage.....327
2. Enforcement of Judgments.....328
D. The Functions of an Atmospheric Recovery Council: Implementation, Administration, Verification, and Tabulation.....331
E. Litigation Information Tracking System.....333
VI. CONCLUSION.....333

I. INTRODUCTION

As reports of planetary heating, glacier melt, sea level rise, species extinction, devastating droughts, and other consequences of human greenhouse gas (GHG) pollution flood the news, citizens and leaders increasingly recognize that climate disruption poses an existential threat to global civilization.[1] And yet, international law—the very structure that society relies upon to provide an organized response to common global threats—shows little capacity to create a logical and rapid response to this crisis.

[1] *See* Todd J. Gillman, *Top Obama Aide Calls Climate Change 'Existential' Problem*, REGISTER GUARD, June 6, 2014, http://projects.registerguard.com/apf/dc/top-obama-aide-calls-climate-change-existential-problem/ (last visited Apr. 17, 2015); U.S. GLOBAL CHANGE RESEARCH PROGRAM, OVERVIEW: CLIMATE CHANGE IMPACTS IN THE UNITED STATES, U.S. NATIONAL CLIMATE ASSESSMENT 4 (2014) [hereinafter CLIMATE CHANGE IMPACTS REPORT], *available at* http://nca2014.globalchange.gov/highlights/overview/overview.

The starting point of any coherent response to this global danger is an understanding of what action remains necessary to stabilize the climate system. In December 2013, an international team of scientists led by Dr. James Hansen, Director of NASA's Goddard Institute for Space Studies, issued a path-breaking report setting forth a clear prescription for restoring the planet's atmosphere to a safe level of 350 parts per million (ppm) carbon dioxide (CO_2).[2] The prescription calls for two measures: 1) a global pathway of 6% annual CO_2 emissions reductions, beginning in 2013, and 2) a drawdown of 100 gigatons of carbon (GtC) from the atmosphere using reforestation and soil sequestration methods.[3] Both parts of this prescription—emissions reduction and drawdown measures—are essential to restoring climate stability, yet the window of time in which to accomplish this response is rapidly closing.[4]

While international climate negotiations have been ongoing for decades, they show remarkably meager progress on emissions reduction, while the effects of climate change worsen.[5] Even as preparations move forward for the next major negotiation, faith in the international treaty process wanes among policy makers and citizens alike.[6] The simple fact remains that there is no global superpower capable of imposing responsibility for a common global asset such as the atmosphere. Without that, climate is left to the sporadic, arbitrary, and highly manipulated process of political negotiation.[7] Absent domestic will to clamp down on carbon emissions, nations have no inclination to offer commitments in international negotiations. As a narrow window of remaining opportunity closes fast, it is imperative to try other approaches not inconsistent with the international approach.

An atmospheric trust approach invokes the public trust principle on the national and subnational level worldwide to establish a framework of global

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2 James Hansen et al., *Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, 8 PLOS ONE 1, 5 (2013) [hereinafter *Climate Prescription*], *available at* http://www.plosone.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0081648&representation=PDF.

3 *Id.* at 10.

4 *See infra* notes 63–64 and accompanying text (noting the amount of annual carbon reduction needed to stabilize the atmosphere will increase from 6% to 15% from 2013 to 2020).

5 *See* Justin Gillis, *Emissions Swamp Efforts to Curb Global Warming, UN Draft Report Says*, SYDNEY MORNING HERALD, Aug. 27, 2014, http://www.smh.com.au/environment/climate-change/emissions-swamp-efforts-to-curb-global-warming-un-draft-report-says-20140827-08u13.html (last visited Apr. 17, 2015).

6 *See, e.g.*, David Biello, *The Real Outcome of Global Warming Talks in Lima: A Future for Coal*, SCI. AM., Dec. 16, 2014, http://blogs.scientificamerican.com/observations/2014/12/16/the-real-outcome-of-global-warming-talks-in-lima-a-future-for-coal/ (last visited Apr. 17, 2015) (noting that even if nations pledge significant reductions in coal emissions, there is still no enforcement mechanism for each nation's pledge).

7 *See* Coral Davenport, *Obama Pursuing Climate Accord in Lieu of Treaty*, N.Y. TIMES, Aug. 26, 2014, http://www.nytimes.com/2014/08/27/us/politics/obama-pursuing-climate-accord-in-lieu-of-treaty.html?_r=0 (last visited Apr. 17, 2015) (detailing President Obama's "name and shame" approach to recent international negotiations on a climate change agreement as a response to congressional unwillingness to ratify treaties concerning climate change).

responsibility.[8] The public trust principle has roots dating back to Roman law and is manifest in nations throughout the world.[9] Having constitutional underpinnings lodged in the fundamental sovereign compact between government and citizens,[10] the principle requires legislatures and agencies to act as trustees in protecting natural resources vital to the welfare and survival of present and future generations of citizens.[11] A global campaign known as Atmospheric Trust Litigation was launched in 2011 to provide a legal structure geared toward forcing urgent emissions reduction around the world.[12] The approach recognizes that, while there is no panacea to a climate negotiation stalemate, domestic courts do have the power to order swift and decisive relief responsive to the climate crisis.[13] The litigation seeks judicial orders requiring governments to develop climate recovery plans that reduce emissions within their jurisdictions by 6% annually, the target established by the international team of scientists led by Dr. James Hansen.[14]

This Article aims to map out a public trust framework for achieving the second side of the scientific climate prescription—drawdown of 100 gigatons (GT) of atmospheric carbon. While it remains feasible to create a common plan of atmospheric drawdown through natural processes such as reforestation and soil sequestration, the required funding for accomplishing such restoration would be significant. The public trust doctrine (PTD) offers an approach for securing such funding by holding the major corporate carbon polluters responsible for natural resource damages (NRDs) to the atmosphere.

Public trust law requires sovereign trustees to seek recovery of monetary damages from third parties that have damaged public trust assets.[15] Corporations that pollute the oceans or waterways through

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8 For additional materials, see Mary Christina Wood, *Atmospheric Trust Litigation Around the World*, *in* FIDUCIARY DUTY AND THE ATMOSPHERIC TRUST (Ken Coghill et al. eds., 2012) [hereinafter Wood, *Atmospheric Trust*], *available at* http://law.uoregon.edu/wp-content/uploads/2011/11/ATL-Across-the-World.pdf.

9 *See* Michael C. Blumm & Rachel D. Guthrie, *Internationalizing the Public Trust Doctrine: Natural Law and Constitutional and Statutory Approaches to Fulfilling the Saxion Vision*, 45 U.C. DAVIS L. REV. 741, 741, 750 n.32 (2012).

10 *See infra* notes 110–118 and accompanying text.

11 MICHAEL C. BLUMM & MARY CHRISTINA WOOD, THE PUBLIC TRUST DOCTRINE IN ENVIRONMENTAL AND NATURAL RESOURCES LAW 3–7 (2013).

12 *See* Our Children's Trust, *Atmospheric Trust Litigation*, http://ourchildrenstrust.org/atl (last visited Apr. 17, 2015); *see also* Gabriel Nelson, *Young Activists Sue U.S., States over Greenhouse Gas Emissions*, N.Y. TIMES, May 5, 2011, http://www.nytimes.com/gwire/2011/05/05/05greenwire-young-activists-sue-us-states-over-greenhouse-64366.html (last visited Apr. 17, 2015); Matthew Brown, *Climate Activists Target States With Lawsuits; Atmosphere As a 'Public Trust'*, CNSNEWS.COM, May 4, 2011, http://cnsnews.com/news/article/climate-activists-target-states-lawsuits (last visited Apr. 17, 2015). The legal approach is described in Mary Christina Wood, *The Planet on the Docket: Atmospheric Trust Litigation to Protect Earth's Climate System and Habitability*, 9 FLA. A&M U. L. REV. (forthcoming 2015).

13 *See* Nelson, *supra* note 12.

14 *See id.*; *Climate Prescription*, *supra* note 2, at 10. For litigation materials and updates, see Our Children's Trust, *Legal Action*, http://ourchildrenstrust.org/Legal (last visited Apr. 17, 2015).

15 *See infra* notes 225–229 and accompanying text.

accidental spills, for example, are regularly held accountable for NRDs.[16] The same principle can extend to the atmosphere, a global trust resource. In that context, the primary responsible parties are the major fossil fuel corporations, which purportedly have known for years that their fuel products pose hazards to Earth's climate system.[17] A groundbreaking study released in 2014 determined their proportionate responsibility for carbon emissions since the Industrial Revolution based on market share data and other evidence.[18] The largest fossil fuel corporations have reaped, collectively, more than one trillion dollars in profits since the millennium[19] and therefore represent a significant deep-pocketed funding source for atmospheric restoration. Nations around the world stand positioned, as cotrustees of the atmosphere, to seek such damages through their domestic legal systems, either by applying existing common law principles or by formulating new statutes that allow recovery.

The following analysis does not purport to resolve or even identify every procedural impediment that may arise in such an effort. Rather, its purpose is to suggest a tangible framework that can stimulate a conversation missing entirely in the international climate negotiations and domestic policy circles: Whether fossil fuel corporations should be held responsible for the damage they have caused to Earth's vital life systems? The narrow window of time to prevent uncontrollable heating is closing rapidly,[20] and if the law is to be relevant at all, it must address the climate imperative and both sides of the scientific prescription with utmost urgency.[21]

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16 *See, e.g.*, Julie Cart, *BP Trial's Last Phase Begins—Penalty for Gulf Oil Spill Will Be Determined*, L.A. TIMES, Jan. 20, 2015, http://www.latimes.com/nation/la-na-penalty-phase-bp-gulf-oil-spill-20150119-story.html (last visited Apr. 17, 2015) (noting that BP will receive the largest environmental penalty in history for the Deepwater Horizon oil spill—up to $13.7 billion for violations of the Clean Water Act).

17 *See generally* CHRIS MOONEY, THE REPUBLICAN WAR ON SCIENCE 60–62 (2005) (describing the emergence of reliable and readily available climate change science in the later 1980s, and the fossil fuel industry's concurrent attempts to cast doubt on that science); *see also* Juliet Eilperin, *Industries Buried Internal Findings: Climate Wording Cut From Public Report*, WASH. POST, Apr. 25, 2009, http://www.washingtonpost.com/wp-dyn/content/article/2009/04/24/AR2009042403331.html (last visited Apr. 17, 2015); Andrew C. Revkin, *Industry Ignored Its Scientists on Climate*, N.Y. TIMES, Apr. 23, 2009, http://www.nytimes.com/2009/04/24/science/earth/24deny.html (last visited Apr. 17, 2015) (quoting an internal 1995 industry report that discusses the impact of GHG emissions on climate). For background, see NAOMI ORESKES & ERIK M. CONWAY, MERCHANTS OF DOUBT ch. 6 (2010).

18 RICHARD HEEDE, CARBON MAJORS: ACCOUNTING FOR CARBON AND METHANE EMISSIONS 1854–2010 METHODS AND RESULTS REPORT 8–9, 25–30 (2014) [hereinafter CARBON MAJORS REPORT], *available at* http://www.climateaccountability.org/pdf/MRR%209.1%20Apr14R.pdf; *see also* Suzanne Goldenberg, *Just 90 Companies Caused Two-Thirds of Man-Made Global Warming Emissions*, THE GUARDIAN, Nov. 20, 2013, http://www.theguardian.com/environment/2013/nov/20/90-companies-man-made-global-warming-emissions-climate-change (last visited Apr. 17, 2015).

19 Bill McKibben, *Global Warming's Terrifying New Math*, ROLLING STONE, July 19, 2012, http://www.rollingstone.com/politics/news/global-warmings-terrifying-new-math-20120719 (last visited Apr. 17, 2015).

20 *See infra* notes 58–64 and accompany text (describing planetary prescription for carbon emission reductions).

21 In their amicus brief urging Supreme Court review in a federal Atmospheric Trust Litigation case brought on behalf of youth, leading climate scientists asserted: "To preserve a

Part II explains the climate context and the scientific prescription to restore the planet's atmospheric equilibrium. Part III provides background on the PTD as it applies to the recovery of NRDs. Part IV presents a conceptual structure for holding major fossil fuel corporations liable for NRDs to the atmospheric trust. Part V offers approaches to both recovery of NRDs and implementation of an atmospheric recovery plan.

II. THE CLIMATE PRECIPICE AND THE SCIENTIFIC PRESCRIPTION TO RESTORE ATMOSPHERIC EQUILIBRIUM

It is probably safe to say that the law has never encountered a threat as pervasive, grave, and urgent as climate crisis. Scientists have warned that CO_2 and other GHG emissions place Earth in "imminent peril"—literally on the verge of an irreversible tipping point that would impose catastrophic conditions on generations of humanity to come.[22] Floods, hurricanes, killer heat waves, fires, disease, crop losses, food shortages, and droughts would arrive with far greater magnitude and regularity.[23] Rising sea levels would inundate coastal areas worldwide and trigger desperate mass human migrations.[24] In May 2010, two separate groups of scientists published papers warning that the melting of the Western Antarctic ice sheet is now unstoppable, and that it will cause an inevitable sea level rise of at least ten feet in the coming centuries.[25] They warn that most of the world's coastal cities will have to be abandoned.[26] According to Dr. James Hansen, society's continued carbon pollution will "transform the planet."[27]

While some climate dynamics will unfold over long time spans, it is no longer possible to assume that severe threats are postponed for future generations. Earth has already warmed about 0.8ºC over the past century.[28] A recent report of the U.S. Global Climate Change Research Program says unequivocally: "Climate change, once considered an issue for a distant

habitable climate system, action must be undertaken without delay." Brief for Climate Scientists as *Amici Curiae* Supporting Petitioners at 22, Alec L. v. McCarthy, 135 S. Ct. 774 (2014) (No. 14-405); *see also infra* note 28 and accompanying text.

22 *See generally* FRED PEARCE, WITH SPEED AND VIOLENCE: WHY SCIENTISTS FEAR TIPPING POINTS IN CLIMATE CHANGE xxiv–xxvi (2007) (describing "unstoppable planetary forces" and the end of climatic stability).

23 See CLIMATE CHANGE IMPACTS REPORT, *supra* note 1, at 14–17. For a documentary showing the projected impacts from each degree rise, see SIX DEGREES COULD CHANGE THE WORLD (National Geographic 2007).

24 KOKO WARNER ET AL., IN SEARCH OF SHELTER: MAPPING THE EFFECTS OF CLIMATE CHANGE ON HUMAN MIGRATION AND DISPLACEMENT iv, 2 (2009), *available at* http://ciesin.columbia.edu/documents/clim-migr-report-june09_media.pdf.

25 Justin Gillis & Kenneth Chang, *Scientists Warn of Rising Oceans From Polar Melt*, N.Y. TIMES, May 12, 2014, http://www.nytimes.com/2014/05/13/science/earth/collapse-of-parts-of-west-antarctica-ice-sheet-has-begun-scientists-say.html (last visited Apr. 17, 2015).

26 *Id.*

27 Jim Hansen, *The Threat to the Planet*, N.Y. REVIEW OF BOOKS, July 13, 2006, http://www.nybooks.com/articles/archives/2006/jul/13/the-threat-to-the-planet/ (last visited Apr. 17, 2015).

28 *Climate Prescription*, *supra* note 2, at 4.

future, has moved firmly into the present. . . . Precipitation patterns are changing, sea level is rising, the oceans are becoming more acidic, and the frequency and intensity of some extreme weather events are increasing."[29] Though climate disruption affects different parts of Earth in different ways—from droughts to floods to superstorms—no part of Earth remains safe from global heating.[30] Climate crisis threatens the basic habitability of the planet for humans and other species.[31] As Dr. Hansen and other scientists stated in an amicus brief supporting Atmospheric Trust Litigation, "[F]ailure to act with all deliberate speed in the face of the clear scientific evidence of the danger functionally becomes a decision to eliminate the option of preserving a habitable climate system."[32]

Beyond the sheer magnitude and pervasiveness of the climate threat, the situation poses unprecedented urgency because of what scientists call "tipping points"—climate tripwires, so to speak.[33] These are thresholds that trigger dangerous feedback processes capable of destroying the balance of the planet's climate system.[34] Once triggered, these cycles continue despite any subsequent carbon reductions achieved by humanity.[35] Such irrevocable tipping points loom near, and some may already be underway. Vast areas of melting permafrost now release huge amounts of CO_2 and methane into the atmosphere, releases that will cause more heating on Earth.[36] Melting polar ice caps intensify heating, because less ice remains to reflect heat away from

29 CLIMATE CHANGE IMPACTS REPORT, *supra* note 1.

30 *See id.* ("Worldwide, the observed changes in average conditions have been accompanied by increasing trends in extremes of heat and heavy precipitation events. . . . It is the sum total of these indicators that leads to the conclusion that warming our planet is unequivocal."); *see* Brief for Scientists as Amici Curiae Supporting Plaintiffs–Appellants in Seeking Reversal at 15–16, Alec L. *ex rel.* Loorz v. McCarthy, 2014 WL 3013301 (D.C. Cir. 2014) (No. 13-5192), *available at* http://ourchildrenstrust.org/sites/default/files/FiledScienceAmicus.pdf ("Amici Scientists warn of climate change impacts including . . . floods, storms, fires and droughts.").

31 Brief for Dr. James Hansen as Amicus Curiae Supporting Plaintiffs–Appellants at 7–8, Alec L. v. Jackson, No. 4:11-cv-02203-EMC, 2011 WL 8583134 (N.D. Cal. Nov. 14, 2011), *available at* http://ourchildrenstrust.org/sites/default/files/Hansen%20Amicus%20.pdf.

32 *Id.* at 7; *see also* Brief of Scientists as Amici Curiae Supporting Plaintiffs in Seeking Reversal, *supra* note 30, at 9 ("Effective action remains possible, but delay in undertaking sharp reductions in emissions will undermine any realistic chance of preserving a habitable climate system, which is needed by future generations no less than by prior generations.").

33 *See* Leslie McCarthy, *Research Finds That Earth's Climate Is Approaching 'Dangerous' Point*, GODDARD INSTITUTE FOR SPACE STUDIES, May 30, 2007, http://www.nasa.gov/centers/goddard/news/topstory/2007/danger_point.html (last visited Apr. 17, 2015) (discussing tipping points and how and when they may occur).

34 *See* PEARCE, *supra* note 22, at xxiv–xxv (observing that the planet may be getting to the tipping point of "dangerous climate change" and there would be no redemption); McCarthy, *supra* note 33 (discussing researchers' studies finding the threshold of global temperatures and atmospheric CO_2 that trigger dangerous interference with the climate system).

35 Dave Levitan, *Quick-Change Planet: Do Global Climate Tipping Points Exist?*, SCI. AM., Mar. 25, 2013, *available at* http://www.scientificamerican.com/article/do-global-tipping-points-exist/.

36 *See* Nafeez Ahmed, *Seven Facts You Need to Know About the Arctic Methane Timebomb*, THE GUARDIAN, Aug. 5, 2013, http://www.theguardian.com/environment/earth-insight/2013/aug/05/7-facts-need-to-know-arctic-methane-time-bomb (last visited Apr. 17, 2015).

Earth—a dynamic known as the albedo effect.[37] And the natural "sinks," such as oceans and forests, that historically absorbed society's carbon pollution are reaching their limits.[38] The oceans are acidifying from the absorption of CO_2 pollution,[39] and large swaths of forests—stressed from heat—are dying and then burning, releasing their stored carbon.[40] In 2007, the evidence of alarming feedbacks caused scientists to warn that GHG emissions put Earth "perilously close to dramatic climate change that *could run out of our control*, with great dangers for humans and other creatures."[41] That same year, the head of the United Nations climate panel told the world, "*What we do in the next two to three years will determine our future. This is the defining moment.*"[42]

But according to many leading scientists, the situation is not yet hopeless. Though much climate harm is irrevocably underway, it is still possible to restore climate equilibrium over the long term by reducing atmospheric CO_2 levels. To explain the dynamics of carbon pollution, some commentators analogize to a bathtub. Professor William R. Moomaw explains: "As with filling a bathtub with an open drain, the level of heat trapping gases in the atmosphere is determined by the rate at which they are being added minus the rate at which they are being removed."[43] At the faucet end of the analogy, humans emit CO_2 into the atmosphere largely through burning fossil fuels—but also through intensive agriculture practices and deforestation, both releasing carbon stored in soils and forests.[44] Human activity results in about thirty-three billion tons of carbon released into the atmosphere a year.[45] On the drain end of the analogy, the planet has natural processes to remove CO_2 from the atmosphere. Forests, soils, and the

37 *See* James Hansen et al., *Climate Change and Trace Gases,* 365 PHIL. TRANSACTIONS ROYAL SOC'Y A 1925, 1935 (2007) ("A climate forcing that 'flips' the albedo of a sufficient portion of an ice sheet can spark a cataclysm."); *see also* Maggie Villiger, *Hot Times in Alaska*, http://www.pbs.org/saf/1404/features/thermostat.htm (last visited Apr. 17, 2015) (explaining the albedo effect).

38 *See* Craig D. Allen, Food and Agricultural Organization, *Climate-Induced Forest Dieback: An Escalating Global Phenomenon?*, http://www.fao.org/docrep/011/i0670e/i0670e10.htm (last visited Apr. 17, 2015); *see also* PEARCE, *supra* note 22, at 86–87.

39 *See* Nat'l Geographic, *Ocean Acidification: Carbon Dioxide Is Putting Shelled Animals at Risk*, http://ocean.nationalgeographic.com/ocean/critical-issues-ocean-acidification (last visited Apr. 17, 2015) (recognizing that the oceans are more acidic now than in the past 300 million years as a result of CO_2 absorption); *see also* Nat'l Oceanic and Atmosphere Admin., *What Is Ocean Acidification?*, http://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F (last visited Apr. 17, 2015).

40 *See* Allen, *supra* note 38.

41 Hansen et al., *supra* note 37, at 1925 (emphasis added).

42 Elisabeth Rosenthal, *U.N. Chief Seeks More Climate Change Leadership*, N.Y. TIMES, Nov. 18, 2007, http://www.nytimes.com/2007/11/18/science/earth/18climatenew.html (last visited Apr. 17, 2015) (quoting Rajendra Pachauri, head of the United Nations Intergovernmental Panel on Climate Change) (emphasis added).

43 William Moomaw, *From Failure to Success: Reframing the Climate Treaty*, http://www.fletcherforum.org/2014/02/10/moomaw/ (last visited Apr. 17, 2015).

44 *Id.*

45 *Id.*

oceans all absorb CO_2—scientists refer to them as "sinks."[46] The climate system has lurched into a perilous imbalance, because humans today are both increasing carbon emissions to the atmosphere and destroying the sinks.[47] In a bathtub, when the volume of water flowing in from the faucet exceeds the ability of the drain to remove the water, an overflow occurs. Similarly, the atmosphere is taking in more CO_2 than can be absorbed by the oceans, vegetation, and soils, thereby causing levels to increase.[48] Before the Industrial Revolution, CO_2 levels hovered at about 280 ppm.[49] Atmospheric CO_2 levels have now passed 400 ppm and continue to rise rapidly.[50]

Dr. James Hansen convened an international team of scientists to create a climate prescription for the planet that quantifies the reduction of CO_2 pollution needed to restore the atmosphere to a state of energy balance.[51] The prescription presents a global strategy aimed to reduce atmospheric levels of CO_2 to 350 ppm, the level deemed necessary to limit the planet's heating to less than 1ºC, which represents an upper range of the Holocene period in which human civilization developed.[52] While international diplomats have instead aimed for a political target of 2ºC warming, the scientific team pointed out that such warming would be "well outside the Holocene range and far into the dangerous range."[53] In light of the observed consequences already evident from the 0.8ºC heating that has already occurred since the beginning of the Industrial Revolution,[54] the team concluded that warming of 2ºC "would have consequences that can be described as disastrous."[55]

46 *See* LiveScience, *What Is a Carbon Sink?*, http://www.livescience.com/32354-what-is-a-carbon-sink.html (last visited Apr. 17, 2015) (explaining carbon sinks).

47 *See* Moomaw, *supra* note 43 ("Unfortunately, we are simultaneously increasing our emissions and degrading the ability of forests and soils to remove carbon dioxide from the atmosphere.").

48 *See id.* ("Each year forests and soils remove only one-quarter of this amount [33 billion tons of CO_2], and an equal amount dissolves in the oceans. The rest remains in the atmosphere.").

49 Nat'l Aeronautics and Space Admin. et al., *Global Climate Change: Evidence and Causes*, http://globalclimate.ucr.edu/resources.html (last visited Apr. 17, 2015).

50 Doyle Rice, *Carbon Dioxide in Atmosphere at Record Level*, USA TODAY, May 2, 2014, http://www.usatoday.com/story/weather/2014/05/01/carbon-dioxide-400-ppm-mauna-loa/8575651 (last visited Apr. 17, 2015).

51 *See Climate Prescription*, *supra* note 2, at 1.

52 *See id.* at 1, 2, 5, 10, 16.

53 *Id.* at 9.

54 *Id.* at 4–8 (discussing the impacts of the 0.8ºC warming).

55 *Id.* at 15; *see also id.* at 13 ("Warming of 1ºC relative to 1880–1920 keeps global temperature close to the Holocene range, but warming of 2ºC, to at least the Eemian level, could cause major dislocations for civilization."); *id.* at 5 (discussing the 350 ppm target); *id.* at 10 ("[K]eeping global climate close to the Holocene range requires a long-term atmospheric CO_2 level of about 350 ppm or less . . . ."). *Cf.* PAUL BAER ET AL., THE THREE SALIENT GLOBAL MITIGATION PATHWAYS ASSESSED IN LIGHT OF THE IPCC CARBON BUDGET (2013), *available at* http://sei-us.org/Publications_PDF/SEI-DB-2013-Climate-risk-emission-reduction-pathways.pdf (discussing how other research institutions refer to a 1.5ºC trajectory as the most cautionary that remains technically feasible).

The scientific prescription has two parts which are inextricably tied to one another. The first part calls for dramatic slash of global carbon emissions.[56] The second part calls for drawing down 100 GT of existing atmospheric carbon through natural processes.[57] As to the first part, the climate prescription describes a "glidepath" that requires a 6% global annual reduction of CO_2, starting in 2013.[58] However, the prescription notes, "[i]t will become exceedingly difficult to keep warming below a target smaller than 2ºC, if high emissions continue much longer."[59] While still considered feasible if it begins immediately,[60] the trajectory becomes steeper with delay and ultimately becomes too steep to salvage a habitable planet.[61] The Hansen team estimates that, had concerted action started in 2005, emissions reduction of just 3.5% a year could have restored equilibrium by the end of the century. In just eight years, that figure has climbed to 6% a year.[62] In other words, society's delay has already delivered a huge penalty, and one that increases with every day that passes. Scientists project that, if emissions reduction is delayed until 2020, society would need to reduce emissions by 15% a year.[63] At some point, the cuts would be too big for global society to feasibly accomplish. The team emphasizes, "it is urgent that large, long-term emissions reductions begin soon."[64]

While scientists broadly pronounce an ultimate goal of zero emissions—effectively decarbonizing society[65]—emissions reduction is not adequate in and of itself to restore climate equilibrium.[66] About 20% of emissions will persist in the atmosphere for over a thousand years at present removal rates.[67] The second part of any climate rescue effort must focus on removing much of the CO_2 that has already accumulated in the atmosphere. Scientists predict that, by restoring Earth's natural ability to remove carbon,

56 *See Climate Prescription*, *supra* note 2, at 2.

57 *Id.*

58 *Id.* at 10. *But see* BAER ET AL., *supra* note 55 (noting reductions of 6% per year only have a 50% chance of holding the global warming under 2ºC, while more aggressive reductions, 9% per year, increase the chance of staying under 2ºC to 66%). The discrepancy in trajectories appears due to the "drawdown" component in the prescription produced in *Climate Prescription*, *supra* note 2, at 10.

59 *Climate Prescription*, *supra* note 2, at 6.

60 BAER ET AL., *supra* note 55 ("The 1.5°C marker pathway is defined as the most challenging mitigation pathway that can still be defended as being techno-economically achievable.").

61 *See Climate Prescription*, *supra* note 2, at 10.

62 *Id.*

63 *Id.* ("These results emphasize the urgency of initiating emissions reduction. As discussed above, keeping global climate close to the Holocene range requires a long-term atmospheric CO_2 level of about 350 ppm or less, with other climate forcings similar to today's levels. If emissions reduction had begun in 2005, reduction at 3.5%/year would have achieved 350 ppm at 2100. Now the requirement is at least 6%/year. Delay of emissions reductions until 2020 requires a reduction rate of 15%/year to achieve 350 ppm in 2100.").

64 *Id.*

65 Moomaw, *supra* note 43.

66 *Id.*

67 *Climate Prescription*, *supra* note 2, at 10.

overall atmospheric levels can drop.[68] As Professor Moomaw explains, "We must not only turn off the faucet that is filling the atmosphere with heat trapping gases, but also unclog the drain that is removing them."[69]

This "drawdown" of carbon can be accomplished through massive reforestation—because trees naturally absorb CO_2—and improved agricultural measures, because soil also absorbs CO_2.[70] Professor Moomaw calls this sort of effort "Restorative Development."[71] Notably, the effort invokes natural processes—the biosphere's inherent capabilities[72]—in stark contrast to a spate of "geo-engineering" proposals increasingly offered to thwart catastrophe.[73] Such proposals, which include wild prospects such as "positioning giant mirrors in space to reduce the amount of sunlight being trapped in the earth's atmosphere or seeding clouds to reduce the amount of light entering earth's atmosphere," remain highly risky, untested, and controversial.[74] A new report produced by professors at UCLA concludes that carbon sequestration through natural biological means holds the most promise for extracting CO_2 from the atmosphere.[75]

Dr. Hansen's team has calculated that a massive restoration program consisting of reforestation and soil measures could conceivably draw down about 100 GtC from the atmosphere over time.[76] This drawdown forms a key part of the strategy to restore atmospheric carbon levels to 350 ppm.[77] Reforestation is a crucial component, as trees absorb CO_2.[78] As to soil measures, the team envisions transformational agricultural practices, including "[m]inimum tillage with biological nutrient recycling, as opposed to plowing and chemical fertilizers."[79] Such agricultural measures, the team

68 Moomaw, *supra* note 43.

69 *Id.*

70 *Id.*

71 *Id.*

72 The term "biosphere" refers to "the part of the world in which life can exist including parts of the lithosphere, hydrosphere, and atmosphere." WEBSTER'S THIRD NEW INT'L DICTIONARY 219 (2002).

73 Moomaw, *supra* note 43.

74 Meg Sullivan, *No Way Around It: Reducing Emissions Will Be the Primary Way to Fight Climate Change, UCLA-Led Study Finds*, UCLA NEWSROOM, June 1, 2014, http://newsroom.ucla.edu/releases/no-way-around-it:-reducing-emissions-will-be-the-primary-way-to-fight-climate-change-ucla-led-study-finds (last visited Apr. 17, 2015); *see also* Moomaw, *supra* note 43 ("Reducing emissions is only one half of the strategy for tackling climate change. Restorative Development—meeting our needs while allowing nature to do its job—is the essential other half of the strategy. It is a far more effective and much safer approach to addressing climate change than geoengineering.").

75 *See* Sullivan, *supra* note 74.

76 *Climate Prescription*, *supra* note 2, at 10.

77 *Id.* ("[I]t is not impossible to return CO_2 to 350 ppm this century. Reforestation and increase of soil carbon can help draw down atmospheric CO_2."). But if the drawdown from reforestation is less than projected, the amount of carbon emissions reduction necessary to achieve 350 ppm increases substantially. *Id.*

78 U.S. Forest Serv., *Forest Carbon Basics*, http://www.nrs.fs.fed.us/niacs/carbon/forests/ (last visited Apr. 17, 2015).

79 *Climate Prescription*, *supra* note 2, at 9.

notes, "can convert agriculture from a CO_2 source into a CO_2 sink."[80] The team admits that the forest and soil storage of 100 GtC is ambitious, but they point out that the strategy carries important co-benefits, including building resilience to climate change, improving productivity in agriculture, and protecting ecosystem function.[81]

As discussed in Part V, nongovernmental organizations or agencies within the United Nations (UN) structure could develop a global biosphere drawdown plan, the Atmospheric Recovery Plan, and a template for approving projects and monitoring their impact.[82] But, the financing will require a legal approach that imposes liability on responsible deep-pocketed parties.[83] Importantly, the task of achieving drawdown through reforestation and soil measures is distinct from another global initiative called Reducing Emissions from Deforestation and Forest Degradation (REDD).[84] REDD is a program administered by agencies within the UN designed to pay countries to reduce the ongoing deforestation, which causes up to 20% of global carbon emissions.[85] The REDD program is geared toward *reducing emissions*—from deforestation—rather than replanting forests to *extract existing* CO_2 from the atmosphere.[86] The atmospheric restoration effort requires going well beyond the preservation of existing forests—the aim of REDD—to replanting deforested areas and improving soils that have been degraded by agriculture.[87] Such affirmative projects require additional funding, and a different scheme of monitoring than any structure in existence today. The focus of this Article turns to liability for past damage to the atmosphere from CO_2 emissions.[88] As the next two Parts explain, the

80 *Id.* at 10. *See generally* THE WORLD BANK, CARBON SEQUESTRATION IN AGRICULTURAL SOILS XV–XVI (2012), *available at* https://openknowledge.worldbank.org/bitstream/handle/10986/11868/673950REVISED000CarbonSeq0Web0final.pdf?sequence=1; A. Müller & A. Gattinger, *Conceptual and Practical Aspects of Climate Change Mitigation Through Agriculture: Reducing Greenhouse Gas Emissions and Increasing Carbon Sequestration*, *in* UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT, TRADE AND ENVIRONMENT REVIEW 2013: WAKE UP BEFORE IT IS TOO LATE 13 (2013), *available at* http://unctad.org/en/publicationslibrary/ditcted2012d3_en.pdf. For websites providing information on the potential of agriculture to draw down atmospheric carbon and also increase food supply, see The Carbon Underground, *Why Just Reduce Climate Change When We Can Reverse It?*, https://www.thecarbonunderground.org (last visited Apr. 17, 2015).

81 *Climate Prescription*, *supra* note 2, at 10.

82 *See infra* Part V.

83 *Climate Prescription*, *supra* note 2, at 16–18.

84 The UN-REDD Programme, *About REDD+*, http://www.un-redd.org/aboutredd/tabid/102614/default.aspx (last visited Apr. 17, 2015) (explaining the REDD and REDD+ initiatives).

85 *Id.*; FOOD & AGRIC. ORG., U.N. DEV. PROGRAMME, U.N. ENV'T PROGRAMME, UN COLLABORATIVE PROGRAMME ON REDUCING EMISSIONS FROM DEFORESTATION AND FOREST DEGRADATION IN DEVELOPING COUNTIES (UN-REDD) 1, 5 (2008), *available at* http://www.un-redd.org/Portals/15/documents/publications/UN-REDD_FrameworkDocument.pdf.

86 UN-REDD Programme, *supra* note 84.

87 *Climate Prescription*, *supra* note 2, at 10.

88 For the sake of clarity, financing needs resulting from climate crisis fall into several categories reaching well beyond forest protection and regeneration. It is helpful to clearly delineate these in order to properly confine the scope of NRDs, which concern only the last category: 1) adaptation measures—building new infrastructure and systems to protect people from climate impacts; 2) renewable energy projects needed to transition to a zero-carbon

public trust principle establishes liability for harm to public natural resources. Such a legal approach, in theory, could force responsible parties to fund atmospheric recovery projects necessary to carry out the drawdown part of the scientific prescription formulated to achieve climate balance.

III. RECOVERY OF NATURAL RESOURCE DAMAGES UNDER THE PUBLIC TRUST DOCTRINE

At its core, the public trust principle encompasses the reserved and inalienable rights of citizens to sustaining a balanced ecology. The principle imposes a sovereign duty on government to protect crucial natural resources for the benefit of present and future generations of citizens. This Part explains the constitutional force of the trust principle, its relationship to statutory law, and the fiduciary duties imposed on government, including the duty to recover natural resource damages from polluters. The framework described herein provides a legal construct that sovereign trustees around the world may use to hold polluters liable for natural resource damage to the common atmosphere.

A. The Trust Frame

The ancient and enduring PTD holds that government owns vital natural resources in "trust" for the public.[89] The beneficiaries of this trust are present and future generations of citizens.[90] The doctrine presents fundamental property rights—public reserved rights—and stands apart from the police power as a source of authority and duty incumbent on the government.[91] As a property-based counterweight to discretionary police power, the trust secures the people's rights to a sustained natural endowment.[92] The principle has a rich tradition in the United States, affirmed

economy; 3) relocation for communities situated in climate hazard zones—such as Alaska native villages; 4) compensation to communities suffering damage from climate impacts—such as victims of Hurricane Katrina; 5) REDD projects to protect existing forests and protect against future emissions from deforestation; 6) atmospheric restoration projects using reforestation and improved soil measures that are designed to draw down and sequester carbon from the atmosphere.

89 Geer v. Connecticut, 161 U.S. 519, 525–29 (1896) (detailing ancient and English common law principles of sovereign trust ownership of air, water, sea, shores, and wildlife and stating: "[T]he power or control lodged in the state, resulting from this common ownership, is to be exercised, like all other powers of government, as a trust for the benefit of the people."); Ill. Cent. R.R. Co. v. Illinois (*Illinois Central*), 146 U.S. 387, 455 (1892); *see also* Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471, 557–66 (1970) (discussing the PTD in his seminal article); Harrison C. Dunning, *The Public Trust: A Fundamental Doctrine of American Property Law*, 19 ENVTL. L. 515, 515–16 (1989). *See generally* BLUMM & WOOD, *supra* note 11, at xiii–xxx (including a comprehensive table of cases and secondary material through 2013).

90 Ariz. Ctr. for Law in the Pub. Interest v. Hassell, 837 P.2d 158, 169 (Ariz. Ct. App. 1991) ("The beneficiaries of the public trust are not just present generations but those to come.").

91 *See* BLUMM & WOOD, *supra* note 11, at 3.

92 *See id.* at 3–4.

by the U.S. Supreme Court many times.[93] The PTD is manifest across the country.[94]

At its core, the PTD defines vital natural resources as quantifiable assets that the government must manage for the long-term interests of the public. As the U.S. Supreme Court said in *Geer v. Connecticut*:

> The ownership of the sovereign authority is in trust for all the people of the state; and hence, by implication, it is the duty of the legislature to enact such laws as will best preserve the subject of the trust, and secure its beneficial use in the future to the people of the state.[95]

As trustee, the government may not give away critical public resources to private interests:

> [T]he power or control lodged in the State, resulting from this common ownership, is to be exercised, like all other powers of government, as a trust for the benefit of the people, and not as a prerogative for the advantage of the government, as distinct from the people, or for the benefit of private individuals as distinguished from the public good. . . . [T]he ownership is that of the people in their united sovereignty.[96]

1. The Constitutional Force of the Public Trust Doctrine

The PTD has often been described as a doctrine of common law, undoubtedly because courts have shaped and defined the principle since its earliest beginnings.[97] Professor Gerald Torres describes the PTD as the slate upon which "all constitutions and laws are written."[98] Scholars and judges increasingly recognize its constitutional force.[99] The PTD has often been

93 *See e.g.*, Phillips Petroleum Co. v. Mississippi, 484 U.S. 469, 469–73 (1988); *Geer*, 161 U.S. at 529–30, 535; *Illinois Central*, 146 U.S. at 432, 455.

94 *Geer*, 161 U.S. at 525–29; *Illinois Central*, 146 U.S. at 455 ("[T]he decisions are numerous which declare that such property is held by the state, by virtue of its sovereignty, in trust for the public."). *See generally* BLUMM & WOOD, *supra* note 11 (compiling cases and materials).

95 *Geer*, 161 U.S. at 534.

96 *Id.* at 529; *see also* Lake Mich. Fed'n v. U.S. Army Corps of Eng'rs, 742 F. Supp. 441, 445 (N.D. Ill. 1990) ("[T]he public trust is violated when the primary purpose of a legislative grant is to benefit a private interest.").

97 RALPH W. JOHNSON ET AL., WASH. STATE DEP'T OF ECOLOGY, THE PUBLIC TRUST DOCTRINE AND COASTAL ZONE MANAGEMENT IN WASHINGTON STATE 2–3 (1991), *available at* https://fortress.wa.gov/ecy/publications/publications/93054.pdf.

98 *See* MARY CHRISTINA WOOD, NATURE'S TRUST: ENVIRONMENTAL LAW FOR A NEW ECOLOGICAL AGE 129 (2013) (quoting Gerald Torres, *The Public Trust: The Law's DNA*, Keynote Address at the University of Oregon School of Law (Feb. 23, 2012)) (internal quotation marks omitted).

99 *See* Douglas L. Grant, *Underpinnings of the Public Trust Doctrine: Lessons from* Illinois Central Railroad, 33 ARIZ. ST. L.J. 849, 877–79 (2001) (explaining reserved powers doctrine as reflection of the public trust principle); Gerald Torres & Nathan Bellinger, *The Public Trust: The Law's DNA*, 4 WAKE FOREST J.L. & POL'Y 281, 282–83 (2014). Thirty-three law professors submitted a brief in the Atmospheric Trust Litigation case before the D.C. Circuit, explaining the federal constitutional underpinnings of the public trust as it relates to Atmospheric Trust Litigation. *See* Brief of Law Professors as Amici Curiae in Support of Plaintiff–Appellants Seeking Reversal at 13, Alec L. *ex rel.* Loorz v. McCarthy, 561 F. App'x 7 (D.C. Cir. 2014) (No. 13-

explained as an attribute of sovereignty that government cannot shed.[100] As the *Illinois Central Railroad v. Illinois* (*Illinois Central*)[101] Court declared:

> The State can no more abdicate its trust over property in which the whole people are interested . . . than it can abdicate its police powers in the administration of government. . . . Every legislature must, at the time of its existence, exercise the power of the state in the execution of the trust devolved upon it.[102]

One federal district court noted: "The trust is of such a nature that it can be held only by the sovereign, and can only be destroyed by the destruction of the sovereign."[103]

The trust is rooted in the original social compact that citizens make with their governments. Because citizens would never confer to their government the power to substantially impair resources crucial to their survival and welfare, the governing assumption of the public trust principle is that citizens reserve public ownership of crucial resources as a perpetual trust to sustain themselves and future generations of citizens.[104] Such reserved public property rights rank fundamental to the democratic understandings underlying all state and federal government authority in the

5192), *available at* http://ourchildrenstrust.org/sites/default/files/FiledLawProfAmicus.pdf. ("The Nation's public trust over these resources remains an attribute of sovereignty that government cannot shed. The constitutional reserved powers doctrine in conjunction with the public trust prevents any one legislature from depriving a future legislature of the natural resources necessary to provide for the well-being and survival of its citizens. . . . Through the [public trust doctrine], the Constitution governs for the perpetual preservation of the Nation."); *see also* Brief of John Edward Davidson et al. as Amici Curiae Supporting Plaintiff–Appellants Seeking Reversal, Alec L. *ex rel.* Loorz v. McCarthy, 561 F. App'x 7 (D.C. Cir. 2014) (No. 13-5192), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2361780 (providing more in-depth analysis of the constitutional federal trust framework). The D.C. Circuit affirmed the trial court's dismissal in a summary opinion without in-depth analysis, Alec L. *ex rel.* Loorz v. McCarthy, 561 F. App'x 7 (D.C. Cir. 2014) (No. 13-5192), *cert. denied*, 135 S. Ct. 774 (2014).

100 *See e.g.*, *Geer*, 161 U.S. 525–28 (describing the wildlife trust as an attribute of sovereignty and tracing it back "through all vicissitudes of governmental authority"); In re Water Use Permit Applications (*Waiahole Ditch*), 9 P.3d 409, 443 (Haw. 2000) ("[H]istory and precedent have established the public trust as an inherent attribute of sovereign authority."); State v. Bartee, 894 S.W.2d 34, 41 (Tex. App. 1994) (describing trust as an "attribute of government"); Karl S. Coplan, *Public Trust Limits on Greenhouse Gas Trading Schemes: A Sustainable Middle Ground?*, 35 COLUM. J. ENVTL. L. 287, 311 (2010) ("The idea that public trust limits and powers inhere in the very nature of sovereignty is one consistent thread in public trust cases. . . . Public trust principles have been described as an essential attribute of sovereignty across cultures and across millennia."). For a discussion of the PTD as an attribute of sovereignty, see WOOD, NATURE'S TRUST, *supra* note 98, at 127–33.

101 146 U.S. 387 (1892).

102 *Illinois Central*, 146 U.S. 387, 453, 460 (1892).

103 United States v. 1.58 Acres of Land, 523 F. Supp. 120, 124 (Mass. Dist. Ct. 1981).

104 *See Illinois Central*, 146 U.S. at 452 (allowing grants of public trust resources to private parties only when doing so promotes the purpose of the PTD and when such grants "do not substantially impair the public interest in the lands and waters remaining").

United States. As Professor Joseph Sax famously said, the PTD demarcates a society of "citizens rather than of serfs."[105]

A constitutional trust over crucial resources remains essential for the endurance of the nation, because it prevents any one set of legislators from destroying ecology that is crucial to perpetuating and sustaining the nation as a whole through the generations of citizens. Legislators stand under constant temptation to convey public resources to industry supporters in return for campaign contributions.[106] Destructive actions taken for short-term political rewards can wreak harm on ecological systems and consequently cripple the ability of future legislatures to meet their citizens' needs. As the Supreme Court emphasized long ago in *Illinois Central* when repudiating a legislative conveyance of shoreline to a private railroad company, failure to impose a trust over the shoreline would "place every harbor in the country at the mercy of a majority of the legislature of the state in which the harbor is situated."[107] The Court noted that privatization of public shoreline and waters "would be a grievance which never could be long borne by a free people."[108]

Courts have recognized the importance of protecting resources for uses that may not be anticipated at the present time. The *Illinois Central* Court declared:

> The legislature could not give away nor sell the discretion of its successors in respect to matters, the government of which, from the very nature of things, must vary with varying circumstances. The legislation which may be needed one day for the harbor may be different from the legislation that may be required at another day. Every legislature must, at the time of its existence, exercise the power of the State in the execution of the trust devolved upon it.[109]

And as the Supreme Court of Minnesota said in applying the public trust principle to waterways in Minnesota:

> Many, if not most, of the meandered lakes of this state, are not adapted to, and probably will never be used to any great extent for commercial navigation; but they are used—and as population increases, and towns and cities are built up in their vicinity, will be still more used—by the people for sailing, rowing . . . *and other public purposes which cannot now be enumerated or even anticipated.* To hand over all these lakes to private ownership, under any old or narrow test of navigability, would be a great wrong upon the public for all time, the extent of which cannot, perhaps, be now even anticipated.[110]

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105 Sax, *supra* note 89, at 484.

106 *Id.* at 559–60 ("For self-interested and powerful minorities often have an undue influence on the public resource decisions of legislative and administrative bodies and cause those bodies to ignore broadly based public interests.").

107 *Illinois Central*, 146 U.S. at 455.

108 *Id.* at 456 (quoting Arnold v. Mundy, 6 N.J.L. 1, 78 (1821)).

109 *Id.* at 460.

110 Lamprey v. Metcalf, 53 N.W. 1139, 1143 (Minn. 1893) (emphasis added).

Because the PTD is an attribute of sovereignty embedded in the governmental structure itself,[111] the existence of a constitutional trust does not depend on the formulation of express constitutional public trust provisions. While some states—and other nations—do have constitutional provisions iterating the trust, these expressions do not create a new constitutional right but rather articulate the pre-existing, inherent property rights held by the public and reserved by the people when forming their government.[112] The principle was famously articulated in an internationally renowned public trust decision issued by the Philippines Supreme Court in 1993, *Oposa v. Factoran*.[113] That court declared that the "right to a balanced and healthful ecology . . . may even be said to predate all governments and constitutions."[114] It made clear, "these basic rights need not even be written in the Constitution for they are assumed to exist from the inception of mankind."[115]

Similarly, a recent landmark opinion penned by the Chief Justice of the Pennsylvania Supreme Court described the trust as embodying the inherent and inalienable rights of citizens reserved through their social contract with government.[116] Writing for a plurality, Chief Justice Castille found that a statute that promoted fracking—the process of injecting fluids into the ground at high pressure in order to fracture shale rock and thus release stored natural gas—violated the constitutional PTD. While article I, section 27 of the Pennsylvania constitution contains a specific provision setting forth the PTD—added by amendment in 1971—the opinion makes clear that the amendment did not create new rights, but rather enumerated the pre-existing rights that the people had reserved to themselves in creating government.[117] Justice Castille explained that such "inherent and indefeasible rights" of citizens[118] arise from the social contract between people and their

111 *See supra* note 100.

112 *See, e.g.*, VA CONST. art. XI, § 1.

113 JAN G. LAITOS ET AL., NATURAL RESOURCES LAW 441–44 (2006) (including a discussion and excerpt of *Juan Antonio Oposa v. Fulgenio S. Factoran*, G.R. No. 101083, 224 S.C.R.A. 792 (July 30, 1993) (Phil.)).

114 *Id.*

115 *Id.*

116 *See generally* Robinson Twp. v. Commonwealth, 83 A.3d 901 (Pa. 2013) (plurality opinion) (declaring the public trust to be an inherent and inalienable right of citizens).

117 *Id.* at 948 ("Among the inherent rights of the people of Pennsylvania are those enumerated in Section 27. . . ."); *id.* at 948 n.36 ("'[T]he concept that certain rights are inherent to mankind, and thus are secured rather than bestowed by the Constitution, has a long pedigree in Pennsylvania that goes back at least to the founding of the Republic.'") (citing Driscoll v. Corbett, 69 A.3d 197, 208 (Pa. 2013)); *id.* at 947 n.35 (explaining that article I, § 27 "merely recites the 'inherent and independent rights' of mankind relative to the environment which are 'recognized and unalterably established' by Article I, Section 1 of the Pennsylvania Constitution.'") (citing Commonwealth v. Nat'l Gettysburg Battlefield Tower, Inc., 311 A.2d 588, 595 (Pa. 1973) (Roberts, J., concurring)); *id.* at 952 ("The corollary of the people's Section 27 *reservation of right to an environment of quality* is an obligation on the government's behalf to refrain from unduly infringing upon or violating the right, including by legislative enactment or executive action.") (emphasis added).

118 *Robinson Twp.*, 83 A.3d at 948; *see* PA CONST. art. I (setting forth "Inherent Rights of Mankind" to include "certain inherent and indefeasible rights").

government and are "of such 'general, great and essential' quality as to be ensconced as 'inviolate.'"[119]

2. A Doctrine Organic to Government Itself

With origins tracing back to the beginnings of human civilization, the PTD is evident in many countries throughout the world.[120] As the Philippines Supreme Court described, government's obligation to protect natural resources for present and future generations has existed "from the inception of humankind."[121] The public rights that infuse the trust were expressed in Roman times in the Institutes of Justinian, which declared: "By the law of nature these things are common to all mankind—the air, running water, the sea, and consequently the shores of the sea."[122] Such public rights were evident in the ancient societies of Europe, the Orients, Africa, Moslem Countries, and Native America.[123] As Professor Charles Wilkinson noted, "[t]he real headwaters of the public trust doctrine . . . arise in rivulets from all reaches of the basin that holds the societies of the world."[124]

The modern PTD manifests in a multitude of court decisions, constitutions, and statutes from around the world, including in nations as far flung as India, the Philippines, and Kenya.[125] The endurance and prevalence of this doctrine is not at all surprising since it speaks to the most fundamental and intuitive rationale of government itself. As an attribute of sovereignty, the trust should be organic to all governmental bodies that gain their power from the people. Some courts have found that the principle traces to natural law, which infuses legal systems throughout the world.[126] The doctrine finds such broad reflection abroad that it has been described as customary international law.[127]

In the United States, the PTD has often been characterized as a doctrine of state law.[128] The depiction stands incomplete, however. The origins of the doctrine were evident several centuries before the formation of the United

119 *Robinson Twp.*, 83 A.3d at 947–48 ("Article I is the Commonwealth's Declaration of Rights, which delineates the terms of the social contract between government and the people that are of such 'general, great and essential' quality as to be ensconced as 'inviolate.'" (citing PA. CONST. art. I, preamb., § 25)).

120 *See* BLUMM & WOOD, *supra* note 11, at 305–30.

121 LAITOS ET AL., *supra* note 113, at 444.

122 WOOD, NATURE'S TRUST, *supra* note 98, at 126 (quoting J. INST., Proemium, 2.1.1. (T. Sandars trans., 3rd ed. 1865)).

123 Charles F. Wilkinson, *The Headwaters of the Public Trust: Some Thoughts on the Source and Scope of the Traditional Doctrine*, 19 ENVTL. L. 425, 429–30 (1989).

124 *Id.* at 431.

125 *See* BLUMM & WOOD, *supra* note 11, at 305–30.

126 *See id.* at 305; Arnold v. Mundy, 6 N.J.L. 1, 24, 30 (1821).

127 Blumm & Guthrie, *supra* note 9, at 782 (quoting Waweru v. Republic, (2006) 1 K.L.R. 677, 687 (H.C.K.) (Kenya), *available at* http://www.kenyalaw.org/environment/content/search_cases_index.php?SearchTerm2=Water).

128 Alec L. *ex rel.* Loorz v. McCarthy, 561 F. App'x 7, 8 (D.C. Cir. 2014), *cert. denied*, 135 S. Ct. 774 (2014).

States.[129] The states adapted and further refined the principle, but the basic concept of lasting public rights in essential ecology logically applies to any national or subnational sovereign. Several courts, including the U.S. Supreme Court, have expressly identified a federal trust obligation.[130] Though, in the United States, the doctrine finds much more frequent application against states—undoubtedly because states have traditionally assumed the role of natural resource managers—the core logic of the PTD mandates its application to the federal government. The prospect of leaving the federal government with unfettered power over national resources remains untenable in the context of a democracy and impractical in light of increased federal environmental management. Not surprisingly, Congress has affirmatively recognized a federal trust obligation in statutes such as the National Environmental Protection Act (NEPA),[131] the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA),[132] and the Oil Pollution Act of 1990 (OPA).[133] Remarkably, however, the U.S. Department of Justice presently denies the federal trust responsibility, and a recent unpublished summary opinion by the D.C. Circuit Court seemingly agrees.[134]

3. The Relationship of the Public Trust Doctrine to Statutory Law

As a constitutional principle embodying property rights retained by the people, no legislature can repudiate the PTD.[135] The legislature stands accountable to the people as trustee, and its statutes—and other actions—must be judged for compliance with fiduciary standards.[136] Agencies within the executive branch act as authorized agents of the trustee and must meet fiduciary standards as well.[137] These basic principles define the relationship

129 *See supra* notes 120–124 and accompanying text; BLUMM & WOOD, *supra* note 11, at 4.

130 Light v. United States, 31 S. Ct. 485, 488 (1911); United States v. 1.58 Acres of Land, 523 F. Supp. 120, 124 (D. Mass. 1981); In re Steuart Transp. Co., 495 F. Supp. 38, 40 (E.D. Va. 1980); Michael C. Blumm & Lynn S. Schaffer, *The Federal Public Trust Doctrine: A Law Professor's Amicus Brief* 1–2, (Lewis & Clark Law Sch., Legal Studies Research Paper No. 2014-18, 2014), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2518260.

131 National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4370h (2012).

132 Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9601–9675 (2012).

133 42 U.S.C. § 4331(b)(1) (2012); 42 U.S.C. § 9607(f)(1) (2012); 33 U.S.C. § 2706(b)(2) (2012); The Environmental Protection Agency (EPA) has iterated the federal trust obligation as well. *See* U.S. ENVTL. PROT. AGENCY, *Natural Resource Damages: A Primer*, http://www.epa.gov/superfund/programs/nrd/primer.htm (last visited Apr. 17, 2015) (explaining the definition of natural resources within CERCLA and the OPA).

134 Alec L. *ex rel.* Loorz v. McCarthy, 561 F. App'x 7, 8 (D.C. Cir. 2014), *cert. denied*, 135 S. Ct. 774 (2014). Over 50 law professors took issue with the decision and filed an amicus brief urging Supreme Court review. *See generally* Blumm & Schaffer, *supra* note 130.

135 *See supra* note 103 and accompanying text.

136 *See infra* notes 138–139 and accompanying text.

137 *See* Ctr. for Biological Diversity v. FPL Grp., Inc., 166 Cal. App. 4th 1349, 1367 (2008) (noting that private plaintiffs should have brought action against the state executive trustee to enforce the PTD, rather that bringing their own suit, because "[t]he trustee charged with the responsibility to implement and preserve the trust alone has the right to bring such an action").

between the PTD and statutory law. A statute or other legislative act in violation of the trust is subject to invalidation by a court.[138] A court may choose to accord some degree of deference to choices a legislative trustee makes in balancing conflicting public beneficiary interests, but doing so does not change the fundamental position of the court as the ultimate judge of trustee competence.[139]

Faced with these challenges, government defendants characteristically raise the political question defense in PTD cases, asserting that the legislature holds the last word on all environmental matters.[140] This defense is fundamentally misplaced. The court cannot automatically defer—as the political question defense suggests—to the judgment of the legislature, because doing so would, for all practical purposes, remove the component of judicial review and transform the trust into an unchecked tyranny. Without enforcement, a trust is not a trust at all: for what makes a trust distinctive is the enforceability of strict fiduciary standards.[141] The steadfast constitutional underpinnings of the PTD provide a necessary check against legislatures. As the Hawaii Supreme Court said, "[t]he check and balance of judicial review provides a level of protection against improvident dissipation of an irreplaceable *res*."[142] Recently, too, a majority of the Supreme Court of Pennsylvania unequivocally rejected a political question defense in a challenge to a statute that promoted fracking.[143] As a prelude to a discussion of the trust, Chief Justice Castille explained:

> [A] statute is not exempt from a challenge brought for judicial consideration simply because it is said to be the General Assembly's expression of policy rendered in a polarized political context. . . . The parties' dispute implicates questions of whether [the statute] was adopted pursuant to constitutional

138 Robinson Twp. v. Commonwealth, 83 A.3d 901, 977–78 (Pa. 2013) (plurality opinion); Lake Mich. Fed'n v. U.S. Army Corps of Eng'rs, 742 F. Supp. 441, 446 (N.D. Ill. 1990) ("The very purpose of the public trust doctrine is to police the legislature's disposition of public lands. If courts were to rubber stamp legislative decisions, . . . the doctrine would have no teeth. The legislature would have unfettered discretion to breach the public trust as long as it was able to articulate some gain to the public."). In an Atmospheric Trust Litigation case brought by youth against the state of Alaska, the Supreme Court of Alaska found that the political question doctrine was not appropriate in the PTD case. Kanuk v. State, 335 P.3d 1088, 1099–100 (Alaska 2014).

139 *See Robinson Twp.*, 83 A.3d at 982–84 (scrutinizing the challenged statute in the light "most deferential" to the statutory purpose, but ultimately finding that the statute was impermissibly unprotective of the PTD and fell short of the fiduciary duties vested in the state government by its constitution).

140 *See, e.g.*, State's Memorandum in Support of Its Motion for Summary Judgment at 37–43, Cherniak v. Kizhaber, No. 161109273 (Or. Cir. Ct. Lane Cnty., Jan. 8, 2015), *available at* https://app.box.com/s/6lzwc6n8wfpjj3kosvmfa3pjo27as3ev/1/3033205387/25649659815/1.

141 *See* United States v. Mitchell, 463 U.S. 206, 226 (1983) (noting, in context of Indian trust doctrine, that a "fundamental incident" of the trust relationship is "the right of an injured beneficiary to sue the trustee for damages resulting from a breach of the trust").

142 *Waiahole Ditch*, 9 P.3d 409, 455 (Haw. 2000).

143 *Robinson Twp.*, 83 A.3d at 928–30.

> procedures, and of whether [it] impinges upon the rights . . . guaranteed by the Pennsylvania Constitution and the U.S. Constitution.[144]

While the PTD forms the constitutional yardstick against which environmental statutes must be measured, the body of modern environmental law developed largely without meaningful trust scrutiny. In the 1970s, Congress passed a multitude of statutes pursuant to its police power, and states followed with additional laws.[145] In other nations too, statutes began to proliferate across the legal landscape.[146] All combined, these U.S. statutes create a comprehensive scheme of environmental regulation.[147] Though comprehensive, the implementation of these statutes has fallen far short of the long-term protection originally promised.[148] In the United States, decades of statutory experience have engendered intense politicization and dysfunction.[149] Many statutory schemes have simply devolved into major permit systems allowing colossal damage to natural resources.[150] As these drawbacks have become impossible to ignore, analysts and advocates have looked to the PTD as a measure of constitutional propriety and have sought judicial enforcement outside of the statutory regime. These PTD cases bring to the surface fundamental questions regarding the balance of powers between the branches of government over life-sustaining ecology.

Over the past four decades—a predominantly statutory era—courts became accustomed to statutory enforcement cases and the limited judicial

144 *Id.* In the ruling, the court cited *Hosp. & Healthsystem Ass'n of Pennsylvania v. Commonwealth*, 77 A.3d 587, 598 (Pa. 2013), which states that the "political question doctrine does not exist to remove a question of law from the Judiciary's purview merely because another branch has stated its own opinion of the salient legal issue." *Robinson Twp.*, 83 A.3d at 928–29. In other recent Atmospheric Trust Litigation, the Alaska Supreme Court agreed that the political question was not appropriate as a defense to a public trust claim, but rejected plaintiff's request for relief on other grounds. Kanuk v. State, 335 P.3d 1088, 1099–1100 (Alaska 2014). The Supreme Court of the Philippines responded to the political question argument similarly: "[This case] cannot be said to raise a political question. Policy formulation or determination by the executive or legislative branches of Government is not squarely put in issue. What is principally involved is the enforcement of a right vis-à-vis policies already formulated and expressed in legislation." LAITOS ET AL., *supra* note 113, at 441–44.

145 WOOD, NATURE'S TRUST, *supra* note 98, at 6–7.

146 *See, e.g.*, Wang Canfa, *Chinese Environmental Law Enforcement: Current Deficiencies and Suggested Reforms*, 8 VT. J. ENVTL. L. 159, 161 (2007) (noting Chinese environmental regulation began in 1978); Eva Adamova, *Environmental Management in Czecho-Slovakia*, *in* ENVIRONMENTAL ACTION IN EASTERN EUROPE: RESPONSES TO CRISIS 42, 48 (Barbara Jancar-Webster ed., 1993) (stating most environmental laws in the former Czech Republic were passed in the second half of the 1970s); Brian J. Preston, *Public Enforcement of Environmental Laws in Australia*, 6 J. ENVTL. L. & LITIG. 39 (1991) (noting Australia's new generation of widespread environmental laws were introduced toward the end of the 1970s).

147 *See* WOOD, NATURE'S TRUST, *supra* note 98, at 6–7 (characterizing United States environmental laws as "complex . . . sophisticated . . . [and] elaborate").

148 *See generally id.* at Part I (exploring the dysfunction of environmental law and resulting damage).

149 *Id.*

150 *Id.* at 57–58.

posture those cases entailed.[151] The court's classic function in a statutory case is simply to assess agency compliance with legislative intent.[152] Aside from other constitutional challenges to statutory law—such as those dealing with enumerated powers or individual liberties protected by the Bill of Rights—courts have encountered very few fundamental questions of whether statutes or other legislative action and inaction complied with basic PTD standards. That situation must surely change, as the existing statutory schemes—and their implementation—reveal grave shortfalls in the face of rapidly approaching catastrophic ecological change.[153] Whereas in the statutory era, courts became content with the role of interpreting legislative intent and treating the legislature as having the last word on the matters before them, courts are increasingly called upon to evaluate the legislative action against a basic fiduciary yardstick.[154] Doing so requires an understanding that legislatures are bound by the constitutional public trust.

Within this constitutional trust structure, a derivative principle flows from the above propositions: agency action that meets statutory standards does not necessarily satisfy the PTD. Courts have repeatedly distinguished the statutory standards and the PTD, noting that compliance with the former does not guarantee compliance with the latter.[155] As the Idaho Supreme Court said, "mere compliance by [agencies] with their legislative authority is not sufficient to determine if their actions comport with the requirements of the public trust doctrine. The public trust doctrine at all times forms the outer boundaries of permissible government action with respect to public trust resources."[156]

This becomes a critical point in the modern era of environmental regulation, as agencies characteristically defend their actions by noting compliance with statutory standards.[157] While courts often express some

151 *See id.* at 108–13 (detailing four factors contributing to the diminished role of courts in reviewing environmental cases).

152 *Id.* at 109–12 (discussing statutory environmental claims and the impact of agency deference).

153 *See id.* at 38–43.

154 For example, a national campaign of Atmospheric Trust Litigation is underway to force CO_2 reduction under the public trust. *See* Our Children's Trust, *Federal Lawsuit*, http://ourchildrenstrust.org/US/Federal-Lawsuit (last visited Apr. 17, 2015) (detailing the organization's efforts to reduce CO_2 through lawsuits relying on "the long-established legal principle of the Public Trust Doctrine"). The campaign is spearheaded by the nonprofit organization Our Children's Trust. *See id.*

155 *See infra* note 156 and accompanying text.

156 Kootenai Envtl. Alliance v. Panhandle Yacht Club, Inc., 671 P.2d 1085, 1095 (Idaho 1983); *see also* Parks v. Cooper, 676 N.W.2d 823, 837 (S.D. 2004) (holding that a statute "does not override the public trust doctrine or render it superfluous. History and precedent have established the public trust doctrine as an inherent attribute of sovereign authority. The doctrine exists independent of any statute."); Brief for William H. Rodgers, Jr. as Amicus Curiae Brief of Law Professors in Support of Granting Writ of Certiorari, at 17, Alec L. *ex rel.* Loorz v. McCarthy, No. 14-405 (2014), 2014 WL 5841697 ("[T]he public trust doctrine is not displaceable by a statute," even when that "[statute] 'speak[s] directly to [the] question' at issue.") (quoting Am. Elec. Power Co. (AEP) v. Connecticut, 131 S. Ct. 2527, 2537 (2011)).

157 *See, e.g.*, Natural Res. Def. Council, Inc. v. Hodel, 865 F.2d 288, 295 (D.C. Cir. 1988) (discussing Secretary of the Interior's argument that NEPA standards and requirements were

degree of deference to legislative or administrative action when judging compliance with the trust,[158] the PTD requires steadfast insistence on fiduciary competence and loyalty apart from statutory mandates.

From this framework, several principles can distinguish trust claims from statutory claims.

a. A Macro Focus

Trust claims focus on the asset as a whole. Such a macro approach is far different from the micro approach of most statutes, which tend to limit their scope of inquiry to discrete actions.[159] A substantive PTD approach evaluates the bottom-line health of the asset as a whole, an inquiry that may implicate the scope of several statutory schemes and multiple jurisdictions. For example, an atmospheric trust approach examines the need to limit aggregate CO_2 loading of the planet's atmosphere. The myriad of laws in the United States and other countries fails to address this basic parameter of atmospheric health. The Clean Air Act[160] regulatory regime, for example, focuses discretely on stationary sources, automobile standards, and other realms.[161] While the prohibitions certainly work toward atmospheric protection, the insistence on asset health and climate balance remains outside the complex and fractured regulatory regime that characterizes statutory law.

b. An Active Duty

The sovereign trust imposes an active, not passive, duty of protection. Under well-established principles of PTD law, a trustee may not sit idle, allowing the trust property to "fall into ruin on his watch."[162] A leading treatise explains that a trustee faces liability for damages if he "should have

met in preparing final environmental impact statement (FEIS) for certain oil and gas leases). Statutes that do not affect the *res* of the trust are judged in a different context than statutes affecting public assets held in trust. Those statutes falling outside the ambit of the trust flow exclusively from the police power. *See* Rock-Koshkonong Lake Dist. v. State Dep't of Natural Res., 833 N.W.2d 800, 822 (Wis. 2013).

158 Robinson Twp. v. Commonwealth, 83 A.3d 901, 953 (Pa. 2013).

159 For example, many pollution statutes are triggered by individual applications for a permit. *See, e.g.*, Clean Air Act, 42 U.S.C. § 7475 (2012) (requiring Prevention of Significant Deterioration permit for major new sources of air pollution in areas that have attained compliance with air quality standards). The full scope of the inquiry under those statutes is whether the individual permit will meet certain standards. *Id.* Of course, it is sometimes the case that the standards tie into the broad asset as a whole. An example would be the jeopardy standard under section 7 of the Endangered Species Act, which calls for evaluating whether the action would threaten the survival of the species. 16 U.S.C. § 1536(a) (2012).

160 42 U.S.C. §§ 7401–7671q (2012).

161 *See, e.g.*, 42 U.S.C. §§ 7521–7590 (Emission Standards for Moving Sources); *id.* § 7475 (Prevention of Significant Deterioration); *id.* § 7503 (Nonattainment New Source Review); *id.* § 7411 (New Source Performance Standards).

162 United States v. White Mountain Apache Tribe, 537 U.S. 465, 475 (2002).

known of danger to the trust, [and] could have protected the trust, but did not do so."[163] To this end, courts require a trustee to exercise continuing supervision of trust assets.[164] They emphasize an agency's ability and duty to revoke permits that become inconsistent with the fiduciary duty to protect the people's natural wealth.[165] By contrast, statutes often fail to provide any active trust duty; compliance with the statute marks the end of the inquiry even if the statute itself stands woefully deficient in protecting the resource.[166]

c. Limited Discretion

Statutes not involving trust assets—such as those dealing with business, criminal affairs, and moral and health matters—are enacted pursuant to the police power alone and may be changed on a legislative whim. These statutes will gain considerable deference, because the legislature is deemed the best judge of how to further the public's interest at the time; moreover, the legislature is dealing primarily with concerns of the present citizens.[167] The trust realm stands entirely different, because it introduces another class of beneficiary interests into the equation: the interests of future generations, which all courts recognize as a beneficiary class.[168] Here, the judicial approach is rooted in concepts of property law and trust law.[169] A statute involving trust property must fulfill fiduciary obligations, as explained in more detail below, protecting both present and future generations of citizens.[170] Of course, courts recognize that legislatures, acting as trustees, may encounter irreconcilably conflicting beneficiary interests, and to that end they will grant some deference to strike an appropriate balance, but the trust nevertheless provides the "outer boundaries" of permissible action.[171] As one judge explained, removing the

163 GEORGE T. BOGERT, TRUSTS § 107 (5th ed. 1973).

164 *Id.*; *Waiahole Ditch*, 9 P.3d 409, 453 (Haw. 2000); Nat'l Audubon Soc'y v. Superior Court, 658 P.2d 709, 712 (Cal. 1983).

165 *See Nat'l Audubon Soc'y*, 658 P.2d at 723 (citation omitted) (noting that case law evidences "the continuing power of the state as administrator of the public trust, a power which extends to the revocation of previously granted rights"); *Waiahole Ditch*, 9 P.3d at 453 (explaining that the state's authority empowers it "to revisit prior diversions and allocations, even those made with due consideration of their effect on the public trust") (citation omitted).

166 *See, e.g.*, Jessica Owley, *Piney Run: The Permits Are Not What They Seem*, 30 ECOLOGY L.Q. 429, 438–39 (2003) (asserting that dischargers have escaped liability for pollution through use of permit shields).

167 *See* Jacobson v. Massachusetts, 197 U.S. 11, 24–25 (holding that it is within a state's police power to enact "reasonable regulations" that protect the public's health and safety).

168 WOOD, NATURE'S TRUST, *supra* note 98, at 165.

169 *See id.* at 170–71 (suggesting that courts can apply the duty against property waste, originating in perpetual trust law, to the public trust).

170 *See infra* Part III.A.3.d.

171 Kootenai Envtl. Alliance v. Panhandle Yacht Club, Inc., 671 P.2d 1085, 1095 (Idaho 1983); *see also Waiahole Ditch*, 9 P.3d 409, 445, 453 (Haw. 2000) (holding that, though the full scope of the PTD is undefined, it applies without exception to all water resources, but necessity may require the accommodation of practices inconsistent with its protection mandate).

PTD inquiry and deciding a case solely within a police power frame, "changes the ease with which the legislature can modify regulation and creates a more lenient legal standard for this court to apply when it reviews such changes."[172]

d. A Separate Set of Obligations

The PTD frame imposes a full set of fiduciary obligations that have been established through a long history of doctrinal jurisprudence. Some of these obligations are substantive in nature, geared toward protecting the natural wealth that the public continues to need in the coming generations.[173] Other duties are procedural in nature, aimed toward ensuring that the trustee does not abuse her breathtaking power to serve her own interests.[174]

B. The Trust Res

The trust *res* consists of assets held in the trust that are designed to serve the trust's purpose. This natural wealth must sustain all foreseeable future generations of citizens; cleaving any category of resource from the trust endowment leaves it open to destruction.[175] Not at all surprisingly, courts have consistently looked to the needs of the public when defining the scope of the trust *res*.[176] The Supreme Court in *Illinois Central* created the framework for defining trust assets by asserting a test of "public concern."[177] That case involved a legislative conveyance of Chicago's waterfront along Lake Michigan to a private railroad company.[178] At the time of the case, in 1892, lakebeds served a vital role for fishing, navigation, and commerce. In light of these public needs, the Court held that the legislature had no power to put the shoreline into private hands.[179] Explaining that the trust arises "necessarily from the public character of the property,"[180] the Court declared:

172 Rock-Koshkonong Lake Dist. v. Dep't of Natural Res., 833 N.W.2d 800, 840 n.3 (Wis. 2013).

173 WOOD, NATURE'S TRUST, *supra* note 98, at 167.

174 *See id.* (noting the fiduciary duty focuses the trustee's power and requires the trustee to act only in the interest of the beneficiaries); *see also* Robinson Twp. v. Commonwealth, 83 A.3d 901, 957–58 (Pa. 2013) (plurality opinion) (noting the State's dual obligations to refrain from executing duties unreasonably and to protect the environment through legislative action).

175 *See* WOOD, NATURE'S TRUST, *supra* note 98, at 70 (explaining that the exclusion of isolated wetlands from "navigable waters" leaves open thousands of wetlands acres for destruction).

176 *See, e.g.*, Matthews v. Bay Head Improvement Ass'n, 471 A.2d 355, 365 (N.J. 1984) (reasoning that the PTD is dynamic, adapting to the public's current needs and conditions) (quoting Borough of Neptune City v. Borough of Avon-by-the-Sea, 294 A.2d 47, 54 (N.J. 1972)).

177 *See Illinois Central*, 146 U.S. 387, 455 (1892) (holding that ownership of a harbor's navigable waters and submerged lands are the public concern of all state citizens); *see also* WOOD, NATURE'S TRUST, *supra* note 98, at 144, 149, 151–52, 156 (providing a broader discussion of the evolution of the "public concern" precedent).

178 *Illinois Central*, 146 U.S. at 448.

179 *Id.* at 452–53.

180 *Id.* at 456.

"The ownership of the navigable waters of the harbor and of the lands under them is a *subject of public concern to the whole people of the State*."[181] Broadly speaking, where a natural resource is a "subject of public concern to the whole people," it warrants inclusion in the *res* of the PTD.[182] Professor Charles Wilkinson articulated this rationale when he said, "[t]he public trust doctrine is rooted in the precept that some resources are so central to the well-being of the community that they must be protected by distinctive, judge-made principles."[183]

The original cases dealt primarily with navigable waters, fisheries, and wildlife.[184] But the underlying rationale of the "public concern" test has pushed the doctrinal evolution of the public trust principle, and courts have demonstrated a strong inclination to expand it to meet modern concerns.[185] As the New Jersey Supreme Court observed, "we perceive the public trust doctrine not to be 'fixed or static,' but one to 'be molded and extended to meet changing conditions and needs of the public it was created to benefit.'"[186] The Supreme Court of Hawaii similarly stated, "the 'purposes' or 'uses' of the public trust have evolved with changing public values and needs."[187] Various courts now recognize modern imperatives such as biodiversity, wildlife habitat, aesthetics, and recreation as purposes of the trust.[188] Aimed toward protecting such modern concerns, the doctrine now reaches well beyond its traditional scope to assets such as groundwater, wetlands, dry sand beaches, parks, and non-navigable waterways in many states.[189]

Moreover, as science advances in its understanding of ecology, courts are increasingly willing to expand the trust *res*.[190] The Hawaii Supreme Court, for example, held that groundwater must be considered part of the

181 *Id.* at 455 (emphasis added).

182 *Id.* at 455.

183 Charles F. Wilkinson, *The Public Trust Doctrine in Public Land Law*, 14 U.C. DAVIS L. REV. 269, 315 (1980).

184 *See, e.g.*, *Illinois Central*, 146 U.S. at 455 (dealing with submerged lands along navigable waters).

185 *See, e.g.*, Matthews v. Bay Head Improvement Ass'n, 471 A.2d 355, 367 (N.J. 1984) (finding a public trust interest in dry sand beaches).

186 *Id.* at 365 (citation omitted).

187 *Waiahole Ditch*, 9 P.3d 409, 448 (Haw. 2000).

188 *See, e.g.*, Marks v. Whitney, 491 P.2d 374, 380 (Cal. 1971) (finding wildlife habitat and recreation interests as protected by the public trust); Mineral Cnty. v. Nev. Dep't of Conservation & Natural Res., 20 P.3d 800, 808 (Nev. 2001) (including aesthetics as a purpose of the public trust); LAITOS ET AL., *supra* note 112, at 441 (including ecological balance a purpose of the public trust). State v. Dickerson, 356 Or. 822, 832–34 (2015) (recognizing Oregon's sovereign property interest in the state's wildlife), *available at* http://www.publications.ojd.state.or.us/docs/S062108.pdf.

189 Robinson v. Ariyoshi, 658 P.2d 287, 310 (Haw. 1982) (including groundwater as part of the public trust); *Matthews*, 471 A.2d at 365–66 (including dry sand area as part of the public trust); Big Sur Properties v. Mott, 62 Cal. App. 3d 99, 99 (1976) (including parks as part of the public trust); Nat'l Audubon Soc'y v. Superior Court, 658 P.2d 709, 721 (Cal. 1983) (including non-navigable tributaries as part of the public trust).

190 *See Waiahole Ditch*, 9 P.3d at 447 (citing modern scientific approaches in confirming that the PTD applies to all water resources, unlimited by any surface–ground distinction).

trust *res* because of its inseparability from surface water.[191] "Modern science and technology have discredited the surface–ground dichotomy. . . . [W]e confirm that the public trust doctrine applies to all water resources, unlimited by surface–ground distinction."[192] The court emphasized that the trust demands the "maintenance of ecological balance."[193] In a similar vein, a plurality opinion from the Pennsylvania Supreme Court emphasized the public's interest in habitable communities and recognized a full gamut of natural resources in the trust *res*, including "resources that implicate the public interest, such as ambient air, surface and ground water, wild flora, and fauna (including fish) that are outside the scope of purely private property."[194] Many state statutes or constitutional provisions recognize the *res* as including all natural resources.[195]

Some courts still cling to an antiquated notion of navigability to define the scope of the public trust *res*.[196] These courts assume that, because many past cases involved submerged lands along navigable waterways, the doctrine's reach remains limited to those areas.[197] However, the history of the doctrine's evolution in the United States shows that navigability was a concept to expand the scope of the trust, not limit it. England's doctrine had been limited to tidelands.[198] U.S. courts expanded the doctrine to inland, nontidal waters that were navigable based on recognition of the public need to promote navigation and commerce.[199] Indeed, the navigability concept has no relevance to wildlife resources, which has always been part of the traditional PTD in the United States.[200] Some courts, noting that navigability is not the *sine qua non* of the PTD, have alluded to the wisdom of dropping the focus on navigability altogether.[201]

191 *Id.* at 458.

192 *Id.*

193 *Id.*

194 Robinson Twp. v. Commonwealth, 83 A.3d 901, 955 (Pa. 2013) (plurality opinion).

195 *See, e.g.*, HAW. CONST. art. XI, § 1 ("All public natural resources are held in trust by the State for the benefit of the people."); TEX. CONST. art. XVI, § 59(a) ("The conservation and development of all of the natural resources of this State . . . are each and all hereby declared public rights and duties . . . .").

196 *See, e.g.*, Rock-Koshkonong Lake Dist. v. Dep't of Natural Res., 833 N.W.2d 800, 820–21 (Wis. 2013) ("There is no constitutional foundation for *public trust* jurisdiction over land, including non-navigable wetlands, that is not below the [ordinary high water mark] of a navigable lake or stream.").

197 *See id.*

198 *See* Nat'l Audubon Soc'y v. Superior Court, 658 P.2d 709, 719 (Cal. 1983).

199 Phillips Petroleum Co. v. Mississippi, 484 U.S. 469, 478–80 (1988).

200 *See* Geer v. Connecticut, 161 U.S. 519, 534 (1896) (recognizing that the state holds wildlife in trust).

201 *See, e.g.*, Parks v. Cooper, 676 N.W.2d 823, 838–39 (S.D. 2004) ("Today we acknowledge, in accord with the State's sovereign powers and the legislative mandate, that all waters within South Dakota, not just those waters considered navigable under the federal test, are held in trust by the State for the public."); Mont. Coal. for Stream Access Inc. v. Curran, 682 P.2d 163, 171 (Mont. 1984) ("In sum, we hold that, under the public trust doctrine and the 1972 Montana Constitution, any surface waters that are capable of recreational use may be so used by the public without regard to streambed ownership or navigability for nonrecreational purposes.").

C. A Sovereign Co-Trusteeship

The trust framework creates logical rights to shared assets that are not confined within any one jurisdictional border. It is well established that all sovereigns with jurisdiction over the natural territory of a transboundary asset have legitimate property claims to the resource.[202] In the United States, for example, states and tribes that share a waterway have correlative rights to the water.[203] It is also recognized that states and tribes have co-existing property rights in a fishery passing through their borders.[204] The concept of co-trustees is well established in the context of a natural resources damage recovery, whereby different trustees recover damages to the assets within their separate jurisdiction and control.[205]

Long described as a fundamental attribute of sovereignty, the trust logically applies to the federal government, a sovereign.[206] Courts in other nations have applied the trust to their national governments.[207] Federal statutory law imposes on the federal government the duty of recovering NRDs where pollution to a trust asset occurs.[208] While the D.C. Circuit Court recently disclaimed any federal trust obligation in an Atmospheric Trust Litigation case,[209] a far more considered analysis comes from a previous federal court decision that characterized the federal and state governments as "co-trustees," each bound by a public trust obligation that must be carried out according to their respective constitutional roles.[210] Discerning the federal role in the submerged lands context, the federal district court in *United States v. 1.58 Acres of Land* declared: "Since the trust impressed upon this property is governmental and administered jointly by the state and

202 *See* Idaho *ex rel.* Evans v. Oregon, 462 U.S. 1017, 1031 n.1 (1983) (O'Connor, J., dissenting) (noting "recognition by the international community that each sovereign whose territory temporarily shelters [migratory] wildlife has a legitimate and protectable interest in that wildlife").

203 *See* Arizona v. California, 373 U.S. 546, 601 (1963).

204 *See* Washington v. Wash. State Commercial Passenger Fishing Vessel Ass'n, 443 U.S. 658, 677–79 (1979); *see also* Minnesota v. Mille Lacs Band of Chippewa Indians, 526 U.S. 172, 204–05 (1999).

205 *See* Coeur D'Alene Tribe v. Asarco Inc., 280 F. Supp. 2d 1094, 1115 (D. Idaho 2003) ("[I]n many instances, co-trustees are the norm and not the exception.").

206 *See* United States v. Beebe, 127 U.S. 338, 342 (1888) ("The public domain is held by the [federal] Government as part of its trust."); United States v. CB & I Constructors, Inc., 685 F.3d 827, 836 (9th Cir. 2012) ("[T]he federal government is more akin to a trustee that holds natural resources for the benefit of present and future generations."); United States v. 1.58 Acres of Land, 523 F. Supp. 120, 124 (D. Mass. 1981); *In re* Steuart Transp. Co., 495 F. Supp. 38, 40 (E.D. Va. 1980). *See also* DAVID C. SLADE ET AL., PUTTING THE PUBLIC TRUST DOCTRINE TO WORK 3–8, 15–24, 307–17 (2d ed. 1997); *supra* notes 128–134 and accompanying text.

207 *See* LAITOS ET AL., *supra* note 113, at 441–44; Waweru v. Republic, (2006) eKLR, Misc. Civil Application No. 118 of 2004 (Kenya), *available at* http://kenyalaw.org/caselaw/cases/view/14988/; M.C. Mehta v. Kamal Nath, (1997) 1 S.C.C. 388 (1996) (India); British Columbia v. Canadian Forest Products Ltd., [2004] S.C.R. 74, 111–12 (Can.).

208 *See* CERCLA, 42 U.S.C. § 9607(f) (2012); *see also supra* Part III.D.2.

209 Alec L. *ex rel.* Loorz v. McCarthy, 561 F. App'x 7, 7–8 (D.C. Cir. 2014) (per curiam), *cert. denied*, 135 S. Ct. 774 (2014).

210 *See 1.58 Acres of Land*, 523 F. Supp. at 123–24 (discussing *Illinois Central*, 146 U.S. 387 (1892), and *United States v. California*, 332 U.S. 19 (1947)).

federal governments by virtue of their sovereignty, neither sovereign may alienate this land free and clear of the public trust."[211] It further explained:

> This formulation recognizes the division of sovereignty between the state and federal governments [of] those aspects of the public interest . . . that relate to the commerce and other powers delegated to the federal government [and] are administered by Congress in its capacity as trustee of the *jus publicum*, [and] those aspects of the public interest in this property that relate to non-preempted subjects reserved to local regulation by the states [and which] are administered by state legislatures in their capacity as co-trustee of the *jus publicum*.[212]

Shared governmental interests in common trust property have been described as a sovereign "co-tenancy."[213] This concept proves helpful in defining responsibilities toward the global trust and planetary assets. Rather than assume that the oceans and atmosphere represent unregulated "commons," a planetary construct of mutual and corollary responsibility invokes concepts of co-tenant trusteeship.[214] As sovereign co-tenant trustees of the planet's atmosphere, climate system, and oceans, nation–states and their subdivisions share organic duties both toward their own citizens and toward the other co-tenant sovereigns. Such duties could—in theory—be enforced on the domestic level using principles that remain relatively uniform across jurisdictional sovereign borders. In this respect, an organized regime of responsibility toward the atmosphere can emerge even absent an international agreement, and in a manner that recognizes the autonomy and sovereignty of nation–states. Such a "distributed legal approach" toward shared fiduciary obligations is discussed below in Part IV.[215] While a robust international climate agreement for restoring the atmosphere would be optimal for multiple reasons, it may not arrive in time to salvage a habitable planet. In the interim, this approach puts domestic pressure on sovereign nation–states to conform to international norms of common asset protection.

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211 *Id.* at 124.

212 *Id.* at 123 (citation omitted).

213 Puget Sound Gillnetters Ass'n v. U.S. Dist. Court, 573 F.2d. 1123, 1126 (9th Cir. 1978) (describing tribal and state rights to a shared migratory fishery as "something analogous to a cotenancy, with the tribes as one cotenant and all citizens of the Territory (and later of the state) as the other") (citation omitted); United States v. Washington, 520 F.2d 676, 685 (9th Cir. 1975) (applying co-tenancy construct, by analogy, to Indian fishing rights); *see also* Washington v. Wash. State Commercial Passenger Fishing Vessel Ass'n, 443 U.S. 658 (1979) (describing rights to shared fishery). For a general explanation of co-tenancy, see 20 AM. JUR. 2D *Cotenancy and Joint Ownership* § 1 (2005) ("A 'cotenancy' is a tenancy under more than one distinct title, but with unity of possession.").

214 Wood, *Atmospheric Trust*, *supra* note 8, at 124–26 (applying co-tenancy concept to atmospheric trust); Mary Turnipseed et al., *Using the Public Trust Doctrine to Achieve Ocean Stewardship*, *in* RULE OF LAW FOR NATURE 365, 376 (Christina Voight ed., 2013) (applying co-tenancy concept to ocean trust).

215 *See infra* Part IV.

D. Fiduciary Duties: Asset Protection and Recovery for Damages

A trust frame centers on fiduciary obligation rather than political discretion.[216] A trustee's role is defined by multiple fiduciary responsibilities toward managing the trust wealth for the purpose of serving the beneficiaries' interests.[217] Courts enforce such fiduciary duties so as to confine the otherwise immense power of a trustee over the assets and assure that the management is directed exclusively toward advancing the interests of the beneficiaries.[218] In the case of a public trust, which is perpetual in nature, the beneficiaries are both present and future generations of citizens.[219] Thus, as Professor John Davidson has aptly pointed out, the fiduciary duties strive to assure intergenerational equity between different generations of citizens.[220] The Supreme Court of the Philippines expressed intergenerational equity in a landmark public trust case where it rejected a federal agency position that would cause deforestation: "[E]very generation has a responsibility to the next to preserve that . . . harmony [of Nature]. . . . [The] right to a balanced and healthful ecology . . . concerns nothing less than self-preservation and self-perpetuation . . . the advancement of which may even be said to predate all governments and constitutions."[221] A trustee's fiduciary duties are both procedural and substantive in character.[222] This Part reviews two core duties: protecting the trust and restoring the trust assets where they have suffered damage. Both duties are relevant to recovering the atmospheric equilibrium that is necessary for the continued habitability of the planet.

1. The Duty of Protection and Restoration

With every trust, there is a core duty of protection. The governmental trustee bears a fiduciary obligation to protect the assets of the trust from damage.[223] Scores of cases emphasize this duty of protection.[224] The trustee

216 *See* WOOD, NATURE'S TRUST, *supra* note 98, at 165 (contrasting statutory framework from the public trust framework).

217 *See id.* at 167 (discussing the procedural and substantive fiduciary obligations of a trustee).

218 *See, e.g.*, United States v. Mitchell, 463 U.S. 206, 226 (1983) (allowing for damages for breaches of fiduciary duty).

219 *See* John Davidson, *Taking Posterity Seriously: Intergenerational Justice*, CLIMATE LEGACY INITIATIVE RES. F., Jan. 28, 2008, http://vlscli.wordpress.com/2008/01/28/taking-posterity-seriously-intergenerational-justice (last visited Apr. 17, 2015).

220 *See id.*

221 LAITOS ET AL., *supra* note 113, at 443–44.

222 *See* WOOD, NATURE'S TRUST, *supra* note 98, at 165–87 (explaining the fiduciary's substantive duties under the public trust); *id.* at 188–207 (discussing the fiduciary's procedural duties under the public trust).

223 GEORGE GLEASON BOGERT ET AL., BOGERT'S TRUSTS AND TRUSTEES § 582 (2014) (Westlaw) ("The trustee has a duty to protect the trust property against damage or destruction. He is obligated to the beneficiary to do all acts necessary for the preservation of the trust *res* which would be performed by a reasonably prudent man employing his own like property for purposes similar to those of the trust."); RESTATEMENT (SECOND) OF TRUSTS § 176 (1957) ("The trustee is under a duty to the beneficiary to use reasonable care and skill to preserve the trust property.").

must defend the trust against injury and may not sit idle in face of threatened damage to the trust.[225] In the public trust realm, courts have emphasized that this is an active duty.[226] It requires that the trustee protect the trust from "substantial impairment."[227]

2. The Recovery of Natural Resource Damages

Where third parties have damaged trust assets, the trustee has the affirmative duty to recoup monetary damages and restore such assets.[228] The

224 *See, e.g.*, United States v. White Mountain Apache Tribe, 537 U.S. 465, 475 (2003) (recognizing that the fundamental common law duty of a trustee is to maintain trust assets) (citing Ctr. States v. Ctr. Transp., Inc., 472 U.S. 559, 572 (1985)); Geer v. Connecticut, 161 U.S. 519, 534 (1896) ("[I]t is the duty of the legislature to enact such laws as will best preserve the subject of the trust and secure its beneficial use in the future to the people of the State."), *partially overruled on other grounds by* Hughes v. Oklahoma 441 U.S. 322 (1979); Nat'l Audubon Soc'y v. Superior Court, 658 P.2d 709, 724 (Cal. 1983) (expressing the "duty of the state to protect the people's common heritage of streams, lakes, marshlands and tidelands"); State v. City of Bowling Green, 313 N.E.2d 409, 411 (Ohio 1974) ("[W]here the state is deemed to be the trustee of property for the benefit of the public it has the obligation to bring suit . . . to protect the corpus of the trust property . . . ."); City of Milwaukee v. State, 214 N.W. 820, 830 (Wis. 1927) ("The trust reposed in the state is not a passive trust; it is governmental, active, and administrative . . . [and] requires the lawmaking body to act in all cases where action is necessary, not only to preserve the trust, but to promote it."). For discussion, see Deborah G. Musiker et al., *The Public Trust and* Parens Patriae *Doctrines: Protecting Wildlife in Uncertain Political Times*, 16 PUB. LAND L. REV. 87, 96 (1995) ("The [government], as trustee, must prevent substantial impairment of the wildlife resource so as to preserve it for the beneficiaries—current and future generations.").

225 *See* GEORGE T. BOGERT, TRUSTS § 107 (6th ed. 1987) ("The trustee . . . is liable for damages if he should have known of danger to the trust, could have protected the trust, but did not do so."). Courts have imported principles of protection from the private realm of trust law to govern public trustee duties in state lands management. *See* Idaho Forest Indus. v. Hayden Lake Watershed Improvement Dist., 733 P.2d 733, 738 (Idaho 1987) (noting the administration of public trust is governed by the same principles applicable to the administration of trusts in general); Robinson Twp. v. Commonwealth, 83 A.3d 901, 978 (Pa. 2013) (plurality opinion) (referencing standards from private trust law); *see also* John Dernbach, *The Potential Meanings of a Constitutional Public Trust*, 45 ENVTL. L. 463, 478–85 (2015) (discussing *Robinson Township*'s iteration of public trust duties).

226 *See, e.g.*, *Nat'l Audubon Soc'y*, 658 P.2d at 728 ("The state has an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible."); Just v. Marinette Cnty., 201 N.W.2d 761, 768 (Wis. 1972) ("The active public trust duty of the state of Wisconsin in respect to navigable waters requires the state not only to promote navigation but also to protect and preserve those waters for fishing, recreation, and scenic beauty."); *Waiahole Ditch*, 9 P.3d 409, 453 (Haw. 2000) ("Under the public trust, the state has both the authority and duty to preserve the rights of present and future generations in the waters of the state."); *see also* State v. Cent. Vt. Ry., 571 A.2d 1128, 1132 (Vt. 1989) ("[T]he state's power to supervise trust property in perpetuity is coupled with the ineluctable duty to exercise this power."); Kauai Springs, Inc. v. Planning Comm'n of Kauai, 324 P.3d 951, 982 (Haw. 2014) ("[T]he public trust creates an 'affirmative duty' of the State and its political subdivisions 'to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible.'") (quoting *Nat'l Audubon Soc'y*, 658 P.2d at 728).

227 *See Waiahole Ditch*, 9 P.3d at 451–53 (discussing the "substantial impairment" standard).

228 *See* State v. Gillette, 621 P.2d 764, 767 (Wash. Ct. App. 1980) (noting "fiduciary obligation of any trustee to seek damages for injury to the object of its trust"); State v. Jersey Cent. Power

duty remains a classic obligation in the private sphere, and it is well established in the sovereign context as well.[229] Natural resource damages (NRDs) focus on the *res* of the PTD, in contrast to other types of damages—such as economic losses—associated with a harmful action.[230] In the context of an oil spill for example, NRDs include compensation for the loss of fisheries, pollution of the coastline, water contamination, and the like. Huge monetary awards have been gained by public trustees for damage caused by oil spills and mining.[231] Such damage awards can arise from a single immediate event or a slow release occurring over decades or even centuries—such as contamination from mining waste.[232]

Generally speaking, only governmental trustees of such resources, not private parties, may assert NRD claims.[233] The trustees positioned to recover NRDs are the sovereigns with authority or jurisdiction over the resource. U.S. cases and statutory law make clear that the federal government, states, and tribes are authorized trustees charged with the duty to recover NRDs.[234] In contexts involving overlapping jurisdiction, courts must determine the relationship among the co-trustees.[235]

& Light Co., 336 A.2d 750, 758–59 (N.J. Super. Ct. App. Div. 1975), *rev'd in part*, 351 A.2d 337 (N.J. 1976) (finding duty to seek damages for harm to natural resources held in public trust); State Dep't of Envtl. Prot. v. Jersey Cent. Power & Light Co., 351 A.2d 337, 342 (1976) (finding plaintiffs had failed to establish causation in their claim for damages, and also holding that federal statute preempted claims under both *parens patriae* and the public trust); *Bowling Green*, 313 N.E.2d at 411 (noting public trustee's "obligation to bring suit . . . to recoup the public's loss occasioned by . . . damage [to] such property"); Susan Morath Horner, *Embryo, Not Fossil: Breathing Life into the Public Trust in Wildlife*, 35 LAND & WATER L. REV. 23, 27–28 (2000) (discussing rights and duties). *See generally* RESTATEMENT (SECOND) OF TRUSTS § 177 (1959) ("[T]he trustee is under a duty . . . to take reasonable steps to realize on claims which he holds in trust."); Charles B. Anderson, *Damage to Natural Resources and the Costs of Restoration*, 72 TUL. L. REV. 417, 426–30 (1997) (discussing the legal theories for seeking damages). The OPA also created a cause of action by private citizens against trustees who failed to recover NRDs. 33 U.S.C. § 2706(g) (2012).

229 Anderson, *supra* note 228, at 426–27.

230 *See* Ira Gottlieb et al., *Natural Resource Damages for Climate Change—An Idea Whose Time Has Not Yet Come, Part I: NRD Claims Are Not Currently Viable Under CERCLA*, 20 ENVTL. CLAIMS J. 256, 263 (2008) [hereinafter Gottlieb, *Part I*].

231 *See generally* Anderson, *supra* note 228, at 435–36 (describing the massive damages judgment imposed by the court in *Puerto Rico v. S.S. Zoe Colocotroni*, 628 F.2d 652 (1st Cir. 1980)).

232 *See* Brian D. Israel, *Natural Resource Damages, in* ENVIRONMENTAL LAW PRACTICE GUIDE § 32B.05 (Michael B. Gerrard ed., 1992) (quoting the Department of Interior as defining "injury" as an occurrence either "long or short-term"); *see also* Gottlieb, *Part I*, *supra* note 230, at 261 (discussing the definition of natural resource loss in CERCLA).

233 Gottlieb, *Part I*, *supra* note 230, at 259; *see also* Lutz v. Chromatex, Inc., 718 F. Supp. 413, 419 (M.D. Pa. 1989) (stating that NRD claims may be brought only by the government trustees); Alaska Sport Fishing Ass'n v. Exxon Corp., 34 F.3d 769, 772 (9th Cir. 1994) (discussing lost-use damages). *But see* OPA, 33 U.S.C. § 2706(g) (2012) (providing a cause of action to private parties when trustees fail to pursue NRDs when that duty is not discretionary).

234 *See* Israel, *supra* note 232, § 32B.01[1]; CERCLA, 42 U.S.C. § 9607(f) (2012) (addressing where liability is placed in the event of injury to natural resources); 33 U.S.C. § 2706(a) (2012).

235 *See* Coeur D'Alene Tribe v. Asarco Inc., 280 F. Supp. 2d 1094, 1114–16 (D. Idaho 2003).

NRD awards are different from cleanup costs of a contaminated site.[236] NRD awards are geared toward restoring the natural wealth that was lost or damaged as a result of the contamination.[237] They also aim to compensate the public for loss of ecosystem services during the period of injury.[238] NRDs are distinguishable from private economic losses, health assessments, personal injuries, and damage to private property.[239] Under the PTD construct, the sovereign must pursue damages in order to make the public—the beneficiaries—whole again and to restore the asset for future generations.[240] As a general matter, NRD awards are to be used for restoration of the trust.[241] Some courts have indicated that the trustees not only have the discretion, but also the firm obligation, to seek damages, and that failure to do so amounts to an abdication of fiduciary responsibility.[242]

Notably, the climate context manifests two types of categorical damage (and thus two kinds of potential NRD awards). First, there is actual, *primary* damage to the atmosphere caused by GHG pollution. As discussed in Part IV below, a successful NRD lawsuit should secure restoration costs to rectify such damage through soil sequestration and reforestation projects.[243] This primary damage category alone forms the subject of this Article. However, the same global litigation strategies designed to hold fossil fuel companies responsible for primary atmospheric damage might also be useful in formulating approaches aimed to recover for a second type of damage: damage to *corollary* natural assets that depend on climate stability as the ecological linchpin for an integral planetary system.

Because so many resources are inextricably hinged to the climate system, atmospheric damage causes extensive injury to nearly all other natural resources comprising the planet's vast natural and biological infrastructure—including species, waterways, coastlines, oceans, and

236 Israel, *supra* note 232, § 32B.01[2].

237 *Id.*

238 *Id.* § 32B.01[1] ("As a general rule, the compensation for [NRDs] is intended to restore the natural environment to its prior condition and compensate the public for the interim lost use from the time of contamination until restoration.").

239 *See id.* § 32B.01[2] (stating that the purpose of NRDs is to restore natural resources); Patrick T. Michael III, *Natural Resource Damages Under CERCLA: The Emerging Champion of Environmental Enforcement*, 20 PEPP. L. REV. 185, 201–02 (1992) (explaining that, because the definition of "natural resource" excludes private property, "courts have interpreted CERCLA as permitting recovery for injury to natural resources on government land only").

240 *See, e.g.*, Ariz. Ctr. for Law in the Pub. Interest v. Hassell, 837 P.2d 158, 170 (Ariz. Ct. App. 1991) (describing the "state's special obligation to maintain the trust for the use and enjoyment of present and future generations").

241 Damages for NRDs under OPA, for example, are deposited into the Oil Spill Liability Trust Fund. Trustees can draw on the fund for the initiation of damage assessments, removal costs, and restoration, rehabilitation, or acquisition of equivalent replacement of the injured resource. 33 U.S.C. § 2712(a) (2012); Oil Spill Liability Trust Fund, 26 U.S.C. § 9509 (2012); *see also* CERCLA, 42 U.S.C. § 9607(f) (2012) (designating that state officials are acting "on behalf of the public as trustees for natural resources").

242 *See* cases cited *supra* note 228.

243 *See infra* notes 291–293 and accompanying text.

forests.[244] It is entirely possible to conceive of NRD actions directed toward restoration of—or compensation for—these impaired corollary ecosystems damaged or ruined as a result of climate disruption. By focusing on the *primary* harm to the atmosphere itself, this Article strives to develop a global mechanism for funding an atmospheric recovery plan that can restore the atmosphere's equilibrium. While it is also imperative to seek recovery for *secondary* harm, stabilizing the climate system stands most urgent in order to maintain Earth's capacity for supporting all natural life systems—and human survival and welfare. Additionally, of the two types of claims, suing for primary damage to the atmosphere presents a more straightforward legal construct than suing for corollary resource damage.[245]

a. Basis for Recovery: Statutory Law and Common Law

The authority to recover NRDs exists as a matter of both state and federal common law.[246] In *State v. Gillette*,[247] for example, the Washington Court of Appeals made clear that government trustees have both the authority and duty, outside of statutory law, to recover NRDs.[248] Holding that the Department of Fisheries was entitled to recover NRDs for loss of fisheries habitat even absent a statutory provision allowing recovery, the court said: "[T]he state, through the Department, has the fiduciary obligation of any trustee to seek damages for injury to the object of its trust."[249] In *In Re Steuart Transportation Co.*,[250] a federal district court held that the federal government and the state of Virginia could recover for the loss of migratory waterfowl resulting from an oil spill, absent any statutory basis.[251] The court

244 *See generally Climate Prescription*, *supra* note 2, at 6 (describing the irreversible effects of climate change on sea level and waterways).

245 A third type of damage, of course, is the actual damage suffered by people as a result of climate disruption. This includes death, injury, economic losses, property damage, and relocation costs. *See, e.g.*, Native Vill. of Kivalina v. ExxonMobil Corp., 696 F.3d 849, 850 (9th Cir. 2012) (rejecting private party claim for climate change damages); Comer v. Nationwide Mutual Ins. Co., No. 1:05-CV-436-LTD-RHW, 2006 WL 1066645, at *1 (S.D. Miss. Feb. 23, 2006) (seeking climate change damages resulting from Hurricane Katrina). Such personal costs have not typically been a part of traditional NRD recovery. Other tort theories might provide a sound basis for recovery, but these are well beyond the scope of this Article. Forging a global litigation model to recover the primary atmospheric NRDs may prove useful in these other areas. Certainly, approaches to all three categories of damage should focus liability on the major fossil fuel companies that caused the colossal harm. For general discussion of the fossil fuel industry's contribution to climate disaster, see generally, NAOMI KLEIN, THIS CHANGES EVERYTHING: CAPITALISM VS. THE CLIMATE (2014).

246 *See* David Hodas, *Natural Resource Damages: A Research Guide*, 9 PACE ENVTL. L. REV. 107, 109 n.6 and accompanying text (1991); Israel, *supra* note 232, § 32B.01[1] ("The authority to seek NRD compensation is rooted in common law principles, including the public trust doctrine and others.").

247 621 P.2d 764 (Wash. App. Ct. 1980).

248 *See id.* at 767.

249 *Id.*

250 495 F. Supp. 38 (E.D. Va. 1980).

251 *Id.* at 40.

stated: "Under the public trust doctrine, the State of Virginia and the United States have the right and the duty to protect and preserve the public's interest in natural wildlife resources."[252] In *State v. City of Bowling Green*,[253] the Supreme Court of Ohio held that a municipality was potentially liable under the PTD for a fish-kill that occurred due to a municipality's negligent discharge from its sewage treatment plant.[254]

Apart from this body of common law, federal and state legislatures have enacted detailed statutory provisions allowing the recovery of NRDs.[255] CERCLA, passed in 1980, provides for NRDs due to releases of "hazardous substances."[256] Following the Exxon Valdez oil spill in Prince William Sound, Alaska, Congress enacted the OPA in 1990 to impose liability for NRDs and cleanup costs associated with oil spills.[257] In 1988, the amendments to the Marine Protection, Research, and Sanctuaries Act (MPRSA)[258] were passed to provide an explicit right of recovery for NRDs to marine resources found in national marine sanctuaries "no matter how the damage is caused or by whom."[259] Similarly, the Park System Resources Protection Act (PSRPA)[260] was enacted to cover injuries to any resources within national parks regardless of causation.[261] Several state legislatures have also passed statutes providing for NRDs.[262] These statutes typically aim toward specific categories of harm.[263] Some statutory schemes impose unique limitations on recovery.[264] For example, CERCLA limits the amount of recovery from $5,000,000 to $50,000,000, depending on the release mechanism.[265]

Common law claims continue to exist outside of statutory law under the PTD.[266] Therefore, if damage to public natural resources does not fall

252 *Id.*

253 313 N.E.2d 409 (Ohio 1974).

254 *Id.* at 411–12.

255 *See generally* BRIAN D. ISRAEL, STATE-BY-STATE GUIDE TO NRD PROGRAMS IN ALL 50 STATES (2006), *available at* http://www.mass.gov/eea/docs/eea/nrd/nrd-state-by-state.pdf.

256 *See generally* CAROLE STERN SWITZER & PETER GRAY, CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (SUPERFUND) 1 (2d ed. 2008) ("CERCLA provides the government with authority to compel or perform remediation of sites contaminated by hazardous substances, as well as a framework establishing liability for remediation costs.").

257 VALERIE A. LEE ET AL., THE NATURAL RESOURCE DAMAGE ASSESSMENT DESKBOOK: A LEGAL AND TECHNICAL ANALYSIS 16 (2002).

258 Marine Protection, Research, and Sanctuaries Act of 1972, 33 U.S.C. §§ 1401–1445, 16 U.S.C. §§ 1431–1447f, 33 U.S.C. §§ 2801–2805 (2012).

259 LEE ET AL., *supra* note 257, at 15.

260 National Park System Resources Protection Act of 1990, 16 U.S.C. § 19jj (2012).

261 *Id.*

262 *See generally* ISRAEL, *supra* note 255 (providing an overview of NRD statutes passed by several state legislatures).

263 *See, e.g.*, CAL. GOV'T CODE § 8670.7 (West 2014) (outlining specific response methods for oil spills).

264 *See, e.g.*, CERCLA, 42 U.S.C. § 9607(c) (2012).

265 *Id.*

266 *See* N.J. Dep't of Envtl. Prot. v. Exxon, 22 A.3d 1, 5, 8–9 (N.J. Super. Ct. 2011) (recognizing claims for NRDs based on the PTD as separate from claims based on public nuisance, trespass, and statutory claims); *see also* State v. Gillette, 621 P.2d 764, 766–67 (Wash. Ct. App. 1980) (allowing a public trust basis for recovery of NRDs absent any statutory recovery

within the purview of a statute, the sovereign still has the authority and fiduciary obligation to pursue damages under the PTD. This matter becomes important in the context of atmospheric climate NRDs, which, as Part IV explains, are not presently covered by statute.

b. Elements of a Natural Resources Damages Claim

The elements of an NRD claim based on either statutory law or public trust law are fairly straightforward. As a basic matter, one must prove the existence of: 1) a trust *res* (natural resources); 2) a trustee; 3) damage to the *res*; 4) liable parties; and 5) causation.[267] Some statutory schemes require additional elements. A CERCLA claim, for example, must allege the release of a classified "hazardous substance."[268] An OPA claim must allege a release of oil.[269] The question of fault is typically absent (or only implied) in statutory schemes, with courts imposing strict liability principles.[270] Given the difficulty of proving negligence or fault in pollution contexts, and in light of the public's need for recovering essential ecological resources, courts are likely to impose strict liability for common law NRD claims as well.

c. Defenses

Most defenses in NRD cases arise from the explicit language of statutes that provide the basis for recovery. These defenses do not automatically apply to nonstatutory NRD claims. The basic statutory defenses are: 1) act of God, 2) act of war, and 3) act or omission of third party.[271] Different statutes have additional provisions that can eliminate liability as well.[272]

provision). In many cases, actions for NRDs assert multiple claims, one of which is the public trust, but others may include public nuisance, trespass, and statutory claims. *See* Hodas, *supra* note 246, at 108–09 n.6. While NRDs may result from other claims, this discussion focuses only on NRDs under the public trust.

267 *See* Gottlieb, *Part I*, *supra* note 230, at 258–59. *See generally* Israel, *supra* note 232, § 32B.05[1]–[4].

268 *See, e.g.*, 42 U.S.C. § 9607.

269 33 U.S.C. § 2702 (2012).

270 *See, e.g.*, *N.J. Dep't of Envtl. Prot.*, 22 A.3d at 5, 11 (recognizing a strict liability PTD common law claim for NRDs based on the state's argument "that at common law, strict liability was developed to fill a gap where trespass and nuisance claims inadequately protected landowners; later, a 1979 Spill Act amendment provided statutory strict liability against dischargers of hazardous substances"). *See also* Johnson Controls, Inc. v. Emp'rs Ins., 665 N.W.2d 257, 293 (Wis. 2003) ("CERCLA liability is a particular breed of strict liability . . . ."); Israel, *supra* note 232, § 32B.01[1] ("[T]he statutes generally impose a strict liability regime upon a class of parties.").

271 *See* 33 U.S.C. § 2703; 42 U.S.C § 9607(b).

272 *See, e.g.*, Federal Water Pollution Control Act, 33 U.S.C. § 1342(k) (2012) (providing a shield from liability if the regulated entity complies with its permit issued under the Clean Water Act).

CERCLA does not impose liability for releases occurring before the statute's enactment unless the damage is ongoing.[273] MPRSA and PSRPA allow a defense for an act authorized by federal or state law.[274] Similarly, CERCLA establishes a "permit shield" protecting polluters against NRD liability where the damage was authorized by a federal permit.[275] Generally, courts have interpreted this federal permit shield narrowly.[276] CERCLA also contains a provision that denies recovery for NRDs if the losses were identified in an environmental impact statement as "an irreversible and irretrievable commitment of natural resources" and "the decision to grant a permit or license authorizes such commitment of natural resources."[277] Notably, however, the legitimacy of such action-limiting provisions has never been analyzed for compliance with basic trust standards. While the permit shield is a long-accepted feature of statutory law, its premise remains dubious. Allowing polluters a permit shield seemingly violates the basic fiduciary duty of restoring the trust and gaining compensation for damage from responsible parties.[278] As courts have emphasized, the PTD stands apart from statutory law, and compliance with a statutory scheme does not automatically ensure compliance with trust standards.[279]

d. Valuation of Natural Resource Damages

Statutory schemes such as CERCLA define three components of the NRD award. The first is restoration costs incurred by trustees in restoring, rehabilitating, or replacing the lost or injured resources.[280] This cost is beyond the typical response costs that agencies incur to prevent ongoing risks to health and the environment.[281] The second component consists of the lost value of the injured or destroyed resource from the time of

273 The definition of "release" becomes especially important in this context. In cases involving groundwater contamination, courts have found that ongoing seepage and passive water migration qualify as "re-releases," and therefore damage continues to occur potentially many years after the initial incident. *See* Coeur D'Alene Tribe v. Asarco Inc., 280 F. Supp. 2d 1094, 1112–14 (D. Idaho 2003).

274 Marine Protection, Research, and Sanctuaries Act of 1972, 16 U.S.C. § 1443(a)(3)(b) (2012); National Park System Resources Protection Act, 16 U.S.C. § 19jj-1(c) (2012).

275 *See* 42 U.S.C. § 9607(c)(1), (j).

276 *See* Idaho v. Hanna Mining Co., 882 F.2d 392, 395 (9th Cir. 1989) (concluding a permit shield provision in CERCLA does not absolve liability for damages occurring before the permit was issued); Reading Co. v. City of Phila., 823 F. Supp. 1218, 1230–31 (E.D. Pa. 1993) (holding that compliance with the Toxic Substances Control Act is not sufficient to qualify for the Solid Waste Disposal Act exception under CERCLA); Idaho v. Bunker Hill Co., 635 F. Supp. 665, 673–74 (D. Idaho 1986) (noting that the State may recover damages from releases not expressly authorized in the permit under CERCLA).

277 42 U.S.C. § 9607(f)(1) (2012).

278 This question need not be analyzed here, however, for historic atmospheric CO_2 pollution fell outside statutory schemes as discussed below.

279 *See supra* notes 243–248 and accompanying text.

280 Israel, *supra* note 232, § 32B.05[5].

281 *See* 42 U.S.C. 9607(a)(4) (distinguishing costs of removal and remedial action from damages to natural resources).

contamination/release until rehabilitation/restoration is achieved.[282] This component recognizes the ongoing value of natural resources to the public and compensates the public for partial or complete loss of trust assets.[283] The third component consists of assessment costs for the previous two components.[284]

Methods for valuing NRDs have been developed in regulations promulgated under CERCLA and OPA.[285] The NRD methodologies under both statutes are voluntary; however, each statute provides trustees with a "rebuttable presumption" that damage assessments done according to the protocol are valid.[286] The Department of the Interior has developed two different models for assessing NRDs under CERCLA. Type A procedures are geared toward "simplified assessments requiring minimal field observation."[287] Type B procedures are appropriate for more complex cases requiring intensive data analysis.[288] The total damages are based on the cost of restoration, rehabilitation, replacement, or acquisition of equivalent resources, and the compensable value of lost services from release until return to baseline.[289] Guidance is provided for determining the baseline for damage to surface water, groundwater, air, geologic, and biological resources.[290]

IV. RECOVERY OF NATURAL RESOURCE DAMAGES TO THE ATMOSPHERIC TRUST

As Part I explains, a massive drawdown of 100 GtC from the atmosphere, along with slashed carbon emissions, remains necessary to restore the climate stability that stands essential to human survival and the endurance of civilization. According to the Hansen team, the drawdown can be accomplished through natural restoration measures consisting of reforestation and soil sequestration.[291] The undertaking requires a global

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282 Israel, *supra* note 232, § 32B.05[5]; *see* ADAM VANN & ROBERT MELTZ, THE 2010 DEEPWATER HORIZON OIL SPILL: NATURAL RESOURCE DAMAGE ASSESSMENT UNDER THE OIL POLLUTION ACT 1 (Cong. Research Serv. ed., 2013) (recognizing NRD award under the Oil Pollution Act for the lost value of resources during recovery); *see* U.S. Envtl. Prot. Agency, *Superfund Natural Resource Damages: A Primer*, http://www.epa.gov/superfund/programs/nrd/primer.htm (last visited Apr. 17, 2015) (recognizing that NRD damages under CERCLA include "compensation for the interim loss of injured resources pending recovery").

283 *See Superfund Natural Resource Damages*, *supra* note 282.

284 *Id.*

285 CERCLA, passed in 1980, assigned the responsibility of promulgating the regulations for assessment to the President, who delegated the task to the Department of the Interior (DOI). 42 U.S.C. § 9615 (2012); *id.* § 9651(c)(1); Exec. Order No. 12,580, 3 C.F.R. 193, 200 (1988); *see also* OPA, 33 U.S.C. § 2706(e)(1) (2012).

286 42 U.S.C. § 9607(f)(2)(C); 33 U.S.C. § 2706(e)(2).

287 42 U.S.C. § 9651(c)(2)(A); *see also* 43 C.F.R. § 11.40(a) (2014).

288 *See* 43 C.F.R. § 11.60; *see* Patrick E. Tolan, Jr., *Natural Resource Damages Under CERCLA: Failures, Lessons Learned, and Alternatives*, 38 N.M. L. REV. 409, 415–16 (2008) (describing Type B regulations).

289 43 C.F.R. § 11.80(b).

290 *Id.* § 11.72.

291 *Climate Prescription*, *supra* note 2, at 10.

atmospheric recovery plan that would identify key projects in areas throughout the world holding the greatest potential for significant carbon drawdown.[292] Such a plan would quantify the carbon drawdown capacity of each project and establish monitoring measures to ensure that the aggregate goals are accomplished.[293] As the plan is implemented, a global carbon accounting must measure progress by quantifying the drawdown achieved. This atmospheric restoration plan, with all of the component projects, requires funding.

The obvious parties to fund such restoration are the very corporations that caused the damage. While there have been many pioneering cases at the forefront of climate litigation, none has yet asserted a claim to recover NRDs to the atmosphere and Earth's climate system. For several years, at least one leading industry lawyer has warned fossil fuel corporations of this potential liability.[294] In a two-part series of articles, Ira Gottlieb explored the viability of climate NRD damage actions and analyzed whether standard insurance policies would provide coverage for such claims.[295] Part I of the series concluded that, as of 2008, the claims were not yet viable for two primary reasons.[296] As a first basis, Mr. Gottlieb correctly observed that the primary NRD recovery statute, CERCLA, did not provide a statutory basis for climate NRD awards.[297] The second basis focused on the difficulty in establishing causation that would link specific emissions of the defendants to specific damage caused by an unstable climate.[298]

However, as the discussion below explains in more detail, neither drawback precludes the NRD claims explored in this Article. As to the first concern, while it is true that CERCLA does not provide for climate NRDs, common law remains a basis for NRDs that fall outside of statutes.[299] Moreover, states, tribes, the federal government, and other nations may pass explicit legislation providing for such damages.[300] As to the second concern, it is important to distinguish *primary* atmospheric and climate system damage from *secondary* climate damage. As noted above, this Article focuses on the former, whereas the difficulties noted by Mr. Gottlieb concerned the latter—collateral losses from climate disruption.[301]

Any conceptual approach for recovering atmospheric NRDs must begin with settled footholds, and from there, judges, legislators, and citizens must

292 *See id.*

293 *See id.*

294 *See generally* Gottlieb, *Part I*, *supra* note 230.

295 *Id.* at 257–58; Ira Gottlieb et al., *Natural Resource Damages for Climate Change—An Idea Whose Time Is Not Yet Come, Part II: Climate Change NRD Claims—Get Coverage*, 21 ENVTL. CLAIMS J. 2, 3–4 (2009) [hereinafter Gottlieb, *Part II*].

296 Gottlieb, *Part I*, *supra* note 230, at 267, 272. Even so, in his second article, Mr. Gottlieb recommended that industries gain coverage for climate liability claims. *See* Gottlieb, *Part II*, *supra* note 295, at 28.

297 Gottlieb, *Part I*, *supra* note 230, at 261, 266.

298 *Id.* at 267.

299 *See infra* Part IV.C.

300 *See infra* Part IV.C.

301 *See* Gottlieb, *Part II*, *supra* note 295, at 5–6 (considering losses from climate change such as dwindling wild populations, increased heat death, beach erosion, and economic impacts).

extend logic-ropes to push the analysis into unprecedented territory. As the above discussion demonstrates, NRDs are well settled, and the elements of NRD claims are straightforward.[302] Moreover, an increasing number of courts recognize the air and atmosphere as a public trust asset.[303] Conceptually, there seems to be no insurmountable logic to preclude recovery of damages to a resource that remains crucial to the survival of humanity. As Gottlieb warned industry groups years ago, climate NRD lawsuits would increasingly appeal to judges as climate consequences intensified and became clearer to the public.[304] By analogy, groundwater NRD cases amounted to the "next frontier" not long ago, but recent key cases have imposed oil producer liability for toxic pollution of public drinking water supplies.[305] Moreover, as other commentators have suggested, courts of nations outside the industrialized world may be most amenable to NRD claims.[306]

But applying the basic concept of NRDs to the global level requires a well-crafted enforcement approach. A logical response to climate crisis would be to allocate international climate responsibility through a carefully devised international treaty scheme. However, such negotiations have repeatedly failed, and time is running out.[307] One basic reason for failure is the lack of domestic will on the part of nations to reduce CO_2 emissions or to fund recovery measures. Another likely reason is the lack of any template for liability. Though the United Nations Framework Convention on Climate Change (UNFCCC) envisions "common but differentiated responsibilities"[308] among nations to protect the climate system, it has proved impossible thus far to translate that broad standard into a set of measurable actions applicable to, and binding on, each sovereign. In this international vacuum, the trust provides a possible construct to allocate sovereign responsibility enforceable in domestic forums.

The discussion below offers a "distributive" legal approach to a global problem based on the trust principle. Global environmental syndromes can be characterized as matters of property law in which a set of discernible

302 *See supra* Part IV.D.

303 *See* James Conca, *Atmospheric Trust Litigation–Can We Sue Ourselves Over Climate Change?*, FORBES, Nov. 23, 2014, http://www.forbes.com/sites/jamesconca/2014/11/23/atmospheric-trust-litigation-can-we-sue-ourselves-over-climate-change/ (last visited Apr. 17, 2015) ("State appellate courts have allowed Atmospheric Trust Litigation lawsuits and administrative petitions brought by students to go forward in New Mexico, Texas, Alaska, Oregon, Colorado, and Pennsylvania.").

304 *See* Gottlieb, *Part I*, *supra* note 230, at 257–58.

305 Israel, *supra* note 232, § 32B.08[1]; *see infra* notes 367–377 and accompanying text for a discussion of groundwater cases.

306 *See, e.g.*, ANDREW GAGE & MICHAEL BYERS, CANADIAN CENTRE FOR POLICY ALTERNATIVES, PAYBACK TIME? WHAT THE INTERNATIONALIZATION OF CLIMATE LITIGATION COULD MEAN FOR CANADIAN OIL AND GAS COMPANIES 8, 9 fig.1 (2014) [hereinafter PAYBACK TIME], *available at* http://wcel.org/sites/default/files/publications/Payback%20Time.pdf.

307 Geoffrey Lean, *How the Lima Climate Change Talks Failed*, TELEGRAPH, Dec. 15, 2014, http://www.telegraph.co.uk/news/earth/11293478/how-the-lima-climate-change-talks-failed.html (last visited Apr. 17, 2015).

308 United Nations Framework Convention on Climate Change art. 3, May 9, 1992, 1771 U.N.T.S. 107, *available at* http://unfccc.int/essential_background/convention/items/6036.php.

rules can promote a common, civilized plan of asset protection—even in a world governed by multiple sovereigns with fragmented jurisdiction over the planet. Packaging problems of planetary ecology in these trust-based property terms enables domestic courts of various nations to summon clear and enforceable fiduciary standards to hold political leaders accountable for common ecological duties.[309] The trust-based model cannot be, of course, a panacea for the world's environmental problems. But as a strategy, it diversifies the legal avenues available to citizens to address grave global problems that so far elude conventional approaches. As Ved Nanda and William Ris observe: "The principles of public trust are such that they can be understood and embraced by most countries of the world."[310]

A. Atmosphere as Trust Res

It is clear that air and atmosphere can be the subject of an NRD claim. Air has been considered a public asset since Roman times.[311] Roman law classified air—along with water, wildlife and the sea—as *res communes*.[312] In a well-cited public trust decision, *Geer v. Connecticut*, the U.S. Supreme Court relied on this ancient Roman classification to find the PTD applicable to wildlife.[313] Just a few years later, the Court explicitly recognized the states' sovereign property interests in air and found such interests supreme to private title. In *Georgia v. Tennessee Copper Co.*,[314] the Court upheld an action brought by the state of Georgia against Tennessee copper companies for discharging noxious gases that drifted across state lines.[315] The Court declared: "[T]he state has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain."[316] Though the Court did not use the word "trust," the decision essentially proclaimed air as the people's sovereign property.

Several judges have recognized air and atmosphere as public trust assets.[317] Numerous constitutions and statutes in the United States have

309 Mary Christina Wood et al., *Securing Planetary Life Sources for Future Generations: Legal Actions Deriving from the Ancient Sovereign Trust Obligation*, *in* THREATENED ISLAND NATIONS: LEGAL IMPLICATIONS OF RISING SEAS AND A CHANGING CLIMATE 531, 534–35 (Michael B. Gerrard & Gregory E. Wannier eds., 2013).

310 Ved P. Nanda & William K. Ris, Jr., *The Public Trust Doctrine: A Viable Approach to International Environmental Protection*, 5 ECOLOGY L.Q. 291, 306 (1976).

311 Geer v. Connecticut, 161 U.S. 519, 525 (1896) (citing Roman law: "These things are those which the jurisconsults called 'res communes' . . . the air, the water which runs in the rivers, the sea and its shores [and] wild animals.").

312 *Id.*

313 *Id.* at 523.

314 206 U.S. 230 (1907).

315 *Id.* at 236–39.

316 *Id.* This passage was cited in Massachusetts v. EPA, 549 U.S. 497, 518–19 (2007).

317 *See, e.g.*, Her Majesty the Queen in Right of the Province of Ontario v. City of Detroit, 874 F.2d 332, 337 (6th Cir. 1989) (citing the Michigan act that codifies the public trust to include "air, water and other natural resources"); Robinson Twp. v. Commonwealth, 83 A.3d 901, 913 (Pa. 2013) (plurality opinion) ("The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment." (quoting

recognized air as part of the *res* of the public's trust.[318] Statutory NRD provisions characteristically include air in the list of resources for which trustees can recover NRDs.[319] Certainly the logic underlying the public trust principle compels recognition of the air as a trust asset. Atmospheric GHG balance carries a magnitude of importance that is difficult to overstate. As one climate analyst noted, a warming of several degrees would amount to "the end of life as we know it on the planet."[320]

But despite the crucial role of air and atmosphere as public trust assets, there has been scant litigation asserting NRDs to these resources. The obvious reason is because air pollution dissipates with the wind.[321] Atmospheric GHG pollution, however, presents a different matter. Concentrations of GHGs build up in the atmosphere in measurable quantities.[322] Indeed, such concentrations are regularly monitored and have been the subject of intense study for many decades.[323] By treating the atmosphere as an integral asset in the *res* of the global trust, legal analysts

PA. CONST. art. I, § 27)); Nat'l Audubon Soc'y v. Superior Court, 658 P.2d 709, 719 (Cal. 1983) (considering "purity of the air" protected by the public trust); Filippone v. Iowa Dep't of Natural Res., No. 12–0444, 2013 WL 988627, at *4 (Iowa Ct. App. Mar. 13, 2013) (Doyle, J., concurring); Bosner-Lain v. Tex. Comm'n on Envtl. Quality, No. D-1-GN-11-002194 (Tex. 201st Jud. Dist. Ct. Travis Cnty. Aug. 2, 2012) (recognizing the atmosphere as a trust asset). Commentators have urged a greater focus on the atmosphere as a trust asset. *See, e.g.*, 1 WILLIAM H. RODGERS, JR., ENVIRONMENTAL LAW: AIR AND WATER § 2.20 (1986) ("It is eminently clear now that trust properties not only can, but must, be administered to protect birdlife and to prevent air and water pollution . . . ."); Sax, *supra* note 89, at 556 ("[T]he judicial techniques developed in public trust cases . . . would be equally applicable and equally appropriate in controversies involving air pollution . . . .").

318 *E.g.*, HAW. CONST. art. XI, § 1 ("[T]he State and its political subdivisions shall conserve and protect Hawaii's . . . natural resources, including land, water, air, minerals and energy resources . . . . All public natural resources are held in trust by the State for the benefit of the people."); LA. CONST. art. IX, § 1 ("The natural resources of the state, including air and water . . . shall be protected . . . ."); PA. CONST. art. I, § 27 (declaring the public trust duty to conserve natural resources, and expressing citizens' right to clean air); R.I. CONST. art. I, §17 (outlining the duty of the legislature to "provide for the conservation of the air," interpreted as codification of Rhode Island's PTD in State v. Bradley, 877 A.2d 601, 606 (R.I. 2005)); OPA, 33 U.S.C. § 2702(b)(2)(A) (2012); CERCLA, 42 U.S.C. § 9607(a)(4)(C) (2012).

319 *See, e.g.*, 33 U.S.C. § 2701(20) (2012); 42 U.S.C. § 9601(16) (2012).

320 Joe Romm, *Is 450 ppm (or Less) Politically Possible? Part 0: The Alternative Is Humanity's Self-Destruction,* CLIMATE PROGRESS, Apr. 26, 2008, http://thinkprogress.org/climate/2008/04/26/202588/is-450-ppm-or-less-politically-possible-part-0-the-alternative-is-humanitys-self-destruction (last visited Apr. 17, 2015).

321 *See* Hodas, *supra* note 246, at 108 ("Because atmospheric damages are diffuse it is hard to assess the costs against the polluter, however, when a tanker spills oil or an industrial concern pollutes an aquifer with toxic chemicals, the damages are more localized and immediately apparent.").

322 *See* U.S. Envtl. Prot. Agency, *Causes of Climate Change,* http://www.epa.gov/climatechange/science/causes.html (last visited Apr. 17, 2015) (explaining that "human activities have contributed substantially to climate change by adding CO_2 and other heat-trapping gases to the atmosphere").

323 *See, e.g.*, U.S. Envtl. Prot. Agency, *National Greenhouse Gas Emissions Data*, http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html (last visited Apr. 17, 2015) (providing a compilation of GHG emissions data going back to 1990).

can discern damage to it not unlike how they would assess damage to water quality from a chemical spill in a lake.

B. Trustees and Beneficiaries

As a general matter, the trustees positioned to sue for NRDs are government agencies charged with environmental protection over the resource that has been damaged.[324] Because the atmosphere is a shared global resource, there is not one trustee, but rather multiple co-trustees. The UNFCCC—entered into in 1992 by most countries of the world and representing almost universal international membership—recognizes nations as co-trustees by stating a common duty to protect the atmosphere for future generations and to prevent "dangerous human interference with the climate system."[325]

Subnational sovereigns—such as states in the United States—are also trustees of the atmosphere.[326] Indeed, in the United States, most of the case law developing the public trust principle arose in the state law context.[327] Most U.S. states have designated trustees acting for the state.[328] Indian tribes are also recognized as trustees of shared natural resources.[329] And finally, U.S. statutory law recognizes the standing of foreign nations to sue in domestic courts for certain NRDs.[330]

At least three incentives may propel sovereign trustees—nations, states, or tribes—to step forward and assert atmospheric NRD claims. First, a growing number of leaders outside the United States recognize the existential threat posed by uncontrollable climate disruption to their people and their nations. In the words of a leader of Maldives—an island nation threatened with territorial obliteration from sea level rise—during the Copenhagen climate conference of 2009: "For us, this is more than just

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324 *See, e.g.*, State v. Gillette, 621 P.2d 764, 766–67 (Wash. Ct. App. 1980) (finding that Washington fisheries agency had authority to pursue damages to salmon habitat).

325 United Nations Framework Convention on Climate Change, *supra* note 308, art. 2, May 9, 1992, S. Treaty Doc. No. 102-38, 1771 U.N.T.S. 107; UN Climate Change Newsroom, *About UNFCCC*, http://newsroom.unfccc.int/about (last visited Apr. 17, 2015).

326 *See* Georgia v. Tenn. Copper Co., 206 U.S. 230, 237 (1907) ("[T]he State has an interest independent of and behind the titles of its citizens, in all the earth and air within its domain.").

327 *See* David L. Callies & J. David Breemer, *Selected Legal and Policy Trends in Takings Law: Background Principles, Custom and Public Trust "Exceptions" and the (Mis)use of Investment-Backed Expectations*, 36 VAL. U. L. REV. 339, 356 (2002) ("[S]tates have the authority to define the limits of the lands held in public trust . . . as they see fit.") (citation omitted).

328 *See, e.g.*, Israel, *supra* note 255.

329 *See* Mary Christina Wood, *Tribal Trustees in Climate Crisis*, 2 AM. INDIAN L. J. 518, 518 (2014) (citing Dep't of Interior v. Klamath Water Users Protective Ass'n, 532 U.S. 1, 11 (2001)), *available at* http://www.law.seattleu.edu/Documents/ailj/Spring%202014/Wood.pdf.

330 *See, e.g.*, OPA, 33 U.S.C. § 2707(b) (2012). Under OPA, for example, a foreign claimant may sue for damages resulting from a qualifying oil discharge as long as the U.S. has an authorizing treaty with the claimant's country or the claimant's country "provides a comparable remedy for United States claimants." *Id.* § 2707(a)(1)(B).

another meeting . . . . This is a matter of life and death."[331] Leaders who understand the consequences of climate disruption will likely also comprehend the imperative of drawing down CO_2 from the atmosphere in order to stabilize the climate system. Moreover, the judges of those nations may perceive their role in a manner different than judges of countries driven by fossil fuel politics—some of whom have dismissed cases believing that courts are not equipped to make such liability determinations absent legislation.[332] As observed in a leading analysis of global climate litigation opportunities:

> [J]udges hearing [new climate-damage] cases will belong to countries, cultures and economies that receive relatively few benefits from fossil fuels while suffering heavy damages caused by climate change. In other words, the social and economic influences on these judges would be significantly different than in Canada or the United States.[333]

Second, some sovereign trustees already dealing with significant climate damage may be intent on pursuing claims against the fossil fuel industry for *secondary* NRDs (harm to wildlife, fisheries, forests, beaches, snow pack, etc.) and for other damages associated with relocation or adaptation.[334] Because, as yet, there is no system in place pinning liability on the fossil fuel corporations for such damages, a litigation strategy seeking recovery of NRDs to the atmosphere could forge important precedent as to producer liability that will pave the way for such other lawsuits against the industry. The first wave of climate lawsuits in the United States brought against the fossil fuel industry was premised on nuisance theory.[335] Thus far, these have failed to yield damages or injunctions against the industry, although they have served an important role by focusing initial public attention on major culpable parties.[336] It is important to create an alternative

331 *Transcript of Voices from Small Island States: Maldives President Mohamed Nasheed, a Tuvaluan Delegate and a Youth Activist from the Solomon Islands*, DEMOCRACY NOW!, Dec. 17, 2009, http://www.democracynow.org/2009/12/17/voices_from_the_island_states_maldives (last visited Apr. 17, 2015).

332 *See* PAYBACK TIME, *supra* note 306, at 14; AEP v. Connecticut, 131 S. Ct. 2527, 2537, 2539–40 (2011).

333 PAYBACK TIME, *supra* note 306, at 14.

334 *See id.* at 5–7 (discussing the possibility of transnational litigation against GHG producers as a result of climate change); *see also* ENVTL. LAW ALLIANCE WORLDWIDE, HOLDING CORPORATIONS ACCOUNTABLE FOR DAMAGING THE ENVIRONMENT 1, 3, (2014) [hereinafter HOLDING CORPORATIONS ACCOUNTABLE], *available at* http://www.elaw.org/system/files/elaw.climate.litigation.report.pdf (discussing prospects for climate litigation around the world generally).

335 Native Vill. of Kivalina v. ExxonMobil Corp., 696 F.3d 849, 855 (9th Cir. 2012) ("[F]ederal common law can apply to transboundary pollution suits. Most often, as in this case, those suits are founded on a theory of public nuisance.").

336 *See, e.g.*, *id.* at 857 (finding displacement of federal common law right of action by the Clean Air Act and that EPA actions authorized by Congress displace remedies); *AEP*, 131 S. Ct. at 2537 (holding that the Clean Air Act "speaks directly" to CO_2 emissions from fossil fuel-fired power plants, thereby displacing any federal common law right to seek abatement); *see also* Thomas Joo, *Global Warming and the Management-Centered Corporation*, 44 WAKE FOREST L. REV. 671, 672, 696–98 (2009) (suggesting that climate nuisance lawsuits, particularly ones that

legal avenue outside of nuisance law for establishing the prospect of liability. Positive case law establishing NRDs as to primary atmospheric damage could lay the groundwork for lawsuits seeking compensation for collateral damage.

A third incentive to pursue atmospheric NRD claims accrues to those nations in which the recovery projects would be located. An atmospheric recovery plan would target "hot spots" around the globe that have promising prospects of significant carbon drawdown through soil sequestration measures or reforestation. Those nations with high-eligibility ecosystems would receive the economic benefit of instituting such projects. Moreover, there are often significant co-benefits associated with such restoration. For example, mangrove restoration projects offer significant ecosystem services such as providing spawning grounds for commercial fisheries, pollution filtration, storm buffers, and erosion control.[337]

C. Fiduciary Authority and Duty to Recover Damages

Ira Gottlieb writes in his two-part series on climate NRDs: "As the effects of climate change are felt, it is a certainty that affected parties will seek redress in the legal system."[338] A recent report quantifying the historic carbon emissions associated with the major fossil fuel corporations provides a key step toward establishing corporate liability for the harm to the atmosphere.[339] Presently, no federal U.S. statute provides a basis for recovering NRDs to the atmosphere from CO_2 emissions. CERCLA, a primary statute that provides for NRDs, only covers releases of "hazardous substances."[340] Thus far, CO_2 has not been listed as such.[341] The other major NRD recovery statute, OPA, covers only discharges of oil into or upon waters or shorelines.[342]

But, as Gottlieb readily admits, "it may only be a matter of time before natural resource trustees file actions for NRD[s] based on climate change effects."[343] Indeed, the pressure to do so will likely intensify as citizens worldwide recognize the imperative of drawing down massive amounts of CO_2 before the climate system passes irrevocable thresholds poised to trigger runaway heating. As the authors of *Payback Time? What the Internationalization of Climate Litigation Could Mean for Canadian Oil and Gas Companies* assert, "rising global damages and the lack of progress of international climate negotiations are spurring even greater interest in . . .

include elements of fraud or moral condemnation, have "the potential to shift public opinion against major carbon-emitting industries, and, by extension their executives").

337 *See* Blue Carbon Initiative, *Blue Carbon*, http://thebluecarboninitiative.org/category/about/blue-carbon (last visited Apr. 17, 2015).

338 Gottlieb, *Part I*, *supra* note 230, at 256.

339 *See* CARBON MAJORS REPORT, *supra* note 18, at 8.

340 CERCLA, 42 U.S.C. § 9607 (2012).

341 *Id.* § 9601(14); *see also* Designation of Hazardous Substances, 40 C.F.R. § 302.4 tbl.302.4 (2014); *Gottlieb,* Part I, *supra* note 230, at 266.

342 33 U.S.C. § 2702(a) (2012).

343 Gottlieb, *Part I*, *supra* note 230, at 257.

climate damages litigation."[344] They conclude, "improvements in climate change science, increasingly visible climate impacts, and changing public conversations have already made climate change damages litigation almost inevitable—in countries around the world."[345] The absence of a clear federal statutory basis for climate NRDs in the United States does not at all foreclose the possibility of recovery. In fact, lawyers are now exploring new avenues of litigation using the laws of countries other than the United States.[346] Two approaches exist for establishing legal liability for such atmospheric NRDs. Both approaches embrace the premise that the trustees positioned to sue are located, in theory, in every country and subnational jurisdiction—including states and native nations in the U.S—in the world.

First, any sovereign trustee may pass new legislation expressly allowing recovery of climate NRDs.[347] While the current political composition of the U.S. Congress makes that legislative body unlikely to do so, other countries may be particularly incentivized to create innovative legislation, as discussed above. Some nations have pioneered new statutory approaches to environmental protection in the last decade. Both Ecuador and Bolivia, for example, amended their constitutions to accord rights to nature.[348]

As a second avenue, trustees may rely on their existing common law or other statutory provisions that implicitly incorporate the PTD. As indicated above in Part III, NRD claims may be based entirely on common law.[349] Further, most states in the U.S. have their own statutory laws allowing recovery of NRDs, and some may be expansive enough to encompass atmospheric damage.[350] Finally, many countries of the world have a public trust principle in their legal system,[351] and ninety-four nations have a constitutional right to a healthy environment.[352] Courts of those nations may interpret such statutory law, constitutional law, or common law as providing an implicit basis for recovering NRDs.[353] In other words, a singular focus on the U.S. legal system would ignore a broad realm of possibility.

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344 PAYBACK TIME, *supra* note 306, at 6.

345 *Id.* at 27.

346 *See id.*

347 *See id.* at 14–15 ("As the impacts of climate change become more costly, and the public discourse on the need for climate compensation grows, governments around the world will come under pressure to enact legislation that clarifies the legal bases for climate change liability. Legislation of this type was enacted in Canada with respect to tobacco liability . . . .").

348 Cole Mellino, *Bolivia and Ecuador Grant Equal Rights to Nature: Is "Wild Law" a Climate Solution?*, CLIMATE PROGRESS, Nov. 21, 2011, http://thinkprogress.org/climate/2011/11/21/373273/bolivia-and-ecuador-equal-rights-to-nature-wild-law-climate-solution/ (last visited Apr. 17, 2015).

349 *See supra* Part III.D.2.a.

350 Gottlieb, *Part I*, *supra* note 230, at 257 n.9 ("State trustees may now already have bases for causes of action under state statutes and common law theories."); *see also* Israel, *supra* note 232, § 32B.12 (providing a state-by-state reference guide to NRD programs in U.S. states).

351 Blumm & Guthrie, *supra* note 9; BLUMM & WOOD, *supra* note 11, at 305–32; *see e.g.*, *supra* note 207.

352 PAYBACK TIME, *supra* note 306, at 9.

353 *See* HOLDING CORPORATIONS ACCOUNTABLE, *supra* note 334 (describing other nations' laws that may have impacts on climate litigation). In 2004, the Supreme Court of Canada issued a landmark decision that, in dicta, indicated with approval the U.S. law allowing the recovery of

D. Liable Parties and Causation

Every single person on Earth pollutes the atmosphere. However, there are large classes of industrial actors that have profited enormously from producing fossil fuels even in spite of clear indication that doing so causes severe damage to the planet's climate system. These polluters are known as the "Carbon Majors," described in a groundbreaking report released in April of 2014 by Richard Heede of Climate Mitigation Services.[354] The research team used public records to correlate global emissions with the fossil fuel supply line.[355] It traced the major producers and their production back through various corporate forms—accounting for mergers and successors—to the time of the Industrial Revolution.[356] The report found that nearly two-thirds of the GHG emissions generated since the beginning of the industrial age could be attributed to just ninety companies, nearly all of which produced oil, gas, or coal—the remainder comprising cement companies.[357] Moreover, nearly 30% of the emissions were traced to just twenty companies.[358] The identified Carbon Majors were headquartered in forty-three different countries, which means that the jurisdictional net remains quite large for purposes of NRD actions and other lawsuits attempting to pin climate liability on producers.[359] Of the more well-known investor-owned large producers, the report found the following associated global emissions: BP, 2.5% of global emissions; Exxon, 3.2%; and Chevron Texaco, 3.5%.[360]

While the Carbon Majors report focused on the actual producers of fossil fuels, another major category of polluters includes coal-fired power plants. The emissions from those plants can be quantified from records detailing electricity generation.[361] Litigation against such emitters has been brought in the United States, though it has encountered procedural barriers such as the displacement and political question doctrines.[362] Litigation seeking funding of an atmospheric recovery plan could target both categories of Carbon Majors. The field of hazardous waste law, while primarily statutory in character, defines several categories of liable parties that play different roles with respect to the same pollution. For example,

NRDs under common law pursuant to a public trust, or parens patriae, theory. British Columbia v. Canadian Forest Products Ltd., [2004] 2 S.C.R. 74, 79–80 (Can.).

354 *See* CARBON MAJORS REPORT, *supra* note 18; Goldenberg, *supra* note 18.

355 CARBON MAJORS REPORT, *supra* note 18, at 9–10.

356 *Id.* at 8. The earliest date traced production back to 1854. *Id.* at 9.

357 *Id.* at 16.

358 Goldenberg, *supra* note 18.

359 *Id.*

360 *Id.*

361 *Id. See also* U.S. ENVTL. PROT. AGENCY, DRAFT INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2013, at 2-13 (Feb. 11, 2015), *available at* http://www.epa.gov/climatechange/pdfs/usinventoryreport/US-GHG-Inventory-2015-Main-Text.pdf (calculating GHG emissions from end-use electricity usage).

362 *See, e.g.*, Native Vill. of Kivalina v. ExxonMobil Corp., 696 F.3d 849, 858 (9th Cir. 2012) (finding federal common law addressing GHG emissions displaced by act of Congress); AEP v. Connecticut, 131 S. Ct. 2527, 2529, 2537 (2011) (noting that the district court dismissed the suit as a political question, but ruling that the claim was displaced).

CERCLA assigns potential liability to both a generator of the hazardous substances and the owner of property upon which those hazardous substances came to be deposited.[363] In the interest of broadening the net of parties to pay for stabilization of the atmosphere, courts may consider both the producer and emitter as liable.

The two categories stand distinct, however, because the causation of atmospheric pollution is one step removed for the producers. Apart from emissions associated with their extraction and production operations, producers are not direct emitters. In CERCLA litigation, for example, manufacturers of chemicals are not usually liable when those chemicals ultimately contaminate the environment in the course of their use.[364] However, that result is closely tied to the actual language of CERCLA, which specifically sets forth categories of liable parties.[365] Common law provides some precedent for holding actual producers responsible for environmental contamination.[366] In the United States, the litigation offering the closest analogy arises from the groundwater pollution context in which cities and states seek to hold producers of the chemical methyl tertiary butyl ether (MTBE) accountable for pollution of groundwater and drinking water supplies.[367] MTBE is an organic chemical compound that, until the mid-2000s, was used as an additive by petroleum companies to reduce the octane level in gasoline.[368] Due to its chemical properties, spilled MTBE spreads easily into groundwater supplies, rendering the water undrinkable.[369]

In two pioneering cases, courts have found ExxonMobil liable as a producer and supplier of MTBE gasoline that contaminated drinking water supplies.[370] In New Hampshire, a jury found the corporation negligent in supplying over 2.7 billion gallons of MTBE gasoline and held it liable for its nearly 30% share of the MTBE market, resulting in an award of $236 million.[371] The City of New York gained a $104 million judgment against

363 CERCLA, 42 U.S.C. § 9607(a)(1)–(4) (2012).

364 *See* Burlington N. & Santa Fe Ry. Co. v. United States, 556 U.S. 599, 610–13 (2009) (refusing to interpret "arranger" for disposal in CERCLA to include the seller of a chemical product that ultimately contaminated a site).

365 42 U.S.C. § 9607(a)(1)–(4).

366 The *Payback Time* report offers several approaches for holding producers accountable. *See* PAYBACK TIME, *supra* note 306, at 20–22.

367 *Id.* at 21.

368 *In re* MTBE Products Liability Litigation, 725 F.3d 65, 80 (2d Cir. 2013).

369 *Id.*

370 *Id.* at 120; Sean McLernon, *Exxon Hit with $236M Verdict in MTBE Water Pollution Case*, LAW360, Apr. 9, 2013, http://www.law360.com/articles/431375/exxon-hit-with-236m-verdict-in-mtbe-water-pollution-case (last visited Apr. 17, 2015).

371 *See* Sher Leff LLP, *Recent Victories and Results*, http://www.sherleff.com/verdicts-settlements.html (last visited Apr. 17, 2015) [hereinafter Sher Leff Victories] (describing the results of the ExxonMobil MTBE case); News Release, N.H. Dep't of Justice, MTBE Jury Verdict (Apr. 9, 2013), *available at* http://www.doj.nh.gov/media-center/press-releases/2013/20130410-exxon-mtbe.htm [hereinafter NH News Release].

ExxonMobil as a "manufacturer, refiner, supplier, or seller of gasoline containing MTBE."[372]

These awards and opinions do not reflect the totality of liability for the groundwater contamination, as plaintiff attorneys have gained large settlements against other producer corporations for MTBE contamination as well.[373] While these cases use a variety of liability theories sounding in tort,[374] they signal a willingness of courts to hold producers responsible for contamination of a vital public resource, and may provide important analysis for use in climate litigation against the Carbon Majors to clean up the atmosphere.

The most extensive discussion of producer liability to date in the groundwater context is the Second Circuit's opinion in *In re MTBE Products Liability Litigation*.[375] In that case, the court affirmed a jury's finding that ExxonMobil was liable for groundwater contamination based on theories of trespass, public nuisance, negligence, and failure to warn.[376] While Exxon argued that its actions as a "'mere refiner and supplier' of gasoline were 'too remote from any actual spills or leaks,'" the court found Exxon liable because the corporation knew that the gasoline it sold would be spilled.[377] Similarly, producers of fossil fuels have certainty that the fuels, if employed as intended for energy use, will be burned and thus add to the load of CO_2 pollution in the atmosphere.

In the CERCLA context, courts have demonstrated an overriding inclination to hold corporate actors accountable to effectuate the remedial cleanup purposes of the statute, despite any arguable unfairness to potential defendants.[378] Courts have developed interstitial federal common law to fill the gaps of CERCLA, which remained silent on the scope and type of

372 In re MTBE Products Liability Litigation, 725 F.3d at 95–96, 117. In a third case arising in New Jersey, a court allowed a common law strict liability claim against Exxon to go forward on a theory of NRD recovery. N.J. Dep't of Envtl. Protection v. Exxon Mobil Corp., 22 A.3d 1, 2 (N.J. Super. Ct. App. Div. 2011).

373 Sher Leff Victories, *supra* note 371 (noting California settlement of $78 million from major oil companies); *see also* NH News Release, *supra* note 371 (noting settlements against petroleum manufacturers for $136 million).

374 *See, e.g.*, In re MTBE Products Liability Litigation, 725 F.3d at 91 (listing tort causes of action on which plaintiff prevailed, including negligence, trespass, public nuisance, and failure to warn).

375 *Id.*

376 *Id.* at 91.

377 *Id.* at 120 (citation omitted).

378 *E.g.*, B.F. Goodrich v. Betkoski, 99 F.3d 505, 514 (2d. Cir. 1996) ("CERCLA is a 'broad remedial statute,' and was enacted with the purpose of '[f]irst, assuring that those responsible for any damage, environmental harm, or injury from chemical poisons bear the costs of their actions.' As a remedial statute, CERCLA should be construed liberally to give effect to its purposes. These include facilitating efficient responses to environmental harm, holding responsible parties liable for the costs of the cleanup, and encouraging settlements that reduce the inefficient expenditure of public funds on lengthy litigation." (citation omitted)); United States v. Ne. Pharm. & Chem. Co., 810 F.2d 726, 733 (8th Cir. 1986) ("Further, the statutory scheme itself is overwhelmingly remedial and retroactive.").

liability.[379] While not directly controlling for common law NRD claims, the approaches developed in the CERCLA context are likely to be influential and persuasive in the atmospheric NRD context, where grave public impacts may well hang in the balance of court decisions. Courts have uniformly imposed strict liability in the CERCLA context for NRDs and cleanup costs resulting from the release of hazardous substances.[380]

As to causation, CERCLA cases reflect a nearly "causation-free" liability scheme developed by courts.[381] The causation hurdle also appears low in cases brought against oil companies in the MTBE groundwater context. In *In re MTBE Products Liability Litigation*, the court applied the New York state law test of tort causation, which holds that "an act or omission is regarded as a legal cause of an injury 'if it was a substantial factor in bringing about the injury.'"[382] The court looked to Exxon's 25% share of the gasoline market to establish that Exxon played a "substantial role" in causing the contamination, holding, "a reasonable jury could conclude that Exxon's conduct as a manufacturer, refiner, supplier, or seller of gasoline containing MTBE was indeed a substantial factor in bringing about the City's injury."[383]

As the *In re MTBE Products Liability Litigation* court noted, the "market share" approach may be invoked not only to establish the "substantial factor" test of causation, but in some other contexts also to provide an exception to the causation requirement altogether: "Where the theory of . . . market-share liability is permitted, a defendant may be held liable absent any showing that it caused or contributed to the plaintiff's injury; instead, a defendant may be presumed liable to the extent of its share of the relevant product market."[384] For example, claims based on market share liability have been allowed in litigation arising from injuries caused by diethylstilbestrol (DES), a drug administered to pregnant women, where the plaintiffs were unable—after the passage of many years between the marketing of the drug and the manifestation of the injuries in the subsequent generation—to

379 *See* United States v. Chem-Dyne Corp., 572 F. Supp. 802, 808–09 (S.D. Ohio 1983) ("In situations where, as here, there is a lack of an express statutory provision selecting state or federal law, the inevitable incompleteness presented by all legislation means that interstitial federal lawmaking is a basic responsibility of the federal courts. . . . Federal statutes dealing with similar subject matter are a prime repository of federal policy on a subject and a starting point for ascertaining federal common law.").

380 *See, e.g.*, New York v. Shore Realty Corp., 759 F.2d 1032, 1042 (2d Cir. 1985) ("Congress intended that responsible parties be held strictly liable . . ."); CRAIG N. JOHNSTON ET AL., LEGAL PROTECTION OF THE ENVIRONMENT 562 (3d ed. 2010) ("[T]he courts have been unanimous in determining that CERCLA imposes strict liability.").

381 *See* JOHNSTON ET AL., *supra* note 380, at 563 (noting that CERCLA liability is "strict and causation-free"); *see also Shore Realty Corp.*, 759 F.2d at 1044 (finding landowner responsible for contamination on property "without regard to causation").

382 In re MTBE Products Liability Litigation, 725 F.3d 65, 116 (2d Cir. 2013) (citation omitted).

383 *Id.* at 116–20 (discussing trespass claim and rejecting "Exxon's argument that its actions as a 'mere refiner and supplier' of gasoline were 'too remote from any actual spills or leaks to be deemed an immediate or inevitable cause of any trespass.'" (citation omitted)).

384 *Id.* at 115.

identify the precise company that had manufactured the product.[385] Courts assessing NRDs to the atmosphere may choose to employ one of these approaches, or variants of them.

Notably, the causation hurdle is much more straightforward in a suit for atmospheric NRDs than for secondary damages resulting from climate disruption. Courts and commentators have pointed out the difficulty of tracing or "fingerprinting" isolated climate harm—such as damage from flooding, fires, droughts, and the like—to emissions caused by any specific defendant.[386] In the case of a lawsuit for *primary* damage to the atmosphere, however, all CO_2 emissions hold the potential to directly and collectively cause the CO_2 concentration in the atmosphere to rise. In theory, all CO_2 released since the inception of the Industrial Revolution has added to the natural baseline of CO_2 in the atmosphere, a level that stood at 280 ppm prior to humanity's development of fossil fuels.[387] A significant share of CO_2 emissions remain in the atmosphere for centuries, even though a portion is also relatively quickly absorbed by terrestrial systems and the ocean;[388] courts, however, need not engage in such hairsplitting analysis. In the CERCLA context, for example, courts have refused to require "fingerprinting" of hazardous substances, that is, tracing the substance definitively from the point of origin to the point of harm.[389]

Where multiple actors contribute to the contamination and the harm is indivisible, courts may impose joint and several liability to hold any one defendant, or subset of defendants, liable for the entire harm.[390] Naturally,

385 *See* Hymowitz v. Eli Lilly & Co., 539 N.E.2d 1069, 1071–72 (N.Y. 1989) (finding a market share theory appropriate "for determining liability and apportioning damages in DES cases").

386 *See, e.g.*, Native Vill. of Kivalina v. ExxonMobil Corp., 663 F. Supp. 2d 863, 880 (N.D. Cal. 2009) (denying plaintiffs standing for failure to meet the causation requirement, because "it is entirely irrelevant whether any defendant 'contributed' to the harm because a discharge, standing alone, is insufficient to establish injury"), *aff'd*, 696 F.3d 849 (9th Cir. 2012); Gottlieb, *Part I, supra* note 230, at 267 ("[T]he causation requirement for damages will be a significant obstacle to successfully pursuing claims for environmental and other harms caused by climate change.").

387 *See supra* note 49 and accompanying text.

388 *See* Nat'l Aeronautics & Space Admin. et al., *supra* note 49 (describing how the land and oceans absorb about half of carbon dioxide emissions, while the "remainder stays in the atmosphere for a century or longer").

389 *See, e.g.*, United States v. Hercules, Inc., 247 F.3d 706, 716 (8th Cir. 2001), *cert. denied sub nom.* CromptonCo./Cie v. United States, 534 U.S. 1065 (2001) ("[O]nce the requisite connection between the defendant and a hazardous waste site has been established (because the defendant fits into one of the four categories of responsible parties), it is enough that response costs resulted from 'a' release or threatened release—not necessarily the defendant's release or threatened release. Thus, the government need not trace or 'fingerprint' a defendant's waste in order to recover under CERCLA.") (citing United States v. Monsanto, 858 F.2d 160, 169–70 (4th Cir. 1988)); New York v. Shore Realty Corp., 759 F.2d 1032, 1044 (2d Cir. 1985) ("[CERCLA] unequivocally imposes strict liability on the current owner of a facility from which there is a release or threat of release, without regard to causation."); United States v. Wade, 577 F. Supp. 1326, 1332 (E.D. Pa. 1983) ("[T]o require a plaintiff under CERCLA to 'fingerprint' wastes is to eviscerate the statute.").

390 *See* In re Acushnet River & New Bedford Harbor Proceedings, 716 F. Supp. 676, 686 (D. Mass. 1989) ("In cases where the natural resource damages are not divisible and the damages or

the liable defendants may sue the other parties for contribution, but the onus of doing so, along with the litigation costs, falls on the liable defendants rather than the government representing the public.[391] The approach can greatly expedite the process of securing funding for a cleanup, because it saves the government from pursuing litigation against all parties and proving their proportionate share of responsibility.[392] In face of climate urgency, this approach would be most expedient.

Courts have imposed joint and several liability in the CERCLA context, even in the face of congressional silence on the matter.[393] The seminal case, *United States v. Chem-Dyne Corp.*, drew upon the common law rule of joint and several liability as expressed in the Restatement (Second) of Torts, section 433A.[394] As that court summarized the rule:

> [W]hen two or more persons acting independently caused a distinct or single harm for which there is a reasonable basis for division according to the contribution of each, each is subject to liability only for the portion of the total harm that he has himself caused. But where two or more persons cause a single and indivisible harm, each is subject to liability for the entire harm. Furthermore, where . . . one or more of the defendants seeks to limit his liability on the ground that the entire harm is capable of apportionment, the burden of apportionment is upon each defendant.[395]

As is obvious from the test, joint and several liability is not always applied to a situation involving multiple actors. If a defendant can prove a "reasonable basis" for apportioning harm, that defendant's liability is limited to the amount of harm attributable to his or her actions. Applying this rule to the climate context, a court could take one of two approaches. One approach would find each defendant corporation responsible for only the amount of emissions attributable to its fossil fuel production, as detailed in the Carbon Majors report.[396] The other approach would view the atmosphere

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the releases that caused the damages continue post-enactment, the sovereigns can recover for such non-divisible damages in their entirety.").

391 *See* CERCLA, 42 U.S.C. § 9613(f)(1) (2012); Mark S. Dennison, *Private Cost Recovery Actions Under CERCLA*, 57 AM. JUR. TRIALS 1, § 21 (1995).

392 *See supra* note 388 and accompanying text.

393 *See* United States v. Chem-Dyne Corp., 572 F. Supp. 802, 808 (S.D. Ohio 1983) (noting application of federal common law to apply "interstitial" rules to fill in gaps of CERCLA and finding joint and several liability rule from common law appropriate in CERCLA context); *see also* JOHNSTON ET AL., *supra* note 380, at 585 (noting CERCLA's silence on the matter of joint and several liability and explaining: "Despite this silence, however, the courts have had little difficulty in determining that CERCLA allows for the imposition of joint and several liability, while not requiring that it be imposed in every case.").

394 *Chem-Dyne Corp.*, 572 F. Supp. at 810; *see also* Burlington N. & Santa Fe Ry. Co. v. United States, 556 U.S. 599, 614 (2009) (finding common law test applicable to CERCLA cleanup).

395 *Chem-Dyne Corp.*, 572 F. Supp. at 810.

396 *See* CARBON MAJORS REPORT, *supra* note 18, at 5 ("This project quantifies and traces for the first time the lion's share of cumulative global CO_2 and methane emissions since the industrial revolution began to the largest multinational and state-owned *producers* of crude oil, natural gas, coal, and cement.").

as a pool resource contaminated with commingled emissions that are impossible to trace back to individual corporate defendants. Under this approach, joint and several liability would apply to hold one or more corporate actors—undoubtedly the deep-pocketed defendants—liable for funding the entire amount of primary atmospheric NRDs. Those liable defendants could pursue contribution actions against other Carbon Majors. Either approach could lead to major settlements.

In sum, with the responsibility of significant Carbon Majors now quantified in terms of the emissions attributable to their production, the legal system offers tools to hold such corporate actors accountable for their damage to the atmosphere. What remains, however, are two policy questions that will undoubtedly influence judges' disposition toward the NRD claims. First, is it fair to hold corporations accountable for atmospheric damage when they were acting within the confines of the law? Second, will damages awards be consistent with good public policy even if they cause the corporations economic hardship?

As to the first question, the CERCLA context, again, is instructive. There, courts have imposed strict and retroactive liability on corporate actors for past conduct on the premise that the fairness to the corporation must be subordinate to the overall fairness to the public.[397] Contamination can cause enormous public harm and personal injury, and someone must pay for the cleanup. Most courts have concluded that it is fairer to impose such costs on the parties that profited from the behavior causing the contamination than to impose such costs on the general public.[398] It is estimated that the top fossil fuel producers have collectively made more than one trillion dollars in profits since just the new millennium.[399] The global costs of private and public property damage from climate change for 2010 alone is estimated to be $591 billion.[400] The costs of climate change will continue to mount dramatically even if emissions are curbed, due to the inertia of the climate system.[401] Commentators have made compelling arguments that the industry, rather than the victims, should pay for this damage.[402] The argument is even more straightforward as to the cost of

397 *See* JOHNSTON ET AL., *supra* note 380, at 564 (listing the various reasons courts have tended to favor strict, causation-free liability despite the apparent unfairness).

398 *See* United States v. Ne. Pharm. & Chem. Co., 810 F.2d 726, 733–34 (8th Cir. 1986) ("Further, the statutory scheme itself is overwhelmingly remedial and retroactive. . . . In order to be effective, CERCLA must reach past conduct. CERCLA's backward-looking focus is confirmed by the legislative history. . . . Cleaning up inactive and abandoned hazardous waste disposal sites is a legitimate legislative purpose, and Congress acted in a rational manner in imposing liability for the cost of cleaning up such sites upon those parties who created and profited from the sites and upon the chemical industry as a whole."); *accord*, Asarco L.L.C. v. Goodwin, 756 F.3d 191, 194 (2d. Cir. 2014).

399 McKibben, *supra* note 19.

400 PAYBACK TIME, *supra* note 306, at 5.

401 *See id.* at 11 (noting that climate change will cost Canada $5 billion annually by 2020 and then rise to $21 billion–$43 billion annually by 2050).

402 *Id.* at 12 ("We should start thinking about cost allocation now because very soon the world is going to start doing so. As the realization sinks in that climate change will cause billions of dollars of harm even if we do everything feasible to cut back on emissions, the

cleaning up the atmosphere itself. While there is yet no firm estimate of the costs of an atmospheric recovery plan, the Carbon Majors are the obvious deep-pocketed funders for the cleanup. There is mounting evidence that the fossil fuel industry has known for decades that the pollution from its sold fuel would critically damage the atmosphere.[403] Courts have generally been disposed toward a broad liability approach in order to effectuate the cleanup purposes of CERCLA.[404] They should adhere to this approach in the context of an atmospheric cleanup designed to restore the planet's energy balance—again, an undertaking conceived by scientists to avoid catastrophic consequences to civilization worldwide.

The second policy concern has to do with the economic fallout that may result from holding fossil fuel producers accountable for primary atmospheric damage. The fossil fuel producers drive the existing industrial economy, and some courts will be reluctant to deliver a blow to their profit scheme. However, from the scientific perspective, retiring the fossil fuel industry is exactly what is needed to salvage a habitable planet. Analysts repeatedly emphasize that, to stabilize the climate system, most remaining fossil fuels must stay in the ground, and society must transition to a zero-carbon economy.[405] Even if the world seeks to limit heating to 2ºC—which some scientists say is still far outside any safe zone[406]—about 80% of existing fossil fuels must remain undeveloped.[407] Given the disaster scenario associated with continued fossil fuel use, the traditional economic arguments favoring the industry no longer hold the force they once did. In fact—and not at all surprisingly in the face of mounting climate disasters worldwide—much of the climate commentary now frontally undermines the very legitimacy of the fossil fuel industry. Author Naomi Klein describes the industry in these terms: "[W]recking the planet is their business model. It's what they do."[408] Author Bill McKibben calls the fossil fuel industry: "Public Enemy Number One," writing, "[t]he numbers are simply staggering—this industry, and this industry alone, holds the power to change the physics and

people who are directly harmed are going to start wondering whether they alone should bear the costs. [Professor] Farber suggests that there are strong arguments in favour of the 'polluter' paying for climate damages.").

403 *See* ORESKES & CONWAY, *supra* note 17, at 169 (noting that the Intergovernmental Panel on Climate Change reported on humans' contributions to climate change as early as 1995).

404 For brief commentary criticizing the approach, see McGuireWoods, *Supreme Court Makes Sense of CERCLA*, http://www.mcguirewoods.com/Client-Resources/Alerts/2009/5/Supreme-Court-Makes-Sense-of-CERCLA.aspx (last visited Apr. 17, 2015) ("CERCLA jurisprudence has long been burdened by a retributive judicial approach abetting EPA's efforts to expand greatly the scope of CERCLA liability in its search for deep pockets to fund remediation.").

405 *See, e.g.*, CLARE PINDER, THE CLIMATE INSTITUTE, BELOW ZERO: CARBON REMOVAL AND THE CLIMATE CHALLENGE (2014), *available at* http://www.climateinstitute.org.au/verve/_resources/BelowZero_March2014.pdf.

406 *See infra* notes 450–451 and accompanying text.

407 McKibben, *supra* note 19; *see also* Sam Bliss, *Leave the Damn Fossil Fuels in the Ground, Says Big Nerdy Study*, GRIST, Jan. 7, 2015, http://grist.org/climate-energy/leave-the-damn-fossil-fuels-in-the-ground-says-big-nerdy-study/ (last visited Apr. 17, 2015).

408 McKibben, *supra* note 19 (quoting Naomi Klein).

chemistry of our planet, and they're planning to use it."[409] A rising global civil society movement, drawing huge street demonstrations across the world, calls for a transition to a fossil fuel-free economy.[410]

In just the past few years, renewable energy has advanced rapidly, providing practical backing for appeals to end the fossil fuel age.[411] Moreover, a broadscale fossil fuel divestment campaign continues to gain momentum. The Rockefeller Foundation has pledged to divest $860 million in assets from fossil fuels, and hundreds of other institutions have committed to divestment as well.[412] A broad campaign of university divestment is underway across the United States.[413] A cloud of legal liability for atmospheric damage gives momentum to a civil society movement now spreading rapidly across the globe to end the fossil fuel economy altogether.

These dramatic turns in public sentiment will not escape judges; they may well enter the judicial calculus of evaluating public policy ramifications of an atmospheric NRD award. If good public policy means protecting civilization as a whole from catastrophic climate change, then a transfer of money from the Carbon Majors to pay for atmospheric cleanup quite simply promotes good public policy—in spite of, and more to the point, *because of*, the economic blow to the industry.

E. Jurisdiction

Because all national, subnational, state, and tribal sovereign co-trustees effectively share a nondivisible global asset, any trustee, in theory, has standing to sue for damage to the atmosphere regardless of where the actual emissions occurred. But regardless of such uniform standing, a court must find jurisdiction over the case. Because climate NRDs are global in nature, the matter of jurisdiction is novel and potentially vexing. Conceivably, nations or subnational governments that pass climate NRD recovery statutes

409 *Id.*

410 *See* Jay Caspian Kang, *The People's Climate March: An Interview with Bill McKibben*, THE NEW YORKER, Sept. 20, 2014, http://www.newyorker.com/tech/elements/peoples-climate-march-interview-bill-mckibben (last visited Apr. 17, 2015). The nonprofit organization, 350.org, has built a global movement calling for the end of fossil fuels to return the atmosphere to 350 ppm. 350.org, *What We Do*, http://350.org/about/what-we-do/ (last visited Apr. 17, 2015).

411 Rebecca Solnit, *Tomgram: Rebecca Solnit, Challenging the Divine Right of Big Energy*, TOMDISPATCH.COM, Dec. 23, 2014, http://www.tomdispatch.com/dialogs/print/?id=175938 (last visited Apr. 17, 2015) ("We need to end the age of fossil fuels . . . . Wind, solar, and other technologies are spreading rapidly with better designs, lower costs, and many extraordinary improvements that are undoubtedly but a taste of what's still to come."); Al Gore, *The Turning Point: New Hope for the Climate*, ROLLING STONE, June 18, 2014, http://www.rollingstone.com/politics/news/the-turning-point-new-hope-for-the-climate-20140618?page=4 (last visited Apr. 17, 2015).

412 *See* John Schwartz, *Rockefellers, Heirs to an Oil Fortune, Will Divest Charity of Fossil Fuels*, N.Y. TIMES, Sept. 21, 2014, http://www.nytimes.com/2014/09/22/us/heirs-to-an-oil-fortune-join-the-divestment-drive.html?_r=0 (last visited Apr. 17, 2015); Adam Vaughan, *Fossil Fuel Divestment: A Brief History*, THE GUARDIAN, Oct. 8, 2014, http://www.theguardian.com/environment/2014/oct/08/fossil-fuel-divestment-a-brief-history (last visited Apr. 17, 2015).

413 Vaughan, *supra* note 412.

can explicitly provide for jurisdiction over classes of producers regardless of where the producers are located in the world. (Such statutes must, of course, observe constitutional requirements). Existing general jurisdiction rules vary tremendously from nation to nation, but typically, jurisdiction arises where the harm is caused.[414] In the case of climate damage, it is possible to envision different approaches to jurisdiction.

The first and most obvious approach is to find jurisdiction in the courts located where the emissions occurred. Courts have jurisdiction when they find a "reasonable and substantial connection" between their jurisdiction and the particular tort that caused the harm.[415] A court would have jurisdiction over a coal-fired power plant operating within its territory, for example. But this is not a satisfactory approach for a liability scheme aimed at producers of the fossil fuels, for such producers do not actually burn the fuels they produce for market. A second approach, therefore, might be to find jurisdiction over the producers at their site of production, on the premise that the production initiated the harm that resulted in deterioration of the atmosphere.[416] A third approach is to find jurisdiction at the place where the actual damage occurs. This is the approach advocated in the *Payback Time* report which concludes, "[i]ncreasingly, we can expect the courts of countries where climate-related damages have occurred to claim jurisdiction over climate damages litigation."[417] In the case of *primary* atmospheric damage, this approach would result in comprehensive jurisdiction in courts worldwide, because the atmosphere spans the globe. Moreover, as the authors of *Payback Time* suggest, a court could reasonably find that the climate harm caused by any one defendant can never be site-specific, as any specific emission is only harmful when combined with aggregate emissions worldwide.[418] In the case of *secondary* climate harm, this approach would vest jurisdiction in courts of those countries where the actual flooding, droughts, fires, or other type of climate damage occurs.

414 *See* PAYBACK TIME, *supra* note 306, at 25 n.67 ("There is a presumption that the courts of the place where a tort (legal wrong) occurred have jurisdiction."). This Article does not delve into U.S.-specific personal jurisdiction questions. For leading cases in the United States, see *World-Wide Volkswagen Corp. v. Woodson*, 444 U.S. 286 (1980), *Int'l Shoe Co. v. Washington*, 326 U.S. 310 (1945), and *Pennoyer v. Neff*, 95 U.S. 714 (1877).

415 *See* PAYBACK TIME, *supra* note 306, at 24.

416 In some pharmaceutical cases, for example, courts have asserted jurisdiction over an out-of-state manufacturer for harm to a citizen who ingested the drug in the state subject to the court's jurisdiction. *See, e.g.*, In re New York Cnty. DES Litigation, 615 N.Y.S.2d 882, 884–86 (1994) (finding proper jurisdiction based on market share liability in New York for suit involving California manufacturer of DES which caused birth defects when ingested by pregnant women in New York).

417 PAYBACK TIME, *supra* note 306, at 24; *id.* at 25 (citing a Canadian Supreme Court case which recognized: "There are situations, of course, notably where an act occurs in one place but the consequences are directly felt elsewhere, when the issue of where the tort takes place itself raises thorny issues. In such a case, it may well be that the *consequences* would be held to constitute the wrong.") (quoting Tolofson v. Jenssen, [1994] 3 S.C.R. 1022, 1050 (Can.) (emphasis added)).

418 *Id.* ("In the case of climate change, it should not be assumed that the tort took place in the location where the emissions were produced, particularly since those emissions only caused actionable damages in conjunction with emissions that originated elsewhere.").

In pursuing *primary* NRDs to the atmosphere—the sole focus of this Article—it is instructive to note at the outset that a court having jurisdiction to determine liability against producers may not be the same court having jurisdiction to enforce the judgment. Those courts situated to enforce the judgment are generally those courts in whose jurisdiction the defendant corporations' assets are located or in which the corporations are based. A well-known process of domestication of judgments, described in Part V below, allows courts to give effect to court orders issued from the tribunals of other countries.

F. Defenses

Generally speaking, statutory claims for NRDs have very few defenses.[419] Such statutory defenses, in any event, would not pose barriers to claims brought under common law.[420] Nevertheless, the two primary federal statutory defenses warrant brief mention. The previously described "federally permitted release" defense provides immunity for damages caused by releases that are allowed by a federal permit.[421] However, as one leading commentator notes, some court cases indicate that the defense may not extend to "releases not expressly covered by the permit, releases that exceeded the limits of the permit, or releases that occurred outside the time period of the permit."[422] Historically emitted GHGs presently in the atmosphere were not subject to any regulation pursuant to federal law and thus fail to come within any permit shield. The other related defense protects against NRD liability for losses that were specified in NEPA or equivalent documents as "irreversible and irretrievable commitment[s]" of natural resources.[423] It is doubtful that past NEPA documents mentioned any climate impacts from fossil fuel development. Interestingly, the provision allows tribes to pursue NRDs despite explicit mention in environmental documents if the federal action—permit or license—allowing the damage was "inconsistent with the fiduciary duty of the United States with respect to such Indian tribe."[424]

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419 The main defenses are iterated in Israel, *supra* note 232, § 32B.04.

420 In fact, in the case of the federally permitted release defense discussed *infra*, CERCLA preserves the ability to pursue NRDs under state common law even if the polluter had a permit shield absolving it from federal liability. *See* CERCLA, 42 U.S.C. § 9607(j) (2012) ("Recovery by any person . . . for response costs or damages resulting from a federally permitted release shall be pursuant to existing law in lieu of this section."); *see also* Idaho v. Bunker Hill Co., 635 F. Supp. 665, 673 (D. Idaho 1986) (interpreting CERCLA: "[R]esort must be made to state common law in order to recover for any damages resulting from permitted releases.").

421 42 U.S.C. § 9601(10).

422 Israel, *supra* note 232, § 32B-04[3] (citing *Bunker Hill*, 635 F. Supp. at 674). In any event, the permit shield provision from statutory law has not been scrutinized for compliance with the legislative trust obligation to protect natural resources. It is altogether unclear how a legislative trustee can immunize, in such wholesale fashion, such damage to the public trust. The question implicates the trust-constitutionality of the statutory provision itself.

423 42 U.S.C. § 9607(f)(1); Israel, *supra* note 232, § 32B-04[4].

424 42 U.S.C. § 9607(f)(1). By the same logic, though not stated in CERCLA, a trustee should be able to pursue NRDs for harm that, while expressly permitted or identified as an irreversible

Because a detailed statutory scheme exists for the recovery of NRDs in certain contexts, such as those involving oil spills and releases of hazardous substances, defendants may claim that such statutes displace common law theories of recovery.[425] The U.S. Supreme Court set forth the governing test for displacement in *American Electric Power Co. v. Connecticut* (*AEP*).[426] As the *AEP* Court noted, "[t]he test for whether congressional legislation excludes the declaration of federal common law is simply whether the statute speaks directly to the question at issue."[427] In that case, states and other plaintiffs brought a federal common law public nuisance claim against major CO_2 emitters seeking injunctive relief forcing them to reduce emissions.[428] The Court found that the Clean Air Act, which authorized the U.S. Environmental Protection Agency (EPA) to regulate CO_2 emissions, displaced the suit.[429] The Court held that displacement occurred despite the fact that EPA had not actually regulated the CO_2 emissions.[430]

While the displacement defense plays a major role in U.S. law, it may not be as prominent, or even present, in the law of some other nations.[431] The fact remains, however, that even in the United States, no statute allows for recovery of atmospheric NRDs, and therefore, no statute displaces such recovery. In the *AEP* case, a regulatory scheme existed under the Clean Air Act to achieve exactly what the plaintiffs sought through injunctive relief—regulation of corporate defendants' emissions.[432] The statute thus spoke directly to the conduct at issue. In the climate context, as previously noted, no statute provides for, or precludes, the recovery of atmospheric NRDs.

One case, *Native Village of Kivalina v. ExxonMobil Corp.* (*Kivalina*),[433] comes closer to the NRD context, but only in the sense that the suit in that case sought monetary damages, rather than injunctive relief, against major

and irretrievable commitment of resources, violated the public trust obligation owed to the general public.

425 *See, e.g.*, Am. Elec. Power Co. v. Connecticut, 131 S. Ct. 2527, 2537 (2011) (holding "that the Clean Air Act and the EPA actions it authorizes displace any federal common law right to seek abatement of carbon-dioxide emissions from fossil-fuel fired power plants"). However, CERCLA, the major statute providing for NRDs, specifically preserves state common law claims for such damages and remedial actions. 42 U.S.C. § 9607(j) ("Nothing in this paragraph shall affect or modify in any way the obligations or liability of any person under any other provision of State or Federal law, including common law, for damages, injury, or loss resulting from a release of any hazardous substance or for removal or remedial action or the costs of removal or remedial action of such hazardous substance.")

426 131 S. Ct. at 2537.

427 *Id.* (internal quotation marks omitted).

428 *Id.* at 2532 (describing the defendants as four private power companies and the federal Tennessee Valley Authority). These five entities are the largest CO_2 emitters in the United States. *Id.* at 2534.

429 *Id.* at 2537.

430 *Id.* at 2538–39.

431 *See* PAYBACK TIME, *supra* note 306, at 55 n.53 (noting that the equivalent doctrine in Canada, the Doctrine of Paramountcy, has been interpreted much more narrowly than its U.S. counterpart).

432 *AEP*, 131 S. Ct. at 2537.

433 696 F.3d 849 (9th Cir. 2012).

fossil fuel corporations.[434] Like the *AEP* case, the plaintiffs in the *Kivalina* suit asserted a common law nuisance claim.[435] The Ninth Circuit panel felt constrained by the Supreme Court's ruling in *AEP* to find that the Clean Air Act displaced the nuisance claim.[436] While the court acknowledged the distinction that *Kivalina* plaintiffs sought damages rather than injunctive relief, which was sought in *AEP*, it held that the "type of remedy asserted is not relevant to the applicability of the doctrine of displacement. . . . [U]nder current Supreme Court jurisprudence, if a cause of action is displaced, displacement is extended to all remedies."[437]

Nevertheless, the court did not suggest that displacement could extend to another, entirely separate, cause of action. Claims for NRDs made pursuant to a PTD obligation stand in stark contrast to nuisance claims. Federal common law defines a public nuisance as an "unreasonable interference with a right common to the general public."[438] The claim is entirely different from a claim made by a public trustee to restore the natural wealth of a public trust asset. The interests of future generations are never captured in a nuisance test, which focuses on present interference with a particular right held by the citizens.[439]

The displacement defense would present an issue if, for example, a state legislature or Congress passed a statute that immunized fossil fuel corporations from NRD liability. But in that event, the analysis must turn to the validity of the legislation itself as measured against trust standards. The very nature of that inquiry suggests the impossibility of a displacement defense in a trust context. As noted earlier, the four corners of legislation cannot answer the question of whether the sovereign, by enacting such legislation, has fully met its fiduciary duty to protect the asset for present and future generations of beneficiaries. No matter how precisely a future NRD scheme may protect defendant polluters, the scheme itself does not "speak[] directly to [the] question" of whether it suffices to meet fundamental fiduciary duties of asset restoration.[440] Thus, the statute itself would be susceptible to challenge on trust grounds. As the Court of Appeals of Arizona stated in underscoring the judicial role in enforcing the PTD, "[t]he check and balance of judicial review provides a level of protection against improvident dissipation of an irreplaceable *res*."[441]

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434 *Id.* at 853.

435 *Id.*

436 *Id.* at 856.

437 *Id.* at 857.

438 *Id.* at 855 (internal quotation marks omitted) (citing the RESTATEMENT (SECOND) OF TORTS § 821B(1) (1979)).

439 *See id.* at 855–56 (setting forth the elements of a federal nuisance claim, with no mention of future interference, but rather that the nuisance must have already "interfered" or be "interfering").

440 *Id.* at 856 (quoting *AEP*, 131 S. Ct. 2527, 2537 (2011)). *But see* State Dep't of Envtl. Prot. v. Jersey Cent. Power & Light Co., 351 A.2d 337 (1976) (holding that federal Atomic Energy Act preempted claims under both *parens patriae* and the public trust. *Id.* at 342.

441 Ariz. Ctr. for Law in the Pub. Interest v. Hassell, 837 P.2d 158, 169 (Ariz. 1991). *See also* Lake Mich. Fed'n v. U.S. Army Corps of Eng'rs, 742 F. Supp. 441 (N.D. Ill. 1990) (stating "[t]he

G. Quantifying the Damages

As part of any NRD recovery strategy, the damage must be quantified so that a sum may be recovered from the defendants and applied to restoration. While it may initially seem daunting to consider how to quantify damage to the atmosphere, the task can be fairly straightforward in the case of *primary* atmospheric NRDs as distinguished from *secondary* NRDs that attempt to quantify the collateral damage to a plethora of natural resources associated with climate disruption. Such secondary NRDs are now ubiquitous worldwide, taking many different forms ranging from lost beaches to vanishing snowpacks, to extinct species. While certainly not impossible to quantify,[442] they are vastly more complicated than assessing the cost of primary atmospheric damage.

One accepted approach to quantifying NRDs is simply to assess the cost of restoring the resource to its "baseline condition."[443] The climate system's "baseline" traces back to the pre-Industrial era, before fossil fuels were introduced as an energy source.[444] Before the Industrial Revolution, the level of atmospheric CO_2 was about 280 ppm; that level had stayed fairly consistent during the Holocene period—the most recent 10,000 years during which human civilization developed.[445] As yet, there is no offered prescription to return the atmosphere to that level of CO_2, presumably because of the apparent impossibility of the task. However, the Hansen team's target of 350 ppm presents a viable surrogate for the historic climate baseline.[446] It offers a recovery path that the scientists regard as feasible in light of the best available science, with the aim of limiting planetary heating to about 1°C, and thus avoiding a "dangerous threshold" of 1.5°C in warming.[447] This constraint is projected to "keep climate close to the Holocene range to which humanity and other species are adapted."[448] An atmospheric restoration goal of 350 ppm CO_2 is deemed necessary to achieve the 1°C limit.[449] Notably, the Hansen team's target of 1°C, and even its dangerous threshold of 1.5°C, differs from the recent international

very purpose of the public trust doctrine is to police the legislature's disposition of public lands").

442 Much work has already been accomplished in the economic area to quantify the value of ecosystem services worldwide. *See* Robert Costanza et al., *Changes in the Global Value of Ecosystem Services*, 26 GLOBAL ENVTL. CHANGE 152, 152–57 (2014), a*vailable at* http://community-wealth.org/sites/clone.community-wealth.org/files/downloads/article-costanza-et-al.pdf.

443 Israel, *supra* note 232, § 32B.07[1].

444 James H. Butler & Stephen A. Montzka, Nat'l Oceanic and Atmospheric Admin., *The NOAA Annual Greenhouse Gas Index (AGGI)*, http://www.esrl.noaa.gov/gmd/aggi/aggi.html (last visited Apr. 17, 2015).

445 *See supra* note 49 and accompanying text (describing the conditions of the Holocene atmosphere maintaining levels of around 280 ppm).

446 *Climate Prescription*, *supra* note 2, at 5.

447 *Id.* at 1–21.

448 *See id.* at 1 (comparing industrial-era limits to larger cumulative emission limits associated with a 2°C increase in global warming).

449 *See id.* at 9, 15, 18 (recommending a target temperature increase close to 1°C and stating that the 350 ppm limit is necessary to stabilize the climate).

consensus goal to limiting global warming to no more than 2ºC above preindustrial levels (correlated with 450 ppm).[450] More recent work by Hansen and his team have shown that 2ºC heating could result in disastrous consequences.[451] In choosing an appropriate baseline, courts would undoubtedly take into account the potential dangers associated with a 2ºC rise in temperature.

Using 350 ppm as the target, the Hansen team's prescription calls for a drawdown of 100 GtC through natural soil and reforestation measures.[452] Thus, primary atmospheric NRDs could be calculated according to the amount necessary to fund an atmospheric recovery plan that would accomplish such 100 GtC drawdown. As noted earlier, one of the most basic approaches to assessing NRDs is simply to price the cost of achieving action measures necessary for restoration.[453] While it is possible to conceive of various other approaches to pricing the cost of climate disruption and the cost of restoring the atmosphere, funding an overall "Atmospheric Recovery Plan" appears the most straightforward and linked to the measures actually necessary to draw down carbon.[454] Part V below discusses the steps of developing an Atmospheric Recovery Plan, pricing it, funding it, and implementing it.

V. ATMOSPHERIC RECOVERY IMPLEMENTATION

To review, litigation aimed to secure the necessary carbon drawdown may be built on the same elements as are other claims seeking to restore public trust natural assets. The relief contemplated here is monetary, namely, that needed to finance the projects that can accomplish the necessary carbon drawdown. Here, 1) a government—nation, state, or sovereign tribe; 2) acting as the trustee; 3) may prosecute; 4) on behalf of intended beneficiaries—present citizens and future generations; 5) those liable parties—fossil fuel companies; 6) for their damage—CO_2 pollution; 7) to a vital trust asset—the atmosphere; and 8) seek money damages sufficient to restore that trust—an atmosphere with CO_2 levels that ensure a relatively stable climate such as that which obtained during the last 10,000 years during which civilization developed.

The structure needed to actually restore the atmosphere utilizing NRD awards does not yet exist. But the funds gained must be put into projects or efforts that actually draw down carbon. The natural steps to this global undertaking are: 1) develop an Atmospheric Recovery Plan; 2) establish and

450 *See* Mark Fischetti, *2-Degree Global Warming Limit Is Called a "Prescription for Disaster"*, SCI. AM., Dec. 6, 2011, http://blogs.scientificamerican.com/observations/2011/12/06/two-degree-global-warming-limit-is-called-a-prescription-for-disaster/ (last visited Apr. 17, 2015).

451 *Climate Prescription*, *supra* note 2, at 21 ("disaster scenario").

452 *Id.* at 10, 18.

453 *See supra* text accompanying note 443.

454 *See also Climate Prescription*, *supra* note 2, at 22 ("If . . . leading nations agree in 2015 to have internal rising fees on carbon with border duties on products from nations without a carbon fee, a foundation would be established for phaseover to carbon free energies and stable climate.").

fund an Atmospheric Recovery Fund to receive NRD monetary judgment payments; 3) bring the litigation to establish defendant liability and enforce atmospheric recovery judgments; 4) establish an Atmospheric Recovery Council—or other supervising and coordinating entity—to identify, prioritize, certify, evaluate, fund, and monitor credible carbon drawdown projects; and 5) establish a centralized litigation information tracking system to compile all judgments and serve as a repository for legal resources.

A. Atmospheric Recovery Plan

An adequate and dynamic global Atmospheric Recovery Plan (Plan) is required both to guide carbon drawdown activities in nations, states, and communities, and to galvanize the international community to concerted action, including securing an adequate funding stream.

The Plan must build on scientific research undertaken in the last twenty years to maximize the carbon sequestering capacity of forests and soils, uncover the potential of bioenergy, and preserve land's central role in providing for food, fiber and ecosystem services. It is a tall order. In the words of the Intergovernmental Panel on Climate Change (IPCC) in 2014, the Agriculture, Forestry, and Other Land Use (AFOLU) sector derives its significant mitigation potential from "both an enhancement of removals of [GHGs], as well as reduction of emissions through management of land and livestock," although "[t]he nature of the sector means that there are potentially many barriers to implementation of available mitigation options."[455]

Enough is known to hazard an outline of the Plan. It will, at minimum, need to identify the highest-yield actions capable of implementation and monitoring over the time period in which the atmospheric drawdown of CO_2 must be accomplished—from the present to 2100. Areas now believed to be of high promise include: 1) forest restoration, reforestation, and improved forest management; 2) cropland practices, including reduced tillage, straw and residue retention, and rewetting peat lands previously drained for agriculture; 3) grassland management, including native revegetation, appropriate stocking densities, and soils restoration; 4) livestock, including improvements in feed and improvements in manure management; and 5) integrated systems, including agroforestry practices that may both increase land productivity and reduce nitrogen inputs—and associated emissions.[456]

455 INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: MITIGATION OF CLIMATE CHANGE: WORKING GROUP III CONTRIBUTION TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE 816 (2014) [hereinafter FIFTH ASSESSMENT REPORT], *available at* http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_full.pdf.

456 *See id.* at 829–31 (discussing the various areas and their respective mitigation potentials, implementation ease, and implementation timescale). Improvements to livestock management are aimed at reducing methane and nitrous oxide emissions. Other projects offer high promise, albeit in limited regions, including halting the destruction of carbon-rich mangrove ecosystems and restoring these ecosystems. *See id.* at 828 (citing a recent study "estimat[ing] that deforestation of mangroves released 0.07 to 0.42 $GtCO_2$/yr").

The goal of the Plan must be to pave the way for a rapid transformation of present land-based sources of CO_2 emissions into net carbon sinks.[457] To implement the Plan and realize its aims, significant scientific expertise is necessary in light of the variability of projects that aim, or claim, to draw down atmospheric carbon. In particular, some such projects may draw down carbon, while some may prove carbon neutral, while others still may do the reverse, depending on numerous factors including location, the existing level of land disturbance, biodiversity and nature conservation requirements, societal and governance questions, and local cultural and economic development constraints. A body with expertise, building upon existing science and reliable information, will need to make distinctions and render authoritative estimates of carbon sequestration potential, related impacts, and costs, so as to secure the overall success of carbon drawdown efforts.[458] In the end, the Plan must produce a strategic and adaptive template geared toward the drawdown element of the climate prescription.

B. Financing the Atmospheric Recovery Fund

Considerable discussion is underway in the international community regarding the compensation of early victims of our disrupted climate through damages litigation against Carbon Majors.[459] To be clear, the object in atmospheric recovery litigation is supplemental and complementary to those efforts. It is also, in a real sense, essential to their interests because, in the absence of atmospheric recovery, persons remaining in highly vulnerable regions—regions that, we must observe, will expand as global warming intensifies—will be devastated again by the next global warming-amplified superstorm, or the one after that. Climate justice, then, requires atmospheric restoration no less than victim compensation.

457 One think tank, for example, estimates the annual carbon sequestration potential for its proposed widespread adoption of "regenerative organic agriculture" practices to be equivalent to total annual global GHG emissions. RODALE INST., REGENERATIVE ORGANIC AGRICULTURE AND CLIMATE CHANGE: A DOWN-TO-EARTH SOLUTION TO GLOBAL WARMING 4 (2014), *available at* http://rodaleinstitute.org/assets/RegenOrgAgricultureAndClimateChange_20140418.pdf.

458 Even forestation projects merit such scrutiny because while, on the whole, ceasing deforestation and enabling reforestation will sequester additional carbon, there is evidence that in northern latitudes afforestation may reduce the winter albedo effect of land-deposited snow and ice. The phenomenon has led at least some scientists to conclude that "projects in the tropics promoting afforestation are likely to slow down global warming, but such projects would offer only little to no climate benefits when implemented in temperate regions and would be counterproductive, from a climate-perspective, at higher latitudes." Govindasamy Bala et al., *Combined Climate and Carbon-Cycle Effects of Large-Scale Deforestation*, 104 PROC. NAT'L ACAD. SCI. 6550, 6550 (2007), *available at* www.pnas.org/content/104/16/6550.full.pdf+html. Our point here is not to disparage all forestry projects in the northern latitudes, but rather to highlight their unsuitability for funding under the mechanisms considered in this Article if, in light of all the factors, they are more likely than not to increase an area's radiative impact.

459 *See* HOLDING CORPORATIONS ACCOUNTABLE, *supra* note 334, at 1 (stating that requiring corporations to "compensate damaged communities would help [*inter alia*] remedy the injustice of climate change," and describing collaborations with "grassroots lawyers in 70 countries").

There are, moreover, significant similarities in these types of cases. Victim compensation and atmospheric recovery claims, for example, both may be directed against the same defendants—major fossil fuel companies, major CO_2 emitters, or both—so that they are both undergirded by the "polluter pays" principle, and both types of cases seek to establish liability in part on the basis of the historical emissions of defendants that may be brought before the court. In addition, litigants contemplating either type of transnational case may confront similar sets of challenges, including obtaining jurisdiction over proposed defendants or in the enforcement of an ensuing judgment.[460]

In a 2014 proposal aimed to avoid or lessen those challenges for climate damage victims, Julie-Anne Richards and Keely Boom of the Australian-based Climate Justice Programme urged a different route, including full-scale financing and use of an international tool known as the Warsaw International Mechanism for Loss and Damage (Warsaw Mechanism).[461] The Warsaw Mechanism was established in November 2013 by the 19th Conference of the Parties (COP) to the UNFCCC.[462] The UNFCCC charged it with "[e]nhancing action and support, including finance, technology and capacity-building, to address loss and damage associated with the adverse effects of climate change."[463] The international community has yet to decide how, or whether, to finance that necessary work. Richards and Boom propose that the Warsaw Mechanism be funded by a levy on Carbon Majors in proportion to their historical and foreseeable planned emissions.[464] These analysts further propose that the Warsaw Mechanism be operated in a fashion similar to international schemes that enable victims of oil spills to bring claims so as to secure compensation for the climate damages they

460 Richards and Boom also observe that early climate victims may have too few resources to prosecute their damages claims. *See* JULIE-ANNE RICHARDS & KEELY BOOM, CARBON MAJORS FUNDING LOSS AND DAMAGE 52 (2d ed. 2014), *available at* http://www.boell.de/sites/default/files/carbon_majors_funding_loss_and_damage_second_edition.pdf ("The loss and damage from climate change is being felt most acutely by the poorest and most vulnerable communities, which have the fewest resources to deal with it."). This may be relieved in the atmospheric recovery context to some degree, where governments, duty-bound to protect the public trust, may be better positioned, in terms of legal resources, to bring claims on behalf of their impacted communities, or on behalf of their entire nation. Problems of causation may also be relieved where a nation brings a claim for damages. *See* PAYBACK TIME, *supra* note 306, at 19 ("[G]overnments . . . seeking to recover the costs of major shifts in weather patterns, or the costs of adapting to climate change, may not need to demonstrate that a single weather event was linked to climate change to succeed.").

461 *See* RICHARDS & BOOM, *supra* note 460, at 11 (introducing the discussion paper as "outlin[ing] the case for fossil fuel producers . . . to provide funding via the Warsaw International Mechanism for Loss and Damage for communities suffering loss and damage from climate change").

462 United Nations Framework Convention on Climate Change, *Warsaw International Mechanism for Loss and Damage*, http://unfccc.int/adaptation/workstreams/loss_and_damage/items/8134.php (last visited Apr. 17, 2015).

463 *Id.*

464 RICHARDS & BOOM, *supra* note 460, at 11.

incurred.[465] The analysts find that the oil compensation programs offer victims a far more direct route to compensation than the alternative, wherein victims otherwise would need to prosecute their claims for compensation through transnational litigation.[466]

Turning to consider the applicability of the Richards and Boom suggestion for atmospheric recovery, we can observe that, in light of its restricted purpose, the Warsaw Mechanism may not be an appropriate instrument to oversee an international funding and assessment program for carbon drawdown. But there may be other, related institutional candidates for that role, including the Global Environment Facility[467] and the Green Climate Fund.[468] Neither of these UNFCCC-related entities focuses exclusively on atmospheric recovery through carbon drawdown, but the mandates governing each encompass both mitigation and adaptation,[469] and so may be broad enough to oversee and finance the projects, given sufficiently available funds.

Furthermore, the closely related UNFCCC program REDD+ designates carbon removal through the "enhancement of forest carbon stocks" among its top five goals.[470] Under REDD+, developing nations are encouraged to develop comprehensive plans with "robust and transparent national forest

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465 *See id.* at 32 (stating that "it is appropriate to consider" existing liability and compensation regimes for pollution damage, such as those for oil spills and nuclear damage).

466 *See id.* at 30, 34 (noting that, "[i]n the absence of a comprehensive loss and damage mechanism," plaintiffs often face a "range of hurdles" in transnational litigation, and describing the use of the oil spill regime as "allowing communities to directly access the International Mechanism for Loss and Damage").

467 The Global Environment Facility is a partnership of 183 nations that serves as the financial mechanism for several international conventions, including the UNFCCC itself. Global Environment Facility, *What Is the GEF*, http://www.thegef.org/gef/whatisgef (last visited Apr. 17, 2015). According to its website, the Global Environment Facility has, since 1991, "provided $13.5 billion in grants and leveraged $65 billion in co-financing for 3,900 projects in more than 165 developing countries. . . . Among the major results of these investments, the [Global Environment Facility] has set up protected areas around the world equal roughly to the area of Brazil; reduced carbon emissions by 2.3 billion tonnes; eliminated the use of ozone depleting substances in Central and Eastern Europe and Central Asia; transformed the management of 33 major river basins and one-third of the world's large marine ecosystems; slowed the advance of desertification in Africa by improving agricultural practices—and all this while contributing to better the livelihood and food security of millions of people." *Id.*

468 According to its website, the Green Climate Fund is "an operating entity of the financial mechanism of the UNFCCC" whose purpose is to channel "new, additional, adequate and predictable financial resources to developing countries" so as to "maximize the impact of its funding for adaptation and mitigation, and seek a balance between the two, while promoting environmental, social, economic and development co-benefits." Green Climate Fund, *Mandate and Governance*, http://www.gcfund.org/about/the-fund.html (last visited Apr. 17, 2015).

469 *See supra* notes 467–468.

470 The others include: reducing emissions from deforestation, reducing emissions from forest degradation, conservation of forest carbon stocks, and sustainable management of forests. U.N. Framework Convention on Climate Change, Cancun, Mex., Nov. 29–Dec. 10, 2010, Report of the Conference of the Parties on Its Sixteenth Session, U.N. Doc. FCCC/CP/2010/7/Add.1, at 12–13 (Mar. 15, 2011), *available at* http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf. For a summary description of REDD and REDD+, see *About REDD+*, *supra* note 84.

monitoring system[s]" to ensure, among other things, the "enhancement of forest carbon stocks."[471] For such purposes, the UNFCCC recently "reaffirmed" its understanding that such "results-based action" requires adequate financing, and reminded developing nations that its Green Climate Fund is supposed to be "channeling financial resources [to them, and otherwise] catalyzing climate finance."[472]

Thirty-two nations have offered at least some limited international funding commitments to these entities.[473] As of December 2014, initial resource commitments from the pledging nations in the Green Climate Fund amounted to $10.2 billion.[474] But, regrettably, though the amount does not seem insignificant on its face, it remains inadequate—even if it were available for the purpose on an annual basis. Moreover, the approach fails to hold accountable the Carbon Majors for the damage they have incurred to the atmosphere. Instead, it asks the nations (the trustees) to foot the bill, which of course means that the taxpayers of these various nations will pay. The logic is opposite to an NRD approach, which assigns liability to the polluters for recovering the damaged asset.[475]

As we have discussed, the Hansen team's scientific prescription for atmospheric recovery requires, in addition to rapid fossil fuel phase-out, a carbon drawdown on the order of 100 gigatons of carbon (GtC) before 2100.[476] The IPCC has estimated that the total theoretical annual mitigation potential from the AFOLU sector to be approximately 3 GtC per year in 2030, assuming resources of approximately $60 billion annually were available to invest in promising projects.[477] The IPCC estimate is consistent with a recent analysis by the U.S. National Academy of Sciences, which has noted that "reforestration, afforestration, and changed management practices . . . have the potential to remove significant but limited amounts of CO_2 from the atmosphere . . . [at a] maximum rate of between 2–5 $GtCO_2$/yr for afforestation and reforestation, with a comparable potential sequestration rate from changed agricultural practices [with] costs for afforestation and reforestation [at] approximately $1–$100/tCO_2."[478] In practice, however, we think it is likely that social, institutional and cultural barriers would lead to a lower level of mitigation–sequestration return on investment.

471 United Nations Framework Convention on Climate Change, Warsaw, Pol., Nov. 11–23, 2013, Report of the Conference of the Parties on Its Nineteenth Session, U.N. Doc. FCCC/CP/2013/10/Add.1, at 31 (Jan. 31, 2014), *available at* http://unfccc.int/resource/docs/2013/cop19/eng/10a01.pdf.

472 *Id.* at 24.

473 GREEN CLIMATE FUND, ATTACHMENT II: REFERENCE EXCHANGE RATES: GREEN CLIMATE FUND INITIAL RESOURCE MOBILIZATION (IRM) 9 (2015), *available at* http://news.gcfund.org/wp-content/uploads/2015/02/pledges_GCF_dec14.pdf.

474 *Id.*

475 *See supra* Part IV.D (discussing NRDs).

476 *Climate Prescription*, *supra* note 2, at 15.

477 FIFTH ASSESSMENT REPORT, *supra* note 455, at 848.

478 NATIONAL ACADEMY OF SCIENCES, CLIMATE INTERVENTION: CARBON DIOXIDE REMOVAL AND RELIABLE SEQUESTRATION 39–40 (2015), *available at* http://www.nap.edu/catalog/18805/climate-intervention-carbon-dioxide-removal-and-reliable-sequestration.

Accordingly, we find it reasonable at this stage to anticipate the sequestration of approximately 1.5 GtC per year from annual investments of approximately $60 billion in appropriately researched and designed carbon-drawdown projects. Based on that estimate, if drawdown at the 1.5 GtC per year rate were to commence no later than 2020 and be maintained, the Hansen team's carbon drawdown goal of 100GtC removal by 2100 could be attained with a decade to spare.

The $60 billion annual global cost estimate is considerable, approximating, for example, the size of the Oregon state budget for the 2013 through 2015 biennium.[479] That price tag, moreover, could climb somewhat in later years, to the extent that first-funded projects pick off the "low-hanging fruit,"[480] or if the international pursuit of fossil fuel phase-out is much further delayed, thus requiring additional sequestration from the AFOLU side of the global CO_2 equation. On the other hand, in the event that technological advances or successful experience enable cost-effective land carbon sequestration to scale, then future costs may be constrained.

On the basis of these considerations, it is abundantly clear that a robust stream of revenue is needed to finance the requisite carbon drawdown. As suggested in this Article, judgments in the form of atmospheric NRDs against deep-pocketed Carbon Majors provide a logical revenue source.[481] That is not to say, however, that such a course precludes other financing strategies. Indeed, annual levies on the Carbon Majors—akin to what Richards and Boom propose to compensate victims—would also be feasible as a supplemental finance source, and more direct than the litigation route. However, thus far, the international forum of nations has not successfully held the Carbon Majors accountable for any such financing, and, given the political pressures attendant to negotiations, the prospect for doing so may not be good. The strategy of litigation pursued by individual sovereign trustees thus remains necessary.

C. Atmospheric Recovery Litigation Partnerships

Earlier portions of this Article discussed a global litigation strategy against the Carbon Majors to secure funding for atmospheric recovery. Part IV of this Article described the framework for atmospheric recovery litigation. Sovereigns, including nations, states in federalist systems, and

479 OREGON LEGISLATIVE FISCAL OFFICE, BUDGET HIGHLIGHTS 2013–15 LEGISLATIVELY ADOPTED BUDGET 1 (2013), *available at* https://www.oregonlegislature.gov/lfo/Documents/2013-15%20Budget%20Highlights.pdf.

480 *See* Gesellschaft für Technische Zusammenarbeit et al., CLIMATE CHANGE FINANCING—FRESH RESOURCES FOR SUSTAINABLE LAND MANAGEMENT OR RE-LABELLING? 20 (2008) [hereinafter CLIMATE CHANGE FINANCING], *available at* http://www.desertifikation.de/fileadmin/user_upload/downloads/Climate_Change_Financing-SLM_SBSTA_2008.pdf (explaining that the private sector has been seeking the low-hanging fruit in the voluntary carbon trading market); FIFTH ASSESSMENT REPORT, *supra* note 455, at 864 (explaining that the current AFOLU projects are marginal from the global perspective).

481 *See supra* Part IV.D (discussing an approach holding one or more deep-pocketed corporate defendants liable for funding of atmospheric NRDs).

tribes are positioned as co-trustees of the shared atmosphere to pursue NRD suits. Many have strong incentives to do so as explained below. But the strategy of distributed (noncentralized) litigation likely requires sovereign trustee partnerships between those positioned to sue Carbon Majors for liability rulings and those positioned to enforce the judgments. Such partnerships can form outside of any UN negotiation. Indeed, partnerships in other areas of climate response are already forming across borders.[482]

1. The Sovereign Advantage

It bears restating that sovereign trustees, rather than citizens, are positioned to sue for NRDs to the atmosphere. Trustees are traditionally vested with the power to sue and recover damages to the trust.[483] While it is not inconceivable that citizens might sue if the trustees fail, citizens confront a raft of barriers to holding major corporations accountable for their environmental contamination and other depredations.[484] These range from a practical disparity in the availability of legal resources[485] to, depending on the nature of the claims, problems of jurisdiction,[486] evidentiary burdens,[487] and the predilection of judges to defer to the presumed expertise of government that may have permitted the complained-of activity or otherwise tolerated it over time.[488]

Sovereigns, as trustees, are duty-bound to protect the natural resources on which their people depend.[489] In virtue of that role, they should be inclined to grasp the opportunity to undertake legal action against companies that bear significant responsibility for spoliation of the atmospheric trust asset—and consequently also for the intensified heat, volatile storms, inexorable rise in the seas, and other climate impacts

482 *See, e.g.*, Michael Wines, *Climate Pact Is Signed by 3 States and a Partner*, N.Y. TIMES, Oct. 29, 2013, http://www.nytimes.com/2013/10/30/us/climate-pact-is-signed-by-3-states-and-a-partner.html?_r=1 (last visited Apr. 17, 2015) (providing one example in which the governors of California, Oregon, and Washington and the premier of British Columbia, Canada announced an alliance to forge a climate compact to combat climate change).

483 Allan Kanner & Mary E. Ziegler, *Understanding and Protecting Natural Resources*, 17 DUKE ENVTL. L. & POL'Y F. 119, 124 (2006).

484 David R. Boyd, *The Constitutional Right to a Healthy Environment*, ENV'T: SCI. & POL'Y FOR SUSTAINABLE DEV., July–Aug. 2012, http://www.environmentmagazine.org/Archives/Back%20Issues/2012/July-August%202012/constitutional-rights-full.html (last visited Apr. 17, 2015) (referring to limited awareness of rights, lack of financial resources or legal assistance, and the distrust of the legal system as some of the barriers to enforcement of a right to a healthy environment).

485 *Id.*

486 *See* PAYBACK TIME, *supra* note 306, at 7–10 (discussing options for plaintiffs to assert jurisdiction for climate change claims).

487 *See id.* at 27 (recognizing that limits on available scientific evidence might inhibit litigation success).

488 *Id.* at 18.

489 Kanner & Ziegler, *supra* note 483, at 124.

eroding the very fabric of their communities.[490] Through its prosecution of atmospheric recovery claims and recovery of NRDs, a sovereign trustee of a nonfossil fuel-dominated nation may gain significant political credit for helping safeguard the citizens and their children.

Apart from that, sovereign trustees may also comprehend that the very same carbon drawdown projects needed for atmospheric recovery may yield a host of co-benefits for their people, ranging from improved and diversified agricultural yield, replenishment of ground and surface freshwater supply, and restored iconic ecosystems and biodiversity, to ancillary benefits deriving from more sustainable local economic development.[491] Even some of the U.S. states that seem unlikely participants in a global litigation strategy against the Carbon Majors may have significant incentives to gain funding for drawdown projects that could be located within their borders. For example, recent research shows potential benefits from regenerative grazing practices.[492] If funded as carbon recovery projects, these initiatives could bring economic life back to ranching communities in states that have thus far been politically reticent to climate action.

2. Enforcement of Judgments

Presuming then, that a sovereign trustee will have brought and successfully prosecuted an atmospheric recovery suit, and thus obtained a judgment as to liability and an order compelling certain defendant Carbon Majors to pay NRDs, there remains the question of whether and how the court's judgment can be enforced. An NRD judgment in favor of a sovereign, when issued by a state or federal court within the United States, is fully enforceable by every other U.S. state or federal court with jurisdiction over the defendant Carbon Major pursuant to the "Full Faith and Credit Clause" of the U.S. Constitution.[493] Where, however, the sovereign trustee secures its NRD judgment in a court of a foreign nation and then seeks to enforce in a

490 *See, e.g.*, Massachusetts v. EPA, 549 U.S. 497, 518–20 (2007) (explaining that certain U.S. states have demonstrated their determination to hold polluters accountable for their damages, even where the federal government has proven itself slow to respond).

491 FOREST CARBON P'SHIP, ESTIMATING THE OPPORTUNITY COSTS OF REDD+: A TRAINING MANUAL 8-2, 8-4, 8-8, 8-22–23 (2012), *available at* https://forestcarbonpartnership.org/sites/forestcarbonpartnership.org/files/Documents/PDF/July2012/OppCostsREDD%20v1.3_Part%2008.pdf.

492 *See* FOOD & AGRIC. ORG. OF THE U.N., CHALLENGES AND OPPORTUNITIES FOR CARBON SEQUESTRATION IN GRASSLAND SYSTEMS 5, 11, 15 (2010), *available at* http://www.fao.org/fileadmin/templates/agphome/documents/climate/AGPC_grassland_webversion_19.pdf; Peter Byck, *Soil Carbon Cowboys*, VIMEO, http://vimeo.com/80518559 (last visited Apr. 17, 2015) (providing a video depiction of carbon storage possibilities associated with regenerative grazing).

493 U.S. CONST. Art. IV, § 1. In the federal context, see 28 U.S.C. § 1963 (2012) (allowing for registration of "[a] judgment in an action for the recovery of money or property entered in any [U.S.] court of appeals [or] district court" and providing that any "judgment so registered shall have the same effect as a judgment of the district court of the district where registered and may be enforced in like manner." In the state context of Oregon, for example, a sister state's judgment will initially be presumed to have been lawfully entered (Oregon Evidence Code 311(k)) and "[o]nce the judgment is registered, it becomes a judgment of the Oregon court and must be treated as an Oregon judgment." Stone v. Stone, 521 P.2d 534, 536 (Or. 1974).

U.S. court, the foreign judgment, while not similarly accorded full faith and credit, nevertheless may be enforced by a state court.[494]

Pursuant to the majority rule,[495] the enforcing state court will first discern if the judgment issued by the original foreign court constituted a "final judgment" in the foreign nation.[496] Assuming that such final judgment status is found—for instance, that the time for appeal has passed—then the enforcing court may recognize the judgment.[497]

An important caveat, however, may pertain where the defendant raises certain objections that may be recognized by the enforcing court, such as that the judgment was rendered "under a judicial system that does not provide impartial tribunals or procedures compatible with due process of law;" or that the original court "did not have jurisdiction over the defendant [or over] the subject matter of the action . . . [or] the judgment was obtained by fraud;" or that "the cause of action on which the judgment was based, or the judgment itself, is repugnant to the public policy of the United States or of the State where recognition is sought."[498] Depending on the asserted objection, and the defendant's proof thereof, the state court either may be required to withhold its recognition of the underlying judgment, or else may have the discretion to do so.[499]

Assuming, however, that the enforcing court recognizes the judgment, then in the majority of states it will enforce the judgment.[500] Again, however, we note that this is a state-by-state determination. Indeed, in some states, a court is bound to withhold enforcement if it determines that the foreign nation might not reciprocally enforce U.S. court judgments.[501] The reciprocity requirement stems from a nineteenth century decision in which the U.S. Supreme Court deemed the enforceability of foreign country judgments to be a matter of the "comity of nations."[502] But the majority view

494 For discussion pertinent to enforcement of such foreign judgments by Canadian courts, see PAYBACK TIME, *supra* note 306, at 28–31. For a brief discussion relevant to such enforcement against Carbon Majors domiciled in the European Union, see HOLDING CORPORATIONS ACCOUNTABLE, *supra* note 334, at 35–37.

495 RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 481 cmt. a (1987).

496 *See id.* § 481(1) ("[A] final judgment of a court of a foreign state . . . is conclusive between the parties, and is entitled to recognition in courts in the United States.").

497 *Id.* Where, however, the enforcing court determines that the time for appeal in the foreign state has not passed, the enforcing state court may be entitled to "stay any proceedings with regard to the foreign-country judgment until the appeal is concluded, the time for appeal expires, or the appellant has had sufficient time to prosecute the appeal and has failed to do so." UNIF. FOREIGN-COUNTRY MONEY JUDGMENTS RECOGNITION ACT § 8 (2005), *available at* http://www.uniformlaws.org/shared/docs/foreign%20country%20money%20judgments%20recognition/ufcmjra_final_05.pdf.

498 RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 482(2)(d) (1987).

499 *Id.* § 482(2)(d) cmt. a.

500 Restatement (Third) of The Foreign Relations Law of the United States § 481, Reporters' Note 1 (1987).

501 *Id.* § 481 cmt. d.

502 Hilton v. Guyot, 159 U.S. 113, 163 (1895) (declining to enforce the judgment of a French court on the ground of lack of reciprocity).

does not now turn on the question of reciprocity, so that most state courts that recognize a final foreign judgment will have the discretion to enforce it.[503]

If the liable defendant subject to an NRD judgment resides not in the United States but in yet another nation external to the original deciding court, then, again, the sovereign trustee seeking to enforce the judgment will need to file for enforcement in a court of that foreign nation in which the defendant is domiciled or has ample assets. In Canada, for example, courts have authority to enforce foreign judgments that are consistent with the Canadian legal system.[504] This is important given that at least five Canadian companies appear on the list of top Carbon Majors.[505]

The upcoming UNFCCC COP climate negotiations, slated for November 20 through December 11, 2015 in Paris, provide an opportunity for various trustees from the Northern and Southern Hemispheres to forge partnerships and strategize an NRD approach to atmospheric recovery litigation. By and large, the northern countries have jurisdiction over the Carbon Majors' assets[506]—and are thus positioned to enforce NRD judgments[507]—while southern nations likely have high potential for robust carbon drawdown projects[508] and the potential for favorable judicial disposition to secure original NRD liability judgments.

Pursuant to the conceptual framework offered in this Article, sovereign trustees would direct litigation judgments to the atmospheric recovery fund described in Part V.B of this Article. This means that courts will have to regard that central financing body, UN affiliated or otherwise, as credible and transparent. An analogy obtains from pollution cases in the United States where courts will often agree to channel settlement money from

503 RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE UNITED STATES § 481 Reporters' n.1 (1987).

504 *See* PAYBACK TIME, *supra* note 306, at 28–29 (describing how enforcement of a final judgment of a foreign court works in the majority of provinces in Canada).

505 *Id.* at 40. In general, venue shopping can be an important strategic component when a party is planning international litigation because of the legal contrasts among states and nations concerning recognition and enforcement of foreign judgments. For an overview of such considerations in the international context, particularly with respect to venues whose constitutions, statutes, or judiciaries may be most amenable to climate-rated claims, see HOLDING CORPORATIONS ACCOUNTABLE, *supra* note 334, at 2–4.

506 *See* U.S. Envtl. Prot. Agency, *Global Greenhouse Gas Emissions Data*, http://www.epa.gov/climatechange/ghgemissions/global.html#four (last visited Apr. 17, 2015) (listing northern countries as the major contributors for GHG emissions).

507 CARBON MAJORS REPORT, *supra* note 18, at 26 (summarizing the top twenty Carbon Majors, which include the U.S. divisions of Chevron, ExxonMobil, ConocoPhillips, Peabody Energy, and Consol Energy, Inc., as well as many European energy companies—demonstrating a concentration of potentially liable parties in the northern countries).

508 *See* MICHAEL I. BROWN, REDEEMING REDD: POLICIES, INCENTIVES AND SOCIAL FEASIBILITY FOR AVOIDED DEFORESTATION 77–80, 83 (2013) (explaining that northern countries, like the United States, tend to push for implementation of projects that address GHGs in southern (developing) countries so that those northern countries need not implement GHG mitigation measures, and thus may maintain the status quo).

citizen suits into environmental projects that will benefit the environment damaged.[509]

D. The Functions of an Atmospheric Recovery Council: Implementation, Administration, Verification, and Tabulation

The next element in this conceptual framework concerns the implementation of the Atmospheric Recovery Plan (Plan). An obvious structure for such implementation would be an agency or entity housed within the UN. Even now, in the absence of a viable funding mechanism, or pending its establishment and endowment, relevant UNFCCC bodies could markedly move the ball down the field by implementing the Plan at the scale allowed by voluntary financial commitments; updating that Plan on the basis of new information; developing appropriate reporting, monitoring and tracking systems; and establishing standards to which third-party agents would adhere for purposes of certifying the integrity of projects. These assessments may be done on a project-by-project basis and, if made broadly available, might encourage additional commitments to the effort. Development of criteria for projects and certification standards would also, as we discuss below, render more feasible the adjudication of claims that may soon arise in transnational atmospheric recovery suits.

Two closely connected bodies with impressively unwieldy names could fulfill these important roles, if so tasked by the UNFCCC. They are: 1) the Subsidiary Body for Scientific and Technological Advice (SBSTA), and 2) the Subsidiary Body for Implementation (SBI).

Among its other duties, the SBSTA undertakes work with respect to "the impacts, vulnerability and adaptation to climate change," as well as "emissions from deforestation and forest degradation in developing countries . . . [and] technical work to improve the guidelines for preparing and reviewing greenhouse gas emission inventories from Annex I Parties."[510] The UNFCCC considers the SBSTA to be, among other things, "the link between the scientific information provided by expert sources such as the IPCC on the one hand, and the policy-oriented needs of the [UNFCCC] COP on the other hand."[511] Its expertise, or access to expertise, would help constrain the uncertainties that may attend multi-factorial evaluations of varying carbon drawdown proposals, as we have discussed above.

For its part, SBI undertakes work in the area of "[l]oss and damage and adaptation finance" and, together with the SBSTA, coordinates support for

509 *See* U.S. Envtl. Prot. Agency, *Supplemental Environmental Projects*, http://www2.epa.gov/enforcement/supplemental-environmental-projects-seps (last visited Apr. 17, 2015). *See generally* Michael Paul Stevens, *Limits on Supplemental Environmental Projects in Consent Agreements to Settle Clean Water Act Citizen Suits*, 10 GA. ST. U. L. REV. 757 (1994).

510 U.N. Framework Convention on Climate Change, *Subsidiary Body for Scientific and Technological Advice (SBSTA)*, http://unfccc.int/bodies/body/6399.php (last visited Apr. 17, 2015).

511 *Id.*

REDD+.[512] Working in conjunction, then, SBSTA and SBI would be well positioned, at minimum, to assist various nations and subnational groups in developing plans to formulate projects that draw down carbon within their borders. Such plans must incorporate the best available science and best estimates of cost. Components of such plans will of necessity vary according to each nation's size, topography, population, latitude, stage of development, degree of deforestation, overgrazing, topsoil loss, and environmental contamination, among other factors.

In the event that the work, as outlined here, is not undertaken by the SBSTA, SBI, or other UNFCCC-affiliated body, it will need to be undertaken by an independent think tank, or else by a university institute with capacity, expertise, and interest in restoring the atmosphere. Such an entity may have advantages over the UN-affiliated bodies in terms of efficiency and autonomy from bureaucratic pressure. The Atmospheric Recovery Council would be tasked with overseeing the funded projects so as to certify project completion, or continuation, and render an accounting of the estimated carbon drawdown. The entity would also keep an overall carbon accounting associated with the aggregate drawdown from the various projects combined. The analogy to this is the certification groups arising with respect to carbon offsets; some are more reputable than others.[513] Again, while this entity might most logically be housed within the panoply of affiliated UNFCCC organizations, bureaucratic barriers must not thwart the important work to be done. Accordingly, after investigation, a public institution associated with a university that has collaborated with the UNFCCC might step in.[514]

Regardless of the level of funding available to the UNFCCC-related bodies or others undertaking the work, it will be important for the atmospheric recovery entity to operate with utmost transparency. This requires, of course, dissemination of findings as to the effectiveness of carbon drawdown project types, as well as the bases for their determinations. This information is essential for courts confronted with atmospheric restoration claims, because the NRD jurisprudence requires that damages recovered by the trustee be spent toward restoration of the damaged asset.[515] Thus, courts must ensure that the sums recovered by the trustee will be put toward projects that will actually achieve carbon drawdown. In so doing, the courts must be able to rely on assessments overseen by the Atmospheric Recovery Council as to the sequestration potential of carbon drawdown projects, along with their estimated costs.

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512 U.N. Framework Convention on Climate Change, *Subsidiary Body for Implementation (SBI)*, http://unfccc.int/bodies/body/6406.php (last visited Apr. 17, 2015).

513 *See, e.g.*, Quirin Schiermeier, *UN Suspends Leading Carbon-Offset Firm*, NATURE, Dec. 9, 2008, http://www.nature.com/news/2008/081209/full/456686a.html (last visited Apr. 17, 2015) (providing an example of a carbon-offset firm that lost its accreditation by the UN).

514 For example, the Numerical Terradynamic Simulation Group based at University of Montana conducts monitoring of the global carbon cycle. *See* Univ. of Mont., *Numerical Terradynamic Simulation Group*, http://www.ntsg.umt.edu/ (last visited Apr. 17, 2015). Universities and think tanks might form partnerships to carry out discrete elements of the Plan.

515 *See supra* note 241 and accompanying text.

E. Litigation Information Tracking System

Finally, an atmospheric recovery litigation information system must materialize so as to enable litigants, as well as potential sovereign trustee litigants and courts, to track the NRD judgments and payments. A basic principle of NRD liability is that there shall be no "double recovery."[516] While defendant corporations will undoubtedly track judgments against them, the broader strategic and settlement processes of trustees will be greatly aided by a centralized tracking system. The system must yield, in essence, a damages award accounting. The effort, in our view, should be housed with a nonprofit institution of unimpeachable credibility that will keep both court judgments and settlement information up-to-date. The repository must be freely and readily available to all so that efforts to consider potentially liable parties are not thwarted by a lack of access to information.

VI. CONCLUSION

As the world plunges toward irrevocable climate thresholds with only a narrow remaining window of opportunity in which to act, leaders and citizens worldwide should focus on the prescription developed by the international team of scientists led by Dr. Hansen to avert calamitous climate change. The prescription entails an ambitious but feasible program of reductions in fossil fuel emissions coupled with an atmospheric carbon drawdown of at least 100 GtC.[517] To be clear, restoring the fundaments of Earth's climate system and safeguarding the life-systems of the planet needed by both present and future generations require success in *both areas*—emissions reduction and atmospheric carbon drawdown.

Atmospheric Trust Litigation is underway across the United States and in other nations to force governments to carry out the carbon reduction called for by the prescription. The stakes in Atmospheric Trust Litigation cases could hardly be more substantial, as scientists warn that continued delay in emissions reduction threatens civilization and the survival of the human species.[518]

The other part of the climate prescription remains equally paramount, though less tied to a specific timeframe. It calls for actions to accomplish

516 *See* Israel, *supra* note 232, § 32B.04[5].

517 *Climate Prescription*, *supra* note 2, at 15.

518 James Hansen, *An Old Story, but Useful Lessons*, http://www.columbia.edu/~jeh1/mailings/2013/20130926_PTRSpaperDiscussion.pdf (last visited Apr. 17, 2015) (As Dr. James Hansen has succinctly described the practical difficulties of human survival in a heated world: "[I]f we should 'succeed' in digging up and burning all fossil fuels, some parts of the planet would become literally uninhabitable, with some time in the year having wet bulb temperature exceeding 35°C. At such temperatures, for reasons of physiology and physics, humans cannot survive . . . it is physically impossible for the environment to carry away the 100 W of metabolic heat that a human body generates when it is at rest. Thus even a person lying quietly naked in hurricane force winds would be unable to survive . . . But it is not an exaggeration to suggest, based on best available scientific evidence, that burning all fossil fuels could result in the planet being not only ice-free but human-free.").

atmospheric drawdown of 100 GtC through soil sequestration, reforestation, and other suitable natural methods. Such initiatives will not suffice where they are undertaken to "offset" a polluters' emissions.[519] As emphasized at the outset of this Article, carbon drawdown must be *additional* to the phase-out of fossil fuel emissions.

This Article concludes that the most straightforward way of accomplishing such drawdown is to develop an Atmospheric Recovery Plan consisting of projects located around the world, designed in the aggregate to lower CO_2 levels by the amount prescribed. The funding for such a Plan should be obtained through NRD actions brought by government trustees—situated, theoretically, anywhere in the world—against the deep-pocketed fossil fuel corporations that are overwhelmingly responsible for creating the present danger.

While, in theory, a centralized NRD recovery approach managed within the existing UN structure would make sense, the UN has achieved little success to date in forcing climate action. In the face of such failure, legal analysts increasingly suggest imposing climate responsibility through distributed litigation that invokes the domestic legal systems dispersed worldwide. This Article offered a conceptual structure in which the development and implementation of an Atmospheric Recovery Plan could be initiated, managed, and supervised either through UN mechanisms or through partnerships and collaborations between trustees and leading nonprofit institutes outside of the UN structure. Funding of such a Plan could be accomplished through lawsuits filed by sovereign trustees against the Carbon Majors claiming NRDs to the atmosphere. Successful liability rulings are most likely to be rendered by courts in countries not dominated by the fossil fuel industry, while judgments could be recovered according to established processes of domestication in courts having jurisdiction over corporate assets.

The upcoming UNFCCC climate negotiation to be held in Paris, France in November 2015 presents an opportunity to form key trustee partnerships at the periphery of the central negotiations. These partnerships should envision a global strategy to develop an Atmospheric Recovery Plan and pursue litigation against deep-pocketed Carbon Majors to fund the Plan. But in order for such atmospheric NRD actions to succeed—as necessary to fund the drawdown projects to stabilize the atmosphere—judges faced with such cases must awaken to their role in what can rightly be thought of as a global rescue. Atmospheric trust cases ask judges to apply well-established public trust principles to the atmosphere in order to address climate exigencies. To properly evaluate the strength of these cases, judges must begin to think beyond the legal frameworks dominated by statutory law, as

519 In the evocative words of Julie-Anne Richards and Keely Boom of the Australian-based Climate Justice Programme, "any attempt to capture the value of intact nature and its *ecosystem services* to turn them into tradable certificates to offset destruction caused in other places or to compensate for any planned future destruction needs to be strongly rejected." RICHARDS & BOOM, *supra* note 460, at 26.

such frameworks have proven ineffective in face of climate urgency and impractical on the global level.

At this eleventh hour, courts should finally recognize that judicial intervention may be the only recourse to break a political stalemate that threatens life, liberty, and civilization itself. As leading climate scientists have declared, judicial relief "may be the best, the last, and, at this late stage, the only real chance to preserve a habitable planet for young people and future generations."[520]

520 Brief of Scientists Amicus Group as Amici Curiae Supporting Plaintiffs–Appellants Seeking Reversal at 25, Alec L. v. McCarthy, 863 F. Supp. 2d 11, 25 (D.C. Cir. 2012) (No. 13-5192), *available at* http://ourchildrenstrust.org/sites/default/files/FiledScienceAmicus.pdf ("Effective action remains possible, but delay in undertaking sharp reductions in emissions will undermine any realistic chance of preserving a habitable climate system, which is needed by future generations no less than by prior generations."); *see also* Brief for Amicus Curiae Dr. James Hansen Supporting Plaintiffs–Appellants at 7, Alec. L. v. Jackson, No. 4:11-cv-02203-EMC, 2011 U.S. Dist. LEXIS 140102 (N.D. Cal. Nov. 14, 2011), *available at* http://ourchildrenstrust.org/sites/default/files/Hansen%20Amicus%20.pdf.