

ARTICLES

WHAT CLIMATE CHANGE CAN DO ABOUT TORT LAW

BY

DOUGLAS A. KYSAR*

To date, scholars exploring the connection between climate change and tort law have tended to ask what the latter can do about the former. With a few notable exceptions, they have answered, "Not much." This Article first reviews a series of doctrinal hurdles facing climate change plaintiffs and concludes that the pessimism of legal scholars is justified. The Article then poses an inverse and previously unexplored question: what can climate change do about tort law? As it turns out, the answer is, "Quite a bit." By forcing courts to confront questions of harm, causation, and responsibility that lie at the frontiers of science and ethics, climate change lawsuits hold potential to move the bar for what counts as exotic in the domain of tort. Radical though it may seem, such a recalibration should be welcomed: just as the administrative state is being forced to adapt to grapple with the global, complex, uncertain, and potentially catastrophic nature of twenty-first century threats to social welfare, the tort system also must shift in order to serve its role as the administrative state's traditional and necessary backdrop. Not only the climate is changing.

* Joseph M. Field '55 Professor of Law, Yale Law School. I am thankful to Lewis & Clark Law School for the opportunity to present the lecture upon which this Article is based as the 2010 Natural Resources Law Institute Distinguished Visitor, and to the students and staff at *Environmental Law* for their outstanding editorial work. I am grateful to Benjamin Ewing and Lindsey Trachtenberg for excellent research assistance and substantive feedback, and to Bruce Ackerman, Deepa Badrinarayana, Michael Gerrard, Ryan Goodman, John Witt, and participants of a faculty workshop at New York University School of Law and the 2010 University of Colorado Law School and Duke University School of Law Climate Change Law and Policy Works-in-Progress Symposium for valuable discussion and comments on earlier drafts.

I.	INTRODUCTION	2
II.	CLIMATE CHANGE AS THE ANTI-TORT	8
	A. <i>Duty/Proximate Cause</i>	10
	B. <i>Breach</i>	20
	C. <i>Causation</i>	29
	D. <i>Harm</i>	42
III.	CLIMATE CHANGE AS TORT REFORM.....	44
	A. <i>Duty/Proximate Cause</i>	48
	B. <i>Breach</i>	58
	C. <i>Causation</i>	62
	D. <i>Harm</i>	65
IV.	CONCLUSION	71

I. INTRODUCTION

Climate change is coming to the common law. Plaintiffs in several cases have pressed tort claims against carefully composed groups of greenhouse gas emitting defendants, seeking monetary damages and injunctive relief to lessen the threat and financial burden of climate change's harmful impacts.¹ Surprisingly, not all of these cases have been dead on arrival. Although malleable and expedient doctrines such as standing, political question, and preemption might be invoked to justify dismissal, at least one climate change tort suit instead was poised to proceed to the merits, at least until the Supreme Court granted review of the Second Circuit Court of Appeals' refusal to dismiss the suit on justiciability grounds.² Depending on the outcome of that appeal, the question of whether greenhouse gas emissions constitute an actionable tort under federal or state law, much discussed in law journals,³ may eventually receive full judicial airing.

¹ See *Native Vill. of Kivalina v. ExxonMobil Corp.*, 663 F. Supp. 2d 863 (N.D. Cal. 2009) (granting defendants' motion to dismiss); *California v. Gen. Motors Corp.*, No. C06-05755 MJJ, 2007 WL 2726871 (N.D. Cal. Sept. 17, 2007) (granting defendants' motion to dismiss); *Comer v. Murphy Oil USA*, No. 1:05-CV-436-LG-RHW, 2007 WL 6942285 (S.D. Miss. Aug. 30, 2007) (granting defendants' motion to dismiss), *rev'd*, 585 F.3d 855 (5th Cir. 2009), *panel opinion vacated en banc*, 607 F.3d 1049 (5th Cir. 2010); *Connecticut v. Am. Elec. Power Co.*, 406 F. Supp. 2d 265 (S.D.N.Y. 2005) (granting defendants' motion to dismiss), *vacated*, 582 F.3d 309 (2d Cir. 2009), *cert. granted*, 79 U.S.L.W. 3342 (U.S. Dec. 6, 2010) (No. 10-174). For discussion of the justiciability aspects of these suits, see Benjamin Ewing & Douglas A. Kysar, *Prods and Pleas: Limited Government in an Era of Unlimited Harm* (2010) (working paper) (on file with author).

² See *Am. Elec. Power Co.*, 406 F. Supp. 2d at 265 (granting defendants' motion to dismiss), *vacated*, 582 F.3d 309, *cert. granted*, 79 U.S.L.W. 3342 (U.S. Dec. 6, 2010) (No. 10-174).

³ See Randall S. Abate, *Automobile Emissions and Climate Change Impacts: Employing Public Nuisance Doctrine as Part of a "Global Warming Solution" in California*, 40 CONN. L. REV. 591 (2008); Myles Allen et al., *Scientific Challenges in the Attribution of Harm to Human Influence on Climate*, 155 U. PA. L. REV. 1353 (2007); David A. Grossman, *Warming Up to a Not-So-Radical Idea: Tort-Based Climate Change Litigation*, 28 COLUM. J. ENVTL. L. 1 (2003); Shi-Ling Hsu, *A Realistic Evaluation of Climate Change Litigation Through the Lens of a Hypothetical Lawsuit*, 79 U. COLO. L. REV. 701 (2008); David Hunter & James Salzman, *Negligence in the Air:*

Assuming that the Supreme Court does not act to prevent climate change tort suits from reaching the merits altogether, courts in all likelihood will agree with commentators that nuisance and other traditional tort theories are overwhelmed by the magnitude and the complexity of the climate change conundrum.⁴ Built as it is on a paradigm of harm in which *A* wrongfully, directly, and exclusively injures *B*, tort law seems fundamentally

The Duty of Care in Climate Change Litigation, 155 U. PA. L. REV. 1741 (2007); Timothy D. Lytton, *Using Tort Litigation to Enhance Regulatory Policy Making: Evaluating Climate-Change Litigation in Light of Lessons from Gun-Industry and Clergy-Sexual-Abuse Lawsuits*, 86 TEX. L. REV. 1837 (2008); Bradford C. Mank, *Standing and Future Generations: Does Massachusetts v. EPA Open Standing for Generations to Come?*, 34 COLUM. J. ENVTL. L. 1 (2009); Bradford C. Mank, *Standing and Global Warming: Is Injury to All Injury to None?*, 35 ENVTL. L. 1 (2005); James R. May, *Climate Change, Constitutional Consignment, and the Political Question Doctrine*, 85 DENV. U. L. REV. 919 (2008); Thomas W. Merrill, *Global Warming as a Public Nuisance*, 30 COLUM. J. ENVTL. L. 293 (2005); Matthew F. Pawa & Benjamin A. Krass, *Global Warming as a Public Nuisance: Connecticut v. American Electric Power*, 16 FORDHAM ENVTL. L. REV. 407 (2005); Christopher R. Reeves, *Climate Change on Trial: Making the Case for Causation*, 32 AM. J. TRIAL ADVOC. 495 (2009); Amelia Thorpe, *Tort-Based Climate Change Litigation and the Political Question Doctrine*, 24 J. LAND USE & ENVTL. L. 79 (2008); Jonathan Zasloff, *The Judicial Carbon Tax: Reconstructing Public Nuisance and Climate Change*, 55 UCLA L. REV. 1827 (2008); Blake R. Bertagna, Comment, *“Standing” Up for the Environment: The Ability of Plaintiffs to Establish Legal Standing to Redress Injuries Caused by Global Warming*, 2006 BYU L. REV. 415 (2006); Erin Casper Borissov, Note, *Global Warming: A Questionable Use of the Political Question Doctrine*, 41 IND. L. REV. 415 (2008); Nigel Cooney, Note, *Without a Leg to Stand on: The Merger of Article III Standing and Merits in Environmental Cases*, 23 WASH. U. J.L. & POL’Y 175 (2007); James R. Drabick, Note, *“Private” Public Nuisance and Climate Change: Working Within, and Around, the Special Injury Rule*, 16 FORDHAM ENVTL. L. REV. 503 (2005); Daniel J. Grimm, Note, *Global Warming and Market Share Liability: A Proposed Model for Allocating Tort Damages Among CO₂ Producers*, 32 COLUM. J. ENVTL. L. 209 (2007); Benjamin P. Harper, Note, *Climate Change Litigation: The Federal Common Law of Interstate Nuisance and Federalism Concerns*, 40 GA. L. REV. 661 (2006); Shawn M. LaTourette, Note, *Global Climate Change: A Political Question?*, 40 RUTGERS L.J. 219 (2008); Kirk B. Maag, Note, *Climate Change Litigation: Drawing Lines to Avoid Strict, Joint, and Several Liability*, 98 GEO. L.J. 185 (2009); Christopher L. Muehlberger, Comment, *One Man’s Conjecture is Another Man’s Concrete: Applying the “Injury-in-Fact” Standing Requirement to Global Warming*, 76 UMKC L. REV. 177 (2007); Sarah Olinger, Comment, *Filling the Void in an Otherwise Occupied Field: Using Federal Common Law to Regulate Carbon Dioxide in the Absence of a Preemptive Statute*, 24 PACE ENVTL. L. REV. 237 (2007); Joseph M. Stancati, Note, *Victims of Climate Change and Their Standing to Sue: Why the Northern District of California Got it Right*, 38 CASE W. RES. J. INT’L L. 687 (2006–2007); Myles R. Allen & Richard Lord, *The Blame Game: Who Will Pay for the Damaging Consequences of Climate Change?*, 432 NATURE 551 (2004); Matthew F. Pawa, *Global Warming: The Ultimate Public Nuisance*, 39 Env’tl. L. Rep. (Env’tl. Law Inst.) 10230 (2009); David A. Dana, *The Mismatch Between Public Nuisance Law and Global Warming* (Nw. U. Pub. L. & Legal Series, Working Paper No. 08-16, L. & Econ., Working Paper No. 08-05, May 6, 2008), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1129838. For an especially early and thoughtful contribution, see Eduardo M. Peñalver, *Acts of God or Toxic Torts? Applying Tort Principles to the Problem of Climate Change*, 38 NAT. RESOURCES J. 563 (1998). For exploration of climate change torts as part of an insightful analysis of efficiency-based and justice-based approaches to global climate change policy, see Amy Sinden, *Allocating the Costs of the Climate Crisis: Efficiency Versus Justice*, 85 WASH. L. REV. 293, 323–39 (2010). For a collection of recent essays exploring the implications of climate change litigation in a variety of contexts both tort and non-tort, see ADJUDICATING CLIMATE CHANGE: STATE, NATIONAL, AND INTERNATIONAL APPROACHES (William C.G. Burns & Hari M. Osofsky eds., 2009).

⁴ Harper, *supra* note 3, at 698.

ill-equipped to address the causes and impacts of climate change: diffuse and disparate in origin, lagged and latticed in effect, anthropogenic greenhouse gas emissions represent the paradigmatic anti-tort, a collective action problem so pervasive and so complicated as to render at once both all of us and none of us responsible. Thus, courts will have ample reason—not to mention doctrinal weaponry—to prevent climate change tort suits from reaching a jury. To be sure, tort law may play a positive role in helping to characterize the harms imposed by climate change, in singling out avenues for efficaciously reducing those harms, and in rattling the cages of the political branches that are best situated to pursue those avenues.⁵ As Professor J.B. Ruhl has emphasized, tort law may also play a significant role in helping to establish standards of foresight and responsibility with respect to climate change adaptation needs.⁶ Beyond such effects, however, tort law is unlikely to play a substantial role in the ultimate effort to reduce greenhouse gas emissions.

But what might climate change suits do for tort law? That is, rather than serving to address the impacts of climate change, might tort law itself be impacted by climate change? This Article answers “yes.” Just as earlier periods of unprecedented injury and loss of life contributed to significant changes in American tort doctrine and practice,⁷ an influx of climate change claims may force a reevaluation of the existing system for compensating and deterring harm. Most significantly, the bar for exoticism in tort may shift as courts are confronted by climate-related claims. Various suits that have frustrated judges because of their scale, scientific complexity, and widespread policy implications—such as claims involving toxic and environmental harm, tobacco and handgun marketing, or slavery and Holocaust reparations—may come to seem less daunting and intractable when juxtaposed against “the mother of all collective action problems.”⁸ Current debate over whether courts are engaging in “regulation through litigation”⁹ may come to appear miscast in the face of suits that raise at once both an ordinary pollution nuisance and a challenge to the very foundations

⁵ See Ewing & Kysar, *supra* note 1, at 6.

⁶ See J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental Law*, 40 ENVTL. L. 363, 401 (2010).

⁷ See generally JOHN FABIAN WITT, *THE ACCIDENTAL REPUBLIC* 4 (2004) (“This book is about the American industrial-accident crisis and the transformations it occasioned in American law. Beginning soon after the Civil War, industrial accidents gave rise to a series of large-scale experiments in social, industrial, and legal reform. Judges and juries developed an entire field of law known as the law of torts.”); LAWRENCE M. FRIEDMAN, *A HISTORY OF AMERICAN LAW* 516–23 (3d ed. 2005) (discussing workers’ compensation and the “liability explosion”).

⁸ Sarah Krakoff, *Fragmentation, Morality, and the Law of Global Warming* 28 (Univ. of Colo. Law Sch., Legal Studies Research Paper Series, Working Paper No. 07-10, 2007), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=976049.

⁹ For critical overviews, see AEI-BROOKINGS JOINT CTR. FOR REGULATORY STUDIES, *REGULATION THROUGH LITIGATION* (W. Kip Viscusi, ed., 2002); ANDREW P. MORRIS, BRUCE YANDLE, & ANDREW DORCHAK, *REGULATION BY LITIGATION* (2009). For the origination of the term, see Robert B. Reich, *Regulation Is Out, Litigation Is In*, USA TODAY, Feb. 11, 1999, at 15A.

of modern industrial life.¹⁰ At long last, courts and commentators may come to view tort claims in degrees of polycentricity, rather than in crude binary terms of conventional civil disputes, on the one hand, and political or regulatory matters, on the other.¹¹

Should these developments occur, they will be salutary, as they will help tort law to continue its role as backdrop and partner to environmental, health, and safety regulation.¹² Gradually and unevenly, the administrative state is evolving in response to the complex, uncertain, and potentially catastrophic nature of twenty-first century threats to social welfare. Problems such as climate change, terrorism, infectious disease outbreaks, and financial market instability resist figuration within conventional regulatory frameworks, not least because their drivers and impacts span the globe and fall under multiple agency mandates. Even garden variety regulatory tasks such as ecosystem management and pharmaceutical regulation increasingly are being seen to require new modes of governance, ones built on an understanding of risk regulation as a continual process of experimentation, monitoring, and adjustment in light of ever-present prospects of unpleasant surprise.¹³ Under this “new governance” framework,¹⁴ regulatory targets are seen to be embedded within intricate

¹⁰ See Eric A. Posner, *Tobacco Regulation or Litigation?*, 70 U. CHI. L. REV. 1141, 1155 (2003) (“Th[e] claim that there is a special class of troubling ‘regulation by litigation’ cases will strike lawyers as odd. Tort law is a form of regulation, and always has been. . . . [O]ne suspects that Viscusi does not understand this basic point.”) (reviewing W. KIP VISCUSI, *SMOKE-FILLED ROOMS: A POSTMORTEM ON THE TOBACCO DEAL* (2002)).

¹¹ Cf. Lon L. Fuller, *The Forms and Limits of Adjudication*, 92 HARV. L. REV. 353, 394–404 (1978) (describing the concept of a “polycentric” task).

¹² See *Connecticut v. Am. Electric Power*, 582 F.3d 309, 325 (2d Cir. 2009) (“[N]uisance principles contribute heavily to the doctrinal template that underbraces [environmental] statutes” (quoting *Me. People’s Alliance & Natural Res. Def. Council v. Mallinckrodt, Inc.*, 471 F.3d 277, 286 (1st Cir. 2006))); WILLIAM H. RODGERS, JR., *HANDBOOK ON ENVIRONMENTAL LAW* § 2.1, at 100 (1977) (“The deepest doctrinal roots of modern environmental law are found in principles of nuisance. . . . Nuisance actions have involved pollution of all physical media—air, water, land—by a wide variety of means. . . . Nuisance actions have challenged virtually every major industrial and municipal activity which is today the subject of comprehensive environmental regulation Nuisance theory and case law is the common law backbone of modern environmental and energy law.”); Matthew F. Pawa & Benjamin A. Krass, *Behind the Curve: The National Media’s Reporting on Global Warming*, 33 B.C. ENVTL. AFF. L. REV. 485, 487–88 (2006) (“Because of its flexibility, common law nuisance continues to play a vital role in complementing statutory environmental enforcement tools”); J.B. Ruhl, *Farms, Their Environmental Harms, and Environmental Law*, 27 *ECOLOGY L.Q.* 263, 315 (2000) (“It has often been said that the statutory form of modern environmental law is built on the backbone of the common law of nuisance.”).

¹³ See Bradley C. Karkkainen, *Adaptive Ecosystem Management and Regulatory Penalty Defaults: Toward a Bounded Pragmatism*, 87 MINN. L. REV. 943, 952 (2003) (noting that new governance principles can be used to approach ecosystem management issues); CATHERINE LYALL, ECON. & SOC. RESEARCH COUNCIL, GENOMICS NETWORK, BRIEFING NO. 9, *GOVERNING GENOMICS: NEW GOVERNANCE TOOLS FOR NEW TECHNOLOGIES?*, at 1–4, available at <http://www.genomicsnetwork.ac.uk/media/Governing%20Genomics.pdf> (noting how new governance is altering the way in which pharmaceutical regulation occurs).

¹⁴ The “new governance” literature is vast. For overviews, see Scott Burris, Michael Kempa, & Clifford Shearing, *Changes in Governance: A Cross-Disciplinary Review of Current Scholarship*, 41 AKRON L. REV. 1 (2008), and Orly Lobel, *The Renew Deal: The Fall of Regulation and the Rise of*

systems that defy precise prediction and control; rapidly evolving, globally interconnected, and wickedly complex, such systems do not yield to straightforward command-and-control regulation or other familiar lawmaking forms.¹⁵ Instead, governance only emerges from the decentralized, overlapping, and continually evolving interventions of public and private actors, each operating at different levels and from different spheres of authority, utilizing a range of policy tools both hard and soft, and representing diverse interests and stakeholder groups. Rather than the hierarchical and near complete authority of the state, power within these systems is widely distributed and decidedly partial. Indeed, even the state itself increasingly is being seen as a complex tissue of actors and networks, rather than a unified or even federally-stratified sovereign.

As regulatory law moves in response to these unprecedented challenges to the promotion of welfare (and new understandings of old challenges), tort law must move along with it in order to continue to serve as the administrative state's necessary backdrop. Given its classical liberal origins and its limited adjudicatory framework, tort law will always lag regulatory law in its embrace of a "systems view" of risk and harm. Nevertheless, the era of climate change will make certain trappings of classical liberalism—such as the presumed atomicity of private actors or the purely mechanistic depiction of causation—increasingly difficult to maintain. Just as railroad and workplace carnage forced recognition of new forms of risk in the latter half of the nineteenth century,¹⁶ just as automobile and product-caused accidents illuminated extended chains of responsibility in the twentieth century,¹⁷ climate change will challenge prevailing conceptions of wrongdoing in the twenty-first century. When even the most dystopian climate change scenario—such as the complete erasure of territorial

Governance in Contemporary Legal Thought, 89 MINN. L. REV. 342 (2004). For helpful applications to climate change, see Richard J. Lazarus, *Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future*, 94 CORNELL L. REV. 1153 (2009), and Kelly Levin et al., *Playing it Forward: Path Dependency, Progressive Incrementalism, and the "Super Wicked" Problem of Global Climate Change* (July 7, 2007) (paper prepared for delivery to the Int'l Studies Ass'n Convention Chicago, Ill., Feb. 28–Mar. 3, 2007), available at [http://environment.yale.edu/uploads/publications/2007levinbernsteincashoreauld Wicked-Problems.pdf](http://environment.yale.edu/uploads/publications/2007levinbernsteincashoreauld%20Wicked-Problems.pdf). For an insightful application to environmental law more generally, see Eric W. Orts, *Reflexive Environmental Law*, 89 NW. U. L. REV. 1227 (1995).

¹⁵ See Michael C. Dorf & Charles F. Sabel, *A Constitution of Democratic Experimentalism*, 98 COLUM. L. REV. 267, 270 (1998) ("[O]ur national affairs are too complex, diverse, and volatile to be governed by lapidary expressions of the public will—laws of Congress, administrative rules, judicial judgments—that indicate precisely how to dispose of most of the cases to which they will eventually be applied.").

¹⁶ Safety Appliance Acts, ch. 196, § 8, 27 Stat. 531, 532 (1893) (codified as amended at 49 U.S.C. § 20304 (2006)). The act imposed liability on railroad carriers for injury or death of workers if the carrier did not meet its statutory obligations; previously, such liability was assumed by the workers. See *Kohn v. McNulta*, 147 U.S. 238, 240–41 (1893).

¹⁷ *E.g.*, *MacPherson v. Buick Motor Co.*, 111 N.E. 1050, 1051, 1053 (N.Y. 1916) (holding that "[i]f the nature of a [car] is such that it is reasonably certain to place and limb in peril when negligently made, it is then a thing of danger," and thus manufacturers are liable for negligence beyond the original owner).

homeland for distinct and long-lived human civilizations,¹⁸ or the rendering of vast swaths of currently inhabited land unsuitable for human existence due to the threat of hyperthermia¹⁹—fails to register as a responsibility of any actor anywhere, our principles of causal and moral attribution need to be rethought. As with earlier periods of societal evolution in response to suffering that is uncompensated, undeterred, and unrationalized, tort law will not be exempt from this necessity of reevaluation. Put bluntly, tort law will be forced to adapt or perish, much like life itself in a warming world.

Part II of this Article provides an overview of challenges facing climate change plaintiffs under prevailing tort doctrines. It begins by noting the odd alignment of legal economists and plaintiffs' lawyers as two groups that both have attempted to squeeze the climate change problem into existing paradigms for understanding and resolving pollution disputes. It then challenges their efforts by detailing a variety of ways in which the problem of climate change causes existing paradigms to buckle and shake. After concluding that climate change tort suits are unlikely to prevail on the merits, Part III turns the lens around to ask what climate change litigation might nonetheless do for tort law itself. It argues that judges, having engaged up close with the extraordinary accumulation of minor, diffuse activities into a global environmental problem of potentially biblical magnitude, may find themselves willing to step farther outside of the classical liberal tort paradigm in non-climate change cases—yet another surprising and dramatic consequence of humanity's most dramatic experiment with the natural world.

¹⁸ Nobuo Mimura et al., *Small Islands*, in INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY 690 (2007) ("Owing to their high vulnerability and low adaptive capacity, small islands have legitimate concerns about their future . . ."); Jon Barnett & W. Neil Adger, *Climate Dangers and Atoll Countries*, 61 CLIMATIC CHANGE 321, 327 (2003) (due to potential impacts of climate change, "the physical basis of national sovereignty of the atoll countries . . . is at risk"). *But see* Arthur P. Webb & Paul S. Kench, *The Dynamic Response of Reef Islands to Sea-Level Rise: Evidence from Multi-Decadal Analysis of Island Change in the Central Pacific*, 72 GLOBAL & PLANETARY CHANGE 234, 245 (2010) (concluding that, to date, there is "no evidence of large-scale reduction in island area" for Pacific atolls "despite the upward trend in sea level").

¹⁹ *See* Steven C. Sherwood & Matthew Huber, *An Adaptability Limit to Climate Change Due to Heat Stress*, 107 PROC. NAT. ACAD. SCI. 9552, 9554 (2010) ("We conclude that a global-mean warming of roughly 7°C would create small zones where metabolic heat dissipation would for the first time become impossible, calling into question their suitability for human habitation. A warming of 11–12°C would expand these zones to encompass most of today's human population."). Influential economic models within climate change policy often assume implausible adaptive capacity by human populations to a warming world, thereby keeping down climate change damage estimates. William Nordhaus's DICE model, for instance, estimates that only one half of world gross domestic product would be lost at a temperature increase of 19°C, an increase far above the human body's capacity to dissipate heat and avoid hyperthermia. *See* Frank Ackerman, Elizabeth A. Stanton & Ramón Bueno, *Fat Tails, Exponents, Extreme Uncertainty: Simulating Catastrophe in DICE*, 69 ECOLOGICAL ECON. 1657, 1660 (2010).

II. CLIMATE CHANGE AS THE ANTI-TORT

Given the connection between legal economic reasoning and tort reform initiatives over the past three decades,²⁰ economists and plaintiffs' lawyers make for unlikely bedfellows. Yet the two groups do come together in their apparent belief that climate change is not a paradigm-shifting phenomenon. To most environmental economists, the fact that anthropogenic greenhouse gas emissions are driving atmospheric and oceanic changes of geologically unprecedented scale does not fundamentally alter their framework for evaluating environmental policy issues. On the conventional economic account, greenhouse gas emissions are just another Pigouvian negative externality,²¹ and the appropriate policy response is simply to "get the incentives right" so that emitters undertake activities with a disciplined awareness of external impacts. Such a policy response might take the form of an emissions tax, which ideally is set equal to the marginal environmental damage caused by a given level of emissions,²² or a cap-and-trade system, which ideally is designed to cap greenhouse gas emissions at the level that balances the benefits and costs of climate change.²³

The problem, however, is that economists have struggled to identify a value metric for measuring cost and benefits that is not parasitic on an implicit continuation of the status quo. For instance, the efficient resolution to a pollution dispute may appear quite different when victims are asked what they are willing to accept in exchange for being harmed than when, as is more typical, they are asked what they are willing (and able) to pay to avoid harm. Continued pollution appears more efficient in part because, as part of the valuation exercise, polluters are assumed to have a baseline right to continue polluting which must be bribed away from them. Likewise, the social welfare analysis of climate change and the identification of an optimal carbon tax may change dramatically when future generations are first endowed with rights over critical resources such as fossil fuels or, relatedly, the atmosphere's ability to withstand greenhouse gas emissions. Even putting aside these fundamental matters of justice, conventional cost-benefit analyses of climate change still typically assume an empirically unrealistic potential for social, economic, and environmental systems to suffer damage without being critically undermined.²⁴ Thus, the calculation of appropriate

²⁰ See JAMES R. HACKNEY, JR., UNDER COVER OF SCIENCE: AMERICAN LEGAL-ECONOMIC THEORY AND THE QUEST FOR OBJECTIVITY 49–57 (2006).

²¹ Robert W. Hahn, *The Impact of Economics on Environmental Policy* 15 (AEI-Brookings Joint Ctr. for Regulatory Studies, Working Paper 99-04, 1999), available at http://www.reg-markets.org/admin/authorpdfs/redirect-safely.php?fname=../pdffiles/WP_99-04v2.pdf.

²² Kenneth P. Green, Steven F. Hayward & Kevin A. Hassett, *Climate Change: Caps vs. Taxes*, ENVTL. POL'Y OUTLOOK, June 2007, at 4, 5, available at http://www.aei.org/docLib/20070601_EPOg.pdf; Hahn, *supra* note 21, at 4.

²³ Lee Lane, *The Green Movement and the Challenge of Climate Change*, ENVTL. POL'Y OUTLOOK, Feb. 2009, at 2, available at <http://www.aei.org/docLib/01-23914%20EEEO%20Lane-g.pdf>.

²⁴ For instance, environmental damage models in a recent water pollution rulemaking assumed that any level of juvenile fish mortality could be inflicted without ever affecting the underlying stock from which new juveniles would emerge in future years. See Douglas A. Kysar,

prices is undertaken in a manner that fails to directly examine the underlying systems that give rise to cost and benefit information; marginalist efficiency analysis is applied to a threat that may impair basic welfare-supporting systems at their core, not merely at their margins.²⁵ Accordingly, an implicit rejection of transformative policies is built into the very exercise that should be asking whether transformative policies are necessary. As critics have noted, such an approach seems driven less by a full and genuine confrontation with the climate change conundrum than by a disciplinary instinct to defend conventional methodologies in the face of that problem.²⁶

Climate change plaintiffs and their lawyers also attempt to depict climate change as a familiar externality problem.²⁷ Frustrated by a lack of greenhouse gas legislation at the federal level, proponents of climate change governance have turned to other venues and strategies, including agency-forcing interpretations of existing federal statutes²⁸ and common law causes of action such as public nuisance.²⁹ Thus, litigants in *Massachusetts v. U.S. Environmental Protection Agency (Massachusetts v. EPA)*³⁰ depicted carbon dioxide (CO₂) as just another Clean Air Act³¹ regulated air pollutant.³² More germane to this Article, plaintiffs in climate change tort suits seek to treat greenhouse gas emissions as just another common law nuisance, the likes of which courts have been adjudicating for centuries.³³ The underlying motive for this normalizing strategy is different from that of economists—“any port in a storm,” as the saying goes—but the resulting conceptual strain is similar: trying to force climate change into traditional common law categories calls into question basic features of tort law itself. At each stage of the traditional tort analysis—duty, breach, causation, and harm—the climate change plaintiff finds herself bumping up against doctrines that are

Fish Tales, in REFORMING REGULATORY IMPACT ANALYSIS 190, 195–97, 204 (Winston Harrington et al., eds. 2009).

²⁵ See Deiter Helm, *Climate-Change Policy: Why Has So Little Been Achieved?*, 24 OXFORD REV. ECON. POL'Y 211, 221–24 (2008).

²⁶ As Herman Daly puts it, “When increasingly vital facts, including the very capacity of the earth to support life, have to be treated as ‘externalities,’ then it is past time to change the basic framework of our thinking so that we can treat these critical issues internally and centrally.” HERMAN E. DALY, BEYOND GROWTH: THE ECONOMICS OF SUSTAINABLE DEVELOPMENT 45 (1996). Likewise, if the foundations of modern economic activity are giving rise to the “greatest example of market failure we have ever seen,” NICHOLAS STERN, THE STERN REVIEW ON THE ECONOMICS OF CLIMATE CHANGE 1 (2007), then the criteria for defining market “success” and “failure” should be interrogated.

²⁷ Jonathan Zasloff intriguingly straddles both economist and plaintiff groups by conceiving of the public nuisance suit as an effective means to institute a “judicial carbon tax.” Zasloff, *supra* note 3, at 1842–43.

²⁸ See *Massachusetts v. U.S. Env'tl. Prot. Agency*, 549 U.S. 497 (2007); Press Release, Earth Justice, Groups Sue to Force EPA Action on California Air Pollution (May 6, 2010), <http://www.earthjustice.org/news/press/2010/groups-sue-to-force-epa-action-on-california-air-pollution> (last visited Feb. 13, 2011).

²⁹ See Zasloff, *supra* note 3, at 1864.

³⁰ 549 U.S. 497 (2007).

³¹ Clean Air Act, 42 U.S.C. §§ 7401–7671q (2006).

³² 549 U.S. at 528–32. Their endeavor was, of course, successful.

³³ See Zasloff, *supra* note 3, at 1828–29.

premised on a classical liberal worldview in which threats such as global climate change simply do not register. And just as environmental economists are faced with a choice between reforming the underlying architecture of their discipline or failing to adequately characterize the climate change problem, courts will be forced to either radically alter existing features of tort law or deem nontortious activities that nevertheless threaten core interests tort law claims to protect. In all likelihood, courts will follow economists in choosing the latter approach.

A. Duty/Proximate Cause

Consider first the related problems of establishing duty and proximate causation. Courts and commentators frequently speak of the former in terms that seem expansive enough to encompass, at least as an initial matter, activities that contribute substantially to anthropogenic climate change:

[i]t is well settled that every person owes a duty of ordinary care to all others to guard against injuries which naturally flow as a reasonably probable and foreseeable consequence of an act, and such a duty does not depend upon contract, privity of interest or the proximity of relationship, but extends to remote and unknown persons.³⁴

On this account, the primary focus of the duty analysis is simply whether and when scientific evidence of the harmful effects of anthropogenic greenhouse gas emissions developed to the point that a duty arose to guard against those effects through ordinary care, however “remote and unknown” the ultimate victims might be.

Writers who have evaluated that question typically conclude that a duty attached around the time of the signing and entering into force of the United Nations Framework Convention on Climate Change (UNFCCC).³⁵ Eventually adopted by 193 nations,³⁶ the UNFCCC states unequivocally that “human activities have been substantially increasing the atmospheric concentrations of greenhouse gases (GHG), that these increases enhance the natural greenhouse effect, and that this will result on average in an additional warming of the Earth’s surface and atmosphere and may adversely affect

³⁴ W. Jonathan Cardi & Michael D. Green, *Duty Wars*, 81 S. CAL. L. REV. 671, 671 n.1 (2008) (alteration in original) (quoting *Widlowski v. Durkee Foods, Div. of SCM Corp.*, 562 N.E.2d 967, 968 (Ill. 1990)).

³⁵ See, e.g., Benito Müller, Niklas Höhne & Christian Ellerman, *Differentiating (Historic) Responsibilities for Climate Change*, 9 CLIMATE POL’Y 593, 595 (2009); Zasloff, *supra* note 3, at 1841 n.63. But see Eric A. Posner & Cass R. Sunstein, *Global Warming and Social Justice*, REGULATION, Spring 2008, at 14, 19, available at <http://www.cato.org/pubs/regulation/regv31n1/v31n1-3.pdf> (positing a later date on the unsubstantiated claim that scientific consensus regarding climate change emerged “only recently”).

³⁶ U.N. Framework Convention on Climate Change, *Status of Ratification of the Convention*, http://unfccc.int/essential_background/convention/status_of_ratification/items/2631.php (last visited Feb. 13, 2011). “Currently, there are 194 Parties (193 States and 1 regional economic integration organization) to the United Nations Framework Convention on Climate Change.” *Id.*

natural ecosystems and humankind.”³⁷ The agreement further identifies its “ultimate objective” as the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”³⁸ Thus, taking the UNFCCC as a reliable indicator of when harmful consequences of greenhouse gas emissions became “reasonably probable and foreseeable,” it might seem that a duty of ordinary care to avoid climate-induced harms arose sometime around 1992.³⁹

Fleshing out the contours of such a duty can appear surprisingly simple. Scientists believe that the planet can tolerate a certain level of annual greenhouse gas emissions without entertaining risks of drastic disruption to life-supporting systems.⁴⁰ Oceans, forests, and other parts of the carbon cycle constitute something of a natural buffer, absorbing anthropogenic GHGs and potentially containing atmospheric warming below levels that would risk critical breakdowns in environmental and social systems (often taken to be 1.5°–2°C above pre-industrial temperatures).⁴¹ The German Advisory Council on Global Change has utilized this “guard rail” approach to estimate the total amount of greenhouse gases that can be emitted by humans between now and 2050 while still ensuring a sixty-seven percent chance of limiting the global mean temperature increase to 2°C.⁴² Divided equally among the world’s people, this amount allows for an annual budget of roughly 2.7 tons of CO₂ equivalent emissions per capita through 2050, falling to one ton per capita in steady state thereafter.⁴³ The duty of reasonable care in respect of greenhouse gas emissions would thus be fixed according to these guidelines and anyone emitting above their annual equitable allocation would be considered in breach.

To put the guidelines in perspective, consider the following activities, each of which in the United States would consume approximately one ton from an individual’s annual emissions budget: driving a standard passenger vehicle for ten weeks,⁴⁴ consuming household energy in an average single-

³⁷ U.N. Framework Convention on Climate Change, May 9, 1992, 1771 U.N.T.S. 107, 31 I.L.M. 849, 851 (1992).

³⁸ *Id.* at 854.

³⁹ This view is buttressed by comparing two pieces of U.S. legislation, the National Climate Program Act of 1978, 15 U.S.C. § 2902 (2006), which was almost entirely related to scientific research in pursuit of a better understanding of climate change and its possible impacts, and the U.S. Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776, which specifies a goal of “stabilization and eventual reduction in the generation of greenhouse gases.” 42 U.S.C. § 13382(a)(2). On the other hand, if one takes expert views, rather than congressional (in)action, as the key domestic indicator, the pertinent moment of concern may be much earlier, as noted *infra* text accompanying notes 277–78.

⁴⁰ GERMAN ADVISORY COUNCIL ON GLOBAL CHANGE (WBGU), SOLVING THE CLIMATE DILEMMA: THE BUDGET APPROACH 12 (2009), available at http://www.wbgu.de/fileadmin/templates/dateien/veroeffentlichungen/sondergutachten/sn2009/wbgu_sn2009_en.pdf.

⁴¹ *Id.* at 13.

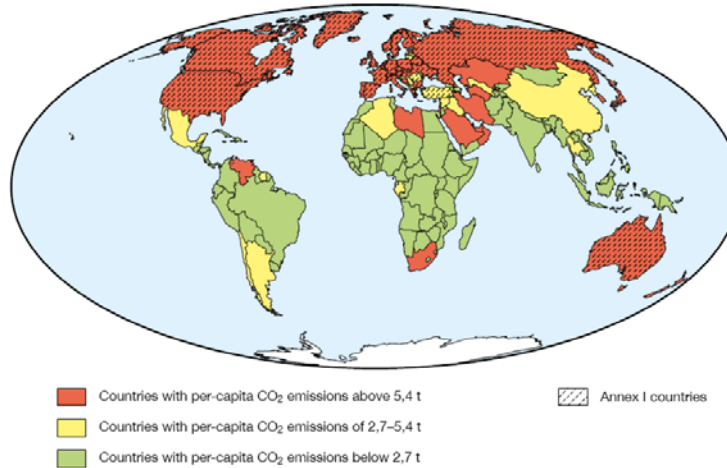
⁴² *Id.* at 15. For an effort to utilize the emissions budget approach to allocate national responsibility for climate change according to different theories of appropriate state behavior, see Müller, Höhne & Ellerman, *supra* note 35.

⁴³ GERMAN ADVISORY COUNCIL ON GLOBAL CHANGE (WBGU), *supra* note 40, at 27.

⁴⁴ A standard passenger vehicle in the United States emits the equivalent of roughly 5.2 metric tons of CO₂ per year. Calculations based on data from U.S. Env’tl. Prot. Agency,

family home for four weeks,⁴⁵ or flying roundtrip from New York City to San Francisco.⁴⁶ Obviously, then, much of the world's population is currently in violation of the duty of ordinary climate care, at least when that duty is defined according to our best scientific estimates of the aggregate global emissions level that does not compromise basic atmospheric, ecological, and social stability. As Figure 1 details,⁴⁷ the potential class of defendants who currently emit above 2.7 tons of annual CO₂ equivalent emissions includes literally billions of individuals, concentrated mainly in North America, Europe, and Australia⁴⁸ but also increasingly found in China and other rapidly industrializing nations.⁴⁹

Figure 1



Of course, to put matters this way is to reveal that legal duty is not now, nor has it ever been, so simple. Even before vexing issues of breach, causation, and harm arise, climate change plaintiffs face significant

Greenhouse Gas Equivalencies Calculator, <http://www.epa.gov/cleanenergy/energy-resources/calculator.html> (last visited Feb. 13, 2011).

⁴⁵ The average home in the U.S. emits the equivalent of approximately four metric tons of CO₂ per year per person. U.S. Env'tl. Prot. Agency, Greenhouse Gas Emissions: In the Home, http://www.epa.gov/climatechange/emissions/ind_home.html (last visited Feb. 13, 2011).

⁴⁶ Calculations based on data from Carbonfund.org, How We Calculate Your Carbon Footprint, http://www.carbonfund.org/site/pages/carbon_calculators/category/Assumptions#TotalUSCO2 (last visited Feb. 13, 2011) (calculating 0.93 tons of emissions for one roundtrip flight for one passenger from John F. Kennedy Airport in New York to San Francisco International Airport).

⁴⁷ GERMAN ADVISORY COUNCIL ON GLOBAL CHANGE (WBGU), *supra* note 40, at 19. Of course, a plethora of complications are being ignored here, including the choice of a 2°C guard rail which many regard as an inadequate level of protection, the possibility of reallocating emissions budgets based on historical responsibility for the existing stock of greenhouse gas concentrations, and the need to account for often dramatic disparities in emissions levels *within* nations.

⁴⁸ *See id.*, at 17.

⁴⁹ *See id.*

challenges establishing the existence of any tort obligation at all, given the sheer pervasiveness of activities with high associated greenhouse gas emissions. Within American torts jurisprudence, our best signposts in the duty wilderness remain the contrastingly brilliant opinions in *Palsgraf v. Long Island Railroad Company*.⁵⁰ For Judge Cardozo and the New York Court of Appeals majority, duty analysis is determined by classical liberal principles of responsibility. In Cardozo's view, "[n]egligence is not actionable unless it involves the invasion of a legally protected interest, the violation of a right"; accordingly, "negligence in the air . . . will not do."⁵¹ This particularized inquiry into the connection between plaintiff and defendant requires the judge to identify what "the eye of ordinary vigilance" would have foreseen as the possible result of defendant's conduct.⁵² On Cardozo's account, then, antisocial conduct only triggers a duty of tort responsibility when its potential harmful effects can be attached to particular, identifiable victims. Critically, those victims must rely on foreseeable injurious pathways that are distinctive to them. It is not enough to cite the wrongfulness of defendant's behavior in relation to others. The benefit of a tort duty is something one owns—or does not own—personally.

With respect to climate change, Cardozo's approach suggests that states, municipalities, tribes, and other aggregative entities might be the most appropriate plaintiffs for a climate change suit, since the scope of the alleged victim would encompass a much larger, and therefore arguably more foreseeable, swath of climate change's adverse impacts. Public nuisance would then commend itself as the logical cause of action to pursue, since it imports a duty to avoid injurious conduct to rights that are held by the public in common.⁵³ Because harm would be conceived of as falling on the public's shared interest in climate stability, the need to trace particular, individualized paths of foreseeability would be lessened, as would the apparent remoteness and attenuation of the link between defendant's conduct and plaintiff's harm. In essence, Cardozo's classical liberal world of interpersonal moral relations would be scaled up to a level commensurate with the climate change problem. A variety of difficulties would remain—including the concern that public nuisance has become an

⁵⁰ 162 N.E. 99 (N.Y. 1928).

⁵¹ *Id.* (internal quotation marks omitted).

⁵² *Id.*; see also *id.* at 100 ("The risk reasonably to be perceived defines the duty to be obeyed, and risk imports relation; it is risk to another or to others within the range of apprehension.").

⁵³ William Blackstone defined "public nuisances" as "a species of offences against the public order and []eonomical regimen of the state; being either the doing of a thing to the annoyance of all the king's [s]ubjects, or the neglecting to do a thing which the common good requires." 4 WILLIAM BLACKSTONE, COMMENTARIES *167. The Second Restatement stresses that a defendant's conduct

does not become a public nuisance merely because it interferes with the use and enjoyment of land by a large number of persons. There must be some interference with a public right. A public right is one common to all members of the general public. It is collective in nature and not like the individual right that everyone has not to be assaulted or defamed or defrauded or negligently injured.

RESTATEMENT (SECOND) OF TORTS § 821B cmt. g (1979).

illicit end-run around the political process in the hands of zealous governmental plaintiffs⁵⁴—but the basic structure of legal duty would be at least arguably fulfilled.

In contrast to the particularistic focus of Cardozo's approach, the *Palsgraf* dissent by Judge Andrews offers a communal notion of responsibility in which all actors are under a duty to avoid unreasonable behavior, irrespective of whether that behavior implies a particular relation of responsibility to plaintiffs or, indeed, of whether it actually causes harm. If the employees of the Long Island Railroad Company negligently assisted passengers onto a crowded train, as they were alleged to have done in *Palsgraf*, then they committed "a wrong not only to those who happen to be within the radius of danger, but to all who might have been there—a wrong to the public at large."⁵⁵ In contrast to Cardozo, "negligence in the air" would seem to be quite cognizable on Andrews's approach, at least to the extent of establishing duty: "Due care is a duty imposed on each one of us to protect society from unnecessary danger, not to protect A, B or C alone."⁵⁶ While Andrews subsequently limits this expansive conception of tort responsibility through application of various proximate cause considerations (including Cardozo's touchstone of foreseeability), at least initially Andrews's view seems to be that duty is breathtakingly vast.⁵⁷ Indeed, under his conception, the basic individual duty to avoid excessive greenhouse gas emissions sketched out above might well be adopted by a court.

Volumes have been written about these two opinions and volumes more no doubt will follow. For present purposes, the most important implication of the debate between Cardozo and Andrews has to do with legal process. Both jurists believe that liability—even for wrongful conduct—must be curtailed in order for individuals to enjoy the freedoms of liberal society.⁵⁸ To put the point in contemporary terms, no one wants to see Grandma held responsible for climate change harms because she drove to church on Sunday when she could have walked, even if her weekly devotion puts her above an annual emissions budget. Where the two judges differ is in their conception of how such a curtailment of liability generally occurs. For Cardozo, a judge protects Grandma by holding as matter of law that no duty attended her choice to utilize a carbon-intensive mode of transport, given

⁵⁴ See *infra* text accompanying note 169.

⁵⁵ 162 N.E. at 102 (Andrews, J., dissenting).

⁵⁶ *Id.*

⁵⁷ See *id.* at 103 ("Every one owes to the world at large the duty of refraining from those acts that may unreasonably threaten the safety of others."). Despite failing to convince a majority in *Palsgraf*, Andrews continues to attract adherents. See, e.g., *Smith v. Finch*, 681 S.E.2d 147, 150 (Ga. 2009) ("[N]egligence may be established where it is shown that 'by exercise of reasonable care, the defendant might have foreseen that some injury would result from his act or omission, or that consequences of a generally injurious nature might have been expected.'"); *Rallis v. Demoulas Super Markets, Inc.*, 977 A.2d 527, 532 (N.H. 2009) (observing that plaintiff must show "that the defendant's conduct created a foreseeable risk of harm; in other words, it was reasonably foreseeable that an injury might occur because of the defendant's actions or inactions").

⁵⁸ See *Palsgraf*, 162 N.E. at 101 (majority opinion); see also *id.* at 105 (Andrews, J., dissenting).

the seeming unforeseeability of any particular victimization from her contribution to climate change. For Andrews, Grandma would find her relief through a jury's determination that the connection between her actions and any climate change harm is too remote or speculative to constitute proximate causation. Importantly, not only are the relevant decisionmaker and doctrinal apparatus different on these two approaches, but also the decisional attitude. For Cardozo, the judge applies rather abstract and formalistic notions of reasonable foreseeability, reflecting, perhaps, Cardozo's ambivalent relationship toward legal realism.⁵⁹ For Andrews, on the other hand, the jury's analysis is unabashedly one of "practical politics," "common sense," "convenience," and "expediency."⁶⁰

Controversy over the precise scope and significance of duty rages to this day, inflamed recently by the American Law Institute (ALI)'s Restatement (Third) of Torts project.⁶¹ With respect to liability for physical and emotional harm, the ALI Reporters laid out a general duty to avoid all behavior that creates a risk of harm to others' interests, seemingly without regard to Cardozo's relational niceties.⁶² Of course, a variety of other doctrinal hurdles remain for plaintiffs to clear, but supporters of the Third Restatement approach see great advantage in keeping those hurdles separate from the more basic question of whether a duty of care exists in the first place.⁶³ The Reporters do acknowledge that duty may be limited by courts in exceptional cases for reasons of public policy.⁶⁴ A good example would be the much-discussed case of *Strauss v. Belle Realty Co.*,⁶⁵ in which the New York Court of Appeals shielded Consolidated Edison from liability to a plaintiff who was injured from a stairway fall during the 1977 electricity blackout in New York City. Despite the acknowledged gross negligence of Consolidated Edison, despite the ready foreseeability of plaintiff and his injury in relation to such conduct, and despite the fact that Consolidated Edison's contract with plaintiff's landlord clearly was intended to benefit plaintiff and other tenants, the court nevertheless fixed upon the contract nexus as a convenient way "to contain liability to manageable levels."⁶⁶ Notwithstanding the inevitable arbitrariness of such a line-drawing exercise, the court felt obliged to avoid the "crushing exposure to liability" that might otherwise result "in the case of a blackout of a metropolis of several million residents and visitors, each in some manner necessarily affected by a 25-hour power failure."⁶⁷

⁵⁹ See John C.P. Goldberg, *The Life of the Law*, 51 STAN. L. REV. 1419, 1459 (1999).

⁶⁰ *Palsgraf*, 162 N.E. at 103–04 (Andrews, J., dissenting).

⁶¹ See, e.g., Dilan A. Esper & Gregory C. Keating, *Abusing "Duty,"* 79 S. CAL. L. REV. 265, 265–66 (2006); John C.P. Goldberg & Benjamin C. Zipursky, *The Restatement (Third) and the Place of Duty in Negligence Law*, 54 VAND. L. REV. 657, 736 (2001).

⁶² Esper & Keating, *supra* note 61, at 266 (noting continuity of general duty language in different drafts of the RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL HARM).

⁶³ See Cardi & Green, *supra* note 34, at 722.

⁶⁴ See Goldberg & Zipursky, *supra* note 61, at 667–69.

⁶⁵ 482 N.E.2d 34 (N.Y. 1985).

⁶⁶ *Id.* at 37.

⁶⁷ *Id.* at 35–36.

To critics, this expansive duty coupled with public policy exceptions invites judges to abrogate their traditional role as definers and elucidators of legal responsibilities, while still allowing for ad hoc “get-out-of-duty-free” cards such as those dispensed in *Strauss*. Critics point fondly to earlier eras in Anglo-American tort law, when liability hinged on a series of elaborately articulated status relationships, such as those between an innkeeper and a guest, a landowner and an invitee, or an employer and an employee.⁶⁸ Influential cases such as *Rowland v. Christian*,⁶⁹ which set aside the intricate doctrinal structure governing duties owed by landowners in favor of loose case-by-case analysis, threaten to undermine social ordering by absolving judges of the responsibility to state in plain and principled terms what the legal duties of private parties are. In the view of critics, this gradual unhinging of duty from status seems to have been related to the increasing importance of instrumentalist reasoning in tort law.⁷⁰ Through a realist lens, such as law and economics, once the standard of care is defined to be simply that which maximizes social welfare, then it seems obvious that the duty to undertake care should be applied as widely as possible. Better, in the view of critics, for judges to keep their ears close to the ground, defining duty in terms of the actual norms of respect and obligation that prevail in liberal society. Listening in that way, the critics suggest, judges would rarely hear such terms as optimal deterrence (or crushing liability, for that matter).⁷¹

Defenders of the Third Restatement approach point out that the history of duty in Anglo-American tort law is more complicated than the critics’ account suggests. To begin with, tort law for centuries has been driven by a mixture of considerations, including instrumental goals, corrective justice principles, and communal norms.⁷² Moreover, much of the duty-based doctrinal structure that critics identify in earlier eras of tort law constituted a series of status-based immunities from tort responsibility (e.g., for sovereigns, charities, spouses, and employers).⁷³ The practical impact of these various immunities should not be understated, as they worked to impose barriers to liability in virtually every important category of social interaction that a nineteenth century plaintiff might experience.⁷⁴

⁶⁸ See Robert L. Rabin, *The Torts History Scholarship of Gary Schwartz: A Commentary*, 50 UCLA L. REV. 461, 467–68 (2002).

⁶⁹ 443 P.2d 561 (Cal. 1968). The number of jurisdictions joining California in the *Rowland* approach continues to grow. See, e.g., *Koenig v. Koenig*, 766 N.W.2d 635, 639 (Iowa 2009).

⁷⁰ See John C.P. Goldberg, *The Constitutional Status of Tort Law: Due Process and the Right to a Law for the Redress of Wrongs*, 115 YALE L.J. 524, 601–27 (2005); John C.P. Goldberg & Benjamin C. Zipursky, *Shielding Duty: How Attending to Assumption of Risk, Attractive Nuisance, and Other “Quaint” Doctrines Can Improve Decisionmaking in Negligence Cases*, 79 S. CAL. L. REV. 329, 334 (2006); see also Alexandra B. Klass, *Tort Experiments in the Laboratories of Democracy*, 50 WM. & MARY L. REV. 1501, 1565–67 (2009).

⁷¹ See Jules L. Coleman, *Doing Away with Tort Law*, 41 LOY. L.A. L. REV. 1149, 1152, 1158–59 (2008).

⁷² See Gary T. Schwartz, *Mixed Theories of Tort Law: Affirming Both Deterrence and Corrective Justice*, 75 TEX. L. REV. 1801, 1801–02 (1997).

⁷³ See Rabin, *supra* note 68, at 472–74.

⁷⁴ See Robert L. Rabin, *The Historical Development of the Fault Principle: A Reinterpretation*, 15 GA. L. REV. 925, 952–53 (1981).

Accordingly, as Robert Rabin has persuasively shown, the central struggle of American tort law over much of its history has not been whether strict liability or negligence should govern unintentional harms, as commentators often assume, but rather whether defendants who cause unintentional harm owe any duty of care at all.⁷⁵ Against this backdrop, the Third Restatement's approach to duty seems not to represent an abrogation of the judicial obligation to articulate communal norms of respect and care, but rather an acknowledgement that those norms expanded significantly over the course of the last century.

Still, it would be hasty to assume that our norms of respect and care have expanded adequately to support common law responsibility for the emission of greenhouse gases. The enduring resonance of *Palsgraf* has much to do with the fact that both of its contrasting approaches remain alive and at work within tort jurisprudence, to the great frustration of law students and scholars who seek doctrinal uniformity. Yet for purposes of limning greenhouse gas tort responsibilities, it may not matter whether plaintiffs' claims hit a roadblock at the duty stage *à la* Cardozo, or only later at the proximate causation stage *à la* Andrews, given that the analytical challenges facing plaintiffs will be similar in either case.⁷⁶ Nor will it necessarily matter whether plaintiffs' case is styled as a negligence, strict liability, private nuisance, public nuisance, or products liability action, given the availability of proximate causation and other liability-curtailling devices under each theory. Most critically, plaintiffs will face the challenge of establishing foreseeability in a way that does not strain liberal notions of limited obligation beyond the breaking point. Unlike more familiar forms of pollution, greenhouse gases do not directly and locally impair human health and ecosystems. Instead, they begin as largely harmless emissions before globally dispersing throughout the atmosphere, warming the planet's surface, and ultimately triggering a laundry list of complex and potentially harmful ripple effects throughout all natural systems.⁷⁷ On the one hand, this

⁷⁵ See *id.*; see also Gary T. Schwartz, *The Beginning and the Possible End of the Rise of Modern American Tort Law*, 26 GA. L. REV. 601, 606 (1992); John Fabian Witt, *Contingency, Immanence, and Inevitability in the Law of Accidents*, 1 J. TORT L. 1, 21 (2007).

⁷⁶ Settlement dynamics may well be affected, however, as Andrews's approach seems more likely to result in plaintiffs reaching discovery.

⁷⁷ The statement in the text has become an article of faith in climate policy discussions. See, e.g., Nicholle Winters, Note, *Carbon Dioxide: A Pollutant in the Air, but Is the EPA Correct that It Is Not an "Air Pollutant"?*, 104 COLUM. L. REV. 1996, 1999 (2004) (discussing the EPA Fabricant Memo that "focuses on the fact that carbon dioxide does not directly cause harm but is a greenhouse gas that contributes to global warming"). An important caveat should be noted, however: CO₂ levels in densely populated, heavy emitting areas remain elevated due to a continuous stream of emissions, thereby forming a "dome" over the areas which, in turn, exacerbates local air pollution problems such as ground level ozone. See *Healthy Planet, Healthy People: Global Warming and Public Health Before the H. Select Committee on Energy Independence and Global Warming*, 110th Cong. 2-3 (2008) (statement of Mark Z. Jacobson), available at <http://www.stanford.edu/group/efmh/jacobson/Testimony0408%202.pdf> (summarizing evidence). Thus, local greenhouse gas emissions can cause higher levels of local mortality and morbidity, notwithstanding the common wisdom that "[t]he fact that [greenhouse gases] mix globally in the atmosphere means that hotspots are not a major concern." Jonathan

may be taken to mean that “[t]he foreseeable zone of impact in the context of climate change, a global tort, is *global*, and the duty owed by defendant contributors to climate change arguably extends to damaged plaintiffs everywhere.”⁷⁸ On the other hand, it may mean that courts will view the climate change conundrum as simply falling beyond the grasp of tort law.

Similarly, the class of climate change defendants includes in the extreme anyone whose activities result in net greenhouse gas emissions, which is to say nearly every natural and legal person on the planet.⁷⁹ As such, climate change is so radically diffuse in origin that it is difficult to identify any actors who stand out as peculiarly responsible for it. Plaintiffs are forced to look for apparent choke points in the anthropogenic carbon cycle, such as fossil fuel companies, electric utilities, motor vehicle manufacturers, and other entities that plausibly can be described as “responsible” for large volumes of emissions or that potentially can effectuate large-scale changes in greenhouse gas emitting activities. For good measure, plaintiffs throw in fraud and conspiracy counts that allow them to offer evidence of how these entities have distorted science and manipulated public debate on climate change for the better part of three decades.⁸⁰ Figure 2 presents a sector-based view of U.S. greenhouse gas emissions that seems to support plaintiffs’ strategy, identifying industry, transportation, and electric utilities as responsible for the lion’s share of U.S. emissions.⁸¹

As Figure 3’s systems-based view of emissions shows,⁸² however, there is a problematic arbitrariness in plaintiffs’ designation of the defendant class: why are automakers and power plants sued rather than their customers?⁸³ If most courts are unwilling to view handgun manufacturers as proximate contributors to the public nuisance of violent crime,⁸⁴ how many will see the oil industry and other corporate defendants as chiefly

B. Wiener, *Radiative Forcing: Climate Policy to Break the Logjam in Environmental Law*, 17 N.Y.U. ENVTL. L.J. 210, 215 (2008).

⁷⁸ Hunter & Salzman, *supra* note 3, at 1781.

⁷⁹ *Id.* at 1750.

⁸⁰ See *Comer v. Murphy Oil USA*, 585 F.3d 855, 859–60 (5th Cir. 2009) (“The plaintiffs’ putative class action asserts claims for compensatory and punitive damages based on Mississippi common-law actions of . . . fraudulent misrepresentation, and civil conspiracy.”); Complaint for Damages and Demand for Jury Trial at 47–62, *Native Vill. of Kivalina*, 663 F. Supp. 2d 863 (N.D. Cal. 2009) (No. C 08-01138 SBA) (detailing civil conspiracy allegations). For supporting evidence, see NAOMI ORESKES & ERIK M. CONWAY, *MERCHANTS OF DOUBT* 169–215 (2010), and DAVID MICHAELS, *DOUBT IS THEIR PRODUCT* 192–211 (2008).

⁸¹ U.S. ENVTL. PROT. AGENCY, *OPPORTUNITIES TO REDUCE GREENHOUSE GAS EMISSIONS THROUGH MATERIALS AND LAND MANAGEMENT PRACTICES* 10 (2009), available at http://www.epa.gov/oswer/docs/ghg_land_and_materials_management.pdf.

⁸² *Id.* at 11.

⁸³ It should be noted here that the *Kivalina* complaint limits its scope to the direct emissions from defendants’ activities (e.g., oil exploration, pipeline construction, and facility operation) rather than from use of defendants’ products by their customers. Complaint for Damages and Demand for Jury Trial at 1, *Native Vill. of Kivalina*, 663 F. Supp. 2d 863 (No. C 08-01138 SBA). In that respect, however, the complaint encompasses a much smaller potential share of overall greenhouse gas emissions.

⁸⁴ See Richard C. Ausness, *Public Tort Litigation: Public Benefit or Public Nuisance?*, 77 TEMPLE L. REV. 825, 840–53 (2004) (reviewing public nuisance handgun litigation).

2011]

CLIMATE CHANGE, TORT LAW

19

responsible for activities that, in truth, are imbricated throughout modern society and that only cause harmful impacts when combined with all other such activities and when traced forward through an extraordinarily complex series of ripple effects that span the planet? How many instead will use longstanding duty and proximate cause principles to avoid jumping down that rabbit hole of responsibility?

Figure 2: Sector-Based View of U.S. GHG Emissions (2006)

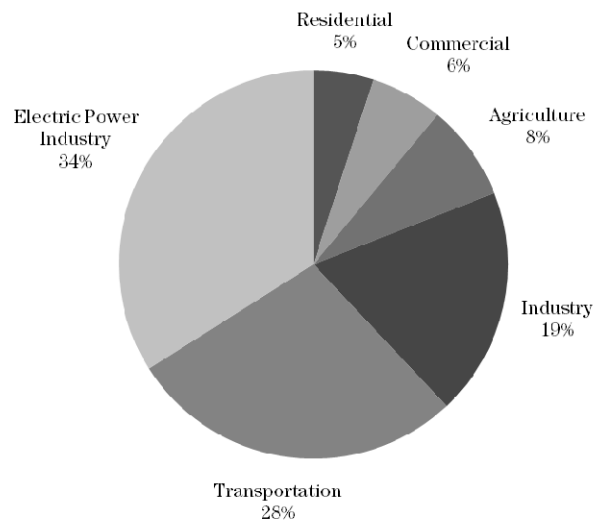
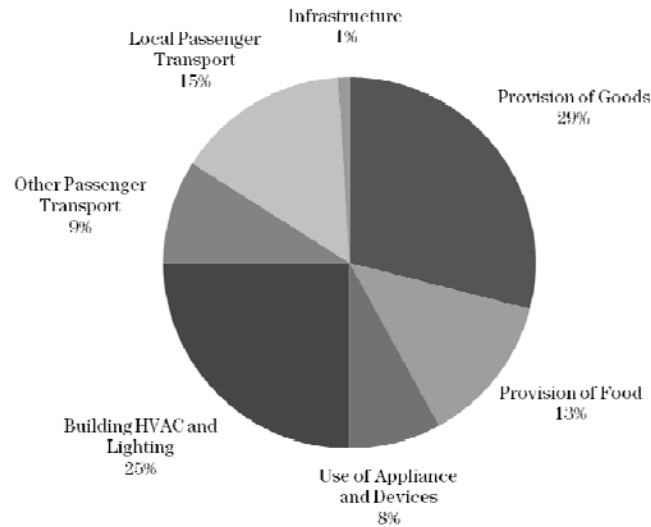


Figure 3: Systems-Based View of U.S. GHG Emissions (2006)

Problems of remoteness and attenuation do not just describe climate change as a policy challenge, they *define* it. Between the moment of emission and the ultimate incidence of harm lie innumerable links in a causal chain, many of which consist of actors with their own agency and arguable culpability. Thus, however articulated as a doctrinal matter, liability-constraining considerations are likely to bite hard against the climate change plaintiff.

B. Breach

Assuming, *pace* the prior discussion, that there is a common law tort duty with respect to greenhouse gas emissions, what is its content? The per capita emissions allowance framework described above is one approach, but it is unappealing to plaintiffs for several reasons: it is too obviously legislative or regulatory in nature; it applies to individual defendants⁸⁵ when corporations and other large entities are the more attractive targets; and it invites consideration of plaintiffs' own greenhouse gas emissions through contributory negligence, unclean hands, and related doctrines. Instead, plaintiffs must advance theories of liability that single out choices and activities of large-scale defendants, characterizing those

⁸⁵ See GERMAN ADVISORY COUNCIL ON GLOBAL CHANGE (WBGU), *supra* note 40, at 27 (explaining that under the per capita emissions allowance framework, individual persons would be budgeted emissions).

actors as especially significant nodes in the otherwise continuous web of relations that give rise to greenhouse gas emissions. Additionally, plaintiffs must seek a standard of liability that eschews instrumentalist balancing in favor of a simple focus on the severity of the victim's harm.⁸⁶ If balancing prevails—whether in the form of conventional negligence analysis or modern versions of trespass and nuisance doctrine—plaintiffs will face the difficult prospect of demonstrating that the defendant's activities fail a social welfare cost-benefit test.⁸⁷ Rather than assume the need for a safe minimum standard of atmospheric stability according to scientific criteria—the analytical foundation of the per capita emissions budget approach—plaintiffs under a cost-benefit regime will need to persuade courts that greenhouse gas intensive activities pose risks that outweigh benefits, despite the fact that those same activities lie at the foundation of industrial society.

Given the stakes involved in such a judgment, courts may well take cues from the political branches in determining what the “social value” of the defendant's activities are.⁸⁸ In that respect, Congress's longstanding tolerance—indeed active support—of activities with substantial greenhouse gas emissions seems especially problematic for plaintiffs.⁸⁹ Although scattered expressions of climate change concern from Congress can be identified, as the United States Court of Appeals for the Second Circuit noted in *Connecticut v. American Electric Power Company*,⁹⁰ “Congress has not acted to regulate greenhouse gas emissions in any *real* way.”⁹¹ Indeed, the most consistent stance of the body over time has been to promote exploration, production, and utilization of fossil fuels through subsidies, tax incentives, and other mechanisms.⁹² Continued unwillingness to adopt a comprehensive climate change and energy reform package forty years after

⁸⁶ See Donald G. Gifford, *Public Nuisance as a Mass Products Liability Tort*, 71 U. CIN. L. REV. 741, 748–49 (2003) (noting disagreement among courts regarding “whether the plaintiff in a public nuisance action must prove underlying tortious conduct by the defendant . . . or whether the existence of an objectionable condition itself establishes tortious liability” (footnote omitted)); Merrill, *supra* note 3, at 329 (“Nuisance law generally—of which public nuisance is a subpart—has long oscillated between a ‘trespass’ mode of analysis and a ‘cost-benefit’ mode of analysis.”).

⁸⁷ See Merrill, *supra* note 3, at 329–30.

⁸⁸ For balancing tests, the Restatement (Second) of Torts typically asks courts to weigh “the *social value* which the law attaches to the interest,” which is promoted or threatened by defendant's behavior. RESTATEMENT (SECOND) OF TORTS § 292 (1965) (emphasis added). Somewhat controversially, the Third Restatement has de-emphasized this social valuation aspect of unintentional torts in favor of private market valuations. See Kenneth W. Simons, *The Hand Formula in the Draft Restatement (Third) of Torts: Encompassing Fairness as Well as Efficiency Values*, 54 VAND. L. REV. 901, 925–26 (2001).

⁸⁹ Cf. *City of Cleveland v. Ameritrust Mortg. Sec., Inc.*, 621 F. Supp. 2d 513, 529 (N.D. Ohio 2009) (observing, among several reasons for dismissing a city's public nuisance suit against subprime mortgage lenders, that “federal government has enacted numerous laws and issued significant regulatory guidance specifically aimed at encouraging lending to traditionally underserved segments of the population”).

⁹⁰ 582 F.3d 309 (2d Cir. 2009).

⁹¹ *Id.* at 385 (emphasis added).

⁹² SALVATORE LAZZARI, CONG. RESEARCH SERV., RL 30406, ENERGY TAX POLICY: AN ECONOMIC ANALYSIS 1, 7 (2005).

the problem was first brought to congressional attention only underscores the discomfort common law judges might feel in allowing juries to declare greenhouse gas-intensive activities unreasonable.⁹³ This is especially the case in light of Congress's failure to act in the face of intensive global campaigning on behalf of climate action during the lead-up to Copenhagen in 2009. Although merely an instance of the proverbial dog not barking, to the climate change policy community Congress's silence was deafening.⁹⁴

Even judges who undertake an independent assessment of climate change costs and benefits will find ample evidence tending to insulate defendants from liability. With some notable exceptions, economic analyses of climate change policy recommend only a gradual reduction in greenhouse gas emissions in the near term, followed by steeper cuts later in the century.⁹⁵ Thus, when looking comprehensively at the social costs and benefits of fossil fuel production or other greenhouse gas-intensive activities, courts may well conclude that the activities are not undesirable overall, at least not yet. Efforts by economists to calculate the "social cost of carbon" similarly tend to draw a favorable comparison of fossil fuel energy sources to lower-emitting alternatives,⁹⁶ despite the extensive negative externalities of the former.⁹⁷ For instance, an interagency working group of the Obama Administration recently compiled the first official U.S. government estimate of the human health, environmental, and other external costs caused by each ton of CO₂ equivalent emissions. The working group came up with a central estimate of \$21 per metric ton of CO₂ in 2010 and \$45 per metric ton in 2050.⁹⁸ Although these estimates

⁹³ For example, Congress's lack of legislation on global climate change was one of the arguments EPA relied on to win over judges at the court of appeals level in *Massachusetts v. EPA*. See Elise Korican, *Massachusetts v. Environmental Protection Agency*, *Exploring the Merits of Greenhouse Gas Regulation*, 28 J. NAT'L ASS'N ADMIN. L. JUDICIARY 193, 205 (2008).

⁹⁴ Michael Jacobs, *Is It All Over for Climate Policy in the United States?*, INSIDE STORY (Austl.), July 29, 2010, available at <http://inside.org.au/is-it-all-over-for-climate-change-policy-in-the-united-states/> (last visited Feb. 13, 2011).

⁹⁵ For the most notable exception and widely discussed report, see STERN, *supra* note 26, at 572. Much of the difference between mainstream and dissenting economic analyses is driven by basic modeling assumptions regarding such matters as economic and population growth, intergenerational ethical obligations, appropriate methods for valuing human life, and whether or how to incorporate catastrophic risks from climate change. See generally DOUGLAS A. KYSAR, *REGULATING FROM NOWHERE* 7–10 (2010). Obviously, not all or even most of these matters are peculiarly within the economics profession's domain of technical expertise.

⁹⁶ See FRANK ACKERMAN & ELIZABETH A. STANTON, *THE SOCIAL COST OF CARBON* 1, 2, 5, 16 (2010), available at http://sei-international.org/mediamanager/documents/Publications/Climate-mitigation-adaptation/socialcostofcarbon_sei_20100401.pdf.

⁹⁷ Morgan McCue Sport, Comment, *An Inconvenient Suit: California v. General Motors Corporation and a Look at Whether Global Warming Constitutes an Actionable Public Nuisance or a Nonjusticiable Political Question*, 38 CUMB. L. REV. 583, 590–95 (2008).

⁹⁸ See U.S. DEP'T OF ENERGY, FINAL RULE TECHNICAL SUPPORT DOCUMENT (TSD): ENERGY EFFICIENCY PROGRAM FOR COMMERCIAL AND INDUSTRIAL EQUIPMENT: SMALL ELECTRIC MOTORS, app. 15A.2 at 2–3 (2010), available at http://www1.eere.energy.gov/buildings/appliance_standards/commercial/pdfs/smallmotors_tsd/sem_finalrule_appendix15a.pdf. Figures are reported in 2007 dollars.

depend on numerous controversial assumptions,⁹⁹ the results of the working group undoubtedly will appear attractive to any common law judge requiring authoritative sources of information for cost-benefit analysis in the context of climate change.

Consider the implications of the working group's estimate for *Connecticut v. American Electric Power Company*. In this suit, various states and non-profit land trusts seek abatement of the "public nuisance" of "global warming," which they believe is substantially exacerbated by the actions of the defendant power plants, "the five largest emitters of [CO₂] in the United States" responsible for "approximately one quarter of the U.S. electric power sector's [CO₂] emissions."¹⁰⁰ Putting aside for the moment problems of causal attribution—after all, the named defendants in the case appear to represent only 2.5% of worldwide annual CO₂ emissions which is, after all, only one of the significant contributors to greenhouse gas concentrations¹⁰¹—plaintiffs still must demonstrate that the defendants' activities are unreasonable. An analysis of comparative electricity production costs by the Congressional Budget Office (CBO) suggests that this showing will be difficult to make.¹⁰² To begin with, the CBO did not even consider intermittent renewable energy sources such as wind and solar power or geographically limited sources such as hydroelectric or geothermal. In the CBO's view, neither category could satisfy base-load generation needs in most parts of the country.¹⁰³ Courts might similarly conclude that the relevant comparison group for tort scrutiny only includes base-load capacity sources such as nuclear and natural gas plants or coal-fired plants that have adopted carbon capture and sequestration (CCS) technology.¹⁰⁴

According to the CBO, the production cost advantages of coal-fired electricity are substantial: "Despite the high carbon intensity of conventional coal technology, continuing to operate existing coal-fired plants would remain a relatively inexpensive source of electricity until [CO₂] charges reached about \$45 per metric ton."¹⁰⁵ Thus, putting together the CBO's estimate of comparative production costs with the interagency working

⁹⁹ See ACKERMAN & STANTON, *supra* note 96, at 7–11.

¹⁰⁰ *Connecticut v. Am. Elec. Power Co.*, 406 F. Supp. 2d 265, 268 (S.D.N.Y. 2005) (quoting the complaints by both the state plaintiffs and plaintiff Open Space Institute (OSI)). Plaintiffs in *Connecticut v. American Electric Power Company* actually name six electric power corporations as defendants but two are related American Electric Power entities.

¹⁰¹ See *id.* (noting plaintiffs' allegations that named defendants represent one-quarter of U.S. electric power sector emissions which in the aggregate constitute ten percent of global emissions from human activities).

¹⁰² CONG. BUDGET OFFICE, NUCLEAR POWER'S ROLE IN GENERATING ELECTRICITY 25–26 (2008), available at <http://www.cbo.gov/ftpdocs/91xx/doc9133/05-02-Nuclear.pdf>.

¹⁰³ *Id.* at 5.

¹⁰⁴ CCS technologies aim to capture CO₂ before it is released into the atmosphere from power plants and industrial facilities and then sequester it in geologic formations more or less permanently. For an overview of CCS and potential liability implications, see Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change and Carbon Sequestration: Assessing a Liability Regime for Long-Term Storage of Carbon Dioxide*, 58 EMORY L.J. 103 (2008).

¹⁰⁵ CONG. BUDGET OFFICE, *supra* note 102, at 7–8 (using 2006 dollars for most of the analysis).

group's estimate of the social benefit of reducing carbon emissions, it would appear that conventional coal-fired plants may not begin to fail a cost-benefit test until 2050. Granted, with respect to any *new* power plants being built, a strong argument can be made that coal-fired plants without CCS technology are unreasonable in light of the general availability of natural gas as a fuel source.¹⁰⁶ But plaintiffs in *Connecticut v. American Electric Power Company* are challenging existing facilities and the economic analysis in that regard is even worse from plaintiffs' perspective, given the great cost of CCS technology and the uncertainty regarding its viability as a commercial-scale retrofit option for existing plants.¹⁰⁷ Thus, whether viewed from the macro-balancing perspective of nuisance or the micro-balancing perspective of negligence, climate change defendants will have substantial evidence to draw from in rebutting the charge of unreasonableness.

Might these apparently authoritative impressions be counteracted if the climate change plaintiff is itself another governmental entity? As noted above,¹⁰⁸ public nuisance is an attractive theory of liability for plaintiffs given that it focuses on harms to the public interest, helping to close some of the remoteness and attenuation that otherwise accompanies claims of climate change injury. Unlike the private nuisance claim, which focuses paradigmatically on unique and limited harms imposed by one landowner on an adjacent or nearby landowner, the public nuisance claim challenges any "unreasonable interference with a right common to the general public."¹⁰⁹ Traditionally, public nuisances have included a variety of harmful activities that seem somewhat analogous to the problem of greenhouse gas emissions, at least if one ignores vast differences in scale and complexity.¹¹⁰ In terms of formal doctrinal language, the public nuisance category also seems quite naturally to reach greenhouse gas emissions. The Second Restatement provides that an unreasonable interference occurs whenever the defendant's "conduct involves a significant interference with the public health, the public

¹⁰⁶ Combined cycle natural gas facilities produce roughly half as much CO₂ as coal-fired plants. U.S. Env'tl. Prot. Agency, Natural Gas, <http://epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html> (last visited Feb. 13, 2011). The cost differential between coal and gas facilities can be as low as \$5 per metric ton. CONG. BUDGET OFFICE, *supra* note 102, at 26; *see also* Hunter & Salzman, *supra* note 3, at 1773 (distinguishing between existing and new coal-fired power plants for purposes of negligence analysis). Of course, with respect to new facilities, plaintiffs face the additional problem of securing relief for prospective injuries. *See infra* text accompanying notes 113–15.

¹⁰⁷ Credible estimates suggest a \$60 per U.S. ton price is needed to make CCS technology cost competitive, a figure that, again, is well below the interagency working group's estimate of the social cost of carbon. *See* Dan Charles, *Stimulus Gives DOE Billions for Carbon-Capture Project*, 323 SCIENCE 1158 (Feb. 27, 2009).

¹⁰⁸ *See supra* text accompanying note 53.

¹⁰⁹ RESTATEMENT (SECOND) OF TORTS § 821B(1) (1979).

¹¹⁰ *See* WILLIAM L. PROSSER, HANDBOOK OF THE LAW OF TORTS § 88, at 583–85 (4th ed. 1971) (listing "interferences with the public health, as in the case of a hogpen, the keeping of diseased animals, or a malarial pond . . . with the public comfort, as in the case of bad odors, smoke, dust and vibration; with public convenience, as by obstructing a highway or a navigable stream, or creating a condition which makes travel unsafe or highly disagreeable" (footnotes omitted)).

safety, the public peace, the public comfort or the public convenience,”¹¹¹ or when “the conduct is of a continuing nature or has produced a permanent or long-lasting effect, and, as the actor knows or has reason to know, has a significant effect upon the public right.”¹¹²

In addition to addressing harms common to the public, an advantage of the Second Restatement formulation for plaintiffs is that it seems to focus on the severity of the alleged harm, rather than on a welfarist assessment of whether the defendant’s activity is socially desirable on net. This stricter formulation used to appear even in the private nuisance context, especially among jurists influenced by a strong classical liberal vision of the sanctity of property rights.¹¹³ To the extent that it retains vitality today, the formulation is most likely to prevail in public nuisance cases, strongly counseling in favor of that cause of action for plaintiffs.¹¹⁴ On the other hand, the

¹¹¹ RESTATEMENT (SECOND) OF TORTS § 821B(2)(a) (1979).

¹¹² *Id.* § 821B(2)(c).

¹¹³ *See, e.g.,* *McFarlane v. City of Niagara Falls*, 160 N.E. 391, 391–92 (N.Y. 1928) (Cardozo, J.) (“Nuisance as a concept of the law has more meanings than one. The primary meaning does not involve the element of negligence as one of the essential factors. One acts sometimes at one’s peril. In such circumstances, the duty to desist is absolute whenever conduct, if persisted in, brings damage to another. Illustrations are abundant. One who emits noxious fumes or gases day by day in the running of his factory may be liable to his neighbor though he has taken all available precautions. He is not to do such things at all, whether he is negligent or careful.” (citations omitted)); *Whalen v. Union Bag & Paper Co.*, 101 N.E. 805, 806 (N.Y. 1913) (“Although the damage to the plaintiff may be slight as compared with the defendant’s expense of abating the condition, that is not a good reason for refusing an injunction. Neither courts of equity nor law can be guided by such a rule, for if followed to its logical conclusion it would deprive the poor litigant of his little property by giving it to those already rich.”). Generalizations of this sort are, of course, a hazardous activity. In addition to moderating the standard of liability, courts have frequently limited the availability of injunctive relief in order to alleviate the seemingly anti-utilitarian consequences of the strict property rights conception. The most widely discussed such case is *Boomer v. Atlantic Cement Company*, 257 N.E.2d 870, 875 (N.Y. 1970) (allowing vacation of an injunction against the defendant if permanent damages were paid to the plaintiff by the defendant); although judicial ingenuity in the crafting of remedies to avoid large-scale economic dislocation long pre-dates *Boomer*. *See, e.g.,* Louise A. Halper, *Nuisance, Courts and Markets in the New York Court of Appeals, 1850-1915*, 54 Alb. L. Rev. 301, 302 (1990); *see also* RESTATEMENT (SECOND) OF TORTS § 827 cmt. b (1979) (“The gravity of the harm, as objectively weighed . . . may be found so severe that in and of itself it requires *compensation*, regardless of the weight of the utility of the conduct.” (emphasis added)).

¹¹⁴ *See, e.g.,* *Cox v. City of Dallas, Tex.*, 256 F.3d 281, 290 (5th Cir. 2001) (observing that “public nuisance law tends to impose liability more often on the basis of strict liability [than negligence]”); *New York v. Shore Realty Corp.*, 759 F.2d 1032, 1051 (2d Cir. 1985) (stating that liability for public nuisance exists under New York law “irrespective of negligence or fault”); *United States v. Hooker Chems. & Plastics Corp.*, 722 F. Supp. 960, 968 (W.D.N.Y. 1989) (“[F]ault is not an issue, the inquiry being limited to whether the condition created, not the conduct creating it, is causing damage to the public.” (quoting *State v. Schenectady Chems., Inc.*, 459 N.Y.S.2d 971, 979 (N.Y. Sup. Ct. 1983))); *Concerned Citizens of Bridesburg v. City of Philadelphia*, 643 F. Supp. 713, 726 (E.D. Pa. 1986) (“At common law, neither individuals nor municipalities have the right to maintain for any period of time activities that constitute a public nuisance, irrespective of lack of fault or due care.”); *State v. Fermenta ASC Corp.*, 608 N.Y.S.2d 980, 985 (N.Y. Sup. Ct. 1994) (“[A] plaintiff in an action to abate a public nuisance is not required to demonstrate negligence or willful conduct on behalf of the defendant.”); *Commonwealth v. Barnes & Tucker Co.*, 319 A.2d 871, 883 (Pa. 1974) (“The absence of facts supporting concepts of negligence, foreseeability or unlawful conduct is not in the least fatal to a finding of the

traditional form of relief in public nuisance suits brought by governmental actors is equitable rather than compensatory.¹¹⁵ Thus, the combination of a potent standard of liability with a presumptive entitlement to injunctive relief would put judges in a difficult position, as they are understandably reluctant to shut down activities of central economic importance. Many commentators questioned the litigation strategy of plaintiffs in *Connecticut v. American Electric Power Company* because their prayer for structured injunctive relief, gradually abating defendants' greenhouse gas emissions, seemed to invite the court to dismiss the case on political question grounds.¹¹⁶ To the surprise of many observers, a Second Circuit panel ruled that the political question doctrine does not pose a barrier to adjudication.¹¹⁷ Nevertheless, the district court might still be able to avoid the wide-ranging implications of plaintiffs' suit by adopting a balancing standard of liability rather than a stricter, more harm-focused standard. On the balancing approach, a predicate finding of breach will be more elusive and the third rail of injunctive relief might still be avoided.

The essential point is that courts in environmental tort cases often seem driven by the type of relief looming at the end of a course of analysis.¹¹⁸ For instance, those courts that maintain a strict conception of trespass liability, in which an injunction is the presumptive form of relief, are less likely to conceive of pollution as a physical invasion despite acknowledging that particulate matter is, well, matter.¹¹⁹ Conversely, those courts that either count pollution as a physical invasion or adopt a strict conception of nuisance liability are less likely to hold onto the presumption that injunctive

existence of a common law public nuisance.”); *Wood v. Picillo*, 443 A.2d 1244, 1247 (R.I. 1982) (“The essential element of an actionable nuisance is that persons have suffered harm or are threatened with injuries that they ought not have to bear.”); *Branch v. W. Petroleum, Inc.*, 657 P.2d 267, 274 (Utah 1982) (“Unlike most other torts, [nuisance law] is not centrally concerned with the nature of the conduct causing the damage, but with the nature and relative importance of the interests interfered with or invaded.”); RESTATEMENT (THIRD) OF TORTS § 20 cmt. c (2010) (noting that while the Restatement (Second) section elucidating nuisance liability “is explained in the language of unreasonableness, that Section in essence rests on an idea of strict liability: it is appropriate for the defendant to compensate the plaintiff even though the defendant has in general behaved in a reasonable way”). As always, exceptions exist: in Maryland, it appears that private nuisance liability is strict while public nuisance requires a showing of unreasonableness. See *Adams v. NVR Homes, Inc.*, 193 F.R.D. 243, 256 (D. Md. 2000). For an attempt to disentangle public and private nuisance, both historically and practically, see Robert Abrams & Val Washington, *The Misunderstood Law of Public Nuisance: A Comparison with Private Nuisance Twenty Years After Boomer*, 54 ALB. L. REV. 359 (1990).

¹¹⁵ See Victor E. Schwartz & Phil Goldberg, *The Law of Public Nuisance: Maintaining Rational Boundaries on a Rational Tort*, 45 WASHBURN L.J. 541, 542 (2006).

¹¹⁶ 406 F. Supp. 2d 265, 270 (S.D.N.Y. 2005) (“Plaintiffs seek an order (i) holding each of the Defendants jointly and several liable for contributing to an ongoing public nuisance, global warming, and (ii) enjoining each of the Defendants . . . by capping its emissions of carbon dioxide and then reducing those emissions by a specific percentage each year for at least a decade.”); see, e.g., *Zasloff*, *supra* note 3, at 1839.

¹¹⁷ *Connecticut v. Am. Elec. Power Co.*, 582 F.3d 309, 332 (2d Cir. 2009). A ruling, it must be stressed, that could be overturned by the Supreme Court.

¹¹⁸ Cf. Denise E. Antolini, *Modernizing Public Nuisance: Solving the Paradox of the Special Injury Rule*, 28 ECOLOGY L.Q. 755, 772 n.59 (2001).

¹¹⁹ See *Adams v. Cleveland-Cliffs Iron Co.*, 602 N.W.2d 215, 223 (Mich. Ct. App. 1999).

relief is awarded to successful plaintiffs.¹²⁰ To thread the needle, then, plaintiffs in climate change suits may need to both persuade the court to eschew balancing in favor of a strict form of protection *and* limit their prayer for relief to damages only. This may mean that governmental plaintiffs and private plaintiffs suing under a public nuisance theory should *not* join forces, given that the former are somewhat restricted in their ability to seek damages.¹²¹ On the other hand, states suing in their proprietary capacity as landowners typically are not restricted from pursuing damages,¹²² and the states' proprietary holdings may be vast enough to achieve much of the goal of climate change litigation.¹²³ Alternatively, governmental plaintiffs may seek to style their prayer for relief as equitable in nature, even though it simply amounts to a request for monetary funds to reimburse public entities for climate change adaptation and compensation expenses.¹²⁴ Either way, the goal of the litigation will be to persuade a court to adopt the strict conception of public nuisance liability without raising the prospect of a politically radioactive and judicially unwieldy injunction.

To date, the best attempt to pass through this narrow needle is *Native Village of Kivalina v. ExxonMobil Corp (Kivalina)*.¹²⁵ In this suit, the city of Kivalina, Alaska and the governing body of approximately 400 Inupiat Eskimo residents challenge twenty-four oil, energy, and utility companies, seeking monetary compensation for expenses associated with relocating the town.¹²⁶ Both the U.S. Army Corps of Engineers and the U.S. Government Accountability Office determined that Kivalina must be relocated imminently on account of increased erosion risk from permafrost melting,

¹²⁰ See, e.g., *Davis v. Georgia-Pacific Corp.*, 445 P.2d 481, 483 (Or. 1968) (holding that “the social value of defendant’s conduct, its efforts to prevent the harm and other circumstances that tend to justify an intrusion cannot be considered” when assessing trespass liability, but that such considerations do apply when assessing whether injunctive relief should be afforded). Those courts that have moved more squarely into the world of cost-benefit balancing have less reason to be concerned about the prospect of an unpopular court-issued injunction, given that only activities deemed harmful on net will be under threat of court cessation.

¹²¹ See RESTATEMENT (SECOND) OF TORTS § 821C(1) (1979).

¹²² See Raymond H. Brescia, *On Public Plaintiffs and Private Harms: The Standing of Municipalities in Climate Change, Firearms, and Financial Crisis Litigation*, 24 NOTRE DAME J.L. ETHICS & PUB. POL’Y 7, 45 (2010).

¹²³ For instance, in California’s public nuisance suit against the six largest automakers, the state sought compensation for

billions of dollars in damages, including millions of dollars of funds expended to determine the extent, location, and nature of future harms and to prepare for and mitigate those harms, and billions of dollars of current harm to the value of flood control infrastructure and natural resources such as the snow pack and coastline that are vital to the well-being of the State.

Complaint for Damages and Declaratory Judgment at 13, *California v. Gen. Motors Corp.*, 2007 WL 2726871 (N.D. Cal. 2007) (No. C06-05755 MJJ), available at http://ag.ca.gov/newsalerts/cms06/06-082_0a.pdf.

¹²⁴ See Richard O. Faulk & John S. Gray, *Alchemy in the Courtroom? The Transmutation of Public Nuisance Litigation*, 2007 MICH. ST. L. REV. 941, 1003–05 (2007) (criticizing a similar attempt in the context of lead paint litigation).

¹²⁵ 663 F. Supp. 2d 863 (N.D. Cal. 2009).

¹²⁶ *Id.* at 868–69.

sea ice decline, and other manifestations of climate change.¹²⁷ Of all the climate change tort cases, this suit seems to be the best pled. The Village of Kivalina not only represents a governmental plaintiff, but an extremely sympathetic one whose constituents are among the most vulnerable people in the world to climate change while also being among the least responsible for it.¹²⁸ Moreover, as discussed below, the primary alleged harm in *Kivalina*—infrastructural damage resulting from enhanced storm exposure due to decreased Arctic sea ice¹²⁹—is more amenable to causal attribution than many other impacts of climate change. Perhaps most critically, plaintiffs in *Kivalina* only seek monetary recovery and the extent of their claim is cabined by pre-existing official estimates of their relocation costs.¹³⁰ Finally, although the amount sought in damages is not trivial—the federal government estimates it will cost between \$95 and \$400 million to move the village¹³¹—the chosen defendants in *Kivalina* include some of the most profitable corporations in the world.¹³²

Notwithstanding these strengths, the federal district court dismissed the *Kivalina* complaint on justiciability grounds.¹³³ Critical to the court's conclusion was a belief that plaintiffs' theory of the case would require the court to "balance the utility and benefit of the alleged nuisance against the harm caused," an analysis that appeared to draw the court inexorably into political juggling of "inter alia, the energy-producing alternatives that were available in the past and . . . their respective impact on far ranging issues such as their reliability as an energy source, safety considerations and the impact of the different alternatives on consumers and business at every level."¹³⁴ Plaintiffs' theory of the case, however, is built on a different

¹²⁷ U.S. Army Corps of Engineers, Kivalina Relocation Master Plan Final Report 06, <http://www.poa.usace.army.mil/en/cw/Kivalina/Kivalina.html> (last visited Feb. 12, 2011); *Alaska Native Villages: Villages Affected by Flooding and Erosion Have Difficulty Qualifying for Federal Assistance Before the S. Comm. on Appropriations*, 108th Cong. 3 (2004) (statement of Robert A. Robinson, Managing Director for Natural Resources and Environment), available at <http://www.gao.gov/new.items/d04895t.pdf>.

¹²⁸ See Complaint for Damages and Demand for Jury Trial at ¶ 46, *Native Vill. of Kivalina v. ExxonMobil Corp.*, 663 F. Supp. 2d 863 (N.D. Cal. 2009) (No. 08-cv-01138-SBA), 2008 WL 594713 ¶¶ 187–88.

¹²⁹ *Native Vill. of Kivalina*, 663 F. Supp. 2d at 869.

¹³⁰ Complaint for Damages and Demand for Jury Trial at ¶ 4, 70, *Native Vill. of Kivalina*, 663 F. Supp. 2d 863 (No. C 08-01138 SBA).

¹³¹ *Id.* at 4.

¹³² *Native Vill. of Kivalina*, 663 F. Supp. 2d at 868 n.1. Under both public and private nuisance doctrine, one consideration weighing in favor of relief can be the simple distributive fact that defendants are able to bear the cost of compensation or abatement in the context of significant harms. See RESTATEMENT (SECOND) OF TORTS §§ 826(b), 829A (1979).

¹³³ *Native Vill. of Kivalina*, 663 F. Supp. 2d at 868.

¹³⁴ *Id.* at 874. In making the determination that balancing would be required, the court cherry-picked seemingly supportive language from comment e to section 821B of the Second Restatement, but overlooked numerous other instances in the Second Restatement that support a stricter approach. See *infra* text accompanying note 173. The district judge in *California v. General Motors Corp.*, which was later voluntarily dismissed by California following its successful regulatory efforts against the auto industry, made a similar leap. 2007 WL 2726871, at *8 (N.D. Cal., Sept. 17, 2007) ("Plaintiff's claim would require the Court to balance the

conception of nuisance liability. Plaintiffs are not asking for judicial “determination of what would have been an acceptable limit on the level of greenhouse gases emitted by [d]efendants,”¹³⁵ as the court put it. Instead, they are asking for revitalization of an earlier conception of nuisance liability that focuses only on the severity of plaintiffs’ harm. In essence, they are asking the court to reinscribe a classical liberal conception of property rights in which the interest of landowners in the use and enjoyment of property is protected with stronger sauce than modern welfarist balancing.¹³⁶ After all, if one accepts the normative argument that property is intended to create a private sphere of sovereignty within which individuals and groups can find shelter from majoritarian incursion and oppression, then the Alaska Natives of Kivalina deserve such sovereignty, if any landowner does.¹³⁷

The *Kivalina* plaintiffs may have another chance to press their argument dismissal if the Supreme Court in its review of *Connecticut v. American Electric Power* does not prevent federal common law adjudication altogether. Nevertheless, even if they clear jurisdictional and justiciability hurdles, the *Kivalina* plaintiffs still will need to persuade the court to adopt a strict conception of nuisance liability. And even if they clear *that* hurdle, they will only find themselves in yet another pickle: having advanced a classical liberal conception of strong property rights protection in order to establish duty and breach, they will then need to quickly shift to an instrumentalist framework in order to deal with problems of causation. As the next Part explains, it is precisely tort law’s classical liberal foundation that limits the ability of courts to trace climate change harms to defendants’ activities according to orthodox causation principles. Thus, for plaintiffs to succeed, the same judge who views nuisance law as a strict bulwark in defense of property rights must then adopt an optimal deterrence lens to see the wisdom of unusual probabilistic causation doctrines. Tort is always pluralist in its goals and conceptions, but this amount of internal dissonance is probably too much for a single case to bear.

C. Causation

The most significant challenge for climate change tort suits lies in proving causation.¹³⁸ To be sure, the president of the National Academy of Sciences testified in 2006 before the U.S. House of Representatives that “we understand the mechanisms of CO₂ and climate better than we do of what causes lung cancer In fact, it is fair to say that global warming may be

competing interests of reducing global warming emissions and the interests of advancing and preserving economic and industrial development.”).

¹³⁵ *Native Vill. of Kivalina*, 663 F. Supp. 2d at 876.

¹³⁶ See Jonathan H. Adler, *Taking Property Rights Seriously: The Case of Climate Change*, 26 SOC. PHILANTHROPIC & POL’Y, Summer 2009, at 296, 306.

¹³⁷ See *id.* at 299, 304.

¹³⁸ Vincent S. Oleszkiewicz & Douglas B. Sanders, *The Advent of Climate Change Litigation Against Corporate Defendants*, 35 Env’t Rep. (BNA) 2365, 2369 (Nov. 12, 2004) (“Causation is the crucial issue for defendants because it will be the most difficult for a plaintiff to demonstrate . . .”).

the most carefully and fully studied scientific topic in human history.”¹³⁹ Nevertheless, defendants might take a cue from the tobacco playbook, finding it cost-effective to contest even rudimentary aspects of climate change science, just as tobacco defendants successfully deterred and prolonged lawsuits by fiercely challenging basic medical facts regarding carcinogenicity and addictiveness.¹⁴⁰ In the administrative law realm, the U.S. Chamber of Commerce and others have filed suit against the Environmental Protection Agency (EPA) for its greenhouse gas endangerment finding under the Clean Air Act.¹⁴¹ Bolstered by scientifically marginal but nonetheless damaging revelations of error in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), these litigants promise a “Scopes Monkey Trial of the 21st century.”¹⁴² Both the EPA and courts have relied heavily on IPCC assessments in evaluating the links between greenhouse gas emissions, global warming, and adverse impacts.¹⁴³ Thus, the IPCC’s public relations disaster could well be viewed as a litigation opportunity by climate change defendants.

Assuming that the basic anthropogenic greenhouse effect is not contested, plaintiffs still face a variety of conceptual and empirical difficulties in their attempts to connect any individual climate-related harm to particular defendants’ emissions. The most blunt barrier is posed by tort law’s traditional requirement of but-for causation: “Under orthodox common law rules concerning causation, a tortfeasor is liable for an indivisible injury that would not have happened absent that party’s breach.”¹⁴⁴ Even though this mechanistic vision of causation has long since been abandoned by scientists in favor of a probabilistic one, courts continue to cling to the but-for requirement in order to implement the classical liberal vision of tort as a system of rules prescribing right conduct within interpersonal relations.¹⁴⁵ Singling out defendant’s behavior as a

¹³⁹ *Questions Surrounding the ‘Hockey Stick’ Temperature Studies: Implication for Climate Change Assessments Hearings Before the Subcomm. on Oversight and Investigations of the H. Comm. on Energy and Commerce*, 109th Cong., 674–743 (July 27, 2006) (statement by Ralph Cicerone, President, National Academy of Sciences).

¹⁴⁰ See Robert L. Rabin, *Institutional and Historical Perspectives on Tobacco Tort Liability*, in *SMOKING POLICY: LAW, POLITICS, AND CULTURE* 110, 112–13, 116 (Robert L. Rabin & Stephen D. Sugarman eds., 1993) (outlining the early strategies of tobacco litigation).

¹⁴¹ Jim Tankersley, *U.S. Chamber of Commerce Seeks Trial on Global Warming*, *L.A. TIMES*, August 25, 2009, <http://articles.latimes.com/2009/aug/25/nation/na-climate-trial25> (last visited Feb. 13, 2011).

¹⁴² *Id.* (quoting unnamed Chamber of Commerce officials).

¹⁴³ See, e.g., EPA’s Denial of the Petitions to Reconsider the Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 75 Fed. Reg. 49,556, 49,569 (Aug. 13, 2010); see also *Massachusetts v. EPA*, 549 U.S. 497, 507 n.9, 508–09 (2007).

¹⁴⁴ Jane Stapleton, *The Two Explosive Proof-of-Causation Doctrines Central to Asbestos Claims*, 74 *BROOK. L. REV.* 1011, 1012 (2009).

¹⁴⁵ See Troyen A. Brennan, *Causal Chains and Statistical Links: The Role of Scientific Uncertainty in Hazardous-Substance Litigation*, 73 *CORNELL L. REV.* 469, 471 (1988) (“[T]he causal concepts derived from Newtonian physics are quite similar to those that inform the law, although they are no longer essential to science.”). Academic criticisms of the orthodox approach are legion. See Jonathan C. Mosher, *A Pound of Cause for a Penny of Proof: The*

necessary cause of plaintiff's harm is seen as prerequisite to the invocation of judicial authority to reallocate losses from where they otherwise fall within private ordering. Put more affirmatively, if tort law's "main idea is about permitting people an avenue of civil recourse through which to redress the wrongful injurings done to them,"¹⁴⁶ then that same idea is likely to affect how courts assess the causal relationship between the doer and the done. When a plaintiff's proof bears the form of a text on quantum physics rather than a morality play, the case will seem to involve the kind of risk prevention and insurance endeavors that are characteristic of the administrative state, rather than the common law.¹⁴⁷

Climate change science presents numerous problems for plaintiffs in this regard. First, most climate-related harms—such as those resulting from hurricanes, heat waves, droughts, seasonal allergies, pest invasions, or disease infections—already have a nontrivial background rate of occurrence, separate and apart from anthropogenic global warming.¹⁴⁸ Thus, under orthodox causation rules, plaintiffs will need to demonstrate that the human warming factor more than doubled the risk that their particular harm would have occurred.¹⁴⁹ Anything less, and plaintiffs will have failed to show that their harm more likely than not resulted from anthropogenic greenhouse gas emissions.¹⁵⁰ This barrier might seem to be insurmountable, but it is not.

Failed Economy of an Eroded Causation Standard in Toxic Tort Cases, 11 N.Y.U. ENVTL. L.J. 531, 531 n.1 (2003) (gathering sources).

¹⁴⁶ Benjamin C. Zipursky, *Foreseeability in Breach, Duty, and Proximate Cause*, 44 WAKE FOREST L. REV. 1247, 1272 (2009).

¹⁴⁷ Consider the following discussion:

Regulatory and advisory bodies . . . utilize a "weight of the evidence" method to assess the carcinogenicity of various substances in human beings and suggest or make prophylactic rules governing human exposure. This methodology results from the preventive perspective that the agencies adopt in order to reduce public exposure to harmful substances. The agencies' threshold of proof is reasonably lower than that appropriate in tort law, which "traditionally make[s] more particularized inquiries into cause and effect" and requires a plaintiff to prove "that it is more likely than not that another individual has caused him or her harm."

Allen v. Pa. Eng'g Corp., 102 F.3d 194, 198 (5th Cir. 1996) (alteration in original) (quoting Wright v. Willamette Indus., Inc., 91 F.3d 1105, 1107 (8th Cir. 1996)).

¹⁴⁸ See Mimura et al., *supra* note 18, at 83 (noting that climate change attribution depends on a demonstration that "observed changes are (1) unlikely to be due entirely to natural internal climate variability; (2) consistent with estimated or modeled responses to the given combination of anthropogenic and natural forcing; and (3) not consistent with alternative, physically plausible explanations of recent climate change").

¹⁴⁹ See, e.g., DeLuca v. Merrell Dow Pharm., Inc., 911 F.2d 941, 957–59 (3d Cir. 1990); Manko v. United States, 636 F. Supp. 1419, 1434 (W.D. Mo. 1986), *aff'd in relevant part*, 830 F.2d 831 (8th Cir. 1987).

¹⁵⁰ DeLuca, 911 F.2d at 957–59; Manko, 636 F. Supp. at 1434. The Third Restatement discourages the use of a formulaic relative risk factor requirement at the general causation stage, preferring to allow plaintiffs to attempt to refine the evidence through "differential etiology" and other methods at the specific causation stage, "[s]o long as there is adequate evidence of general causation." RESTATEMENT (THIRD) OF TORTS § 28 cmt. c(3) (2010). Whether the strong filter is applied at the general or the specific causation stage, however, plaintiffs ultimately will need to demonstrate that their particular harm was more likely than not the

Some climate change impacts, for instance, are akin to what is known as a “signature disease” in toxic tort parlance, in that the impacts simply would not have occurred absent anthropogenic climate change.¹⁵¹ The harm alleged in *Kivalina* may well fit this characterization. In a world without human-induced warming—that is, in the counterfactual world required by the orthodox causation test—plaintiffs in *Kivalina* could have continued to inhabit their village without substantial fear of sea level rise, storm surge, permafrost erosion, or other climate-related threats to habitability for hundreds of years.

The problem of cryosphere¹⁵² melting that lies behind Kivalina’s woes will give rise to other signature impacts of climate change. In its Fourth Assessment Report on Climate Change, the IPCC focused considerable attention on the role of temperature change as a direct driver of climate change impacts, given that “physical and biological responses to changing temperatures are often better understood than responses to other climate parameters, and the anthropogenic signal is easier to detect for temperature than for other parameters.”¹⁵³ Furthermore, the evidence for shrinking of the cryosphere—including melting of glaciers, snow, sea ice, and permafrost—is strong and the “effects in the environment and in human activities are already detectable.”¹⁵⁴ Among such effects are glacier retreat, glacial lake flooding and outburst, and reduced snowpack at low altitudes,¹⁵⁵ with adverse implications for municipal water suppliers, ski resorts, tourism companies, snow runway operators, and other potential climate change plaintiffs. Ironically, even oil companies might claim to have suffered a signature climate change impact given the reduced number of exploration days available in the Arctic due to thawing of ice roads.¹⁵⁶

Even for non-signature impacts, climate modeling in some cases can enable relatively fine parsing of natural and human contributions to the risk of adverse events. A study published in the journal *Nature*, for instance, estimated that the 2003 European heat wave, which resulted in the premature death of approximately 22,000 to 35,000 people, was at least two times more likely to have occurred as a result of the human contribution to

result of anthropogenic greenhouse gas emissions, unless they can avail themselves of an unusual doctrine such as the substantial risk factor test for causation. See *infra* text accompanying notes 321–22.

¹⁵¹ Cf. Allen et al., *supra* note 3, at 1384 (“The key difference between long-term, catastrophic impacts of GHG increases and more mundane short-term impacts is that we might, in some instances, be able to say with confidence that some of these long-term impacts would not have occurred in the absence of human influence on climate.”).

¹⁵² The cryosphere is “[t]he component of the climate system consisting of all snow and ice (including *permafrost*) on and beneath the surface of the Earth and ocean.” Mimura et al., *supra* note 18, at 873.

¹⁵³ *Id.* at 84.

¹⁵⁴ *Id.* at 89.

¹⁵⁵ *Id.*

¹⁵⁶ *Id.* at 86 tbl.1.2 (noting decline in travel days in the Alaskan tundra from 220 to 130 days per year).

global warming.¹⁵⁷ Likewise, some experts now believe that the collapse of lobster fisheries south of Cape Cod is directly attributable to warmer ocean temperatures from climate change, as other explanations have been tested and excluded.¹⁵⁸ Thus, with respect to these events, credible scientific evidence exists to support a finding of causation, even under the restrictive more-likely-than-not formulation. Fortuitously for plaintiffs, the National Oceanic and Atmospheric Administration has formed a “Climate Scene Investigators” unit that is specifically tasked with evaluating extreme climate and weather events for evidence of an anthropogenic climate change fingerprint.¹⁵⁹

Much will depend on the particular harm involved. Plaintiffs in *Comer v. Murphy Oil USA (Comer v. Murphy Oil)*,¹⁶⁰ for instance, have a much tougher row to hoe, given that their primary claims “rely on allegations of a causal link between greenhouse gas emissions, global warming, and the destruction of the plaintiffs’ property by rising sea levels and the added ferocity of Hurricane Katrina.”¹⁶¹ Although studies predict a substantial future increase in the severity and damage potential of Atlantic hurricanes due to human-induced rises in sea temperature and sea level, retrospective analyses of the human contribution to the risk of an event like Hurricane Katrina are much more equivocal.¹⁶² Unfortunately for climate change

¹⁵⁷ Peter A. Stott et al., *Human Contribution to European Heatwave of 2003*, 432 NATURE 610, 610 (2004); see also Daithi A. Stone et al., *The Detection and Attribution of Human Influence on Climate*, in 34 ANN. REV. ENVIRON. & RESOURCES 1, 10–11 (Ashok Gadgil & Diana M. Liverman eds., 2009) (explaining methodology behind the heat wave study); Allen et al., *supra* note 3, at 1392 (observing that the heat wave researchers utilized a conservative assumption of normal probability assumptions when a fat-tail distribution may have been more appropriate).

¹⁵⁸ See Doug Fraser, *Cape Lobster Industry Faces Crisis*, CAPE COD TIMES, June 13, 2010, <http://www.capecodonline.com/apps/pbcs.dll/article?AID=/20100613/NEWS/6130340/-1/NEWSMAP>. Alternative explanations include overfishing, water pollution, invasive species, and disease. Through experimental and observational means, scientists have determined that these explanations cannot account for recent drastic declines in lobster populations in the southern portion of their North Atlantic habitat. Importantly, the remaining suspect—warmer water temperatures—is not merely the last explanation standing, but a well-understood and studied driver of health impairment and reproductive decline among lobsters. Cf. Neal C. Stout & Peter A. Valberg, *Bayes’ Law, Sequential Uncertainties, and Evidence of Causation in Toxic Tort Cases*, 38 U. MICH. J.L. REFORM 781, 889–90 (2005) (“Generally, the more alternative possible causes there are for the injury, or the more likely an alternative possible cause explains the injury, the more explanation (specificity) courts should require from the causation expert as to why the subject agent is the probable cause.”).

¹⁵⁹ See Katy Human, *CSI: NOAA Climate Scene Investigators*, CLIMATEWATCH MAGAZINE, Oct. 23, 2009, <http://www.climatewatch.noaa.gov/2009/articles/csi-noaa-climate-scene-investigators>.

¹⁶⁰ 585 F.3d 855 (5th Cir. 2009), *panel opinion vacated en banc*, 607 F.3d 1049 (5th Cir. 2010).

¹⁶¹ *Id.* at 863.

¹⁶² See Thomas R. Knutson et al., *Tropical Cyclones and Climate Change*, 3 NATURE GEOSCIENCES 157, 157 (2010) (“[I]t remains uncertain whether past changes in tropical cyclone activity have exceeded the variability expected from natural causes. However, future projections based on theory and high-resolution dynamical models consistently indicate that greenhouse warming will cause the globally averaged intensity of tropical cyclones to shift towards stronger storms”); Morris A. Bender et al., *Modeled Impact of Anthropogenic Warming on the Frequency of Intense Atlantic Hurricanes*, 327 SCIENCE 454, 454 (2010) (utilizing

plaintiffs, the majority of expected impacts are likely to present a complicated causal picture similar to that of hurricanes. With respect to vector-borne diseases, allergies, and other health impacts, for instance, causal attribution is complicated by a lack of long-term data relating climate and health, and by the significant effects of wealth, demographics, technology, and other non-climate drivers.¹⁶³ Unless courts are willing to adopt a significant risk test for causation—under which plaintiffs could proceed merely if defendant’s conduct was shown to have created a significant risk of the harm occurring¹⁶⁴—many climate change plaintiffs will simply fail to meet their actual causation burden.

Again, the logic behind a governmental plaintiff and a public nuisance cause of action becomes plain, as a state or a city might cite the entire time series of hurricanes, heat waves, or other adverse events as falling under its purview and therefore amenable to judicial relief.¹⁶⁵ From this perspective, recovery arguably would not need to depend on showing that any particular event more likely than not resulted from anthropogenic climate change. Instead, the governmental plaintiff would cite the entire trend of adverse events and seek abatement or restitution on account of elevations in the trend. The harm alleged would thus fit the epistemological shape of climate science. Other high-profile uses of public nuisance litigation, however, suggest that courts are unlikely to embrace this aggregative view. Governmental plaintiffs in suits against the tobacco industry urged a statistical causation approach that did not require identification of particular victims of smoking-related diseases, but instead only an epidemiologically identified elevation in disease among the relevant population group.¹⁶⁶ However, the reasoning of at least one state court suggests that such an approach might violate the state’s constitutional due process clause,¹⁶⁷ and the theory more generally was not tested in courts prior to the Master Settlement Agreement that ended most litigation by states against the tobacco industry. Subsequent cases against the lead paint industry, handgun

a hurricane-prediction model to project a doubling of the frequency of category four and five storms by the end of the twenty-first century).

¹⁶³ See Mimura et al., *supra* note 18, at 107; see also *id.* at 84 (noting that, for many climate change impacts, “decades of data may be needed in order to separate the response to [natural] climate oscillations from that due to longer-term climate change”). A recent report in *Nature*, for instance, suggested that fears of malaria expansion due to climate change are overstated, in light of the ability of public-health measures such as improved access to medications and preventative measures such as bed nets to outweigh the effects of temperature on mosquito populations and bite frequency. See Heidi Ledford, *Malaria May Not Rise as World Warms*, 465 NATURE 280, 280 (2010).

¹⁶⁴ See *infra* text accompanying notes 321–22.

¹⁶⁵ See Hunter & Salzman, *supra* note 3, at 1793 (“[T]he states’ claims of public nuisance are not premised on any one specific weather event, so they may not be required to show that climate change has resulted in a specific hurricane or drought—just that, generally, over time climate change may have certain impacts (e.g., declines in snowpack, more intense storms, and warmer temperatures).”).

¹⁶⁶ Gifford, *supra* note 86, at 753.

¹⁶⁷ Agency for Health Care Admin. v. Associated Indus. of Fla., 678 So.2d 1239, 1253–55 (Fla. 1996).

manufacturers, and subprime mortgage lenders have also revealed only faint appetite among courts for creative use of the public nuisance cause of action.¹⁶⁸ Much of the criticism levied against these cases has been that governmental plaintiffs appear to be pressing public nuisance theories as an end-run around conventional causation requirements.¹⁶⁹

A second causation challenge facing plaintiffs has to do with the extraordinary numerosity of greenhouse gas emitters. As noted above, this numerosity spells trouble for the establishment of duty. It also has profound implications for causation, as any individual defendant can quite plausibly offer the “consequentialist alibi” that its emissions are simply too small of a share of global emissions to cause a discernable difference.¹⁷⁰ It is only in combination with millions of other emitters that the anthropogenic greenhouse effect becomes a radical and potentially devastating climactic experiment. Plaintiffs’ dream scenario to overcome this multiple defendant problem would be for courts to adopt the same presumption of indivisibility that they do in the asbestos context, such that any significant contribution to anthropogenic greenhouse gas emissions would subject a defendant to joint-and-several liability for the entirety of plaintiff’s harm.¹⁷¹ Precedent in the pollution nuisance context exists for such an approach. To begin with, it is clear that contribution to a pollution nuisance above a *de minimis* threshold can give rise to damages liability or injunctive relief, notwithstanding the presence of numerous other contributors.¹⁷² Moreover, many courts have held that, where apportionment among contributors is infeasible, plaintiffs may hold defendants jointly and severally liable or may shift the burden of

¹⁶⁸ See, e.g., *In re Lead Paint Litig.*, 924 A.2d 484, 494 (N.J. 2007) (“[W]ere we to permit these complaints to proceed, we would stretch the concept of public nuisance far beyond recognition and would create a new and entirely unbounded tort antithetical to the meaning and inherent theoretical limitations of the tort of public nuisance.”).

¹⁶⁹ See Jill D. Jacobson & Rebecca S. Herbig, *Public Nuisance Law: Resistance to Expansive New Theories*, 8 MASS TORTS 3, 5 (A.B.A. Sec. Litig., Fall, 2009) (noting that plaintiffs have used public nuisance theories to “evade” traditional causes of action).

¹⁷⁰ On the moral philosophical implications of what I am calling the “consequentialist alibi,” see Jonathan Glover & M. J. Scott-Taggart, *It Makes No Difference Whether or Not I Do It*, 49 PROC. OF THE ARISTOTELIAN SOC’Y, SUPPLEMENTARY VOLUMES 171, 171 (1975).

¹⁷¹ See Stapleton, *supra* note 144, at 1013.

¹⁷² See *Illinois ex rel. Scott v. City of Milwaukee*, No. 72 C 1253, 1973 U.S. Dist. LEXIS 15607, at *20–*22 (N.D. Ill. Nov. 1, 1973) (“The correct rule would seem to be that any discharger who contributes an aliquot of a total combined discharge which causes a nuisance may be enjoined from continuing his discharge. Either that is true or it is impossible to enjoin point dischargers.”), *aff’d in relevant part and rev’d in part sub nom.*; *Illinois v. City of Milwaukee*, 599 F.2d 151, 177 (7th Cir. 1979), *vacated on other grounds*, 451 U.S. 304, 332 (1981); RESTATEMENT (SECOND) OF TORTS § 840E (1965) (stating with respect to both private and public nuisance that “the fact that other persons contribute to a nuisance is not a bar to the defendant’s liability for his own contribution”); *Cox v. City of Dallas*, 256 F.3d 281, 292 n.19 (5th Cir. 2001) (gathering sources in support of this claim). It is important to distinguish the multiple defendant problem, in which a substantial contribution is likely to be adequate to support some form of liability, from the more basic problem of connecting plaintiffs’ harm to the phenomenon of human-induced climate change. For the latter, courts are far less likely to adopt a substantial risk contribution approach and will instead retain traditional more-likely-than-not principles.

proof onto defendants to disaggregate their respective contributions.¹⁷³ Perhaps it was this precedent that the Second Circuit panel had in mind when, in *Connecticut v. American Electric Power Company*, the panel offhandedly referred to rules governing “a federal common law of nuisance case[s] involving air pollution, where the ambient air contains pollution from multiple sources and where liability is joint and several.”¹⁷⁴ Although merely dicta to support the conclusion that redressability for standing purposes had been adequately alleged, this statement nonetheless likely sent a chill through defendants’ boardrooms.

The air warms slightly for defendants when one considers the ready divisibility of contributions to anthropogenic climate change. Although greenhouse gas emissions contribute to a single global phenomenon, well-understood metrics and methods are available to standardize the warming potential of different gases and to quantify any particular defendant’s contributions. Thus, so long as the emissions levels of a particular defendant can be measured, that defendant’s contribution to climate change harms also can be estimated. EPA’s recently adopted greenhouse gas reporting rule, which requires suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of greenhouse gas emissions to submit annual reports on their emissions levels to EPA, surely eliminates any basis for plaintiffs to

¹⁷³ See *Borel v. Fibreboard Paper Prods. Corp.*, 493 F.2d 1076, 1095 (5th Cir. 1973) (“Where several defendants are shown to have each caused some harm, the burden of proof (or burden of going forward) shifts to each defendant to show what portion of the harm he caused. If the defendants are unable to show any reasonable basis for division, they are jointly and severally liable for the total damages.”); *Landers v. E. Tex. Salt Water Disposal Co.*, 248 S.W.2d 731, 734 (Tex. 1952) (“Where the tortious acts of two or more wrongdoers join to produce an indivisible injury, that is, an injury which from its nature cannot be apportioned with reasonable certainty to the individual wrongdoers, all of the wrongdoers will be held jointly and severally liable for the entire damages and the injured party may proceed to judgment against any one separately or against all in one suit.”); RESTATEMENT (SECOND) OF TORTS § 875 (1965) (“Each of two or more persons whose tortious conduct is a legal cause of a single and indivisible harm to the injured party is subject to liability to the injured party for the entire harm.”); *id.* § 433B(2) (“Where the tortious conduct of two or more actors has combined to bring about harm to the plaintiff, and one or more of the actors seeks to limit his liability on the ground that the harm is capable of apportionment among them, the burden of proof as to the apportionment is upon each such actor.”); David W. Robertson, *The Common Sense of Cause in Fact*, 75 TEX. L. REV. 1765, 1790–91 (1997) (“[M]ost American courts will say that the plaintiff must apportion the separate damages between or among the tortfeasors when that is feasible, but that when apportionment is not feasible the tortfeasors should be held jointly and severally liable for the entire damage.” (footnote omitted)).

On the other hand, the Second Restatement also offers the following caveat:

The possibility arises that there may be so large a number of actors, each of whom contributes a relatively small and insignificant part to the total harm, that the application of the rule [of joint and several liability and burden-shifting] may cause disproportionate hardship to defendants. Thus if a hundred factories each contribute a small, but still uncertain, amount of pollution to a stream, to hold each of them liable for the entire damage because he cannot show the amount of his contribution may perhaps be unjust.

RESTATEMENT (SECOND) OF TORTS § 433B cmt. e (1965).

¹⁷⁴ 582 F.3d 309, 349 (2d Cir. 2009).

claim the infeasibility of disaggregating defendants' contributions to climate change going forward.¹⁷⁵ And although historical emissions data is much harder to estimate, plaintiffs still have means available to undertake such estimations through corporate records, tax filings, government lease documents, and other sources. One study, for instance, concludes that as much as five per cent of anthropogenic CO₂ emissions over the last 120 years can be attributed to a single oil company and its corporate predecessors.¹⁷⁶

In short, because of the relatively diffuse and uniform effect of greenhouse gas emissions and because of the possibility of estimating particular defendants' emissions levels, plaintiffs do not need to rely on joint and several liability, burden-shifting, or other concessionary causation doctrines. Nor do they need to resort to market share liability, as some commentators have suggested.¹⁷⁷ Under market share liability, courts apportion liability according to defendants' share of the relevant product market, rather than more directly on their share of causal responsibility for plaintiffs' harm. Courts have invoked market share liability in the diethylstilbestrol (DES) context in light of plaintiffs' inability to prove which defendant manufactured and marketed the particular doses of DES that plaintiffs' mothers ingested and that led to teratogenic harm.¹⁷⁸ At least in theory, if all DES victims sued all DES manufacturers, and if all courts applied market share liability in the same fashion, then eventually all manufacturers would pay damages equal to their actual causal shares of responsibility. Some semblance of classical liberal tort responsibility would thus be preserved through the aggregate impact of the suits. Nonetheless, very few courts have applied the market share theory outside of the DES context, usually on the ground that other products and activities do not have the feature of generic fungibility that DES does.¹⁷⁹ Perhaps because greenhouse gas emissions *do* seem to have that elusive quality of fungibility, commentators advocate application of market share liability for climate-related harms.¹⁸⁰ The climate change context, however, is fundamentally different: each emission contributes to a *single* global process that causes *all* harms. In such a context, several liability is the appropriate theory of recovery, rather than market share.

¹⁷⁵ See Mandatory Greenhouse Gas Reporting, 74 Fed. Reg. 16,448, 16,612–14 (Apr. 10, 2009) (to be codified at scattered sections of 40 C.F.R.).

¹⁷⁶ The distinction belongs to ExxonMobil. Hunter & Salzman, *supra* note 3, at 1750 (quoting Press Release, Friends of the Earth, ExxonMobil's Contribution to Global Warming Revealed (Jan. 29, 2004), http://www.foe.co.uk/resource/press_releases/exxonmobils_contribution_t_28012004.html).

¹⁷⁷ See Grimm, *supra* note 3, at 211; Maag, *supra* note 3, at 210–11.

¹⁷⁸ *Sindell v. Abbott Labs.*, 607 P.2d 924, 937 (Cal. 1980).

¹⁷⁹ See *Edwards v. A.L. Lease & Co.*, 54 Cal. Rptr. 2d 259, 262 (Cal. Ct. App. 1996) (market share liability not applicable to ABS pipe); *Univ. Sys. of N.H. v. U.S. Gypsum Co.*, 756 F. Supp. 640, 656 (D.N.H. 1991) (asbestos not a fungible product susceptible to application of market share liability); *Mullen v. Armstrong World Indus. Inc.*, 246 Cal. Rptr. 32, 35–36 (Cal. Ct. App. 1988) (same).

¹⁸⁰ See Grimm, *supra* note 3, at 219–21.

Of course, once causal contributions are disaggregated in this way, the problem of diluteness reappears. Tellingly, the Second Restatement offers this caveat regarding the multiple causation context: “although no one of the contributing factors may have such a predominant effect, their combined effect may, as it were, so dilute the effects of the actor’s negligence as to prevent it from being a substantial factor.”¹⁸¹ Do the emissions of any individual defendant constitute a “substantial factor” driving climate change? To be sure, there is remarkable market concentration in the fossil fuel, automobile, and electricity sectors.¹⁸² “In fact, 50 companies are responsible for three-quarters of the emissions from the U.S. electric power sector. Of these, just 18 companies are responsible for 50% of the emissions, and just 5 companies for 25%.”¹⁸³

By carefully selecting a group of defendants from among these high-emitting companies, plaintiffs are somewhat able to overcome the causal diluteness impression. As one of the lead plaintiffs’ lawyers observed with respect to the defendants in *Connecticut v. American Electric Power Company*, “[a] court order requiring these five companies to reduce their emissions would constitute one of the single greatest reductions in GHGs ever effected.”¹⁸⁴ Nevertheless, it would still be a reduction that is slight in comparison to the overall level of emissions. Notably, when the Supreme Court was faced with this feature of the climate change problem in *Massachusetts v. EPA*, the majority stressed that regulatory agencies are entitled to “whittle away” at a complex problem such as climate change by targeting only selected contributors, rather than being required to bring all significant sources under a control regime in one fell swoop.¹⁸⁵

But courts are not agencies and the common law of tort is designed to address discrete harms by discrete actors, rather than to “whittle away” at the margins of a comprehensive problem. Indeed, even if one assumed for a moment that national governments could be sued in tort for permitting greenhouse gas emitting activities within their jurisdictions—in order to construct a class of defendants manageable in size yet still emissions-encompassing in scope—the problem of diluteness would remain. Historical responsibility for existing greenhouse gas concentrations is difficult to calculate, but studies suggest that at most around thirty percent of the

¹⁸¹ RESTATEMENT (SECOND) OF TORTS § 433 cmt. d (1965). *See also id.* § 834 cmt. d (“When a person is only one of several persons participating in carrying on an activity, his participation must be substantial before he can be held liable for the harm resulting from it.”).

¹⁸² *See* Grossman, *supra* note 3, at 29–31.

¹⁸³ *See* Pawa, *supra* note 3, at 10,238 (citing SANDRA GOODMAN ET AL., NATURAL RES. DEF. CTR., BENCHMARKING AIR EMISSIONS OF THE 100 LARGEST ELECTRIC POWER PRODUCERS IN THE UNITED STATES—2002, at 3 (2004), available at http://www.nrdc.org/air/pollution/benchmarking/2002/benchmark2002_pt1.pdf)

¹⁸⁴ *Id.*

¹⁸⁵ 549 U.S. 497, 524 (1997). A similar defense of incremental regulation and selective targeting of industries that are amenable to greenhouse gas regulation was accepted by the European Court of Justice, notwithstanding the argument of targeted industries that the principle of equal treatment under law had been violated. *See* Case C-127/07, *Société Arcelor Atlantique et Lorraine v. Premier ministre*, 2009 O.J. (C 44/13) 8, 8–9 (Court of Justice of the European Union 2008).

current stock is attributable to any single nation.¹⁸⁶ Looking forward, relative national contributions will become even more diffuse, as China, India, Brazil, and other major developing countries continue to expand their emissions.¹⁸⁷ Thus, even in a fanciful world of full tort liability against national actors, the problem of causal diluteness still looms large over plaintiffs' claims. Perhaps, then, the reason that commentators turn to market share liability is that its logic seems to eliminate the need for any particular defendant to constitute a "substantial factor" in bringing about plaintiff's harm. In theory, if plaintiff wishes to sue defendants representing only one percent of the relevant market, then she receives only one percent of her available recovery. Nothing within the logic of market share liability seems to prevent this result, or its extension to the greenhouse gas context.

There are at least two problems with this reasoning. First, even in the DES context, courts have failed to accept the full implications of the market share logic, often requiring plaintiffs to assemble a group of defendants representing a "substantial percentage" of the total market.¹⁸⁸ This requirement reflects the discomfort that judges have in stepping too far away from tort law's classical *A-hits-B* framework. Second, as noted above,¹⁸⁹ the climate change context poses distinct conceptual problems in terms of attribution, given the participation of so many actors in bringing about emissions other than named defendants. For instance, in its abandoned climate change nuisance suit, the State of California alleged that defendant automakers represented nine percent of the world's CO₂ emissions.¹⁹⁰ Not only is this an uncomfortably small share of global emissions for a common law court to stomach, but it also represents a debatable depiction of responsibility for vehicle emissions. If automakers are only held accountable for *direct* emissions from manufacturing, rather than also from vehicle use, then their small percentage of emissions becomes even smaller.

¹⁸⁶ The distinction belongs, of course, to the United States. See World Res. Inst., Contributions to Global Warming: Historic Carbon Dioxide Emissions from Fossil Fuel Combustion, 1900–1999, <http://earthtrends.wri.org/text/climate-atmosphere/map-488.html> (last visited Feb. 13, 2011) (estimating U.S. contribution to carbon dioxide accumulation between 1900–1999 as 30.3%, compared to a 27.7% contribution by Europe, and a 12.2% contribution by China, India, and other developing parts of Asia combined).

¹⁸⁷ See World Res. Inst., Power Surge: Energy Use and Emissions Continue to Rise, <http://www.wri.org/publication/content/8601> (last visited Feb. 13, 2011) (describing increasing fossil fuel use and CO₂ emissions in developing countries).

¹⁸⁸ *E.g.*, *Sindell v. Abbott Labs.*, 607 P.2d 924, 937 (Cal. 1980). Indeed, only the New York Court of Appeals seems to have recognized that the market share logic counsels *against* letting individual defendants rebut the presumption of causal contribution by showing in any particular case that their products could not have been ingested by plaintiff's mother. *Hymowitz v. Eli Lilly & Co.*, 539 N.E.2d 1069, 1078 (N.Y. 1989) (refusing to permit defendant to exculpate itself by showing that its product could not have caused plaintiff's injury).

¹⁸⁹ See *supra* text accompanying notes 174–75.

¹⁹⁰ Complaint for Damages and Declaratory Judgment at 2, *California v. Gen. Motors Corp.*, 2007 WL 2726871 (N.D. Cal. 2007) (No. C06-05755 MJJ), available at http://ag.ca.gov/newsalerts/cms06/06-082_0a.pdf.

Plaintiffs no doubt can point to a wealth of evidence suggesting that automakers deliberately steer customers toward high-emitting vehicles and resist legal and market efforts to advance alternative, lower-emitting technologies.¹⁹¹ On the other hand, customers are not mere putty in the hands of automakers: they also bear a share of responsibility for purchasing inefficient vehicles and for driving them in inefficient ways. In that sense, the greenhouse gas emission context is far more complicated than, say, the DES context, in which plaintiffs' mothers simply had no idea they were posing a developmental risk to their infants, or the secondhand smoke context, in which victims plausibly seek to attribute the lion's share of responsibility to the tobacco industry for marketing an addictive product and hiding its dangers from smokers and the public.¹⁹² Before shares of greenhouse gas responsibility can be calculated, we must settle on an appropriate principle of attribution. Just as governments internationally have not decided whether emissions associated with globally traded goods should be attributed on a production or consumption basis,¹⁹³ courts domestically have yet to establish exactly where in the anthropogenic carbon cycle culpability attaches. Critically, any attempt by plaintiffs to narrow the class of defendants will be met by the defendants' demand that other major contributors be joined as third parties (who will themselves also seek to implead other contributors). Quite simply, there is no way to avoid the extraordinary numerosity problem when it comes to greenhouse gas emissions.¹⁹⁴

A final causal difficulty for climate change plaintiffs relates to temporality. Most greenhouse gases are stock pollutants, capable of persisting in the atmosphere and warming the planet for decades, even centuries.¹⁹⁵ Thus, even if plaintiffs successfully disentangle their harms from

¹⁹¹ Cf. Daniel Sperling et al., *The Price of Regulation*, 25 ACCESS, Fall 2004, at 9, 9–16, available at <http://www.uctc.net/access/access25.pdf> (exploring costs, effects, and background of regulatory schemes including those relating to emission controls).

¹⁹² See Robert L. Rabin, *Enabling Torts*, 49 DEPAUL L. REV. 435, 449–50 (1999) (describing partially successful class action suit by airline flight attendants against tobacco manufacturers for secondhand smoke injuries).

¹⁹³ Cf. Jiahua Pan, Jonathan Phillips & Ying Chen, *China's Balance of Emissions Embodied in Trade: Approaches to Measurement and Allocating International Responsibility*, 24 OXFORD REV. ECON. POL'Y 354, 371 (2008) (estimating a thirty percent reduction in attributed emissions for China when greenhouse gas emissions "embodied" in traded goods are assigned to the country where consumption of such goods takes place).

¹⁹⁴ I am indebted to Michael Gerrard for this insight.

¹⁹⁵ JOHN REILLY ET AL., MIT JOINT PROGRAM ON THE SCI. & POLICY OF GLOBAL CHANGE, REPORT NO. 77, COMPARING GREENHOUSE GASES 1–2 (2001), available at http://dspace.mit.edu/bitstream/handle/1721.1/3568/MITJPSPGC_Rpt77.pdf. This little appreciated feature of climate change has depressing implications for policy. Even if all anthropogenic greenhouse gas emissions stopped tomorrow, the atmosphere would not restore its pre-industrial concentration levels for one thousand years. See Susan Solomon et al., *Irreversible Climate Change Due to Carbon Dioxide Emissions*, 106 PROC. NAT'L ACAD. SCI. 1704, 1705 (2009). On the other hand, the underappreciated role of short-lived greenhouse gases such as black carbon offers some reason for optimism, as the significant co-benefits to be obtained from their mitigation offers potential to overcome some of the deadlock in international climate negotiations. See Frances C. Moore & Michael C. MacCracken, *Lifetime Leveraging: An Approach to Achieving International*

alternative causal explanations and successfully establish some principle of causal apportionment among defendants, they still must isolate precisely *when* a duty to avoid emissions attached and *when* their particular harm became reasonably foreseeable. Both of these analyses will work to shorten the time period within which defendants' harmful emissions were *culpably* harmful. Both analyses will require plaintiffs to develop scientific evidence that not only separates anthropogenic climate change impacts from background drivers, but also models a counterfactual world in which emissions occur at historic rates right up until the moment climate responsibility attaches and then drop to whatever level is deemed to be reasonable. This exercise is necessary to ensure that plaintiffs' harm resulted not merely from defendants' conduct, but from the negligent or otherwise tortious aspect of defendants' conduct.

In the realm of products liability, courts have rarely—and usually only briefly—applied a standard under which manufacturers are responsible for product or warning defects irrespective of whether they were reasonably or even scientifically knowable at the time of manufacture.¹⁹⁶ Generally attributed to Deans Page Keeton and John Wade, this “constructive knowledge” approach has the effect of making a negligence-based test for defectiveness into something more like a strict liability test, in light of the deemed irrelevance of foreseeability.¹⁹⁷ Jane Stapleton draws attention to an interesting case from the United Kingdom which presented a similar problem outside of the products liability context.¹⁹⁸ Plaintiffs had been exposed to excessive occupational noise over extended periods of employment, all of which contributed to hearing loss.¹⁹⁹ Plaintiffs were unable, however, to precisely identify the portion of their damage that occurred after the point at which defendant employers became negligent by virtue of the reasonable foreseeability of harm.²⁰⁰ Rather than adopt a crude all or nothing approach, the trial judge instead treated the matter as one of rough justice for the factfinder to assess.²⁰¹ Plaintiffs in the climate change context may need to avail themselves of either the “constructive knowledge” or the “rough justice” approaches, in light of the difficulty they face demonstrating what portion of the climate-related harm is attributable to *culpable* anthropogenic greenhouse gas emissions. Both doctrines are, however, unusual and controversial.

Agreement and Effective Climate Protection Using Mitigation of Short-Lived Greenhouse Gases, 1 INT'L. J. CLIMATE CHANGE STRATEGIES & MGMT. 42, 49 (2009).

¹⁹⁶ David G. Owen, *Bending Nature, Bending Law*, 62 FLA. L. REV. 569, 601 n.174 (2010).

¹⁹⁷ See DAVID G. OWEN, PRODUCTS LIABILITY LAW § 8.7, at 547–49 (2d ed. 2008). Judge Andrews in *Palsgraf* utilized a similar trick when he posited that the reasonable foreseeability of Helen Palsgraf's injury from the defendant railroad's negligence in assisting fireworks-carrying passengers onto a train should be assessed “assum[ing] prevision of the explosion.” 162 N.E. 99, 104–105 (N.Y. 1928) (Andrews, J., dissenting).

¹⁹⁸ See Stapleton, *supra* note 144, at 1021 n.34 (2009) (discussing *Thompson v. Smiths Shiprepairers (North Shields) Ltd.*, [1984] 1 Q.B. 405 (U.K.)).

¹⁹⁹ *Id.*

²⁰⁰ *Id.*

²⁰¹ *Id.*

D. Harm

Even though the element of harm comes last in the hornbooks,²⁰² it comes first in the minds of plaintiffs' lawyers. For tort law, no harm generally means no foul.²⁰³ A basic problem for plaintiffs and their lawyers in the climate change context is that the most devastating impacts of greenhouse gas emissions are not expected to begin until later this century or afterward.²⁰⁴ Thus, in many contexts, climate change plaintiffs will want to seek recovery for a present risk of future harm. The circumstances under which courts permit such recovery, however, are quite limited. Medical monitoring claims in the context of toxic substance exposure present perhaps the best analogy.²⁰⁵ Although courts have rejected the notion that "enhanced risk" of future injury is itself a compensable harm, they have been friendlier to claims based on the need for medical surveillance.²⁰⁶ Plaintiffs might similarly contend that anthropogenic greenhouse gas emissions have created a need for adaptation planning as a precautionary expenditure in advance of climate change's worst impacts.²⁰⁷ Individualized assessments of climate change vulnerability and response needs are now being undertaken at all levels of government and increasingly also by the private sector, often at the behest of their insurers.²⁰⁸ Such expenses might be characterized as the reasonable and foreseeable consequence of climate change defendants' risk-enhancing activities, just as medical monitoring costs have been so characterized in the toxic exposure context.

Courts are unlikely to buy the analogy, however. To begin with, some courts have limited medical monitoring recovery to those risks "for which a medical test for early detection exists . . . and which test has been prescribed by a qualified physician according to contemporary scientific principles."²⁰⁹ Despite the importance and sincerity of their activities, the community of experts involved in climate change adaptation planning do not yet have the level of experience and methodological refinement—not to mention epistemic authority within litigation—that the medical profession does.²¹⁰

²⁰² See, e.g., JOHN L. DIAMOND, LAWRENCE C. LEVINE & M. STUART MADDEN, UNDERSTANDING TORTS, at ix–xvii (3d ed. 2008); EDWARD J. KIONKA, TORTS, at vii–x (3d ed. 2002).

²⁰³ See DIAMOND, LEVINE & MADDEN, *supra* note 202, at 215.

²⁰⁴ Drew Shindell, *Estimating the Potential for Twenty-First Century Sudden Climate Change*, 365 PHILANTHROPIC TRANSACTIONS ROYAL SOC'Y A 2675, 2675 (2007).

²⁰⁵ Daniel A. Farber, *Tort Law in the Era of Climate Change, Katrina, and 9/11: Exploring Liability for Extraordinary Risks*, 43 VAL. U. L. REV. 1075, 1097 & n.72 (2009). As Dan Farber notes, the case of "stigma damages," in which plaintiffs seek compensation for diminution in property values on account of the fear of harm from pollution or other nuisances, also offers a useful analogy. *Id.* at 1097 n.71.

²⁰⁶ For the pioneering opinion adopting these two positions, see *Ayers v. Township of Jackson*, 525 A.2d 287, 297–304 (N.J. 1987).

²⁰⁷ Daniel A. Farber, *Adapting to Climate Change: Who Should Pay*, 23 J. LAND USE & ENVTL. L. 1, 2 (2007).

²⁰⁸ Ruhl, *supra* note 6, at 418.

²⁰⁹ *Hansen v. Mountain Fuel Supply Co.*, 858 P.2d 970, 979 (Utah 1993).

²¹⁰ See Robin Kundis Craig, *Adapting to Climate Change: The Potential Role of State Common-Law Public Trust Doctrines*, 34 VT. L. REV. 781, 808–09 (2010).

Second, some courts require plaintiffs to demonstrate that “as a proximate result of the exposure, plaintiff has a significantly increased risk of contracting a serious latent disease.”²¹¹ Such a requirement seems to incorporate all of the causal attribution difficulties described above, as plaintiffs can identify few if any actors below the level of national governments that can plausibly be described as significantly increasing the risk of anthropogenic climate change. Third, some courts also require “plaintiffs to show not only that their exposure to toxic substances is greater than normal background levels, but that the increased risk of injury from such exposure warrants medical monitoring against future illness beyond that which is recommended for everyone.”²¹² Much of climate change adaptation planning will involve precautionary measures that may be difficult to distinguish from ordinary good governance,²¹³ just as some toxic risk health screening is indistinguishable from good preventative medicine. Thus, a requirement similar to the “special medical monitoring” rule might preclude recovery in the climate change context.

Fourth, several courts have rejected the medical monitoring theory altogether, often citing concern over increases in the number of prospective tort plaintiffs and the possibility that limited defendant funds will be diverted away from presently injured plaintiffs.²¹⁴ Just as medical monitoring awards could easily exhaust available funds for presently injured victims of toxic substance exposure, recovery of anticipated climate change expenses by states could quickly bankrupt whichever industries are held responsible for adaptation planning costs. Finally, to the extent that governmental plaintiffs seek compensation for anticipated rises in public health and safety expenditures rather than more directly for harm to their proprietary holdings, the economic loss rule might pose an independent barrier to recovery, just as it has in public nuisance litigation against handgun manufacturers and subprime mortgage lenders.²¹⁵ In short, the “climate monitoring” approach to future injury faces a number of obstacles for plaintiffs. Instead, plaintiffs seem best advised to identify presently realized injuries and to connect them to the *ongoing* nuisance of climate change, hoping to obtain in the process the holy grail of injunctive relief to address

²¹¹ *Redland Soccer Club, Inc. v. Dep’t of the Army*, 696 A.2d 137, 145 (Pa. 1997); *see also* *Potter v. Firestone Tire & Rubber Co.*, 863 P.2d 795, 823 (Cal. 1993) (citing as relevant factors “the relative increase in the plaintiff’s chances of developing a disease as a result of the exposure, when compared to (a) plaintiff’s chances of developing the disease had he or she not been exposed, and (b) the chances of the members of the public at large of developing the disease”).

²¹² *Redland Soccer Club, Inc. v. Dep’t of the Army*, 55 F.3d 827, 846 n.8 (3d Cir. 1995), *cert. denied*, 516 U.S. 1071 (1996).

²¹³ *See* *Faber*, *supra* note 207, at 7, 19.

²¹⁴ *See* *Hinton ex rel. Hinton v. Monsanto Co.*, 813 So.2d 827, 831 (Ala. 2001); *Wood v. Wyeth-Ayerst Labs.*, 82 S.W.3d 849, 857 (Ky. 2002); *see also* *Metro-N. Commuter R.R. Co. v. Buckley*, 521 U.S. 424, 435–36, 442 (1997) (rejecting an upfront lump sum payment of medical monitoring costs to plaintiff with no symptoms because—among other reasons—the payment might deprive those injured in the future of an adequate remedy).

²¹⁵ *See* *City of Cleveland v. Ameriquest Mortg. Sec., Inc.*, 621 F. Supp. 2d 513, 526 (N.D. Ohio 2009); *City of Chicago v. Beretta U.S.A. Corp.*, 821 N.E.2d 1099, 1143 (Ill. 2004).

future harms.²¹⁶ Of course, as noted throughout this Part, that path faces numerous obstacles of its own.

III. CLIMATE CHANGE AS TORT REFORM

Make no mistake: a conceivable set of arguments on behalf of climate change tort plaintiffs *does* exist. The problem, however, is that the winning scenario for most climate-related harms requires a court to stretch in plaintiffs' direction at nearly every stage of the traditional tort analysis: duty would have to encompass "negligence in the air," rather than more particularized relations of responsibility; nuisance would have to be interpreted as an absolute protection against significant invasions, irrespective of social welfare balancing; actual cause would have to embrace—at long last—a probabilistic, risk-enhancement conception of causation; exceptional measures of apportionment would have to be invoked to address a multiple defendant problem of unprecedented magnitude; proximate cause would have to be interpreted such that the scope of foreseeable harm from greenhouse gas emissions both tracks projections from climate models that stand at the very forefront of scientific inquiry and, in many cases, applies retroactively as a form of imputed knowledge tantamount to strict liability; and harm would have to be expanded to include much more by way of anticipatory injury than courts currently recognize.

Judges are unlikely to follow plaintiffs down this gauntlet. Nevertheless, the very attempt to run it may yield benefits for the tort system. As this Part argues, the effort to fit the mother of all collective action problems into the traditional paradigm of tort reveals much about how that paradigm more generally needs to shift. In many respects, this shift will be a continuation of trends that began last century, but were pulled up short before their logical completion. Broadly speaking, American law evolved during the twentieth century from an individualized *ex post* reparative modality to a systemic *ex ante* planning one.²¹⁷ Coinciding with the rise of statistical methods in fields such as public health and business management, this modality exerted obvious and important influences on administrative agencies. To some extent, tort law went along for the ride during this transformation.²¹⁸ As the

²¹⁶ See *Miotke v. City of Spokane*, 678 P.2d 803, 817, 821–22 (Wash. 1984) (upholding issuance of injunction against future water pollution discharges where plaintiffs adequately demonstrated present, albeit relatively minor injuries), *overruled on other grounds by* *Blue Sky Advocates v. State*, 727 P.2d 644, 648–49 (Wash. 1986).

²¹⁷ See BRUCE A. ACKERMAN, *RECONSTRUCTING AMERICAN LAW* 74 (1984); see also WITT, *supra* note 7, at 139–40 ("Statistical thinking is a remarkably recent development in Western thought. The word 'statistics' itself, which derives from the word 'state' and describes the science of gathering facts bearing on the condition of the state, did not appear in English until the late eighteenth century.").

²¹⁸ Indeed, the effort by tort jurists, labor organizers, business managers, and others to grapple with the industrial-accident crisis might be said to have instigated the transformation. See WITT, *supra* note 7, at 5 (observing that "the industrial-accident crisis introduced to the American legal system new ideas and institutions organized around risk, security, and the

paradigmatic tort shifted from intentional battery to accidental injury, judges and academics began to think of tort law as more than simply a means for affording private redress to victims of civil wrongs. First legal realists and then legal economists came to conceive of tort law largely in instrumental terms, as a device for deterring socially undesirable conduct.²¹⁹ Attention moved from a focus on particular actions between particular parties (e.g., *A* hits *B*) to a focus on activities with more general and potentially harmful impacts (e.g., manufacturing automobiles, marketing pharmaceuticals, and shipping toxic chemicals).²²⁰ Although courts never fully surrendered to an instrumental view of tort law or a statistical conception of injury, the basic need to acknowledge these modes of analysis manifested itself in numerous doctrinal changes. Indeed, by the end of the twentieth century, the public law understanding of tort had become so influential that a neo-traditionalist literature emerged with the aim of restoring the field's classical liberal framing.²²¹

If neo-traditionalists are right that tort law has lost its mooring, then climate change suits will only underscore their point. Alternatively, if judges and academics continue to view tort law at least partially in instrumental terms—which they undoubtedly will²²²—then climate change suits may have the salutary effect of fostering judicial recognition of just how complex and interrelated social, economic, and environmental systems are. Judges may learn to see the world through an ecological lens, just as they have come to see it at least partially through an economic one. Such a development should be welcomed, for despite the intellectual and practical success of law and

actuarial categories of insurance—ideas and institutions that to this day remain at the heart of much of our law”).

²¹⁹ See ACKERMAN, *supra* note 217, at 52 (“Instead of sifting the facts in search of *the* cause of the trouble, the lawyer-economist urges a conception of causation that recognizes how a multiplicity of factors, operating over a lengthy period of time, contribute to our legal discontents.”).

²²⁰ See *id.*

²²¹ See, e.g., Goldberg, *supra* note 70, at 596; John C.P. Goldberg, *Rethinking Injury and Proximate Cause*, 40 SAN DIEGO L. REV. 1315, 1315–16 (2003); Goldberg & Zipursky, *supra* note 70, at 344; Goldberg & Zipursky, *supra* note 61, at 736; Benjamin C. Zipursky, *Civil Recourse, Not Corrective Justice*, 91 GEO. L.J. 695, 754 (2003); Benjamin C. Zipursky, *Rights, Wrongs, and Recourse in the Law of Torts*, 51 VAND. L. REV. 1, 98 (1998). In addition to the neo-traditionalists, mention also must be made of corrective justice theorists who have long argued that instrumentalist welfarism does not provide a satisfactory positive or, in the case of some authors, normative account of tort law. See, e.g., JULES L. COLEMAN, *THE PRACTICE OF PRINCIPLE: IN DEFENSE OF A PRAGMATIST APPROACH TO LEGAL THEORY* 27–28 (2001); JULES L. COLEMAN, *RISKS AND WRONGS* 198 (1992); ARTHUR RIPSTEIN, *EQUALITY, RESPONSIBILITY, AND THE LAW* 24 (1999); ERNEST J. WEINRIB, *THE IDEA OF PRIVATE LAW* 4–5 (1995); Jules L. Coleman, *The Practice of Corrective Justice*, in *PHILOSOPHICAL FOUNDATIONS OF TORT LAW* 53, 72 (David G. Owen ed., 1995); Arthur Ripstein & Benjamin C. Zipursky, *Corrective Justice in an Age of Mass Torts*, in *PHILOSOPHY AND THE LAW OF TORTS* 214, 245 (Gerald J. Postema ed., 2001); Jules L. Coleman, *The Structure of Tort Law*, 97 YALE L.J. 1233, 1240–41 (1988) (reviewing WILLIAM M. LANDES & RICHARD A. POSNER, *THE ECONOMIC STRUCTURE OF TORT LAW* (1987) and STEVEN SHAVELL, *ECONOMIC ANALYSIS OF ACCIDENT LAW* (1987)); Stephen R. Perry, *The Moral Foundations of Tort Law*, 77 IOWA L. REV. 449, 450 (1992); Ernest J. Weinrib, *Understanding Tort Law*, 23 VAL. U. L. REV. 485, 525 (1989).

²²² See Schwartz, *supra* note 72, at 1834.

economics, the movement has not lived up to its ambition of providing a comprehensive framework for analyzing the social welfare effects of laws and regulations. Most critically, economic evaluation of common law rules and regulatory policies has tended to consist only of partial equilibrium analysis, in which major components of society's systems are held constant, save for whatever particular rule or policy is under inspection.²²³ In part, this approach has been driven by methodological constraints, as more dynamic and comprehensive general equilibrium analyses are difficult and costly to undertake. In addition, however, the preference for partial equilibrium analysis has been tied to the conservative view that laws and institutions function best when they have withstood the test of time and that, accordingly, society should resist radical or wholesale change. Practitioners of law and economics implement this view by evaluating policy proposals piecemeal, examining each for marginal social welfare improvements over a baseline case of business as usual. The baseline case itself is rarely critically examined.

This marginalist orientation has two important limitations in the context of contemporary environmental, health, and safety threats. First, the partial equilibrium framing tends as a practical matter to miss important welfare consequences that would be more apparent from a vantage point that assumes complex interrelations among systems. For instance, on the conventional economic account, liability for shipping toxic chemicals by rail through residential neighborhoods is treated as a simple matter of weighing the direct health and cleanup costs of a spill against the expense of preventing it.²²⁴ From a more dynamic and systemic perspective, however, the costs of a toxic release would be expanded to include the erosion of social capital and the unraveling of housing prices, school quality, and other indicators of well-being that often accompany such disasters.²²⁵ Likewise, the risk of a toxic release occurring would include not only well-characterized engineering, weather, and human operational factors, but also uncertain variables such as the possibility of terrorist acts.²²⁶ Even seemingly well-understood factors such as toxicity would be accompanied by an awareness that unforeseen exposure pathways, synergistic interactions, disease mechanisms, vulnerable subpopulations, and other unpredictable features make toxic risk assessment inherently uncertain.²²⁷

²²³ KYSAR, *supra* note 95, at 21–23.

²²⁴ See *Ind. Harbor Belt R.R. Co. v. Am. Cyanamid Co.*, 916 F.2d 1174, 1179–81 (7th Cir. 1990).

²²⁵ See Jon D. Hanson & Douglas A. Kysar, *Abnormally Dangerous: Inequality Dissonance and the Making of Tort Law*, 45 VAL. U. L. REV. (forthcoming 2011).

²²⁶ See Hazardous Materials: Enhancing Rail Transportation Safety and Security for Hazardous Materials Shipments, 73 Fed. Reg. 72,182, 72,191 (Nov. 26, 2008) (to be codified at 49 C.F.R. pts. 172, 174) (detailing reasons why conventional cost-benefit analysis cannot be applied to homeland security rail safety regulations, including difficulty of assessing the risk and consequence of terrorist action).

²²⁷ See *generally* PRESIDENT'S CANCER PANEL, U.S. DEP'T OF HEALTH & HUMAN SERVS., REDUCING ENVIRONMENTAL CANCER RISK: WHAT WE CAN DO NOW (2010), available at http://deainfo.nci.nih.gov/advisory/pcp/annualReports/pcp08-09rpt/PCP_Report_08-09_508.pdf (discussing the effect of various environmental risk factors on cancer rates). The

Second, the partial equilibrium framing is only able to offer marginal efficiency improvements to a given status quo, rather than an entirely different imagined baseline from which to seek such marginal improvements.²²⁸ This limitation is significant because in some policy areas such as climate change, truly transformative alterations to the status quo are required. This analytical point is critical: when judged according to conventional economic analysis, such transformations will involve steps along the way that appear to be *in*-efficient. That is, in order to realize entirely new systems of energy, housing, transportation, manufacturing, waste disposal, forestry, agriculture, and water treatment—all of which depend at present on unsustainable levels of greenhouse gas emissions²²⁹—societies will need to adopt policies that seem welfare-*decreasing* when evaluated according to cost-benefit data that are derived from present orderings. One way of understanding this second point is to imagine the pursuit of social welfare maximization as being akin to climbing a mountain. Partial equilibrium analysis offers narrow technical advice on how best to climb that mountain. Through disciplined calculation, each proposed step is evaluated to determine whether it results in a gain of elevation.²³⁰ Nowhere in the analysis, however, is the question posed, “Are we on the right mountain?”²³¹

Of course, for reasons of institutional competence and political legitimacy, no one should expect common law courts to direct us to the right mountain. Such wholesale changes in response to climate change will come, if at all, from legislative and regulatory programs that ultimately join the New Deal and the Second Reconstruction in terms of their transformative impact on the American legal, economic, and social order. Nevertheless, as this Part details, the effort to assess the validity of climate-related tort claims may have significant secondary effects for the common law, encouraging judges to view less extreme fact settings as more amenable to tort resolution

fact that the “benefits” side of an activity’s balance sheet might also have uncertainties and overlooked systemic dynamics simply underscores the limitation of partial equilibrium efficiency analysis in the face of large-scale harms that are connected to foundational technologies and activities. Unable to trace costs and benefits through to a systemic resting point—and unable to agree upon a neutral value metric for assessing their weight—we instead rely on unarticulated assumptions about the valence and magnitude of uncounted costs and benefits. See generally KYSAR, *supra* note 95, at 73–74 (discussing the relative ease of identifying toxicity effects on one species, but the difficulty in using nonlinear, dynamic factors and the irreducible uncertainty of such analyses).

²²⁸ See also James M. Anderson, *The Missing Theory of Variable Selection in the Economic Analysis of Tort Law*, 2007 UTAH L. REV. 255 (2007) (discussing the variability of inputs in assessment of negligence).

²²⁹ See U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2008, at ES–1 to –2, ES–7 to –15 (2010).

²³⁰ Even on this score, the partial equilibrium approach faces insuperable obstacles. See R.G. Lipsey & Kelvin Lancaster, *The General Theory of Second Best*, in 24 REV. ECON. STUD. 11, 11–12 (1956). As anyone who has climbed an actual mountain knows, the surest route to the top is *not* the one that ascends with every step.

²³¹ The analogy could be extended: “Will this mountain offer the most inspirational view? How many of us will fit at the top? Is the top really a cliff?”

than they currently do. It is possible, of course, that these secondary effects will occur in precisely the opposite direction. Judges, in other words, might retrench even further onto a narrow, classical liberal conception of tort law in the face of extraordinary conceptual and empirical challenges to that conception posed by climate change. They would do so, however, at the long-term risk of the social relevance and viability of the tort system. To the extent that this Part appears to offer prediction, then, it should be understood as an exercise in hopeful or aspirational prediction. Many possible futures lie ahead for tort law and for the notions of duty and responsibility embodied within it. The one sketched here is not only possible, but desirable.

A. Duty/Proximate Cause

Duty within the common law of tort must be attentive to changing circumstances while remaining stable enough to honor private expectations. At times, this balancing act reaches a crisis point. As John Witt has powerfully illustrated, common law judges came under tremendous strain during the late 19th century, as shocking rates of injury and death among industrial workers were difficult to square with prevailing tort doctrines and the free labor ideology that supported them.²³² The romantic ideal of freely bargaining, self-possessed workers helped to normatively underwrite tort defenses such as assumption of risk and the fellow servant rule.²³³ Yet, as the American workplace changed dramatically in character, those same doctrines seemed to become primarily a shield for capital owners rather than an enabler of autonomy for labor.²³⁴ Although judges did experiment with new principles and practices for redressing the industrial carnage that came before them, they ultimately lost out to the systems of workers' compensation that proliferated throughout state legislatures, largely displacing the common law of tort, workers' cooperative movements, and other institutional responses to the accident crisis.²³⁵ As Witt argues, part of tort law's adaptive disadvantage was its inability to assimilate new social scientific ways of apprehending the industrial landscape.²³⁶ While classical tort doctrines seemed capable of rationalizing away any individual case of workplace suffering, aggregated accident data presented instead a policy problem of historically unprecedented magnitude.²³⁷ "[I]n the face of such statistical regularities, classical tort law's attempt to assign fault and responsibility through individualized inquiry into each work-accident case seemed beside the point."²³⁸

²³² See WITT, *supra* note 7, at 7–8.

²³³ See *id.* at 13.

²³⁴ *Id.* at 64–65.

²³⁵ See *id.* at 69.

²³⁶ See *id.* at 44.

²³⁷ *Id.* at 2–3.

²³⁸ *Id.* at 144.

In contrast to this experience, common law judges showed nimbleness in responding to the changing character of the American consumer marketplace, perhaps in part because of lessons they learned from the industrial accident crisis. Starting with Cardozo's storied opinion in *MacPherson v. Buick Motor Company*,²³⁹ and continuing until the liability counterrevolution of the 1980s, judges unabashedly and creatively forged a new body of products liability law to respond to the rise of a mass consumer marketplace.²⁴⁰ Rather than remain locked in a contractual ideology that seemed increasingly out of touch with the realities of commodity distribution, judges instead set aside traditional doctrines such as the privity barrier, opening the door to a new body of case law that articulated the duties manufacturers and marketers owe to all foreseeable users of their goods.²⁴¹ The same judicially conservative impulses that prevailed in the context of workplace torts seemed to have little force when it came to product-caused accidents.²⁴² Whatever its normative merits, this products liability revolution had the effect of protecting the common law from the kind of wholesale displacement that had occurred in the case of worker injury. Eventually consumer-focused regulatory agencies would develop on the state and federal level, but—with the notable exception of the United States Food and Drug Administration—these agencies pose little if any threat to the dominance of the common law as overseer of product safety.²⁴³

Like industrialization and mass marketing in their respective eras, climate change ill fits the existing tort paradigm and its underlying ideology. Consider, for instance, the familiar framing of environmental harm as a collective action problem. For the better part of two thousand years, this lens has influenced and at times dominated Western understanding of why certain resources—such as the finite capacity of the earth to absorb greenhouse gases without serious repercussion—are prone to tragic overuse.²⁴⁴ Unless individual self-interest can be constrained through some

²³⁹ 111 N.E. 1050 (N.Y. 1916).

²⁴⁰ See WITT, *supra* note 7, at 208.

²⁴¹ William L. Prosser, *The Assault Upon the Citadel (Strict Liability to the Consumer)*, 69 YALE L.J. 1099, 1100 (1960).

²⁴² See William L. Prosser, *Palsgraf Revisited*, 52 MICH. L. REV. 1, 13–14 (1953) (“A little more than a century ago Lord Abinger foresaw that ‘the most absurd and outrageous consequences, to which I can see no limit, would ensue,’ if it should ever be held that one party to a contract was under any obligation to anyone but his immediate promisee. All the progeny of *MacPherson* . . . have now given the lie to those words in the case of the manufacturer who sells his goods” (footnotes omitted)).

²⁴³ Cf. Judith S. Kaye & Kenneth I. Weissman, *Interactive Judicial Federalism: Certified Questions in New York*, 69 FORDHAM L. REV. 373, 399 (2000) (noting that certification of questions from federal court to state court is common in products liability cases because products liability is “dominated by state common law and arises frequently in federal diversity cases”).

²⁴⁴ See ELINOR OSTROM, *GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION* 2–3 (1990) (tracing the intellectual origins of the tragedy of the commons to Aristotle); see also Elinor Ostrom, *A Polycentric Approach for Coping with Climate Change* 9 (The World Bank, Policy Research Working Paper No. 5095, 2009), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1494833 (“The applicability of the conventional theory [of collective action] is considered to be so obvious by many scholars that few questions have been raised about whether this is the best theoretical foundation for making

mechanism, such as law or social norms, the logic of the commons dilemma is inexorable: “burn ‘em if you got ‘em, since the other guy is surely going to burn his.” In their essay on climate change justice, Eric Posner and Cass Sunstein repeatedly return to this consequentialist alibi as an argument *against* the imposition of a legal duty: “[i]t is not negligent to fail to contribute to a public good if not enough others are doing similarly, so that the public good would not be created even if one did contribute.”²⁴⁵ With more subtlety, Keith Hylton attempts to distinguish between public goods—for which the government must compensate individuals when they are required to contribute—and public harms—for which the government may impose nuisance liability against individual contributors.²⁴⁶ The problem, of course, is determining which is which. Are the *Connecticut* defendants creating a public harm when they emit greenhouse gases that contribute to climate change or are they merely failing to preserve the public good of atmospheric stability? What are the relevant public goods in *Kivalina*—the electricity grid and the highway transportation system, in which case plaintiffs would seem to be bearing a disproportionate burden for the goods’ provision, or the atmosphere’s limited absorptive capacity, in which case defendants would seem to be unfairly saddled by nuisance liability? Expectations about resource ownership and socially appropriate behavior must drive the public good/public harm dichotomy in order for it to do meaningful conceptual work, yet the task of law frequently is to subject those very expectations to fresh inquiry.

Whatever its logical force and empirical veracity, the consequentialist alibi fails to provide hope and guidance in a warming world. Its seeming undeniability now clouds our thinking. Posner and Sunstein, for instance, repeatedly claim that they are analyzing climate change through notions of corrective justice, rather than welfarism.²⁴⁷ Yet their conclusions at critical stages are driven by distinctively welfarist habits of thought: “As long as the costs [of emissions] are being toted up, the benefits should be as well, and

real progress toward substantially reducing greenhouse gas emissions and taking other actions to reduce the threat of massive harm brought about by climate change.”).

²⁴⁵ Posner & Sunstein, *supra* note 35, at 19.

²⁴⁶ Keith N. Hylton, *When Should We Prefer Tort Law to Environmental Regulation?*, 41 WASHBURN L. J. 515, 533–34 (2002). More specifically, Hylton fuses Justice Scalia’s approach to regulatory takings jurisprudence with a public choice model of the political process. Just as regulators may limit private property use when background nuisance principles would afford relief, courts may intervene through nuisance when the political process fails to do so. The recent Supreme Court case of *Stop the Beach Renourishment, Inc. v. Florida Department of Environmental Protection*, 130 S. Ct. 2592 (2009), offers a challenging context to test Hylton’s theory, as the majority indicated keen interest in developing the concept of *judicial* takings. *Id.* at 2602. If both regulatory and judicial takings are defined in terms of one another, which will provide a fulcrum for analysis? Like his attempt in *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992), to find something “magical in the reasoning of judges long dead,” *id.* at 1055 (Blackmun, J., dissenting), Justice Scalia’s answer in *Stop the Beach Renourishment* is the unsatisfactory and historically inaccurate one that courts in the founding era “had no power to ‘change’ the common law.” *Stop the Beach Renourishment*, 130 S. Ct. at 2606.

²⁴⁷ Eric A. Posner & Cass R. Sunstein, *Climate Change Justice*, 96 GEO. L. J. 1565, 1592 & n.122 (2008).

used to offset the requirements of corrective justice.”²⁴⁸ As long as welfare consequences are used to “offset” alternative moral theories, there will be no alternative moral theories. At bottom of the climate change dilemma is a pessimistic moral imagination. Unable at the global level to coordinate behavior through law or shared social norms, individuals instead expect the worst from others and thereby bring out the worst in themselves. Nations do the same: afraid to unilaterally incur mitigation costs, they instead lock themselves into an irresolvable game of greenhouse gas chicken. A different sort of moral imagination might anticipate an upward spiral from acts of leadership and self-sacrifice, one that brings out the best in all.²⁴⁹ Obviously, this hope can be proven wrong, as realists repeatedly remind, but there is honor in a sucker’s payoff when the stakes are these. As Solzhenitsyn said, “Let the lie come into the world, even dominate the world, but not through me.”²⁵⁰

Moral imagination might respond in a second way to the view that individual contributions to a commons dilemma are of inconsequential effect. The theoretical possibility of climate change tipping points helps actors to envision the impact of their emissions. If there do exist greenhouse gas concentration thresholds beyond which runaway climate change scenarios may occur—caused, for instance, by a massive dieback of the Amazon, melting of the Antarctic or Greenland ice sheets, or release of massive stores of methane from the ocean floor²⁵¹—then individual emitters may have to live with the possibility that their contribution was *the one* that pushed the planet over the edge. It is not that these tipping point scenarios actually undermine the commons dilemma aspect of the climate change problem, but they do help make tangible the way in which discrete contributions to the problem matter, even though they appear only as proverbial drops in a bucket. Common law precedent for such an exercise exists in the asbestos context, where courts treat every significant exposure

²⁴⁸ *Id.* at 1594.

²⁴⁹ A prime, albeit contested, historical example being the abolitionist movement. See Seymour Drescher, *Capitalism and Slavery After Fifty Years*, in 18 *SLAVERY & ABOLITION* 212, 219 (1997) (reviewing literature on the role of economic, as opposed to moral suasion, factors in driving the British abolition of slavery).

²⁵⁰ Glover & Scott-Taggart, *supra* note 170, at 184 (quoting Solzhenitsyn’s Nobel lecture). Glover, it should be noted, goes on to critique Solzhenitsyn’s moral romanticism. In a recent book, I defend approaches such as Solzhenitsyn’s for environmental law—not on the basis of their absolutism—but on the basis that alternative approaches grounded exclusively in logic and empiricism simply cannot resolve many of the fundamental issues that lie at the heart of problems such as climate change. See KYSAR, *supra* note 95, at 71–73. Writers such as Glover, Posner, and Sunstein essentially assume an absence of any moral or legal duty and then try to identify logical conditions under which one might arise. *Id.* at 54–55. A different philosophical tradition begins with the assumption that individual subjectivity does not exist prior to ethical obligation. From this perspective, we come to be *already* under a duty of care to respond to suffering. This tradition deserves reconsideration, if only because it seems to offer motivational resources in the climate change context that alternatives lack. See *id.* at 32–34.

²⁵¹ On tipping point scenarios, see the extremely useful overview, Timothy M. Lenton et al., *Tipping Elements in the Earth’s Climate System*, 105 *PROC. NAT’L. ACAD. SCI.* 1786 (2008), available at <http://www.pnas.org/content/105/6/1786.full.pdf+html>.

to asbestos as if it were a factual cause of plaintiff's cancer, even though scientists are unsure whether the underlying biological mechanism for asbestos-related cancers is a threshold one.²⁵² Because we *do* know that catastrophic thresholds loom with respect to climate change,²⁵³ the imaginative exercise may be even more appropriate.

Moral imagination also is required to conceive of responsibility in terms that extend beyond the presentist and individualistic orientation of classical liberalism. Posner and Sunstein repeatedly claim that "standard ideas about distributive or corrective justice poorly fit the climate change problem."²⁵⁴ Their concern about fit with corrective justice principles stems from the facts that many of the individuals responsible for the existing stock of greenhouse gas concentrations are long dead, that differences in emissions levels within nations are obscured by per capita data, and that individuals will experience wildly varying welfare consequences from climate change even within the same region. In such a context, the requirement that justice be cashed out in individual terms poses a serious obstacle to the design and implementation of any system of responsibility and redress. One response, then, is to maintain the conceptual framework for corrective justice intact and conclude that the climate change problem simply falls outside its purview, since "corrective justice requires an identity between the victim and the claimant."²⁵⁵ A different approach is to try to build new frameworks for the analysis of justice, ones that are commensurate with the temporal and geographic scale of the problem. Tort law is unlikely to be the venue within which such a project unfolds, but it may not be immune from the project's influence.

Consider in this respect the case of *Barasich v. Columbia Gulf Transmission Company*,²⁵⁶ in which a putative class of Louisiana landowners sued several oil and gas companies for exploration, pipeline, and shipping activities that left residents more vulnerable to property damage from wind

²⁵² Stapleton, *supra* note 144, at 1024–26.

²⁵³ See Kirsten Zickfeld et al., *Expert Judgments About Transient Climate Response to Alternative Future Trajectories of Radiative Forcing*, 107 PROC. NATL. ACAD. SCI. 12,451, 12,455 (2010), available at <http://www.pnas.org/content/early/2010/06/24/0908906107.full.pdf> (reporting results of a survey of fourteen leading climate change scientists, the overwhelming majority of whom believe that a climate change tipping point is more likely than not to occur before the year 2200 under IPCC high emissions scenarios).

²⁵⁴ Posner & Sunstein, *supra* note 247, at 1573. Their concern about fit with distributive justice principles stems from the fact that wealthy nations at present make only meager resource transfers to non-wealthy nations. Thus, for Posner and Sunstein, "it remains puzzling why wealthy nations should be willing to protect poor nations from the risks of . . . climate change . . . while not being willing to give them resources with which they can set their own priorities." *Id.* at 1585. The puzzle, however, perhaps lies in the assumption that distributive justice is only concerned with monetary resources.

²⁵⁵ *Id.* at 1595; see also *id.* at 1572 ("blame must ordinarily be apportioned to individuals"); *id.* at 1602 (dismissing "collectivist habits of thinking"); David Weisbach, *Responsibility for Climate Change, By the Numbers* 25 (U. Chi. Law Sch., John M. Olin Law & Econ. Working Paper No. 448, 2009) ("Standard notions of responsibility for bad acts usually reject collective responsibility; we have to assign responsibility to particular individuals.").

²⁵⁶ 467 F. Supp. 2d 676 (E.D. La. 2006).

and storm surge during Hurricanes Katrina and Rita.²⁵⁷ Unlike *Comer v. Murphy Oil*, plaintiffs in *Barasich* faced no necessity of causally linking specific hurricanes to the phenomenon of climate change.²⁵⁸ Instead, their allegation of harm was tightly and directly linked to defendants' activity in reducing and impairing protective marshland areas along the Louisiana coast.²⁵⁹ Nevertheless, in dismissing the plaintiffs' trespass and nuisance claims, the court emphasized that such obligations traditionally only apply between "neighbors," which the court construed in narrow terms.²⁶⁰ Similarly, with respect to plaintiffs' negligence claim, the court determined that under Louisiana law, defendants owed no duty of care to remote plaintiffs to avoid risk-enhancing alterations of coastal areas.²⁶¹ Despite the apparent expansiveness of the Louisiana code provision on negligence—in sweeping terms, the provision states that "[e]very act whatever of man that causes damage to another obliges him by whose fault it happened to repair it"—the court held that defendants were under no duty of care with respect to "these hundreds of thousands of plaintiffs to protect them from the results of coastal erosion allegedly caused by operators that were physically and proximately remote from plaintiffs or their property."²⁶²

What can account for these holdings, other than visceral revulsion at the sheer magnitude of the claimed liability as in *Strauss v. Belle Realty Co.*? Despite rejecting defendants' political question arguments, the trial judge nevertheless seemed driven by a concern that the weight of the case moved it from the domain of tort to politics, from adjudication to regulation. After all, the judge concluded her opinion by inviting plaintiffs to re-plead with a more narrow and carefully constituted class: "By all accounts, coastal erosion is a serious problem in south Louisiana. [P]erhaps a more focused, less ambitious lawsuit between parties who are proximate in time and space, with a less attenuated connection between the defendant's conduct and the plaintiff's loss, would be the way to test their theory."²⁶³

This equivocation was odd. The plaintiffs' case was premised on the *ecological* consequences of oil and gas operations in the Gulf. They alleged that "as a result of the defendants' operations . . . , over one million acres of marshland have already been destroyed, and millions more essentially decimated, depriving inland communities, such as the City of New Orleans and St. Bernard Parish, of their natural protection from hurricane winds and accompanying storm surge."²⁶⁴

Thus, if the judge was willing to accept the ecological mechanism by which plaintiffs' harms allegedly occurred, then the reach of defendants' responsibility should be determined by the reliability of storm surge models,

²⁵⁷ *Id.* at 678.

²⁵⁸ See *supra* text accompanying notes 160–64 (discussing dim prospects for the *Comer v. Murphy Oil* plaintiffs in this regard).

²⁵⁹ *Barasich*, 467 F. Supp. 2d at 679–80.

²⁶⁰ *Id.* at 690.

²⁶¹ *Id.* at 693.

²⁶² *Id.* at 690, 693.

²⁶³ *Id.* at 695.

²⁶⁴ *Id.* at 679.

not by abstract principles of proximity and remoteness. Put differently, if the judge was willing to find a duty of care with respect to some landowners but not others, then her ruling would represent an unexplained and only half-hearted embrace of the lessons of ecology.

The fundamental lesson of ecology is, of course, that everything is connected; we are all “neighbors” in an environmental sense, whatever our classical liberal conceptions may hold. Hence, law’s intimate embrace of territoriality—and tort law’s dependence on some notion of proximity—both are severely tested by climate change awareness. Some degree of retrenchment is naturally to be expected: witness, for instance, the strong reassertion of Westphalian national sovereignty and backing away from comprehensive global climate regulation that occurred at Copenhagen in 2009.²⁶⁵ Likewise, notwithstanding modern expansions, the concepts of duty and proximate causation in tort law remain substantially animated by a classical liberal worldview in which individuals are deemed free to pursue activities unless they impose harms upon identified victims that bear some geographic, market, or other relational nexus to the actor. As commentators have noted, certain categories of harm such as emotional distress or pure economic loss are problematic on this account because they reveal us to be embedded in systems capable of spreading wide the harmful impacts of our behavior.²⁶⁶ Tort law manages these conceptual threats by recognizing only particularly salient and limited categories of emotional distress and economic loss recovery, and by otherwise preserving the classical liberal fiction that we are atomistic and isolated from one another, save for our occasional physical collisions. Climate change deals a final blow to this fiction by making the causation of physical harm utterly independent of collision or, indeed, of any other familiar understanding of proximity. By comparison, the duty alleged in *Barasich* seems non-controversial, even mundane.²⁶⁷

Law in the twenty-first century will be preoccupied with the problem of instilling responsibility within complex networks. The challenge for tort law will be particularly acute, as much of tort law works out the idea that responsibility needs to be confined, rather than located in the first place. Individuals are thought to have limited capacity to care for others, not least because of their imperfect abilities to predict and prevent harmful consequences of action. The various uses of foreseeability in tort law respond to this condition, providing cues to individuals to help them prioritize their limited investments in the prevention of harm.²⁶⁸ Not only practical, this rule also is said to reflect principled notions of fairness:

²⁶⁵ *Key Powers Reach Compromise at Climate Summit*, BBC NEWS, Dec. 19, 2009, <http://news.bbc.co.uk/2/hi/europe/8421935.stm> (last visited Feb. 13, 2011).

²⁶⁶ *E.g.*, Mark Geistfeld, *Negligence, Compensation, and the Coherence of Tort Law*, 91 GEO. L.J. 585, 614–15 (2003).

²⁶⁷ *See In re Katrina Canal Breaches Consol. Litig.*, 647 F. Supp. 2d 644, 697 (E.D. La. 2009) (finding that actions by the Army Corps of Engineers over several decades in negligently constructing and maintaining the Mississippi River Gulf Outlet proximately caused a portion of plaintiffs’ harm, notwithstanding the much stronger causal contribution of Hurricane Katrina).

²⁶⁸ *See* Mark Geistfeld, *The Analytics of Duty: Medical Monitoring and Related Forms of Economic Loss*, 88 VA. L. REV. 1921, 1927 (2002) (“The relational nature of negligence, embodied

The basic idea is that it is unfair to impose liability for an injury unless the defendant may cogently be said to be responsible for bringing about the injury. *D*'s conduct being a cause in fact of *Y*'s injury is not sufficient for saying that *D* is responsible for bringing about *Y*'s injury; *D* cannot be said to be responsible for *Y*'s injury if the action of *D* that caused *Y*'s injury is one with respect to which *Y*'s injury was an unforeseeable consequence. These propositions, put together, yield the conclusion that it is unfair to impose liability on *D* for *Y*'s injury if that injury was merely an unforeseeable consequence of *D*'s action.²⁶⁹

Whatever its appropriateness in earlier times, this interpersonal vision seems out of focus in the climate change context, where *Y* may be a many thousand year old Inuit tribe and where *D* may be a multinational corporation that ranks above most nations as one of the largest economic entities in the world.²⁷⁰ Duty and foreseeability in this context should not be uncritically carried over from a nineteenth century template. Responsibility may need to be created, not limited.

One attractive option will be to focus on the instrumental efficacy of large institutional actors, such as corporations, or groups of actors, such as industries. Notwithstanding isolated flirtation by judges with a concept of industry-wide "enterprise liability,"²⁷¹ the basic account of agency in tort law remains essentially individualistic. Nevertheless, climate change litigation may cause courts to renew their romance with supra-individual conceptions of agency and responsibility, as the mismatch between the atomistic account and our governance needs will become starkly apparent. Even in the far less extreme causation context presented by *Barasich*, the court bridled against plaintiffs' "allegations that all of the defendants' activities caused all of the plaintiffs' damages."²⁷² Rejecting any notion of "group liability" that would allow plaintiffs to recover "without demonstrating any individual connection between any single member of the industry and the plaintiffs' harm," the court ruled instead that traditional (and insurmountable) causal requirements apply.²⁷³ Again, a classical liberal individualism was at work, one in which "groups" do not easily register as duty-bearing entities with causal capacity, just as individuals are not thought to owe obligations to society at large. After marinating in climate change litigation for a while, however, judges might view a case like *Barasich* differently. They might see for instance, that the named defendants in *Barasich* had behaved as a group in several conspicuous ways, including collectively lobbying to secure rights

in the element of duty, corresponds to the behavioral assumption that potential injurers, like drivers, need to focus and prioritize their precautionary efforts, something that would be difficult to accomplish under a generic, nonrelational conception of negligence.").

²⁶⁹ Zipursky, *supra* note 146, at 1267.

²⁷⁰ *D* in this example is ExxonMobil Corp, the lead named defendant in *Kivalina*. For data supporting this characterization, see Rhett A. Butler, *Corporations Agree to Cut Carbon Emissions*, MONGOBAY.COM, Feb. 20, 2006, <http://news.mongabay.com/2007/0220-roundtable.html> (last visited Feb 13, 2011).

²⁷¹ *E.g.*, Hall v. E.I. Du Pont de Nemours & Co., 345 F. Supp. 353, 358 (E.D.N.Y. 1972).

²⁷² *Barasich*, 467 F. Supp. 2d 676, 694 (E.D. La. 2006).

²⁷³ *Id.* at 695.

to conduct the exploration and pipeline activities that allegedly caused plaintiffs harm.²⁷⁴

Courts in the twenty-first century may also become increasingly sophisticated in their treatment of epistemic responsibility. Commentators frequently assume that causal pathways in the climate change context are too complex and speculative to ground a duty of tort responsibility under conventional approaches.²⁷⁵ This may or may not be true,²⁷⁶ but it is certainly mistaken to assume that foreseeability somehow exists independent of defendants and should be analyzed as such. To ask what is foreseeable in order to ground responsibility is to ignore the responsibility of those who influence what is foreseeable. In fact, as the *Kivalina* plaintiffs note in their complaint, major oil companies began funding research into the climate change problem as far back as 1970,²⁷⁷ right around the time that the first report of the U.S. Council on Environmental Quality warned that “carbon dioxide in the atmosphere could have dramatic and long-term effects on world climate.”²⁷⁸ At a certain level of generality, then, foreseeability in the climate change context has been satisfied for decades. Following those early investigations, however, major oil companies shifted to a concerted effort to obfuscate public understanding of climate change and to forestall domestic and international legal action to arrest greenhouse gas emissions.²⁷⁹ Accordingly, part of the reason that commentators today believe science cannot trace climate change’s causal pathways is that defendants have invested in the production of scientific doubt.²⁸⁰ Contrary to the classical view, then, it may not be unfair to hold defendants responsible for an unforeseeable harm when the attention and reach of foresight is itself increasingly under their influence.

Tort law eventually will have to reckon with this dynamic, as it will become impossible to maintain the assumption that a robust independent body of knowledge exists to bring to bear on foreseeability questions. Moreover, as David Owen has written, twenty-first century problems are

²⁷⁴ *E.g.*, Leslie Wayne, *Companies Used to Getting Their Way*, N.Y. TIMES, Dec. 4, 1998, at C8 (“The oil companies lobby in a very coordinated way,” said a staff member for a House energy-related committee.”).

²⁷⁵ *E.g.*, Posner & Sunstein, *supra* note 247, at 1592.

²⁷⁶ *See supra* text accompanying note 246.

²⁷⁷ Complaint for Damages at and Demand for Jury Trial ¶ 162, *Native Vill. of Kivalina*, 663 F. Supp. 2d 863 (N.D. Cal. 2009) (No. C 08-01138 SBA).

²⁷⁸ *Id.* at 34. (quoting COUNCIL ON ENVIRONMENTAL QUALITY, THE FIRST ANNUAL REPORT OF THE COUNCIL ON ENVIRONMENTAL QUALITY 71, 90 (1970)). The Council on Environmental Quality has made all of its annual reports available online in a “Proactive Disclosure Reading Room.” *See* Council on Envntl. Quality, CEQ Proactive Disclosure Reading Room, <http://www.whitehouse.gov/administration/eop/ceq/foia/readingroom> (last visited Feb. 13, 2011).

²⁷⁹ JAMES HOGGAN & RICHARD LITTLEMORE, CLIMATE COVER UP: THE CRUSADE TO DENY GLOBAL WARMING (2009); ORESKES & CONWAY, *supra* note 80, at 85–86, 190–97; ERIC POOLEY, THE CLIMATE WAR: TRUE BELIEVERS, POWER BROKERS, AND THE FIGHT TO SAVE THE EARTH 33–41 (2010).

²⁸⁰ John H. Cushman, Jr., *Industrial Group Plans to Battle Climate Treaty*, N.Y. TIMES, Apr. 26, 1998, at A1, available at <http://www.nytimes.com/1998/04/26/us/industrial-group-plans-to-battle-climate-treaty.html>.

likely to be ones characterized by predictable unforeseeability.²⁸¹ Increasingly, scientists are confident that we have entered a new geological epoch, the *Anthropocene*, in light of the sheer scale and intensity of human interventions into earth system processes.²⁸² To name just one among many unprecedented features of this age, atmospheric CO₂ levels are now higher than at any point in the last 650,000 years.²⁸³ Thus, it is reasonably foreseeable that we will face unforeseeable environmental challenges. Likewise, for precisely the same reason that they seem to hold enormous promise, new technologies such as genetic and nanoscale engineering also pose dimly understood and potentially considerable threats to human and ecosystem health.²⁸⁴ Behaving reasonably under such circumstances cannot simply mean conforming to an existing understanding of risk and benefit. Instead, it must mean relating to uncertainty in a particular way, with a particular attitude. It might mean, for instance, deploying what Sheila Jasanoff calls “technologies of humility”²⁸⁵ or what Buzz Thompson refers to as “exploration capacity.”²⁸⁶ Scenario planning and other proactive, open-ended risk projection techniques might be required in order to behave reasonably toward novel technologies and activities, since their release constitutes a nonreplicable experiment on the world.²⁸⁷ Rather than risk

²⁸¹ See Owen, *supra* note 196, at 580.

²⁸² NAT'L RESEARCH COUNCIL, CLIMATE STABILIZATION TARGETS: EMISSIONS, CONCENTRATIONS, AND IMPACTS OVER DECADES TO MILLENNIA 2 (2010), available at http://www.nap.edu/catalog.php?record_id=12877.

²⁸³ See *id.* at 1 (“Emissions of carbon dioxide from the burning of fossil fuels have ushered in a new epoch where human activities will largely determine the evolution of Earth’s climate.”); see also Johan Rockström et al., *A Safe Operating Space for Humanity*, 461 NATURE 472, 472 (2009) (listing, among global environmental stressors nearing estimated “planetary boundaries,” climate change, biodiversity loss, nitrogen and phosphorous cycle alterations, ozone depletion, freshwater depletion, land use alteration, atmospheric aerosol loading, and chemical pollution); Ruhl, *supra* note 6, at 394 (“[E]cologists now warn of the no-analog future—ecological variability unprecedented in the history of ecology, riddled with nonlinear feedback and feedforward loops, previously unknown emergent properties, and new thresholds of irreversible change.”).

²⁸⁴ See Owen, *supra* note 196, at 579, 607–08.

²⁸⁵ Sheila Jasanoff, *Technologies of Humility*, 450 NATURE 33, 33 (2007); Sheila Jasanoff, *Technologies of Humility: Citizen Participation in Governing Science*, 41 MINERVA 223, 227 (2004).

²⁸⁶ Personal communication from Barton H. Thompson, Jr., Robert E. Paradise Professor in Natural Resources Law and Perry L. McCarty Director, Woods Institute for the Environment, Stanford University (August 2009).

²⁸⁷ John Witt has written that these twenty-first century risks exceed the grasp of the tort system:

Diverse new risks, including nuclear disasters, global warming, genetically modified organisms, and any number of complex systems whose compromise might lead to catastrophic results, present challenges on a scale that seems to defy even the most innovative accident-law institutions on the contemporary scene. Because we lack aggregatable experience with such catastrophes, these new catastrophic risks move beyond the actuarial model that emerged in the work-accident experience. Statistical models of risk like those that animated developments in the law of accidents a century ago simply cannot be assembled in the absence of the requisite time-series data. In this regard, the federal compensation fund set up in the wake of the September 11, 2001 attack on the World Trade Center may be a harbinger of the kinds of departures from

detering the production of knowledge about risky products and activities through fixed assumptions about foreseeability, tort law might instead actively marshal the considerable epistemic capacity of private enterprise by imposing more dynamic duties of humility, caution, and investigation. In the extreme, judges might reconsider their abandonment of the “constructive knowledge” approach to foreseeable risk.²⁸⁸

B. Breach

We are all embedded in systems in which responsibility is diffused to the vanishing point. As a result, the most consequential instances of negligence today are quite literally in the air, beyond the vision of the “eye of ordinary vigilance.” Once, *extra*-ordinary vigilance was a familiar feature of tort law, imposed as a duty on innkeepers, common carriers, promoters of ultrahazardous activities, and other designated status holders.²⁸⁹ The common law’s move toward a general duty of ordinary care, motivated largely by instrumentalist rather than classical convictions, has ironically obscured the instrumental benefits of a renewed focus on status, particularly the status of institutional actors: plaintiffs look to electric utilities and other choking points in the anthropogenic carbon cycle not necessarily because those actors are especially morally culpable, but because they are powerful entities created by law and capable of exerting strong influence over the systems in which we are embedded. If we think of fossil fuel companies as natural persons, we become embroiled in intractable disputes about whether and when they knew of climate change, how seriously they have manipulated public understanding and the political process, and so on. If we simply think of them as malleable creations of law, then we sidestep such questions and focus instead on how they might be deployed for public purposes. This does not mean, as some have opined, that corrective justice and other nonwelfarist considerations have no bearing on corporate responsibility.²⁹⁰ It does mean that instrumental considerations loom larger for the most instrumentally consequential actors within complex networks.

traditional practice that we may be compelled to adopt in a world of mass risks and postmodern technologies.

WITT, *supra* note 7, at 208–09 (footnote omitted). One claim of this Article, though, is that judges, and indeed all governmental actors, will be forced by the climate change problem to become comfortable with nonstandard risk assessment techniques. *Id.* at 209. As a result, common law judges may see the virtue of including such techniques within the judicial construction of reasonable foresight.

²⁸⁸ See *supra* text accompanying notes 197–98.

²⁸⁹ See generally, Robert W. James, Comment, *Absolute Liability for Ultrahazardous Activities: An Appraisal of the Restatement Doctrine*, 37 CALIF. L. REV. 269, 269–70 (1949) (discussing the idea of absolute liability as applied to defendants engaged in abnormally dangerous activities and other scenarios).

²⁹⁰ Posner & Sunstein, *supra* note 247, at 1595 (“[B]ecause the corporate form itself is a fiction, and the shareholders today are different from the wrongdoers yesterday, corporate liability cannot be grounded in corrective justice. Thus, it provides no analogy on behalf of corrective justice for the climate change debate.” (footnote omitted)).

Such an orientation has implications for the assessment of liability. For instance, one effect might be to reveal an even deeper wisdom behind Judge Learned Hand's famous admonition in *The T.J. Hooper v. Northern Barge Corporation*,²⁹¹ that "a whole calling may have unduly lagged in the adoption of new and available devices."²⁹² This statement is often understood as an acknowledgment that markets sometimes fail and that independent judicial assessment of reasonableness is therefore merited, rather than deference to prevailing market conditions through a customary care standard.²⁹³ As the climate change problem reveals, independent judicial assessment of market outcomes may be merited not only by the kind of discrete market failures that justify partial equilibrium analysis, but also by pervasive structural features of the economy that no longer are sustainable, even if they might not as yet fail a partial equilibrium analysis. Judges will not become macroeconomists or energy systems analysts, of course, but as the broad features of the climate change problem are grasped by judges, they may experience a macro-scale shift in their attitude toward conventional economic activities. Judicial interest in strict liability—episodic and marginal in the past²⁹⁴—may revive as the accumulated negative externalities of greenhouse gas emissions come to loom far larger than the felt positive externalities of economic activity.

In truth, attitudes of that sort have long driven tort doctrine, although typically in favor of negligence rather than strict liability.²⁹⁵ Even during tort law's classical phases, judges struggled to explain why faultless victims of nonnegligent harms should bear a loss, rather than the actor who caused the harm.²⁹⁶ Appeals to defendants' liberty interests and the value of freedom of action always rang hollow, given the obvious impairment of those same interests among injured plaintiffs.²⁹⁷ Pressed for an account, judges and commentators turned to a nebulous concept of social good that was said to flow from industrious activity.²⁹⁸ Often, such appeals took the form of rather histrionic claims about the "barbarism" and "savage life in a wilderness" that apparently would follow if individuals were not free to pursue their activities

²⁹¹ 60 F.2d 737 (2d Cir. 1932).

²⁹² *Id.* at 740 (holding that evidence of industry custom is relevant, but not decisive, for purposes of assessing reasonableness in the negligence context).

²⁹³ See Kenneth S. Abraham, *Custom, Noncustomary Practice, and Negligence*, 109 COLUM. L. REV. 1784, 1796–97 (2009); Joseph W. Rand, *What Would Learned Hand Do?: Adapting to Technological Change and Protecting The Attorney-Client Privilege on the Internet*, 66 BROOK. L. REV. 361, 364–65 (2000).

²⁹⁴ See James A. Henderson, Jr., *Why Negligence Dominates Tort*, 50 UCLA L. REV. 377, 382–85 (2002).

²⁹⁵ The argument in this section is fully laid out in an article with Jon Hanson. See Hanson & Kysar, *supra* note 225.

²⁹⁶ WITT, *supra* note 7, at 47 ("[T]hose who articulated classical tort law faced an ongoing problem in elaborating the principles of a liberal approach to accidents for cases of nonnegligent harm to faultless victims.").

²⁹⁷ That does not stop commentators from continuing to offer such appeals. See Peter M. Gerhart, *The Death of Strict Liability*, 56 BUFF. L. REV. 245, 264, 273 (2008).

²⁹⁸ See Losee v. Buchanan, 51 N.Y. 476, 484–85 (1873) (asserting that industrialization is necessary for civilization and the advancement of mankind).

without fear of strict liability.²⁹⁹ Although overt references to the ideologies of colonialism and Manifest Destiny eventually fell away, the core rationale for preferring negligence over strict liability remained one of a basic, almost aesthetic preference for society's doers. As Oliver Wendell Holmes, Jr. most famously put it:

A man need not, it is true, do this or that act,—the term *act* implies a choice,—but he must act somehow. Furthermore, the public generally profits by individual activity. As action cannot be avoided, and tends to the public good, there is obviously no policy in throwing the hazard of what is at once desirable and inevitable upon the actor.³⁰⁰

Classical tort law's preference for the doer later was formalized by law and economics, as the choice between strict liability and negligence came to be seen as a matter of summing the negative and positive externalities generated by a defendant's activity. According to canonical accounts, the costs and benefits of accidents are a function of two key variables: care levels and activity levels.³⁰¹ The former has to do with the level of precaution an actor utilizes while engaging in an activity, while the latter has to do with the frequency and scale of the activity.³⁰² With respect to any accident, then, judges may ask both whether the actor adopted all cost-justified investments in precaution and whether the activity in its overall costs and benefits was justified at all. The latter activity level analysis is said to be difficult, if not impossible for courts to conduct. Undertaking a macro-scale assessment of the costs and benefits of an activity requires tremendous amounts of information. It also invites judges to make critical assessments not merely of the marginal costs and benefits of some added safety step, such as driving within the speed limit, but of the more personal and subjective benefits of the activity itself. Judges would be forced to ask not only whether one drove carefully, but *why* one was driving at all: Was it to take Grandma to church on Sunday? Was it to visit her in the hospital? Or was the actor just "out for a drive," as people used to say?

On the law and economics account, such judgments are thought to be too costly and controversial for judges to undertake. Thus, the determinative factor in choosing between strict liability and negligence is said to hinge on these uncounted impacts of activity.³⁰³ Where judges suspect that an activity

²⁹⁹ *Brown v. Collins*, 53 N.H. 442, 1873 WL 4192, at *6 (1873); see also *Losee*, 51 N.Y. at 484–85 ("We must have factories, machinery, dams, canals and railroads. They are demanded by the manifold wants of mankind, and lay at the basis of all our civilization. If I have any of these upon my lands, and they are not a nuisance and are not so managed as to become such, I am not responsible for any damage they accidentally and unavoidably do my neighbor. He receives his compensation for such damage by the general good, in which he shares, and the right which he has to place the same things upon his lands.")

³⁰⁰ OLIVER W. HOLMES, JR., *THE COMMON LAW* 95 (Dover Publications 1991) (1881).

³⁰¹ See Steven Shavell, *Strict Liability Versus Negligence*, 9 J. LEGAL STUD. 1, 17 (1980).

³⁰² Keith N. Hylton, *The Economic Theory of Nuisance Law and Implications for Environmental Regulation*, 58 CASE W. RES. L. REV. 673, 677 (2008).

³⁰³ *Id.* at 681.

poses significant residual costs even after all reasonable precautions have been undertaken, strict liability is justified.³⁰⁴ Implicitly, then, the canonical law and economics wisdom assumes that activities tend to offer positive benefits for society, over and above those which are already captured by the price mechanism.³⁰⁵ Absent such an assumption, it would remain unexplained why negligence is the default rule that must be overcome through a showing of significant unregulated costs from activity. Courts just as easily could apply strict liability as the default rule unless an activity is shown to offer significant uncaptured benefits.³⁰⁶ Thus, the classical liberal preference for the doer remains at work, albeit with more elaborate theoretical trappings. The dominance of the negligence standard for unintentional harms, and the gradual migration of trespass and nuisance liability away from strict standards of responsibility, is justified on the ground that activity levels are generally not thought to need disciplining, since positive externalities of activity tend to dominate negative ones.³⁰⁷

Because of climate change, the presumption that external costs and benefits of activity are positive on net is becoming no longer tenable with respect to major segments of the economy. Although economic studies of climate change still tend to recommend fairly tepid policy responses,³⁰⁸ the tenor of the debate is starting to change even within economics, as thoughtful scholars are realizing that the field's prior treatment of such issues as discounting, uncertainty, catastrophic risk, global equity, and adaptive capacity had drastically understated the severity of the climate change problem.³⁰⁹ Moreover, with respect to the choice between strict liability and negligence, the insight of law and economics is to focus specifically on *externalized* costs and benefits, rather than on those costs and benefits which are already incorporated into an actor's private decisionmaking. In the absence of corrective legal interventions, actors have every reason to seek to capture gains from external benefits and every reason to avoid responsibility for external costs. In light of these lopsided incentives, one would naturally expect the external costs and benefits of greenhouse gas emissions to reflect a negative balance. Thus, the

³⁰⁴ *Id.* at 683.

³⁰⁵ *See id.* at 679.

³⁰⁶ With characteristic brilliance, Guido Calabresi long ago presaged not only the law and economics approach to activity level effects, but also its critique in just this fashion. *See* Guido Calabresi & John T. Hirschoff, *Toward a Test for Strict Liability in Torts*, 81 YALE L.J. 1055, 1063 n.29 (1972).

³⁰⁷ *See generally* Jackson W. Adams, *Cow 54, Where are You? Producer Liability and the National Animal Identification System*, 23 J. CONTEMP. HEALTH L. & POL'Y 106, 128–30 (2006) (explaining that American courts adopted negligence as the standard for unintentional harms to promote industry and its social benefits); Hylton, *supra* note 302, at 681 (arguing that adopting strict liability where external benefits are greater than social costs is not optimal); Frona M. Powell, *Trespass, Nuisance, and the Evolution of Common Law in Modern Pollution Cases*, 22 REAL EST. L.J. 182, 187 (1992) (describing the move away from strict liability in trespass and nuisance actions).

³⁰⁸ *See* Lisa Heinzerling & Frank Ackerman, *Law and Economics for a Warming World*, 1 HARV. L. & POL'Y REV. 331, 344–46 (2007).

³⁰⁹ *See supra* text accompanying note 95; *see infra* text accompanying notes 368, 370.

longstanding assumption that “the public generally profits from individual activity” may be subjected to intense scrutiny in coming years, as the accumulated debts from such activity become increasingly difficult to ignore. At that point, the theoretical apparatus devised by law and economics to explain the dominance of negligence liability will instead provide strict liability’s most powerful justification.

C. Causation

Classical tort is most comfortable with liability when *A* is shown to have directly and exclusively caused a discrete harm to *B*. Advocates of this approach seek epistemic assurance that a tort defendant is *the* cause of plaintiff’s injury in order to implement “conceptions of individual responsibility that coincide neatly with eighteenth century science’s notions of causation.”³¹⁰ Our understanding of many harms in the twenty-first century bears little resemblance to this atomistic and mechanistic worldview. An adverse outcome may be only probabilistically related to a prior action, given the inability of aggregative knowledge schemes to disaggregate causal influence in specific cases. The outcome may be the result of not one action or series of actions by a single actor, but rather a confluence of multiple actions by multiple actors, given the ability of complex, adaptive systems to combine and magnify causal impacts. Climate change renders this new worldview both plain and urgent, as billions of emitters now contribute to trend elevations that are difficult to dissect in an individual case, but that may ultimately lead to catastrophic tipping points. With respect to such “fat tail” risks, scientists are confident that they will occur if emissions continue unabated,³¹¹ but the ability to pinpoint time scales and risk factors is hampered by the lack of a spare planet on which to experiment.

How should judges adapt to this new worldview? Consider two quotations from Judge Richard Posner: “[T]he courtroom is not the place for scientific guesswork, even of the inspired sort. Law lags science; it does not lead it.”³¹² “Knowledge increasingly is statistical, and judges must not let themselves lag too far behind the progress of knowledge.”³¹³

Both quotations posit a lag between science and the courtroom, but the latter evinces an obligation on judges to keep up. For some time during the latter half of the twentieth century, judges did attempt to keep up, implementing new methods of dealing with scientific and statistical evidence of harm. Market share liability was devised as a way of apportioning responsibility for harm in the absence of other means to disaggregate causal influence. Loss of chance recovery was made available to those whose dim chances for survival might otherwise have rendered them ineligible for protection from negligent behavior under a more-likely-than-not causation

³¹⁰ Brennan, *supra* note 145, at 491.

³¹¹ See Zickfeld, *supra* note 253, at 12,451, 12,453 fig.2.

³¹² Rosen v. Ciba-Geigy Corp., 78 F.3d 316, 319 (7th Cir. 1996) (Posner, C.J.).

³¹³ DePass v. United States, 721 F.2d 203, 209 (7th Cir. 1983) (Posner, J., dissenting).

test.³¹⁴ Subtle toxic causation presumptions were incorporated into contexts where orthodox doctrines would otherwise have prevented recovery due to uncertainty regarding the precise biological mechanism of a disease.³¹⁵ At some point, however, these various developments were stopped short: market share liability was largely limited to the DES context,³¹⁶ loss of chance recovery to the medical malpractice context,³¹⁷ and novel toxicity presumptions to the asbestos context.³¹⁸

These limitations are difficult to understand from an internal perspective on tort law. As commentators have noted, the instrumental and fairness argument in favor of market share liability need not be limited to the kind of generic physical fungibility posed by DES.³¹⁹ Other conceptions of fungibility—such as the generic lack of knowledge of any risk of HIV-AIDS among blood and plasma suppliers prior to the Center for Disease Control's warning in 1983³²⁰—could just as easily support the market share theory. Likewise, the loss of chance doctrine, at bottom, rests on judicial recognition that certain increased risks can be sufficiently well-characterized to constitute a harm, and that certain actors should be made liable for such harms when they stand in relations of heightened responsibility vis-à-vis their charges, even if the percentage change in plaintiffs' outlook does not clear a more-likely-than-not hurdle. These reasons need not be limited to the medical malpractice context; industrial employers, for instance, could also be said to fit the identified conditions to the extent that tort law is not displaced by workers compensation schemes. More generally, increasing sophistication in the scientific understanding of risk counsels a shift from classical to probabilistic causation principles as a guiding template for analysis. Rather

³¹⁴ See, e.g., *Matsuyama v. Birnbaum*, 890 N.E.2d 819, 828 & n.23 (Mass. 2008) (observing that “[t]he highest courts of at least twenty States and the District of Columbia have adopted the loss of chance doctrine” and joining them).

³¹⁵ See Stapleton, *supra* note 144, at 1025.

³¹⁶ See Schwartz, *supra* note 75, at 671. One important exception is the Wisconsin Supreme Court's decision to allow its variation of market share liability—the “risk-contribution theory”—to be applied in the lead paint context. See *Thomas ex rel. Gramling v. Mallett*, 701 N.W.2d 523, 567 (Wis. 2005).

³¹⁷ See RESTATEMENT (THIRD) OF TORTS: LIAB. FOR PHYSICAL & EMOTIONAL HARM § 26 cmt. n (2010) (“To date, the courts that have accepted lost opportunity as cognizable harm have almost universally limited its recognition to medical-malpractice cases.”).

³¹⁸ On the exceptionalism of asbestos litigation, see Anita Bernstein, *Asbestos Achievements*, 37 Sw. U. L. REV. 691, 709 (2008).

³¹⁹ See, e.g., Glen O. Robinson, *Multiple Causation in Tort Law: Reflections on the DES Cases*, 68 VA. L. REV. 713, 750 (1982) (“As long as liability is proportionate to the risks created by a defendant, there is no reason why the *Sindell* liability rule cannot be applied to cases involving multiple and *different* risk-creating activities.”); Allen Rostron, *Beyond Market Share Liability: A Theory of Proportional Share Liability for Nonfungible Products*, 52 UCLA L. REV. 151, 215 (2004) (arguing that courts should recognize that “fungibility is not essential if liability can be allocated in a way that reasonably accounts for the differing levels of risk created by each defendant”).

³²⁰ *But see Doe v. Cutter Biological*, 852 F. Supp. 909, 913, 924 (D. Idaho 1994) (declining to adopt market share or any other alternative causation doctrine to aid plaintiff hemophiliacs who had contracted HIV from infusion of tainted Factor VIII clotting agent), *appeal dismissed*, 89 F.3d 844 (9th Cir. 1996) (dismissed upon death of plaintiff).

than but-for causation, courts might take what Guido Calabresi calls “causal linkage” as the basic touchstone for analysis.³²¹ At the least, such a conception might be accepted in the public nuisance context when governmental plaintiffs allege an elevated risk of harm over a time series of events or within a population of individuals or resources. More ambitiously, courts might fashion a system of proportionate recovery by individuals for mere risk exposure, as commentators have long advocated.³²²

Ironically, the expressed desire of major greenhouse gas emitters to pursue a “Scopes monkey trial of the 21st century” may hasten these developments. Following the Supreme Court’s influential opinion in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,³²³ all federal and most state courts have adopted a more proactive stance toward the admission and supervision of scientific evidence.³²⁴ In theory, the *Daubert* process need not entail a particular valence in favor of plaintiffs or defendants in the tort law context, since the espoused goal of the Court’s opinion was to move judges away from a simple scientific acceptance test to a more judicially-engaged inspection of the actual techniques and methodological rigor behind proffered scientific evidence. In practice, commentators regard *Daubert* as having created a heightened bar for plaintiffs in environmental, toxic tort, and products liability suits, as judges have shown a willingness to utilize their gatekeeper role to hold plaintiffs’ experts to a high standard of scientific veracity.³²⁵ Climate change litigation, however, may reverse this dynamic, particularly if defendants do choose to contest basic features of climate science. If judges are faced with climate change scientists and their skeptical counterparts in a series of intensive *Daubert* hearings, they will find the former group more worthy of admission to testify on every relevant criteria identified in *Daubert* and subsequent case law.³²⁶ Judicial concern about “junk science”—usually focused on experts hired by plaintiffs’ lawyers in advance of litigation—instead may shift to scientists

³²¹ See Guido Calabresi, *Concerning Cause and the Law of Torts: An Essay for Harry Kalven, Jr.*, 43 U. CHI. L. REV. 69, 71 & n.4 (1975) (“There is a causal link between an act or activity and an injury when we conclude on the basis of the available evidence that the recurrence of that act or activity will increase the chances that the injury will also occur.”).

³²² See Richard Delgado, *Beyond Sindell: Relaxation of Cause-in-Fact Rules for Indeterminate Plaintiffs*, 70 CAL. L. REV. 881, 895, 908 (1982); Glen O. Robinson, *Probabilistic Causation and Compensation for Tortious Risk*, 14 J. LEGAL STUD. 779, 781, 783 (1985); Robinson, *supra* note 319, at 739, 754; David Rosenberg, *The Causal Connection in Mass Exposure Cases: A “Public Law” Vision of the Tort System*, 97 HARV. L. REV. 849, 866, 928 (1984).

³²³ 509 U.S. 579 (1993).

³²⁴ See Robert J. Goodwin, *Fifty Years of Frye in Alabama: The Continuing Debate over Adopting the Test Established in Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 35 CUMB. L. REV. 231, 233–34 (2004–2005).

³²⁵ See, e.g., Margaret A. Berger, *Upsetting the Balance Between Adverse Interests: The Impact of the Supreme Court’s Trilogy on Expert Testimony in Toxic Tort Litigation*, 64 LAW & CONTEMP. PROBS., Spring/Summer 2001, at 289, 290 (noting judges are less likely to admit some types of expert testimony under *Daubert*, allowing defendants an advantage in toxic tort cases).

³²⁶ See, e.g., *Green Mountain Chrysler Plymouth Dodge Jeep v. Crombie*, 508 F. Supp. 2d 295, 310–33 (D. Vt. 2007) (thoroughly reviewing and finding qualified to testify leading climate change scientists, including Dr. James Hansen).

and spokespeople hired by greenhouse gas emitters.³²⁷ The result may be a cultural shift among judges in their attitudes toward scientific evidence and a concomitant willingness to re-engage their earlier efforts to modernize causation doctrine.

D. Harm

As feminist torts scholars have demonstrated, implicit conceptual dichotomies often lurk beneath the surface of tort doctrine: physical is contrasted with emotional, individual with communal, manmade with natural, immediate with distant, present with future, and so on.³²⁸ With varying degrees of subtlety, one side of these pairings is privileged over another, often on the theory that tort cannot provide redress for all wrongs and thus must establish some system of triage.³²⁹ More insidiously, the pairings become implicitly gendered, such that one side is viewed as prototypically male and the other female.³³⁰ The hierarchy of interests then inadvertently becomes a hierarchy of gender. These “deep structures of tort law”³³¹ can exert a powerful and unnoticed impact on judicial decisionmaking. Disfiguration of sexualized female body parts, for instance, can lead judges to conclude that an *emotional* injury has been suffered.³³² Though obviously physical in a basic sense, the injury does not code as such because it inflicts harm on a body part that is otherwise coded as “female,” and therefore assumed to give rise to “emotional” suffering.³³³ Surfacing tort law’s deep structures and subjecting them to critique has been a major and fruitful focus of feminist tort scholarship for some time now. Intriguingly, climate change litigation may aid this cause by making more visible tort law’s disfavored interests. Certain forms of injury that have been rationalized away as incidental or marginal may come to appear more significant when presented in this dramatic new light.

Consider the distinction between individual and communal interests, which relates to similar dichotomies between personal and relational or

³²⁷ See Sophia I. Gatowski, et al., *Asking the Gatekeepers: A National Survey of Judges on Judging Expert Evidence in a Post-Daubert World*, 25 LAW & HUM. BEHAV. 433, 443 (2001) (noting that seventy five percent of surveyed judges believed that the *Daubert* ruling was intended to guard against “junk science”). Further results from this survey give reason for pause, it should be disclosed: While judges overwhelmingly support the active gatekeeper role established in *Daubert* and many overwhelmingly believe falsifiability and error rate to be crucial criteria to apply in that role, less than eight percent and four percent of judges, respectively, demonstrated basic understanding of what falsifiability and error rate actually mean in an open-response item. *Id.* at 444.

³²⁸ Martha Chamallas, *The Architecture of Bias: Deep Structures in Tort Law*, 146 U. PA. L. REV. 463, 469 (1998).

³²⁹ Martha Chamallas, *Vanished from the First Year: Lost Torts and Deep Structures in Tort Law*, in LEGAL CANONS 104, 108 (J. M. Balkin & Sanford Levinson eds., 2000)

³³⁰ Chamallas, *supra* note 328, at 469.

³³¹ Chamallas, *supra* note 329, at 107; Chamallas, *supra* note 328, at 467.

³³² See Lucinda M. Finley, *Female Trouble: The Implications of Tort Reform for Women*, 64 TENN. L. REV. 847, 860 (1997).

³³³ *Id.* at 858–59.

property and cultural interests. In classical liberal fashion, the former set of interests is privileged over the latter within tort law, as evidenced by limitations on loss of consortium, bystander emotional distress, and other claims that express an inherently intersubjective harm. On broader social dimensions, judges struggle to comprehend what a claim for harm to cultural integrity might even mean. In the wake of the 1989 Exxon Valdez disaster, for instance, a class of Alaska Natives sought recovery for an irreparable impairment to their way of life, over and above the more tangible deprivations they had suffered.³³⁴ Addressing this claim, the Ninth Circuit first noted that the Alaska Native class had settled economic claims stemming directly from loss of fishing resources.³³⁵ The panel then pondered what could be meant by “cultural damage” apart from those losses.³³⁶ To the extent that culture was acknowledged by the panel, it was understood to be the basic right of every individual to pursue a life of his choosing in liberal society.³³⁷ From that perspective, the Alaska Natives failed to satisfy the “special injury” requirement that would enable them to recover as private litigants in the context of a public nuisance: “While the oil spill may have affected Alaska Natives more severely than other members of the public, the right to obtain and share wild food, enjoy uncontaminated nature, and cultivate traditional, cultural, spiritual, and psychological benefits in pristine natural surroundings is shared by all Alaskans.”³³⁸

A sleight of hand was at work here. It may be that all Alaskans can pursue the various disaggregated activities that were impaired by the Exxon Valdez disaster and that collectively *appear* to compose the Native Alaskans’ distinctive culture. But only Native Alaskans can claim historical continuity with this culture. For all these thousands of years, it is only Native Alaskans who have been returning the bones of consumed salmon to the waters from which they are caught, with gratitude and hope for next year’s harvest.³³⁹ To imagine that liberalism’s self-made man might somehow fashion himself into the equivalent of a Native Alaskan is to deprive the group injury of distinctiveness through what amounts to a threat of cultural entry. And because liberalism promises to every individual maximal freedom to pursue his own life course, this hypothetical threat of entry is always available to defeat a claim of cultural distinctiveness.

³³⁴ Alaska Natives Class v. Exxon Corp., 104 F.3d 1196, 1197 (9th Cir. 1997).

³³⁵ *Id.* at 1198.

³³⁶ *Id.*

³³⁷ *Id.*

³³⁸ *Id.* (internal quotation omitted). Denise Antolini has criticized the special injury rule in the public nuisance context more generally, arguing that the modern requirement that plaintiffs demonstrate harm different in kind, rather than merely degree, from the public rests on a misconstrual of public nuisance’s historical origins. See Denise Antolini, *supra* note 118, at 761–63.

³³⁹ See Natural Res. Dep’t, The Tualip Tribes, Tualip Spring Chinook Run Boosts Cultural Pride, <http://www.tualip.nsn.us/htmldocs/nr062097.htm> (last visited Feb. 13, 2011).

As the number of lost cultures, languages, and territorial homelands mounts,³⁴⁰ judges will perhaps come to see group claims more charitably. Plaintiffs in the *Kivalina* litigation are also Native Alaskans, among the approximately 170,000 Inuit people that currently live in the Arctic.³⁴¹ Although their territory now belongs largely to the United States, Canada, Greenland, and Russia, the Inuit have lived in the Arctic for as long as 8000 to 9000 years.³⁴² To survive under such extreme conditions, the Inuit depend on accumulated knowledge about wildlife availability, weather patterns, and other ecological processes.³⁴³ With Arctic temperatures rising faster than anywhere else on the planet,³⁴⁴ much of the Inuit way of life is being challenged. For instance, traditional food sources such as caribou, moose, and waterfowl are shifting in range and declining in abundance.³⁴⁵ Important native plant species also are in decline.³⁴⁶ Traveling in search of food is becoming less predictable and more dangerous due to changing weather patterns, intensification of storms, thinning of sea and lake ice, and loss of snow for emergency shelter.³⁴⁷ As temperatures warm, traditional ways of drying fish and storing meat are becoming less safe and reliable.³⁴⁸ Accordingly, the Inuit are shifting to canned goods and other Western foods in place of their traditional diet, with accompanying rises in diabetes and other diseases.³⁴⁹

Already working against the effects of colonial and postcolonial attempts to eradicate indigenous culture,³⁵⁰ elders report increasing difficulty passing on traditional knowledge, as the veracity of that knowledge seems less obvious to younger generations.³⁵¹ The longstanding Inuit practice of sharing the fruits of a hunt is also coming under strain.³⁵² Developed as a way to spread the risk of low-probability, high-payoff hunts for whales and other large mammals, the sharing tradition also reinforces communal solidarity. But with some hunting grounds no longer viable due to sea ice loss and

³⁴⁰ See Rebecca Tsosie, *Indigenous People and Environmental Justice: The Impact of Climate Change*, 78 U. COLO. L. REV. 1625, 1635 (2007) (summarizing threats posed by climate change to indigenous peoples).

³⁴¹ These facts are drawn from a valuable University of British Columbia Faculty of Law teaching module. AVA MURPHY & SHI-LING HSU, CLIMATE CHANGE LITIGATION: INUIT V. THE U.S. ELECTRICITY GENERATION INDUSTRY 5 (2008), available at http://www.law.ubc.ca/files/pdf/enlaw/climatechange_04_24_09.pdf.

³⁴² *Id.*

³⁴³ *Id.* at 5–7.

³⁴⁴ *Id.* at 5 (citing INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 30 (2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf).

³⁴⁵ *Id.* at 6.

³⁴⁶ *Id.* at 6–7.

³⁴⁷ *Id.* at 7.

³⁴⁸ *Id.*

³⁴⁹ *Id.* at 7, 9.

³⁵⁰ Brad Morse, *Australia and Canada: Indigenous Peoples and the Law*, 8 LEGAL SERVICE BULL. 104, 104–06 (1983).

³⁵¹ MURPHY & HSU, *supra* note 341, at 9.

³⁵² *Id.*

other changes, the stability of the hunting network system is under threat.³⁵³ Higher levels of stress and anxiety also are reported, in large part because of a declining ability to express and enact the Inuit identity in its familiar form.³⁵⁴ Unfortunately, these trends will not reverse: given the existing stock of greenhouse gases in the atmosphere, the level of emissions expected under even the most optimistic mitigation scenario, and the special vulnerability of the Arctic to climate change impacts, the Inuit can expect an increasingly unfamiliar and inhospitable environment in the coming decades. Ironically, then, the reality of group-based cultural interests may become more tangible to courts precisely because their disappearance from the world makes their uniqueness and non-replicability more plain. Claims premised on climate change harms would still face a variety of other obstacles, but in a more tractable context like the Exxon Valdez litigation, courts may no longer assume that the cultural harm at issue is indistinct.

A similar dynamic already seems to be playing out in the common law with respect to ecological resources. Although American property and tort law traditionally expressed a bias against intact wilderness and in favor of human development of land,³⁵⁵ some courts now are recognizing that a variety of valuable ecosystem services are derived from parcels of land that previously would have been coded as underexploited. "These ecosystem services include flood mitigation and groundwater recharge from wetlands, water filtration and sediment capture from forests, nutrient cycling, gas regulation, pollination, thermal regulation, carbon sequestration, and so on."³⁵⁶ As Professor J.B. Ruhl has argued, advances in the scientific understanding and economic monetization of such services enable their recognition as protectable interests under traditional common law tests.³⁵⁷ What once would have appeared as an exotic or speculative claim increasingly seems "rather plain vanilla as far as nuisance doctrine is concerned."³⁵⁸ Thus, courts are beginning to adopt a sensibility toward land use that is more ecologically informed, breaking down the longstanding dichotomy between development, seen as productive, and wilderness, seen as wasteful or dangerous.

The New Hampshire Supreme Court, for instance, has upheld a lower court order requiring relocation of a home that had been built on wetlands, thereby altering the area hydrology in a way that increased flooding on

³⁵³ *Id.*

³⁵⁴ *Id.*

³⁵⁵ See John G. Sprankling, *The Antiwilderness Bias in American Property Law*, 63 U. CHI. L. REV. 519, 556 (1996).

³⁵⁶ J.B. Ruhl, *Making Nuisance Ecological*, 58 CASE W. RES. L. REV. 753, 757 (2008) (emphasis removed); see also Stephen M. Johnson, *From Climate Change and Hurricanes to Ecological Nuisances: Common Law Remedies for Public Law Failures?*, 27 GA. ST. U. L. REV. (forthcoming), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1607861.

³⁵⁷ Ruhl, *supra* note 356, at 768, 773.

³⁵⁸ *Id.* at 773.

plaintiff's land.³⁵⁹ Likewise, the Minnesota Supreme Court has upheld negligence liability against landowners whose pesticide spraying activities on their own land foreseeably harmed bees that were visiting to forage from a neighbor's beekeeping operation.³⁶⁰ The *Barasich* litigation is also instructive in this regard, as plaintiffs successfully impressed upon the trial judge the seriousness of marshland erosion, even if they did not prevail in establishing a duty owed by defendants to protect the marshland's ecological integrity.³⁶¹ Climate change suits will further this exercise in judicial education, as the attempt to understand any climate change harm forces judges to think ecologically.³⁶² Ecosystem services that were previously overlooked or undervalued become more legible and material. Distances that seemed remote become more intimate, as the natural pathways that connect them are brought into view. Accordingly, it becomes less comfortable to maintain the traditional assumptions that "natural" and "distant" interests are less important than those that are "manmade" and "immediate."

Less comfortable too will be the traditional assumption that risk of future harm is not itself an injury. In the asbestos context, such an assumption drove the Supreme Court to reject medical monitoring, fear-of-exposure, and enhanced risk theories of tort recovery, out of concern that such harms are "comparatively less important" than realized harms.³⁶³ While state courts have shown some willingness to allow recovery for medical monitoring expenses on account of toxic substance exposure, they too have rejected the notion that enhanced risk is itself a compensable harm.³⁶⁴ Like the somewhat arbitrary restriction of loss of chance recovery to the medical malpractice context,³⁶⁵ courts have not adequately justified this stance. Concern over limited funds and the need to prioritize recovery is one attempt, but it is unsatisfactory. From a corrective justice orientation, it does seem problematic to allow recovery on account of enhanced risk if "comparatively more important" harms will later go uncompensated. From an instrumentalist orientation, however, the limited fund problem seems less

³⁵⁹ See John Copeland Nagle, *From Swamp Drainage to Wetlands Regulation to Ecological Nuisances to Environmental Ethics*, 58 CASE W. RES. L. REV. 787, 799 (2008) (citing Cook v. Sullivan, 829 A.2d 1059, 1067–68 (N.H. 2003)).

³⁶⁰ Anderson v. State Dep't of Natural Res., 693 N.W.2d 181, 192 (Minn. 2005). For discussion of this case, see Alexandra B. Klass, *Bees, Trees, Preemption, and Nuisance: A New Path to Resolving Pesticide Land Use Disputes*, 32 ECOLOGY L.Q. 763, 803–05 (2005).

³⁶¹ 467 F. Supp. 2d 676, 678–79, 695 (E.D. La. 2006)

³⁶² Relatedly, scholars have argued that climate change will force the common law public trust doctrine to become more broad and flexible in its conception of the public's entitlement to ecological resources. See Craig, *supra* note 210, at 781; Mary Christina Wood, *Advancing the Sovereign Trust of Government to Safeguard the Environment for Present and Future Generations (Part I): Ecological Realism and the Need for a Paradigm Shift*, 39 ENVTL. L. 43, 63–64 (2009).

³⁶³ Metro-N. Commuter R.R. Co. v. Buckley, 521 U.S. 424, 432, 435–36, 444 (1997); see also Mark Geistfeld, *supra* note 266, at 1934, 1943.

³⁶⁴ See Schwartz, *supra* note 75, at 677 (observing that "absent . . . a current injury, most courts have been reluctant to approve recoveries for fear of future diseases").

³⁶⁵ See *supra* text accompanying note 317.

pressing since the incentive effects of enhanced risk recovery going forward would be to discourage activities that give rise to a limited fund problem in the first place. Because the ability to attract capital in furtherance of potentially harmful activities or products would be lessened, tort law would help channel economic activity toward softer development paths, while still maintaining the flexibility and decentralized decisionmaking for which markets are heralded. Governance would, in a sense, be distributed throughout the market by altering the constraints under which market actors optimize.³⁶⁶

Short-sighted and optimistic habits of thought frequently lead us to downplay the significance of uncertain future harms in pursuit of current gains.³⁶⁷ The debt overhang from these bargains is beginning to appear worrisome to those who study it. Climate change litigation offers a useful debiasing opportunity because it focuses courts' attention on the extraordinary inertia and risk potential of the climate system. Familiar linear understandings of time become confused in the climate change context, where emissions are long-lived and system patterns are often irreversible. The possibility of runaway climate change and other catastrophic scenarios focuses attention on the "fat tails" of the risk distribution, while the reality of system inertia—both in the climate system and in social systems such as energy or transportation infrastructure—forces those scenarios into present consideration. The decision to build a new coal-fired electricity plant, for instance, can no longer be evaluated according to the present discounted value of future mean risk estimates. Or, rather, it is no longer reasonable to evaluate the decision in that manner. Instead, the reality of path dependence in energy infrastructure investment and the possibility of climate change catastrophe demands more by way of prevention and insurance than it does optimal cost-benefit balancing.³⁶⁸ Likewise, the implementation of duties toward future generations demands consideration of the distribution of rights and resources across time, rather than the normalization of costs and benefits according to a discount rate. The intergenerational distribution gives rise to discount rates; it cannot be determined by them.³⁶⁹

Once judges have understood these aspects of the climate change problem, they may view risk recovery as a useful epistemological device for bringing the future into present focus and attention. Again, climate change plaintiffs will face a variety of remaining doctrinal obstacles, but for other victims of future harm, courts may begin to see the wisdom of fashioning

³⁶⁶ See Douglas A. Kysar, *Ecologic: Nanotechnology, Environmental Assurance Bonding, and Symmetric Humility*, 28 UCLA J. ENVTL. L. & POL'Y (forthcoming 2010).

³⁶⁷ See Jeffrey J. Rachlinski, *The Psychology of Global Climate Change*, 2000 U. ILL. L. REV. 299, 307–13 (2000).

³⁶⁸ On path dependence in technological and socioeconomic systems, see Steven J. Davis et al., *Future CO₂ Emissions and Climate Change from Existing Energy Infrastructure*, 329 SCIENCE 1330, 1333 (2010). On the significance of insurance-based reasoning to climate policy, see Martin L. Weitzman, *On Modeling and Interpreting the Economics of Catastrophic Climate Change*, 91 REV. ECON. & STAT. 1 (2009), and Martin L. Weitzman, *A Review of the Stern Review on the Economics of Climate Change*, 45 J. ECON. LITERATURE 703 (2007).

³⁶⁹ See Douglas A. Kysar, *Discounting . . . On Stilts*, 74 U. CHI. L. REV. 119, 122–23 (2007).

mechanisms to overcome temporal neglect. By comparison to the climate change conundrum, the latency problem posed in more garden variety environmental and toxic tort suits seems quite manageable. As regulators grapple with the challenge of compounding centuries-spanning climate impacts into the price of carbon, courts may feel less timid using the liability system to bridge two or three decades in the case of toxic substances exposure. This may be especially likely if regulators find themselves increasingly unable to prioritize such risks for oversight, given the sheer magnitude and complexity of their other tasks. By adapting to these changes—both in the world of risk and in its regulation—common law judges would ensure the continued relevance and importance of tort law.

IV. CONCLUSION

Notwithstanding admirable scholarly attempts to encapsulate its intellectual essence, tort law does not exist in a vacuum as the pure unfolding of an internal logic. Nor does it inevitably and predictably respond to material conditions outside the courtroom. Nor finally does it have a monopoly on principles and procedures for redressing and preventing harm. Instead, ideas about the proper form and function of tort law must continually interact with the raw realities of human suffering and with various alternative institutions that address such suffering.³⁷⁰ Obviously, such a complex and contingent matrix does not lend itself readily to prediction, but if scientists are even remotely correct in their assessment of harms to be expected from greenhouse gas emissions, then climate change will enter prominently into tort law's evolutionary dynamics. Accordingly, this Article has offered speculative discussion on what a barrage of climate change tort suits might do for the development of tort law itself. It has argued that judges likely will not award damages or issue injunctions for climate-related harms, but that they may find themselves affected in other ways by the very process of rejecting such claims. As a result, the tort system may shift to keep in alignment with an administrative state that is increasingly pre-occupied by grander and more complicated challenges than the previous century posed.

Even as climate change tort suits fail on the merits, they may yet change the air.

³⁷⁰ See Witt, *supra* note 75, at 19.