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ARTICLE

The Legal Crisis Within the Climate Crisis

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Abstract. Climate change creates a difficult choice for property owners and governmental officials alike: Should they invest in costly climate adaptation measures or retreat from climate-exposed areas? Either decision is fraught with legal uncertainty, running headfirst into antiquated legal doctrines designed for a more stable world. Climate impacts to the coastline are forcing policymakers to consider four adaptation tools: (1) resisting climate impacts by building sea walls and armoring the shoreline; (2) accommodating those impacts by elevating existing structures; (3) managed retreat such as systematically and preemptively moving people out of harm's way; and (4) reactively moving people to new locations following natural disasters. This final tool of unmanaged retreat has emerged as the default "strategy." However, longstanding property and tort law doctrines—developed when there was a more stable physical environment—are poised to thwart these tools.

In this Article, I argue that just as climate change destabilizes the physical environment, legal doctrine is also ripe for destabilization. Using coastal zone adaptation challenges as a touchpoint, I show how legal doctrines designed for a more stable physical environment constrain climate adaptation efforts. For example, if governments invest in armoring measures, they will confront physical takings jurisprudence that mandates just compensation. The duty to repair and maintain—a mixed question of property and tort law—complicates disinvestment by states and localities from coastal roads and their retreat from coastal areas. Legal doctrine needs to adapt to meet the climate moment. Absent a doctrinal change, climate adaptation will default to unmanaged retreat—an ad hoc, reactive, and disjointed "strategy" that exacerbates existing inequalities.

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Introduction

Should I stay or should I go now?
If I go there will be trouble
And if I stay it will be double

—The Clash (1982)[1]

In a time of wildfires, hurricanes, and other climate-exacerbated extreme weather, local governments confront a difficult choice: Should they invest in costly and complicated climate adaptation measures or disinvest from climate-vulnerable communities? Individuals retreating from climate-exposed communities should, ideally, relocate in a coherent, voluntary, and orchestrated manner. But no single United States governmental agency or institution is in charge of managed retreat.[2] The result: *unmanaged* retreat and response. This "strategy" has emerged as the default adaptation approach as localities react to climate impacts in a disjointed, reactive, and ad hoc manner. Unmanaged retreat also imposes enormous financial, legal, and psychological costs on climate migrants, while posing novel legal questions concerning the duties that a government owes to its citizens.

Climate decisionmaking is also a "hot mess," so to speak—both legally and physically. As policymakers decide whether to retreat from or invest in climate-exposed communities, they will encounter longstanding legal doctrines designed for a more stable physical environment—an "Earth 1.0." But climate change is the ultimate physical destabilizer and has brought forth an "Earth 2.0." Earth 2.0 is a fundamentally different physical world, where climate dynamism clashes with antiquated legal doctrines.[3] Indeed, core

1. THE CLASH, SHOULD I STAY OR SHOULD I GO (CBS Records 1982).

2. Managed retreat is defined as "the planned, purposeful, coordinated movement of people and assets away from risk." A.R. Siders, *Managed Retreat in the United States*, 1 ONE EARTH PERSP. 216, 216 (2019).

3. For an overview of climate change projections this century—including a global temparature increase of four degrees Celsius—see generally J.B. Ruhl & Robin Kundis Craig, *4°C*, 106 MINN. L. REV. 191, 231-32, 239-44 (2021). *See also* U.S. GLOBAL CHANGE RSCH. PROGRAM, FOURTH NATIONAL CLIMATE ASSESSMENT: VOLUME II: IMPACTS, RISKS, AND ADAPTATION, IN THE UNITED STATES: REPORT-IN-BRIEF 53-55, 164-66 (2018) [hereinafter NCA4 VOL. II], https://perma.cc/RB2J-MM5H. Adaptation is defined as "adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects." Exec. Order No. 13653, 78 Fed. Reg. 66819, 66824 (Nov. 6, 2013); *see also* U.S. GLOBAL CHANGE RSCH. PROGRAM, GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES 8 (2009), https://perma.cc/26BT-8FKS (defining adaptation measures as those designed "to improve our ability to cope with or avoid harmful impacts and take advantage of beneficial ones, now and in the future"). For an overview of climate change adaptation law, see generally J.B. Ruhl, *Climate Adaptation Law*, *in* GLOBAL CLIMATE CHANGE & LAW 611 (Michael B. Gerrard, Jody Freeman & Michael Burger
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property and tort law doctrines were established well before legal experts and legislators understood climate impacts. Just as climate change continues to destabilize the physical environment, it is also poised to destabilize longstanding common law doctrines.[4]

These doctrines evolved slowly, mirroring the physical environment's gradual transformation.[5] But the future will be anything but stable. Earth 2.0 will be defined by climate destabilization.[6] As state and local governments ask "Should we stay or should we go?" they must walk a legal tightrope that balances adaptation action with inaction. It is increasingly clear that climate change is serving as a forcing mechanism, and legal doctrine will *also* have to adapt to meet the climate moment. Lawmakers can work collaboratively with jurists, easing this doctrinal shift by integrating climate science into coastal

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eds., 2023). *See also* Andrea McArdle, *Managing "Retreat": The Challenges of Adapting Land Use to Climate Change*, 40 U. ARK. LITTLE ROCK L. REV. 605, 610-11 (2018) (discussing strategies of climate resilience); Edward P. Richards III, *The Hurricane Katrina Litigation Against the Corps of Engineers: Is Denial of Geology and Climate Change the Way to Save New Orleans?*, 40 U. ARK. LITTLE ROCK L. REV. 695, 703-06 (2018) (using Hurricane Katrina as a case study to highlight how climate change will exacerbate environmental factors). Disinvestment in the climate retreat context refers to the process of consciously allowing an infrastructure asset to "fall below previously accepted standards of condition or performance." *Infrastructure Disinvestment*, GEORGETOWN CLIMATE CTR., https://perma.cc/R59K-6TXM (archived May 6, 2024) (quoting NAT'L COOP. HIGHWAY RSC. PROGRAM, ECONOMIC AND DEVELOPMENT IMPLICATIONS OF TRANSPORTATION DISINVESTMENT: A SYNTHESIS OF HIGHWAY PRACTICE 1 (2015), https://perma.cc/WS9E-LK87).

4. *See* JOHN R. NOLON, CHOOSING TO SUCCEED: LAND USE LAW & CLIMATE CONTROL 135-39 (2021) ("The very essence of the common law is flexibility and adaptability. . . . [P]recedents must yield to the reason of different or modified conditions." (quoting *In re* Hood River, 227 P. 1065, 1086-87 (Or. 1924)); *see also* Robin Kundis Craig, *"Stationarity Is Dead"—Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENV'T L. REV. 9, 62-63 (2010) (arguing that climate change "will alter the basic parameters of ecosystems, which in turn provide ecosystem services . . . [and] should be sufficient to prompt revitalized legal attention to the public and community values of private property and to the legal doctrines that give cognizance to those values").

5. *See* Christopher Serkin, *Passive Takings: The State's Affirmative Duty to Protect Property*, 113 MICH. L. REV. 345, 369-70 (2014) (arguing that the jurisprudence of property rights changes to reflect societal shifts); *cf.* J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems—With Applications to Climate Change Adaptation*, 89 N.C. L. REV. 1373, 1387 (2011) ("At any scale, moreover, our federalism governance model has also allowed us to configure different combinations of local, state, and federal governance units to respond to different policy challenges, and to rearrange the combinations to adjust for changing conditions. The system has done both for centuries—placing a premium on evolvability.").

6. For a discussion of what this physical destabilization may portend for the future, see David Wallace Wells, *Beyond Climate Catastrophe: A New Climate Reality is Coming into View*, N.Y. TIMES MAG. (Oct. 26, 2022), https://perma.cc/L6M7-BSD5. *See also* Craig, *supra* note 4, at 16; P.C.D. Milly et al., *Stationarity Is Dead: Whither Water Management?*, 319 SCIENCE 573, 574 fig. (2008).

adaptation measures, embracing climate transparency, and emphasizing the need to safeguard the health and welfare of affected communities. Barring a doctrinal transformation, local governments will be constrained and left with inadequate adaptation tools. This Article addresses this fast-approaching legal destabilization, arguing that jurists and lawmakers must embrace adaptation realism in the face of climate uncertainty.

Climate destabilization has already transformed several statutes and areas of the law. Within environmental law, climate change has expanded the Supreme Court's interpretation of the Clean Air Act's scope to encompass greenhouse gas (GHG) emissions regulations.[7] Climate-driven sea level rise is shifting historic boundaries between land and sea and impacting national security law, the public trust doctrine, and the law of the sea.[8] Within national security and disaster law, policymakers now conceptualize climate change both as a threat accelerant and as a catalyst for conflict, broadening our understanding of security threats.[9] Finally, climate risks are shaking up the United States financial system,[10] prompting the SEC to introduce new reporting requirements just before this Article was published.[11]

7. *See* Massachusetts v. EPA, 549 U.S. 497, 528-32 (2007). *But see* West Virginia v. EPA, 142 S. Ct. 2587, 2609-13 (2022) (limiting the scope of the Clean Power Plan).

8. On national security, see Mark Patrick Nevitt, *On Environmental Law, Climate Change, & National Security Law*, 44 HARV. ENV'T L. REV. 321, 328-34 (2020). On the public trust doctrine, see Margaret E. Peloso & Margaret R. Caldwell, *Dynamic Property Rights: The Public Trust Doctrine and Takings in a Changing Climate*, 30 STAN. ENV'T L.J. 51, 54, 58 (2011). On the law of the sea, see, for example, *Request for an Advisory Opinion Submitted by the Commission of Small Island States on Climate Change and International Law*, CLIMATE CASE CHART, https://perma.cc/XXC3-F6YH (archived Apr. 1, 2024) (describing pending proceedings before the International Tribunal for the Law of the Sea).

9. *See* Kendra Sakaguchi, Anil Varughese & Graeme Auld, *Climate Wars? A Systematic Review of Empirical Analyses on the Links Between Climate Change and Violent Conflict*, 19 INT'L STUD. J. 622, 623-24 (2017); U.S. DEP'T OF DEF., REPORT ON EFFECTS OF A CHANGING CLIMATE TO THE DEPARTMENT OF DEFENSE 2, 8, 16 (2019), https://perma.cc/5A2V-5492; *see also* Mark Nevitt, *The Commander in Chief's Authority to Combat Climate Change*, 37 CARDOZO L. REV. 437, 441, 445 (2015) (using a national security lens to analyze the President's authority to combat climate change).

10. *See* Madison Condon, *Market Myopia's Climate Bubble*, 2022 UTAH L. REV. 63, 70-78 (discussing "equity-misvaluation"—the failure to properly assess climate risk); Bill McKibben, *Citing Climate Change, Blackrock Will Start Moving Away from Fossil Fuels*, NEW YORKER (Jan. 16, 2020), https://perma.cc/C8NZ-3PF9; George S. Georgiev, *The Market-Essential Role of Corporate Climate Disclosure*, 56 U.C. DAVIS L. REV. 2105, 2107-08 (2023) (discussing the SEC's climate-related rulemaking). Some corporations have pledged to reduce or eliminate their emissions. *See, e.g.*, Rishi Iyengar, *Microsoft Wants to Eradicate Its Carbon Footprint by Going Emissions Negative by 2030*, CNN (updated Jan. 17, 2020, 4:35 AM EST), https://perma.cc/ZM49-ZRTZ. *But see, e.g.*, Shelley Welton, Feature, *Neutralizing the Atmosphere*, 132 YALE L.J. 171, 175-79 (2022) (discussing risks associated with corporate "net-zero" pledges).

11. The Enhancement and Standardization of Climate-Related Disclosures for Investors, 89 Fed. Reg. 21668 (Mar. 28, 2024) (to be codified at 17 C.F.R. pts. 210, 229, 230, 232, 239,

footnote continued on next page

Four climate adaptation strategies and their corresponding doctrinal stress points illustrate how additional areas of law must evolve to meet the climate adaptation moment:

- *Resist: Physical takings.*[12] Localities may choose to adapt to climate change by resisting its impacts. For example, many localities are defending against sea level rise and extreme weather by investing in hard and soft armoring adaptation measures like seawalls. While these armoring measures qualify as a *public use* within the meaning of the Fifth Amendment, following the resistance strategy may well trigger an indirect or temporary taking, thus requiring compensation.[13] Resistance also implicates the "common enemy" doctrine.[14]
- *Accommodate: Regulatory Takings.*[15] Localities may choose an accommodation strategy in the face of climate impacts. For example, some localities require that properties in the coastal zone elevate their structures, even turning to no-build provisions along the coast. Yet these regulations run the risk of going "too far," triggering a compensable regulatory taking.[16] Disclosing climate risk upfront affects a property

249). Litigation challenging the new rule is ongoing. *See* Consolidation Order, *In re* Securities and Exchange Commission, MCP No. 180 (J.P.M.L. Mar. 21, 2024), https://perma.cc/YTN5-JATL (consolidating petitions for review in the Eighth Circuit).

12. *See infra* Part II.

13. *See* William B. Stoebuck, *The Property Right of Access Versus the Power of Eminent Domain*, 47 TEX. L. REV. 733, 764 (1969) (arguing that a taking occurs "when governmental activity causes a substantial loss of access").

14. The common enemy doctrine is a longstanding legal principle by which landowners have "the right to repel or caputre water without becoming liable for the adverse effects this might have on neighbors." ANNE SIDERS, COLUMBIA CTR. FOR CLIMATE CHANGE L., MANAGED COASTAL RETREAT: A LEGAL HANDBOOK ON SHIFTING DEVELOPMENT AWAY FROM VULNERABLE AREAS 68 (2013), https://perma.cc/XY9R-FX67. This doctrine is shifting, with some jurisdictions adopting a "reasonable use" test (which holds landowners liable if their actions unreasonably harm neighboring lands) or a civil law rule (in which landowners must accept the natural drainage of the land). *Id.* The Supreme Court of Washington has held that the common enemy doctrine does not apply to seawater, limiting the doctrine's ability to be used as a defense to hard armoring or elevating seawalls. Grundy v. Thurston County, 117 P.3d 1089, 1090 (Wash. 2005).

15. *See infra* Part III.

16. *See* Pa. Coal Co. v. Mahon, 260 U.S. 393, 415 (1922). Regulatory takings is a common law doctrine that is of growing importance for governmental efforts to combat climate change—particularly in the floodplain. The government may be required to provide just compensation to a private property owner if a governmental regulation deprives the owner of all economic value or if the regulation significantly reduces the economic value of the property. *See generally* SIDERS, *supra* note 14, at 15-17.

owner's reasonable investment-backed expectation—a key factor in regulatory takings inquiries.[17]

- *Unmanaged Retreat: Inverse Condemnation and Duty to Maintain.*[18] Localities are increasingly choosing to adapt to climate change by disinvesting from vulnerable communities, often in a reactive and ad hoc manner. This unmanaged "strategy" invites legal challenges, particularly if state and local governments terminate key services without following the requisite procedures. For example, a Florida county faced litigation after residents voted to terminate maintenance of Old A1A, a key coastal road subject to damage from natural forces.[19] But inaction can trigger an inverse condemnation and impose governmental liability.
- *Managed Retreat: Eminent Domain and Buyouts.*[20] Localities may adapt to climate change through managed retreat, which can be voluntary (buyouts) or involuntary (eminent domain).[21] But proactive managed retreat can be fraught, expensive, and hampered both by a community's attachment to a place and the economic costs of losing property tax revenue.[22] Managed retreat—in addition to being preferable as a policy

17. In *Severance v. Patterson*, for example, the Supreme Court of Texas held that public beach access easements do not "roll" onto previously unencumbered property when the coastline changes drastically due to a hurricane. 370 S.W.3d 705, 724-25 (Tex. 2012). In so holding, the court found that providing notice that the coastline might change was not sufficient to "relieve the State from the legal requirement of proving or purchasing an easement nor from the constitutional requirement of compensation if a taking occurs." *Id.* at 720, 726. For more on how notice can impact regulatory takings in other contexts beyond climate, see *Metro. Dade Cnty. v. Fontainebleau Gas & Wash, Inc.*, 570 So. 2d 1006, 1008 (Fla. Dist. Ct. App. 1990) (holding that property owners are deemed to purchase property with constructive knowledge of the law including applicable land use regulations); and *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 124, 127-28 (1978) (discussing how the reasonable investment-backed expectation factor informs the regulatory takings analysis more generally).

18. *See infra* Part IV.A.

19. *See infra* Part IV.A.1. In North Carolina, policymakers are faced with an analogous challenge of safeguarding Highway 12, a 200-mile-long ribbon of islands on the Outer Banks that is uniquely vulnerable to climate change. Gilbert M. Gaul, *Shifting Sands: Carolina's Outer Banks Face a Precarious Future*, YALE ENV'T 360 (July 14, 2022), https://perma.cc/44X8-NHNN.

20. *See infra* Part IV.B. Residents of Isle de Jean Charles, a low-lying part of Louisiana vulnerable to climate impacts, just retreated from their ancestral homeland. *See* Adam Crepelle, *The United States First Climate Relocation: Recognition, Relocation, and Indigenous Rights at the Isle de Jean Charles*, 6 BELMONT L. REV. 1, 26-31 (2019); Jessica R.Z. Simms, Helen L. Waller, Chris Brunet & Pamela Jenkins, *The Long Goodbye on a Disappearing, Ancestral Island: A Just Retreat from Isle de Jean Charles*, 11 J. ENV'T STUD. & SCIS. 316, 325 (2021) (showcasing the human impact of the move away from the Isle de Jean Charles).

21. Are these climate actions a "public use" within the meaning of the Takings Clause? *See* Kelo v. City of New London, 545 U.S. 469, 477-81 (2005).

22. *See* SIDERS, *supra* note 14, at 103.

matter—implicates the fewest doctrinal problems. Policymakers should incentivize and implement managed retreat strategies that favor voluntary over involuntary movement—a possible way to sidestep doctrinal challenges while taking proactive adaptation measures.

Property and disaster law scholars are beginning to address this doctrinal destabilization precipitated by climate change's impacts on property rights.[23] Specifically, they have noted that climate change will destabilize regulatory takings doctrine as state and local governments disinvest from vulnerable coastal communities.[24]

Regulatory takings exceptions—such as what might constitute "new knowledge," a "grave threat," or an "actual necessity"—will assume increased importance in the face of climate destabilization.[25] Regulatory takings doctrine may also encompass governmental *inaction*, particularly if the government invests in adaptation measures and later refuses to maintain or repair those measures.[26] For communities vulnerable to sea level rise or extreme weather, governments are even considering the termination of services or the provision of advance notice that emergency services may not be available. If state and local governments are unable or unwilling to rescue property owners who build in coastal zones vulnerable to climate change, does that trigger a

23. *See, e.g.*, Michael Pappas & Victor B. Flatt, *Climate Change Property: Disasters, Decommodification, and Retreat*, 82 OHIO ST. L.J. 331, 341-50 (2021) (analyzing the ineffectiveness of current laws to address the rise in climate-driven disasters).

24. *See* Thomas Ruppert, *Castles—and Roads—in the Sand: Do All Roads Lead to a "Taking"?*, 48 ENV'T L. REP. NEWS & ANALYSIS 10914, 10915, 10922 (2018) (arguing that the law has been slow to acknowledge sea level rise, while describing how one case in Florida introduced the idea that government inaction may support a Fifth Amendment takings claim). The regulatory takings doctrine is already subject to criticism from other legal scholars. *See, e.g.*, J. Peter Byrne, *Ten Arguments for the Abolition of the Regulatory Takings Doctrine*, 22 ECOLOGY L.Q. 89, 90-91 (1995) (critiquing the regulatory takings doctrine).

25. The reference to "new knowledge" is a nod to Justice Scalia's holding in *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003, 1030-31 (1992) ("The 'total taking' inquiry we require today will ordinarily entail . . . analysis of, among other things, the degree of harm to public lands and resources, or adjacent private property, posed by the claimant's proposed activities . . . . The fact that a particular use has long been engaged in by similarly situated owners ordinarily imports a lack of any common-law prohibition . . . though changed circumstances or *new knowledge* may make what was previously permissible no longer so . . . .") (emphasis added)).

26. *See* Serkin, *supra* note 5, at 346-47; *cf.* Jordan v. St. Johns County, 63 So. 3d 835, 838-39 (Fla. Dist. Ct. App. 2011) (holding that a county government must maintain a road so long as it has not formally abandoned it). This inaction strategy will also impact the public trust doctrine as the property line moves with sea level rise. For a full discussion of climate change's impacts on the public trust doctrine, see Peloso & Caldwell, note 8 above, at 56-57.

compensable taking?[27] The failure to repair a levee near a climate-vulnerable community can trigger affirmative duties. Failure to take such actions raises mixed questions of property and tort law.[28] The upshot is that any governmental adaptation measure must balance action with inaction and be mindful of the regulatory takings doctrine. Failure to do so risks the governmental entity paying unexpected costs as "just compensation."

This Article proceeds in five Parts. Part I addresses the physical destabilization already underway. It summarizes the Intergovernmental Panel on Climate Change's (IPCC) and National Climate Assessment's (NCA) reports and what they foretell for climate-exposed coastal communities. Part II analyzes how the *resist* adaptation strategy implicates longstanding property law doctrine as states and localities invest in hard and soft armoring to safeguard property. Part III addresses how the *accommodation* adaptation strategy will destabilize property law doctrine, with a focus on regulatory takings and its undertheorized exceptions as applied to climate change. Part IV addresses differing *retreat* strategies, both managed and unmanaged, and demonstrates how decisionmakers often refuse to make difficult climate decisions ex ante. The default is ex post, reactive decisionmaking exemplified by unmanaged retreat. Finally, Part V proposes several principles to manage climate retreat in the coastal zone, focusing on proactive measures, climate disclosure, and notice requirements. If properly applied, these principles—such as increased notice and better climate risk disclosure—can act as shields to regulatory takings challenges. I conclude by arguing that legal doctrines may not evolve in time, and it may well be time to reconceptualize new rights via federal and state constitutions, what I label "climate constitutionalism."[29]

But these strategies can only do so much in the face of doctrines designed for a stable Earth 1.0. Absent legal doctrines adapting to meet the climate challenge, governments will be thwarted in their adaptation decisions. The stakes could not be higher, with trillions of dollars of coastline assets and millions of homes in danger.[30]

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27. The Takings Clause requires "just compensation." U.S. CONST. amend. V. Some scholars have asserted that governmental *inaction* can also trigger a compensable taking. *See, e.g.*, Serkin, *supra* note 5, at 372-88.

28. The Army Corps of Engineers plays a critical role in maintaining levees and protecting communities vulnerable to flood. Does the government have an affirmative duty to continue to maintain and improve these levees, regardless of the cost? I turn to this question in Part IV.

29. *See infra* Part V.C.

30. *See* CLIMATE CENT., OCEAN AT THE DOOR: NEW HOMES AND THE RISING SEA 2 (2019), https://perma.cc/E9JJ-HHHX; U.S. GLOBAL CHANGE RSCH. PROGRAM, FIFTH NATIONAL CLIMATE ASSESSMENT: REPORT-IN-BRIEF 82-83 (2023), https://perma.cc/7QA7-T23D [hereinafter NCA5].

I. Climate Change's Physical Destabilization

A. Climate Science's Role in Adaptation Decisionmaking

The scientific community has made tremendous advances in furthering climate science in recent years, demonstrating that sea level rise and storm surge expose coastal communities to climate impacts. These scientific advances have broad implications for climate adaptation governance as officials decide whether to resist, accommodate, or retreat from climate impacts.[31] Despite these advances, more and more Americans reside in areas vulnerable to storm surge, extreme weather, flooding, wildfires, and other climate-driven impacts.[32]

Of course, any adaptation strategy is inextricably linked with climate change mitigation. To confront the challenges of climate change, the world must massively decrease its GHG emissions while adapting to a climate-destabilized future.[33] Because emissions stay in the atmosphere for years—even decades—a certain global temperature increase is already locked in.[34]

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31. As the Court acknowledged in *Lucas v. South Carolina Coastal Council*, "[C]hanged circumstances or new knowledge may make what was previously permissible no longer so . . . ." 505 U.S. 1003, 1031 (1992).

32. *See* Lily Katz & Sebastian Sandoval-Olascoaga, *More People Are Moving in than out of Areas Facing High Risk from Climate Change*, REDFIN: NEWS (updated Sept. 8, 2021), https://perma.cc/GXU6-8V9Q; *see also* NCA5, *supra* note 30, at 24 (discussing how the United States is addressing climate change through mitigation and adaptation but "without deeper cuts in global net greenhouse gas emissions and accelerated adaptation efforts, severe climate risks to the United States will continue to grow").

33. *See* WORLD METEOROLOGICAL ORG., UNITED IN SCIENCE 2020, at 18-19 (2020), https://perma.cc/R4RY-R697 (calling for transnational action); Will Steffen et al., *Trajectories of the Earth System in the Anthropocene*, 115 PNAS 8252, 8257 (2018) ("Ultimately, the transformations necessary to achieve the Stabilized Earth pathway require a fundamental reorientation and restructuring of national and international institutions toward more effective governance at the Earth System level . . . ."); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2021: THE PHYSICAL SCIENCE BASIS 23-25, 27-28 (Valérie Masson-Delmotte et al. eds., 2021), https://perma.cc/7ZYK-PUED (to locate the full report, select "View the live page") [hereinafter IPCC 2021 REPORT]. *See generally* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2023: SYNTHESIS REPORT (Hoesung Lee et al. eds., 2023), https://perma.cc/LK59-V24M, [hereinafter IPCC 2023 SYNTHESIS REPORT].

34. As a scientific baseline, I rely upon the Fourth National Climate Assessment, which highlights how climate change is affecting the physical earth system across the United States and its associated impacts and risks in the United States. *See generally* NCA4 VOL. II, *supra* note 3. Recent advances in climate attribution science link climate change to extreme weather events. *Id.* at 56; *see* Michael Burger, Jessica Wentz & Radley Horton, *The Law and Science of Climate Attribution*, 45 COLUM. J. ENV'T L. 57, 89-110 (2020) (highlighting the scientific underpinnings of extreme event attribution); DANIEL J. METZGER, SABIN CTR. FOR CLIMATE CHANGE L., ATTRIBUTION SCIENCE IN TAKINGS LITIGATION 6-10 (2021), https://perma.cc/QCG5-7U8W (describing the scientific context of extreme event attribution).

According to the most recent IPCC climate report, "Global warming will continue to increase in the near term (2021-2040) mainly due to increased cumulative CO_2 emissions in nearly all considered scenarios and modelled pathways."[35] And the fourth NCA report explains that the increase in the frequency and extent of high tide flooding due to climate-driven sea level rise threatens to destroy large swaths of the U.S. coastal property market and "increasingly disrupt and damage critical infrastructure and property, labor productivity, and the vitality of our communities."[36]

The 2020 United in Science report declared that "[t]ransformational change [is] needed to close the emissions gap."[37] But what does transformational change mean in the adaptation context? Surely it begins with the acceptance of climate science and the recognition that the traditional approach to land use and zoning is not workable in a climate-destabilized future. I call this growing awareness about climate science "adaptation realism." The NCA explains that "[w]ithout substantial and sustained global mitigation and regional adaptation efforts, climate change is expected to cause growing losses to American infrastructure and property and impede the rate of economic growth over this century."[38] Adaptation realism reflects the understanding that mitigation (the reduction in GHG emissions) alone will not avert climate catastrophe. What is needed is massive investment and changes in adaptative land use to minimize climate change's devastating and inequitable impacts.

Climate change will cause a dramatic increase in sea level rise this century; the fifth NCA report estimates that in the United States, sea level rise will increase by 11 inches by 2050, "as much as the observed rise over the last 100 years."[39] The fourth NCA report exclaims, "Global average sea levels are expected to continue to rise—by at least several inches in the next 15 years and by 1-4 feet by 2100. A rise of as much as 8 feet by 2100 cannot be ruled out."[40] The IPCC estimates that sea level rise will be between 0.28 and 1.01 meters by 2100.[41]

Sea level rise is already reshaping physical boundaries. Coastal property lines are often drawn to coincide with the physical boundary between the

35. IPCC 2023 SYNTHESIS REPORT, *supra* note 33, at 12.

36. *See* NCA4 VOL. II, *supra* note 3, at 12, 17.

37. WORLD METEOROLOGICAL ORG., *supra* note 33, at 18.

38. NCA4 VOL. II, *supra* note 3, at 12.

39. NCA5, *supra* note 30, at 82.

40. U.S. GLOBAL CHANGE RSCH. PROGRAM, CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME I, at 10 (2017), https://perma.cc/45PQ-EXUM. "Annual median sea level along the U.S. coast . . . has risen by about 9 inches since the early 20th century . . . ." NCA4 VOL. II, *supra* note 3, at 30.

41. IPCC 2021 REPORT, *supra* note 33, at 21. Others have estimated that sea levels will rise between 0.75 and 1.9 meters in that same period. Martin Vermeer & Stefan Rahmstor, *Global Sea Level Linked to Global Temperature*, 106 PNAS 21527, 21530 (2009).

ocean and the shore.[42] Complicating matters, these estimates reflect global *average* sea level rise. Sea level rise is highly variable across the major U.S. coastlines.[43] Nearly half of the U.S. population likely to be affected by sea level rise resides in Florida.[44]

Climate change is also impacting the strength and frequency of existing extreme weather patterns. The National Oceanic and Atmospheric Administration (NOAA) estimates that extreme weather cost the United States $433 billion from 2021 to 2023 alone.[45] Of the 130 peer-reviewed studies published as part of the American Meteorological Society (AMS)'s annual assessments through 2019, "about 65 percent have identified the fingerprints of climate change in extreme weather events."[46]

As climate attribution and detection science evolves, scientists are making closer connections between human activity, GHG emissions, and extreme weather events.[47] Climate detection refers to determining whether "climate or a system affected by climate has changed in some defined statistical sense."[48] Attribution refers to the "process of evaluating the

42. *See* John D. Echeverria, *Climate Change and Property Law*, *in* RESEARCH HANDBOOK ON CLIMATE DISASTER LAW: BARRIERS AND OPPORTUNITIES 332, 339 (Rosemary Lyster & Robert R.M. Verchick eds., 2018).

43. *See* Jianjun Yin, *Rapid Decadal Acceleration of Sea Level Rise Along the U.S. East and Gulf Coasts During 2010-22 and Its Impact on Hurricane-Induced Storm Surge*, 36 J. CLIMATE 4511, 4511-12 (2023) (discussing the accelerating sea level rise along the East and Gulf Coasts of the United States); Sönke Dangendorf et al., *Acceleration of U.S. Southeast and Gulf Coast Sea-Level Rise Amplified by Internal Climate Variability*, 14 NATURE COMMC'NS 1935, 1935 (2023) (detailing how global mean sea level rise has been accelerating since the 1960s, but the mean sea level rise along the North American East and Gulf coasts has been rising even faster than the global mean).

44. Matthew E. Hauer, Jason M. Evans & Deepak R. Mishra, *Millions Projected to Be at Risk from Sea-Level Rise in the Continental United States*, 6 NATURE CLIMATE CHANGE 691, 692 (2016).

45. *United States Summary*, NAT'L CTRS. FOR ENV'T INFO., https://perma.cc/SW4V-EQMA (last updated Mar. 8, 2024).

46. *See* Juliet Eilperin & Brady Dennis, *New EPA Document Tells Communities to Brace for Climate Change Impacts*, WASH. POST (Apr. 27, 2019, 4:41 PM EDT), https://perma.cc/2XPY-ZG2D.

47. *See, e.g.*, Stephanie C. Herring, Nikolaos Christidis, Andrew Hoell, Marty Hoerling & Peter A. Stott, *Introduction to Explaining Extreme Events of 2017 from a Climate Perspective*, 100 BULL. AM. METEOROLOGICAL SOC'Y (SPECIAL SUPPLEMENT) S1, S2 tbl. (2019); *see also* JACOB ELKIN, SABIN CTR. FOR CLIMATE CHANGE L., CLIMATE SCIENCE IN ADAPTATION LITIGATION IN THE U.S. 5-10 (2022), https://perma.cc/76RF-U9UH (discussing attribution science).

48. ELKIN, *supra* note 47, at 6 (quoting GABRIELE C. HEGERL ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, GOOD PRACTICE GUIDANCE PAPER ON DETECTION AND ATTRIBUTION RELATED TO ANTHROPOGENIC CLIMATE CHANGE 2 (Thomas Stocker et al. eds., 2009), https://perma.cc/3NV7-TJ7U).

relative contributions of multiple causal factors to a change or event with an assignment of statistical confidence."[49]

Every year, the AMS publishes an annual assessment of how human-caused climate change has affected the frequency and intensity of certain extreme weather events such as record heat waves, droughts, and wildfires.[50] The results are sobering. For example, the AMS found that 16 of 17 extreme weather events in 2017 were made more likely by climate change.[51]

Further, potential climate tipping points might massively accelerate the physical destabilization already underway.[52] For example, a collapse of the Antarctic ice sheet could dramatically increase worldwide sea level rise.[53]

Climate change is also wreaking havoc on coastal real estate valuations. Climate change's economic impacts are immense and could affect some of the most valuable real estate as well as vulnerable coastline communities. The NCA estimates that $1 trillion in coastal real estate is threatened by sea level rise, higher storm surges, and high tide flooding.[54] Using data from Zillow, a real estate website, Climate Central predicts that unchecked greenhouse gas emissions could expose $1.75 trillion in coastal real estate to a 10% or higher annual risk of flooding by 2100.[55] In 2017, Zillow estimated that in Florida alone almost a million properties, collectively worth more than $400 billion, were at risk of being submerged by rising seas within the century.[56] But it is not just

49. *Id.* (quoting HEGERL ET AL., *supra* note 48, at 2). There are subsets of attribution science, including climate change attribution, impact attribution, and extreme event attribution. *See id.* at 6-8.

50. *See* Herring et al., *supra* note 47, at S3.

51. *See id.* at S2 tbl.

52. *See* Timothy M. Lenton et al., Comment, *Climate Tipping Points—Too Risky to Bet Against*, 575 NATURE 592, 592 (2019).

53. *See* Julius Garbe, Torsten Albrecht, Anders Levermann, Jonathan F. Donges & Ricarda Winkelmann, *The Hysteresis of the Antarctic Ice Sheet*, 585 NATURE 538, 543 (2020); *see also* Robert M. DeConto et al., *The Paris Climate Agreement and Future Sea-Level Rise from Antarctica*, 593 NATURE 83, 88 (2021) ("Once initiated, marine-based ice loss is found to be unstoppable . . . in all mitigation scenarios . . . ."); Chris Mooney & Brady Dennis, *'Uncertainty Is Not Our Friend': Scientists Are Still Struggling to Understand the Sea Level Risks Posed by Antarctica*, WASH. POST. (May 5, 2021, 1:26 PM EDT), https://perma.cc/X3SX-KC5W.

54. NCA4 VOL. II, *supra* note 3, at 38.

55. *See* CLIMATE CENT., *supra* note 30, at 2.

56. Krishna Rao, *Climate Change and Housing: Will a Rising Tide Sink All Homes?*, ZILLOW: RSCH. (June 2, 2017), https://perma.cc/37AE-T4XN; *see also* Fred Foldvary, *American Wealth and Real Estate*, PROGRESS (June 12, 2016), https://perma.cc/DZ3H-N9H7 (estimating that the total value of U.S. real estate is about $65 trillion, out of an estimated U.S. net wealth of $80 trillion, based on data from 2015). *See generally* Burger et al., *supra* note 34 (linking climate change to coastal risks).

wealthy property owners who are at risk. Poor communities are similarly exposed to climate impacts, and they have the fewest resources to adapt.[57]

Private properties on the coast and along barrier islands rely on publicly owned and maintained coastal access roads.[58] Many of these roads are at risk of storm surge and sea level rise.[59] Sea level rise has already increased the frequency of high tide flooding by a factor of five to ten in several coastal communities.[60] This rise will force local governments to make a difficult decision: Should they maintain an existing coastal road at great expense or plan for wholesale retreat? Either choice encounters legal doctrines that have yet to wrestle with climate impacts and the difficult tradeoffs associated with adaptation decisionmaking.

B. Climate Science Meets Climate Adaptation Realism

In the United States, state and local governments have legal authority to act to address zoning, land use, and climate-adaptation measures.[61] In recent years, the federal government has occasionally provided funding for managed retreat by Native American tribes and local communities.[62]

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57. NCA5, *supra* note 30, at 44 (noting that low-income household and communities of color "are especially vulnerable to more intense extreme heat events and associated health risks, particularly if they live in homes with poor insulation and inefficient cooling systems").

58. *See, e.g.*, Christopher Flavelle, *Tiny Town, Big Decision: What Are We Willing to Pay to Fight the Rising Sea?*, N.Y. TIMES (Mar. 14, 2021), https://perma.cc/MYD2-HW3E (discussing the cost of maintaining a coastal access road in North Carolina); Jordan v. St. Johns County, 63 So. 3d 835, 836-37 (Fla. Dist. Ct. App. 2011) (discussing the maintenance of a public road, Old A1A, along the Florida coast); PAUL WILDES, SHANA JONES & J. SCOTT PIPPIN, LEGAL ISSUES WHEN MANAGING PUBLIC ROADS AFFECTED BY SEA LEVEL RISE: GEORGIA 4-7 (2019), https://perma.cc/6Z4U-Y6EN (discussing coastal road access issues in Georgia).

59. *See* Jim Titus, *Does Sea Level Rise Matter to Transportation Along the Atlantic Coast?*, *in* U.S. DEP'T OF TRANSP. CTR. FOR CLIMATE CHANGE & ENV'T FORECASTING, THE POTENTIAL IMPACTS OF CLIMATE CHANGE ON TRANSPORTATION 135, 139 (2002), https://perma.cc/4382-2HP4 ("In many low-lying communities, roads are lower than surrounding lands, so that land can drain into the streets. As a result, the streets are the first to flood."); *Climate Change Impacts on Coasts*, EPA, https://perma.cc/9K3L-ZZUH (last updated Nov. 16, 2023) (noting that more than 60,000 miles of roads are located in U.S. coastal floodplains).

60. NCA4 VOL. II, *supra* note 3, at 66.

61. *See* Village of Euclid v. Ambler Realty Co., 272 U.S. 365, 387-88 (1926); Robin Kundis Craig, *Climate Adaptation Law and Policy in the United States*, 9 FRONTIERS IN MARINE SCI. 1059734, at 4 (2022), https://perma.cc/8NGU-L8MP ("[S]tate and local governments are key players in climate change adaptation in the United States.").

62. *See, e.g.*, Christopher Flavelle, *U.S. to Pay Millions to Move Tribes Threatened by Climate Change*, N.Y. TIMES (Nov. 30, 2022), https://perma.cc/EQ75-UWM5. The federal government is in the process of giving $75 million to three Native American tribes to relocate communities facing urgent climate threats. *Id.* In 2016, $48 million dollars was

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Choosing whether to resist, accommodate, or retreat is fraught. Yet the benefits of ex ante adaptation often exceed the ex post costs of responding after property loss. For example, proactive shoreline protection and ecosystem conservation decrease direct property losses.[63] Following extreme weather events, a taxpayer-funded cycle of destroy-repair-rebuild often occurs.[64] In many cases, climate costs to taxpayers and risk to residents are simply too great, favoring retreat over reinvestment.[65] Retreat is hampered by institutional incentives (e.g., subsidized flood insurance) and psychological factors (e.g., fear, optimism bias, and place attachment).[66] Many perceive retreat from their homes as a defeat—a spectacular failure. But as discussed in Part V below, it is far better to incentivize managed retreat over an *un*managed retreat "strategy" that is ad hoc, inequitable, and reactive.

Despite the growing need for local governments to embrace climate adaptation realism, local adaptation efforts can be limited by the political priorities and sensitivities of elected representatives.[67] As the NCA observes, "Successful adaptation has been hindered by the assumption that climate

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spent to relocate a community on Isle de Charles, Louisiana; that relocation began in earnest in 2022. *Id.*

While the United States lacks a national adaptation policy document, President Biden has issued an executive order requiring agencies to, among other things, create climate action plans that describe their adaptation efforts. Exec. Order. No. 14008, 86 Fed. Reg. 7619, 7625 (Jan. 27, 2021). For an example of how the agencies responded, see generally U.S. DEP'T OF DEF., CLIMATE ADAPTATION PLAN (2021), https://perma.cc/JB8R-NP2J.

63. *See* Daniel Lincke & Jochen Hinkel, *Economically Robust Protection Against 21st Century Sea-Level Rise*, 51 GLOB. ENV'T CHANGE 67, 68-69 (2018).

64. *See* Kevin Sack & John Schwartz, *As Storms Keep Coming, FEMA Spends Billions in 'Cycle' of Damage and Repair*, N.Y. TIMES (Oct. 8, 2018), https://perma.cc/5YY7-63GR; *see also* Pappas & Flatt, *supra* note 23, at 338-46, 399 (discussing how current policies fail to adequately address recurrent disasters). To highlight one example, a Mississippi home was rebuilt over thirty times in thirty-two years at a $663,000 cost to taxpayers for a home worth just $69,000. Siders, *supra* note 2, at 219. FEMA policy funds the rebuild, while state and local zoning authorizes future building in the vulnerable area. *See* David Dana, *Incentivizing Municipalities to Adapt to Climate Change: Takings Liability and FEMA Reform as Possible Solutions*, 43 B.C. ENV'T AFFS. L. REV. 281, 283 (2016) (arguing that municipalities will be central to how well the United States adapts to climate change while FEMA disaster aid creates perverse incentives).

65. *See, e.g.*, Ian Duncan, *A Changing Climate Is Buckling Concrete and Flooding Roads. States Are Moving Slowly to Guard the Nation's Infrastructure*, WASH. POST (Nov. 28, 2021, 8:05 PM EST), https://perma.cc/3X9D-YXF7 (reporting state estimates that "[r]aising every vulnerable road and bridge in Delaware would cost $1.4 billion").

66. *See* Siders, *supra* note 2, at 219 fig.3.

67. *See* OECD, CLIMATE ADAPTATION: WHY LOCAL GOVERNMENTS CANNOT DO IT ALONE 18 (2023), https://perma.cc/R2BC-G2XC.

conditions are and will be similar to those in the past."[68] Comprehensive adaptation implementation remains rare.[69]

While we are in the nascent stages of growing coastline loss and climate-driven instability, longstanding legal doctrines have yet to reckon with this imminent destabilization. Innovative proactive adaptation strategies can ameliorate some of climate change's worst effects and help grease the jurisprudential wheels for a doctrinal shift. Indeed, the NCA gauges that "[m]ore than half of the damages to coastal property are estimated to be avoidable through well-timed adaptation measures."[70] But what measures should be chosen and what are the doctrinal limitations of choosing various adaptation strategies? This choice—whether to invest in climate resilient measures or retreat—will only take on growing importance.

As federal, state, and local governments come around to adaptation realism, now is the time to consider how longstanding legal doctrines will affect adaptation strategies. In light of worsening physical destabilization, what are the legal obstacles to adaptation efforts in constitutional, property, and tort law? I turn to this question below.

II. Resist: Hard and Soft Armoring Adaptation Measures

The *resist* adaptation strategy encompasses coastline armoring of public or private property. This may include hard armoring (such as the placement of sea walls) or soft armoring (such as creating living shorelines that buffer storm surge and protect the coastline).[71] As these novel strategies collide with centuries-old property law, they produce doctrinal tensions. Under the Fifth Amendment's Takings Clause, "[P]rivate property [shall not] be taken for

68. NCA4 VOL. II, *supra* note 3, at 164. Climate change is already "having effects that depart from baseline linear change and that, over time, will shift the entire envelope of variability for [climate] phenomena." Ruhl & Craig, *supra* note 3, at 253.

69. *See* NCA4 VOL. II, *supra* note 3, at 165. While it is beyond the scope of this Article, disinvestment and abandonment can also include cessation of key public utility services to minimize climate-exacerbated disasters in wildfire zones. For a discussion of the duty to serve and its legal implication in the face of climate change, see Heather Payne, *Unservice: Reconceptualizing the Utility Duty to Serve in Light of Climate Change*, 56 U. RICH. L. REV. 603, 608-20 (2022).

70. NCA4 VOL. II, *supra* note 3, at 18.

71. SIDERS, *supra* note 14, at 63-67 (discussing the differences between hard and soft armoring measures). For a discussion of how to protect urban cultural heritage in the face of sea level rise, see Ryan Rowberry, *Avoiding Atlantis: Protecting Urban Cultural Heritage from Disaster*, *in* HOW CITIES WILL SAVE THE WORLD: URBAN INNOVATION IN THE FACE OF POPULATION FLOWS, CLIMATE CHANGE AND ECONOMIC INEQUALITY 49, 52-58 (Ray Brescia & John Travis Marshall eds., 2016).

public use, without just compensation."[72] The Takings Clause prohibits the government from physically taking private property unless the taking qualifies as a "public use."[73] The Supreme Court has interpreted the "public use" requirement capaciously to encompass a valid exercise of the state's police power.[74] This interpretation likely encompasses a broad swath of environmental and climate adaptation uses, giving governments latitude to act. But the requirement to provide just compensation makes adaptation strategies difficult to implement at scale without bankrupting localities. Practically, takings jurisprudence limits the placement of hard and soft armoring measures on public and private property.[75] Doing so inevitably will result in litigation and just compensation payouts.

In sum, the Takings Clause prohibits the physical taking of private property if the taking does not constitute a valid "public use." If the taking does constitute a valid public use, the private property can lawfully be taken, but "just compensation" must be provided to the property owner. Further, a regulatory taking may result if a land use regulation goes "too far," also requiring just compensation to the property owner.

A. Climate Adaptation Measures and Eminent Domain: A Legitimate Public Use?

The Supreme Court fundamentally expanded the scope of the Takings Clause in two key moments. First, in 1897, the Court incorporated the Takings Clause to apply to state and local actions.[76] This jurisprudential expansion has broad implications for climate adaptation efforts implemented at the state and

72. U.S. CONST. amend. V. The Supreme Court has held that the Fifth Amendment's requirement that the government pay just compensation when it takes private property for public use also applies to state governments. Chicago, Burlington & Quincy R.R. Co. v. City of Chicago, 166 U.S. 226, 241 (1897).

73. Courts have construed "public use" broadly. *See, e.g.*, Kelo v. City of New London, 545 U.S. 469, 483-85 (2005) (holding that "public use" includes private economic development). *See generally* Joseph L. Sax, *Takings and the Police Power*, 74 YALE L.J. 36 (1964) (discussing the challenges of distinguishing between a compensable taking and the lawful exercise of the "police power"—such as through zoning—which is not compensable).

74. *See* Haw. Hous. Auth. v. Midkiff, 467 U.S. 229, 240 (1984) ("The 'public use' requirement is . . . coterminous with the scope of a sovereign's police powers.").

75. *See* Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 419, 435-41 (1982) (finding that the installation of cable equipment is a taking).

76. *Chicago*, 166 U.S. at 241 ("In our opinion, a judgment of a state court, even if it be authorized by statute, whereby private property is taken for the State or under its direction for public use, without compensation made or secured to the owner, is, upon principle and authority, wanting in the due process of law required by the Fourteenth Amendment of the Constitution of the United States, and the affirmance of such judgment by the highest court of the State is a denial by that State of a right secured to the owner by that instrument.").

local level. Second, in 1922, the Court expanded the Takings Clause to include regulatory takings.[77] Regulatory takings occur when governmental regulations go "too far" in impacting property rights.[78] Interpreting the precise meaning of "too far" has confounded lawmakers, scholars, and property owners for over a century.[79] This interpretive challenge is poised to grow as government officials grapple with increased climate regulation in the coastal zone.

Acquisition programs are being employed in communities to create natural buffers that protect the community from climate impacts, thus benefiting the broader community.[80] For example, local governments can offer buyouts to vulnerable properties on the coastline to create a protective buffer between the ocean and the community.[81] To do so involuntarily requires eminent domain proceedings, where the government physically seizes private property and converts it for public use. This seizure constitutes a taking.

While the Supreme Court has yet to wrestle with the outer scope of what qualifies as a "public use" in the climate adaptation context, it has interpreted that requirement to include the valid exercise of a state's police powers.[82] In *Kelo v. City of New London*, for example, the Court adopted a capacious view of "public use" to encompass the promotion of economic development.[83] In upholding New London's economic redevelopment plan that relied on the physical taking of private property, Justice Stevens, writing for the majority, summarized public use jurisprudence:

> Viewed as a whole, our jurisprudence has recognized that the needs of society have varied between different parts of the Nation, just as they have evolved over time in response to *changed circumstances*. Our earliest cases in particular embodied a strong theme of federalism, emphasizing the "great respect" that we owe to state legislatures and state courts in discerning local public needs.[84]

Climate adaptation measures such as armoring appear to fit squarely in the definition of a "local public need[]." Indeed, under *Kelo*, taking a property for the purposes of economic development "satisfies the 'public use' requirement of the

77. Pa. Coal Co. v. Mahon, 260 U.S. 393, 415-16 (1922).

78. *Id.* at 415.

79. For a robust critique of the regulatory takings doctrine, see Byrne, note 24 above, at 90.

80. *See* SIDERS, *supra* note 14, at 109-10.

81. *See* PROGRAM FOR THE STUDY OF DEVELOPED SHORELINES, W. CAROLINA UNIV., THE POTENTIAL COST/BENEFITS OF BUYOUTS IN RODANTHE, NORTH CAROLINA 1-2 (2023), https://perma.cc/TWL6-ZZC2 (analyzing a buyout proposal for a town experiencing significant coastal erosion).

82. *See* Haw. Hous. Auth. v. Midkiff, 467 U.S. 229, 240 (1984).

83. 545 U.S. 483-85 (2005).

84. *Id.* at 482 (emphasis added) (quoting Hairston v. Danville & W. Ry. Co., 208 U.S. 598, 607 (1908)).

Fifth Amendment."[85] The Court in *Kelo* defined the concept of public use broadly while continuing a "longstanding policy of deference to legislative judgments in [the] field."[86] In applying the ends test, Justice Stevens deferred to the wisdom of the New London legislative body, affording them "broad latitude in determining what public needs justify the use of the takings power."[87]

As cities and localities prepare for climate change's multifaceted threats, they should take some comfort in Justice Stevens's opinion and his emphasis on jurisprudential evolution in the face of changed circumstances. In defending Takings Clause challenges, lawmakers should emphasize that adaptation measures are a necessary, rational response to changing climactic circumstances—a bona fide public need. Therefore, "great respect" is owed to state legislative bodies in making such an interpretation.[88] Indeed, climate adaptation measures are designed to protect communities from a variety of climate impacts—sea level rise, extreme weather, and coastal erosion—a purpose that is broadly aligned with *Kelo*'s conception of "public use" and traditional notions of the state's police power.

To be sure, any forward-leaning eminent domain proceeding may well be challenged by organized constituents.[89] Nevertheless, the Court's interpretation of public use provides a sound legal basis for prospective eminent domain proceedings involving properties located in areas uniquely vulnerable to recurrent flooding and storm surge. Indeed, for certain coastal communities facing imminent coastline loss due to climate-driven sea level rise, eminent domain should increasingly be considered a bona fide adaptation tool.[90] But due to the just compensation requirement, it is impossible—both fiscally and politically—for state and local governments to "eminent domain our way" out of the climate crisis.[91]

85. *Id.* at 477, 489-90.

86. *Id.* at 480; *see also* Rindge Co. v. County of L.A., 262 U.S. 700, 707 (1923) ("In determining whether the taking of property is necessary for public use not only the present demands of the public, but those which may be fairly anticipated in the future, may be considered.").

87. *Kelo*, 545 U.S. at 483.

88. *Id.* at 482 (quoting *Hairston*, 208 U.S. at 607).

89. *See* Nicole Stelle Garnet, *The Neglected Political Economy of Eminent Domain*, 105 MICH. L. REV. 101, 115-18 (2006).

90. *See* Alexandra B. Klass, *Eminent Domain Law as Climate Policy*, 2020 WIS. L. REV. 49, 71-83.

91. *See supra* notes 54-56 and accompanying text (highlighting the cost of coastal property loss).

As an alternative to eminent domain, a government seeking to acquire private property for public use can offer self-initiated voluntary buyouts.[92] Voluntary buyouts avoid the contentious political backlash associated with forced eminent domain actions,[93] but they can be costly for governments and have been disproportionately used by wealthier communities.[94]

Eminent domain and voluntary buyouts do, nevertheless, remain a viable climate adaptation for climate-exposed properties that are sound candidates for shoreline conversion buffers. These shoreline properties can perform a double duty of moving people out of harm's way while serving as a buffer to protect inland properties from storm surge and sea level rise.[95] In New Jersey, for example, the state government voluntarily purchases land from homeowners who reside in areas particularly vulnerable to sea level rise, storm surge, and related climate impacts.[96] In extreme cases, governments may consider using the power of eminent domain to relocate entire communities via involuntary, managed retreat. In sum, eminent domain remains a bona fide adaptation option, particularly for coastal barrier islands that can be transitioned to protective, shoreline buffers. Still, because of its expense—and political fallout—eminent domain will remain a minor, niche adaptation tool for the foreseeable future.

B. Physical Takings Meets Climate Resistance and Armoring

The "resist" adaptation tool can also encompass partial occupation or governmental confiscation of property through climate armoring measures—such as the placement of a sea wall or barrier on private property. This, too, implicates the Takings Clause.[97]

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92. *See, e.g.*, GEORGETOWN CLIMATE CTR., MANAGING THE RETREAT FROM RISING SEAS: STATE OF NEW JERSEY: BLUE ACRES BUYOUT PROGRAM 3-4 (2020), https://perma.cc/YQ5T-SLL3.

93. *See* A.R. SIDERS & L. GERBER-CHAVEZ, UNIV. OF DEL. DISASTER RSCH. CTR., FLOODPLAIN BUYOUTS: CHALLENGES, PRACTICES, AND LESSONS LEARNED 27-29 (2021), https://perma.cc/Y8SK-72Y5 (noting that buyouts are often initated by members of the community); Ilya Somin, Essay, *The Politics of Economic Development Takings*, 58 CASE W. RSRV. L. REV. 1185, 1185-86 (2008) (discussing political backlash to eminent domain).

94. *See* Katharine J. Mach et al., *Managed Retreat Through Voluntary Buyouts of Flood-Prone Properties*, 5 SCI. ADVANCES eaax8995, at 5 (2019).

95. *See* SIDERS, *supra* note 14, at 109-10.

96. *See* GEORGETOWN CLIMATE CTR., *supra* note 92, at 2.

97. *See* William Michael Treanor, *The* Armstrong *Principle, The Narratives of Takings, and Compensation Statutes*, 38 WM. & MARY L. REV. 1151, 1171 (1997) ("The original rationale behind the Takings Clause was to provide heightened protection for those who could not protect adequately their property through the political process."); *see also* Andrew S. Flynn, Note, *Climate Change, Takings, and* Armstrong, 46 ECOLOGY L.Q. 671, 677 (2019).

Coastline armoring can encompass hard or soft armoring measures. Soft armoring "refers to the use of organic materials to strengthen and protect the shoreline," which has the benefit of imitating natural systems and interacting with the local ecosystem.[98] In contrast, hard armoring "refers instead to structures like retaining walls and bulkheads that physically block wave and current action from reaching the vulnerable shoreline."[99] Hard armoring can be particularly problematic, as the blocked water must go *somewhere*.[100] Sea wall armoring, for example, "can redirect wave action towards neighboring shores, causing damage to neighboring properties" and result in a nuisance.[101] This strategy is expensive and the armoring walls may need to be raised in the futuren as sea levels continue to rise.[102] Armoring can cause a new physical diversion of floodwater that negatively impacts nearby property owners.[103] As state and local governments consider implementing armoring measures, they must reconcile such actions with the Takings Clause jurisprudence.

In *Loretto v. Teleprompter Manhattan CATV Corp.*, the Supreme Court held that a permanent (albeit minor) government-authorized physical occupation of an owner's property—in this case, the installation of cable television equipment—was a compensable taking.[104] Following *Loretto*, any governmental action that involves the physical occupation of private property will require compensation under the Fifth or Fourteenth Amendments—regardless of its benefit to the broader community.[105] As such, hard armoring measures that are permanent physical occupations of private property—such as the construction of a seawall on private property—will require compensation to the affected

98. SIDERS, *supra* note 14, at 63.

99. *Id.*

100. *See id.* at 66.

101. *Id.* at 65-67 (discussing the "costs and harms of hard armoring"); *see* MOLLY LOUGHNEY MELIUS & MARGARET R. CALDWELL, STANFORD L. SCH., ENV'T & NAT. RES. L. & POL'Y PROGRAM, 2015 CALIFORNIA COASTAL ARMORING REPORT: MANAGING COASTAL ARMORING AND CLIMATE CHANGE ADAPTATION IN THE 21ST CENTURY 18-19 (2015), https://perma.cc/2MCJ-8MHW.

102. *Id.* at 65.

103. A privately built sea wall that damages a neighboring property would not implicate the Takings Clause but may create a private nuisance claim. *See, e.g.*, Grundy v. Thurston County, 117 P.3d 1089, 1090 (Wash. 2005).

104. Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 419, 435-40, 441 (1982).

105. *See id.* After *Loretto*, an older case called *Armstrong v. United States* became more important. 364 U.S. 40 (1960). In *Armstrong*, Justice Black announced what is now known as the "*Armstrong* principle" when he stated, "The Fifth Amendment's guarantee that private property shall not be taken for a public use without just compensation was designed to bar Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole." *Id.* at 49. Some have advocated applying the *Armstrong* principle to climate-related takings cases. *See* sources cited *supra* note 97.

property owners.[106] Similar to eminent domain, this adaptation path will be difficult to scale along the United States's entire coastline due to the just compensation requirement.

Further, governmental armoring measures could effectuate an indirect taking. This concept was first articulated nearly 150 years ago in *Pumpelly v. Green Bay Co.*, a decision poised to take on increased importance in our climate-destabilized era.[107] In *Pumpelly*, the Wisconsin government commissioned the building of a dam that permanently flooded a citizen's property.[108] The Court held that "where real estate is actually invaded by superinduced additions of water, earth, sand, or other material, or by having any artificial structure placed on it, so as to effectually destroy or impair its usefulness, it is a taking, within the meaning of the Constitution."[109] As a consequence, any flooding—"superinduced additions of water," in the *Pumpelly* language—caused by armoring measures likely constitutes a physical taking.[110]

This nearly-150-year-old opinion is growing in salience as states and localities invest in sea walls and other hard armoring adaptation measures. Federal, state, and local adaptation plans must take into account the consequences of otherwise well-intentioned adaptation measures. Failure to do so could risk quickly draining of the coffers of Miami Beach, Norfolk, New Orleans, and other cities vulnerable to climate-induced sea level rise.[111] If the Army Corps of Engineers constructs a dam to safeguard one community, for example, any resultant flooding of the second community will trigger a compensable taking.[112]

Some climate armoring measures may be temporary, but temporary measures can also lead to a Takings Clause claim. If a physical occupation is

106. *See Loretto*, 458 U.S. at 432; SIDERS, *supra* note 14, at 64.

107. 80 U.S. (13 Wall.) 166 (1872).

108. *Id.* at 167.

109. *Id.* at 181.

110. *See id.*; *see also* Ark. Game & Fish Comm'n v. United States, 568 U.S. 23, 38 (2012) (holding that temporary flooding can also trigger a compensable taking).

111. On remand, the *Loretto* decision may offer an instructive and somewhat hopeful lesson for future climate adaptation measures. There, the New York Court of Appeals affirmed the New York State Cable Television Commission's determination that a one-time payment of just one dollar was all that the landlord was entitled to as just compensation. *See* Loretto v. Teleprompter Manhattan CATV Corp., 446 N.E.2d 428, 432-33, 433 n.3 (N.Y. 1983); *Loretto*, 458 U.S. at 423-24 (noting the one dollar payment); *see also* Michael L. Gold, Case Note, Loretto v. Teleprompter Manhattan CATV Corp.*: The Propriety of a Per Se Rule in Takings Claims*, 16 J. MARSHALL L. REV. 419, 421 (1983). For a fuller treatment of just compensation, see Christopher Serkin, *The Meaning of Value: Assessing Just Compensation for Regulatory Takings*, 99 NW. U. L. REV. 677, 681-703 (2005) (identifying nine valuation mechanisms behind the just compensation analysis).

112. *See Pumpelly*, 80 U.S. (13 Wall.) at 181.

temporary, the Court may consider how this temporary occupation affects reasonable investment-backed expectations, relying on the analysis in *Arkansas Game and Fish Commission v. United States*.[113] In *Arkansas Game*, the United States Army Corps of Engineers authorized the temporary flooding of a state-owned wildlife management area by periodically releasing water from a federal dam.[114] While not permanent, this flooding destroyed large amounts of timber and the public's enjoyment of the land.[115] The Court noted that the permanent physical occupation of property amounted to a "bright line" under Takings Clause jurisprudence, but no such "bright line" applies to temporary occupations.[116] Still, it held that temporary government-induced flooding is not automatically exempt from the categorical taking inquiry under *Loretto*.[117] The court's reasonsing suggests that there may be more flexibility when placing temporary climate-armoring measures on private property.[118] But in *Cedar Point Nursery v. Hassid*, the Supreme Court held that a California regulation granting labor organizers a "right to take access" to an agricultural employer's property for purposes of soliciting support for unionization constituted a per se physical taking, even though the organizers could only access the property for 3 hours per day and 120 days per year.[119] *Arkansas Game*'s discussion of temporary takings should be read in conjunction with *Cedar Point Nursery*. Taken together, these two cases suggest that even short-term climate armoring measures that physically occupy private property may constitute a per se taking. As we look to the future, such temporary takings challenges are sure to arise with greater frequency, due to government action as well as inaction. For example, as unmaintained municipal access roads temporarily wash away during storms, homeowners may argue that the temporary loss of access to their homes effectuated a constitutional taking, thus requiring just compensation.[120]

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113. *See Ark. Game*, 568 U.S. at 39.

114. *Id.* at 26-28.

115. *Id.* at 26.

116. *Id.* at 31.

117. *Id.* at 31-32, 34, 38.

118. *See id.* at 38-40. While the *Arkansas Game* Court held that a temporary governmental flooding "gains no automatic exemption from Takings Clause inspection," it acknowledged that "time is indeed a factor in determining the existence *vel non* of a compensable taking." *Id.* at 38.

119. 141 S. Ct. 2063, 2069, 2072 (2021).

120. *See infra* Part IV.A.1; *see also* Jordan v. St. Johns County, 63 So. 3d 835, 836-37 (Fla. Dist. Ct. App. 2011). The trial court in *St. Johns County* granted summary judgment in favor of St. Johns County, reasoning that "[t]he Florida Supreme Court has made it clear that in order to recover a claim of inverse condemnation based upon a theory of impaired access, the landowner must prove that governmental action (and not inaction) caused the loss of access." No. CA05-694, slip op. at 12 (Fla. Cir. Ct. May 21, 2009), *aff'd in part,*
footnote continued on next page

Finally, private homeowners may seek to invest in hard armoring at their own expense. While this is not a governmental action that runs afoul of the Fifth Amendment, it does impose its own legal risk. Because water diverted away from one parcel of private property must go somewhere, private armoring implicates the "common enemy" doctrine. This doctrine has historically indemnified the private property owner from water runoff on to an adjacent property.[121] But this doctrine may be shifting to no longer apply to seawater, removing a possible defense for property owners looking to reduce flooding on their property by raising seawalls.[122] Depending on the diversion pattern, the rerouted water may damage neighboring properties and expose the seawall owner to a nuisance or negligence lawsuit.[123] In addition to causing flooding, coastal armoring can also accelerate erosion on adjacent land.[124] The Supreme Court has yet to weigh in on such private coastal armoring efforts; meanwhile, several states have taken nascent steps to restrict coastal armoring activities.[125]

In sum, the resistance adaptation tool of armoring holds *some* promise. But similar to coastline eminent domain, armor remains difficult to scale. This difficulty arises due to the just compensation requirement and the expansion of physical takings to include indirect and temporary takings. If lawmakers emphasize the health, safety, and welfare basis driving climate armoring, it is possible that courts may take that emphasis into account as part of an equitable relief in the just compensation analysis.[126] But that is far from certain, and doing so would challenge historic conceptions of private property rights. Absent a broader doctrinal change to temporary takings or the common enemy doctrine, climate armoring resistance measures will likely be relegated

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rev'd in part, 63 So. 3d 835 (Fla. Dist. Ct. App. 2011). But the appellate court explicitly rejected that interpretation, holding that "government inaction—in the face of an affirmative duty to act—can support a claim for inverse condemnation." *St. Johns County*, 63 So. 3d at 839.

121. For an overview of the common enemy doctrine and the recent shift to a "reasonable use test," see SIDERS, note 14 above, at 68.

122. *See* Grundy v. Thurston County, 117 P.3d 1089, 1093-94 (Wash. 2005) (declining to apply the common enemy doctrine to seawater in a case involving a private seawall).

123. *Id.*; SIDERS, *supra* note 14, at 63 (noting that "[a] number of states, including Maine, Massachusetts, North Carolina, Oregon, Rhode Island, South Carolina, and Texas, have banned shoreline armoring or imposed significant restrictions").

124. SIDERS, *supra* note 14, at 66; *see* Holly Doremus, *Climate Change and the Evolution of Property Rights*, 1 U.C. IRVINE L. REV. 1091, 1106 (2011).

125. State courts in Oregon and North Carolina have upheld armoring prohibitions. *See* Doremus, *supra* note 124, at 1107 (citing Shell Island Homeowners Ass'n v. Tomlinson, 517 S.E.2d 406 (N.C. Ct. App. 1999); and Stevens v. City of Cannon Beach, 854 P.2d 449 (Or. 1993)).

126. For a discussion of how "just compensation" is determined in the regulatory takings context, see Serkin, note 111 above, at 681-703.

as a peripheral, niche adaptation tool that is employed in a limited manner by local governmental officials.

III. Accommodation Meets Regulatory Takings

> *The fact that a particular use has long been engaged in by similarly situated owners ordinarily imports a lack of any common-law prohibition . . . though changed circumstances or new knowledge may make what was previously permissible no longer so . . . .*
>
> —*Lucas v. South Carolina Coastal Council* (1992)[127]

The *accommodation* strategy is fairly capacious, encompassing several adaptation options. At one end, it includes resilient land use strategies that facilitate a community's ability to address climate change impacts in order to protect its citizens.[128] The classic example is requiring homes to be elevated to protect against sea level rise and storm surge.[129] Accommodation may also include designating no-build areas in coastal zones, but such measures are sure to trigger regulatory takings challenges.[130]

Since the Supreme Court's 1926 decision in *Village of Euclid v. Ambler Realty Co.*, states and localities have enjoyed considerable discretion in developing zoning and land use regulations.[131] But this discretion is not absolute. As local governments consider new and innovative adaptation strategies, they must take into account regulatory takings jurisprudence, particularly how the doctrine's many exceptions apply to future accommodation efforts.

Even today, this century-old doctrine has yet to fully wrestle with climate change's destabilizing coastal impacts. For example, *Lucas v. South Carolina Coastal Council*—a leading regulatory takings case addressing the state's regulatory authority in the coastal zone—omits any mention of climate change.[132] As discussed in Subpart C below, *Lucas* established a new categorical

127. 505 U.S. 1003, 1031 (1992).

128. *See* J.B. Ruhl & Jim Rossi, *Adapting Private Law for Climate Change Adaptation*, 76 VAND. L. REV. 827, 849 (2023) (defining "resilience" to include "adjustment, accommodate, manage, or transform").

129. *See* Siders, *supra* note 2, at 218 fig.2 (illustrating different adaptation categories).

130. *See, e.g.*, *Lucas*, 505 U.S. at 1006-09.

131. 272 U.S. 365, 386-88, 397 (1926) (holding that a land use regulation was justified due to the increasing complexity of urban life); Agins v. City of Tiburon, 447 U.S. 255, 260 (1980) (upholding zoning ordinances that "substantially advance legitimate governmental goals"); *see also* Christopher Serkin, *A Case for Zoning*, 96 NOTRE DAME L. REV. 749, 755-62 (2020) (analyzing *Village of Euclid* and discussing its legacy on planning and zoning decisions); Steven J. Eagle, *A Prospective Look at Property Rights and Environmental Regulation*, 20 GEO. MASON L. REV. 725 (2013) (addressing "the future interaction of environmental regulation and private property rights").

132. 505 U.S. 1003 (1992).

taking category: A taking occurs when governmental action deprives the owner of "all economically beneficial use" of property.[133] Other legal scholars suggest that this may already be causing a chilling effect on climate adaptation measures in coastal zones.[134] For example, *Lucas* may dissuade local legislators from adopting analogous no-build provisions in critical coastal zones.[135]

Because of the urgent need to enable governments to address climate change, regulatory takings is ripe for a jurisprudential shakeup. Specifically, Justice Scalia's majority opinion in *Lucas* references three different exceptions to sidestep a regulatory takings challenge, the outer contours of which are poised to take on increased importance. These are: (1) public necessity and grave threats; (2) the discovery of new knowledge and changed circumstances; and (3) background principles of property and nuisance.[136] These raise new questions as localities confront climate impacts. How, exactly, does climate science inform the new knowledge analysis? Is sea level rise a "changed circumstance" necessitating newfound deference to local legislators? When is

133. *Id.* at 1027.

134. *See, e.g.*, Michael Allan Wolf, *Supreme Court Roadblocks to Responsive Coastal Management in the Wake of* Lucas, 53 REAL PROP. TR. & EST. L.J. 59, 64 (2018) (arguing that "the Court's continued reliance on the Takings Clause beyond the contexts of eminent domain and actual physical confiscation threatens the conscientious efforts of state and local government land use coastal regulators who are confronting the too-real efforts of climate change"); Sandra B. Zellmer, *Takings, Torts, and Background Principles*, 52 WAKE FOREST L. REV. 193, 193-94 (2017) (arguing that transforming negligence claims into takings claims is likely to "produce a chilling effect, making officials less likely to restrict improvident floodplain and coastal development for fear of takings [lawsuits]").

135. *See* Michael Allan Wolf, *Strategies for Making Sea-Level Rise Adaptation Tools "Takings-Proof,"* 28 J. LAND USE & ENV'T L. 157, 183 (2013) (quipping that private property owners "will cry '*Lucas*!'" if officials opt to ban new permanent structures in coastal zones subject to sea level rise). *But see* Richard J. Lazarus, *Putting the Correct "Spin" on* Lucas, 45 STAN. L. REV. 1411, 1427 (1993) (arguing that "because environmental laws almost never result in total economic deprivations, . . . [the *Lucas* per se rule] will rarely apply").

136. *See* Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1031-32 (1992). Perhaps not surprisingly, *Lucas*'s creation of a new categorical takings category has triggered a growing body of scholarship that addresses the Takings Clause in a time of climate-driven instability. *See, e.g.*, Timothy M. Mulvaney, *Foreground Principles*, 20 GEO. MASON L. REV. 837, 844-55 (2013) (discussing how background principles affect the takings analysis); James G. Titus, *Rising Seas, Coastal Erosion, and the Takings Clause: How to Save Wetlands and Beaches Without Hurting Property Owners*, 57 MD. L. REV. 1279, 1285 (1998) (analyzing "three ways to protect tidelands: (1) *prevent development* in vulnerable areas seaward of a 'setback line,' (2) *defer action*, and (3) create *rolling easements*, which allow development but prohibit property owners from holding back the sea"); Victor B. Flatt, *Unsettled: How Climate Change Challenges a Foundation of Our Legal System, and Adapting the Legal State*, 2016 BYU L. REV. 1397, 1408 (wrestling with the problem of climate-driven uncertainty as applied to the law); Robin Kundis Craig, *Of Sea Level Rise and Superstorms: The Public Health Police Power as a Means of Defending Against "Takings" Challenges to Coastal Regulation*, 22 NYU ENV'T L.J. 84, 86-99 (2014) (discussing the application of takings law to proposed solutions to sea level rise).

climate change an imminent threat, cracking the door open for more adaptation options such as for no-build zones on coastal barrier islands? I turn to these questions below.

A. *Pennsylvania Coal Co. v. Mahon* (1922): The Regulatory Takings Doctrine Emerges

In *Pennsylvania Coal Co. v. Mahon*, the Supreme Court held that a governmental regulation of private property can be a taking when it goes too far.[137] Prior to *Pennsylvania Coal*, "it was generally thought that the Takings Clause reached only a 'direct appropriation' of property, or the functional equivalent of a 'practical ouster of [the owner's] possession.'"[138] The creation of the regulatory takings doctrine has inspired criticism from many legal scholars.[139] Abraham Bell and Gideon Parchomovsky have described it as "perhaps the most complex doctrine within the world of takings and, indeed, one of the most controversial and difficult in the world of law."[140] And Peter Byrne has argued that the entire regulatory takings doctrine should be abolished—including because of its inability to address "emerging ecological understandings."[141]

Writing for the majority in *Pennsylvania Coal*, Justice Holmes first addressed the validity of a 1921 Pennsylvania law, the Kohler Act, through a takings lens.[142] The Kohler Act prohibited "the mining of anthracite coal in such a way as to cause the subsidence of, among other things, any structure used as a human habitation."[143] Justice Holmes began by analyzing the scope of regulatory authority, acknowledging that private intersts "must yield to the police power" because "[g]overnment hardly could go on if to some extent values incident to property could not be diminished without paying for every such change in the general law."[144] But the legislature must not "go[] beyond its

137. 260 U.S. 393, 415 (1922). The Takings Clause has been incorporated to apply to state and local governmental action. *See supra* note 76 and accompanying text.

138. *Lucas*, 505 U.S. at 1014 (alteration in original) (citation omitted) (first quoting Legal Tender Cases, 79 U.S. (12 Wall.) 457, 551 (1871); and then quoting Transp. Co. v. Chicago, 99 U.S. 635, 642 (1879)).

139. *See, e.g.*, Byrne, *supra* note 24 (making ten arguments for abandoning the regulatory takings doctrine).

140. Abraham Bell & Gideon Parchomovsky, *Partial Takings*, 117 COLUM. L. REV. 2043, 2088 (2017).

141. Byrne, *supra* note 24, at 131-32.

142. 260 U.S. at 412.

143. *Id.* at 412-13.

144. *Id.* at 413. In other cases, the Supreme Court has upheld zoning ordinances that include the location of trades, industries, apartment houses, and the size and height of

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constitutional power."[145] Justice Holmes could have chosen to uphold the legality of the Kohler Act, mandating that compensation be paid to the affected property powers. Instead, he went further, striking down the Kohler Act as an invalid exercise of the police power.[146]

This landmark opinion of just five pages "sprang without obvious antecedents."[147] Since 1922, however, *Pennsylvania Coal* has served as the judicial touchstone for regulatory takings. As part of the standard introduced in *Pennsylvania Coal*, courts will look at the particular facts of each case and the gravity of the public interest served to determine whether a taking has occurred.[148] But courts have struggled to ascertain what this standard means. What is a "certain magnitude"? When does a regulation go "too far"?[149] Under Justice Holmes's reasoning, if the uses of private property were subject to unbridled, uncompensated qualification under the police power, "the natural tendency of human nature [would be] to extend the qualification more and more until at last private property disappears."[150]

In expanding the Fifth Amendment to encompass regulatory actions, Justice Holmes acknowledged that there are exceptions to this new rule. He wrote:

> The general rule at least is, that while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking. It may be doubted how far exceptional cases, like the blowing up of a house to stop a conflagration, go—and if they go beyond the general rule, whether they do not stand as much upon tradition as upon principle.[151]

Determining the outer scope of these "exceptional cases" will take on increased importance as emergency first responders—including members of the military—respond to disaster areas in an effort to protect human lives in areas exposed to climate impacts.[152]

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buildings. *See, e.g.*, Village of Euclid v. Ambler Realty Co., 272 U.S. 365, 380, 389-90 (1926) (upholding a zoning ordinance as a valid exercise of the police power); Hadacheck v. Sebastian, 239 U.S. 394, 412-14 (1915) (upholding a law making it illegal to operate a brickyard within city limits).

145. *Id.*

146. *Id.* at 414.

147. Byrne, *supra* note 24, at 97.

148. *See Pa. Coal*, 260 U.S. at 413 (holding that the question of whether a regulatory taking has occurred "depends upon the particular facts"). Justice Brandeis, in dissent, noted that "[a governmental] restriction imposed to protect the public health, safety or morals from dangers threatened is not a taking." *Id.* at 417 (Brandeis, J., dissenting).

149. *See, e.g.*, Palazzolo v. Rhode Island, 533 U.S. 606, 617-18 (2001) (summarizing the post-*Pennsylvania Coal* jurisprudence).

150. *Pa. Coal*, 260 U.S. at 415.

151. *Id.* at 415-16 (citing Bowditch v. Boston, 101 U.S. 16 (1880)).

152. This has occurred in several recent extreme weather events, including Hurricanes Ida and Harvey. *See, e.g.*, Thomas Gibbons-Neff, *This Is the U.S. Military's Response to*

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The Court revisited a similar statute and analogous fact pattern to *Pennsylvania Coal* in 1987. In *Keystone Bituminous Coal Ass'n v. DeBenedictis*, the Court upheld Pennsylvania's Subsidence Act—a statute similar to the Kohler Act—by a five-to-four margin.[153] The Court first distinguished *Pennsylvania Coal* by focusing on the Subsidence Act's animating purpose, which was to protect the health, welfare, and safety of the community.[154] The Court also explained that, unlike in *Pennsylvania Coal*, there was no basis here for finding that the regulation at issue made it impossible for the coal company to profitably engage in its business.[155] In finding that the Act did not constitute a taking, the Court explained that "[l]ong ago it was recognized that 'all property in this country is held under the implied obligation that the owner's use of it shall not be injurious to the community,' and the Takings Clause did not transform that principle to one that requires compensation whenever the State asserts its power to enforce it."[156] It concluded that the property owner had failed to "satisfy the heavy burden placed upon one alleging a regulatory taking."[157]

As local governments grapple with climate adaptation realism and look to pass accommodation regulations, they should clarify that such laws are designed with the express goal of protecting health and safety. In applying *Keystone Bituminous Coal*, local governments can take heart in the Court's deference to local regulations that protect the health and safety of the community. Still, future adaptation regulatory efforts must strike a delicate balance between addressing public health and safety considerations and ensuring private investment-backed expectations are met—a topic that I turn to below.

Hurricane Harvey, WASH. POST (Aug. 28, 2017, 3:11 PM ET), https://perma.cc/P9UZ-9KFF; Press Release, White House, FACT SHEET: How the Biden Administration Is Supporting Hurricane Ida Response Efforts in the Gulf Coast (Sept. 2, 2021), https://perma.cc/BLL3-5HFS.

153. 480 U.S. 470, 474 (1987).

154. *See id.* at 485-86.

155. *Id.* at 501 ("Petitioners may continue to mine coal profitably . . . .").

156. *Id.* at 491-92 (citation omitted) (quoting Mugler v. Kansas, 123 U.S. 623, 665 (1887)).

157. *Id.* at 493.

B. *Penn Central Transportation Co. v. City of New York* (1978): Changes in Reasonable Investment-Backed Expectations

1. The multifactor *Penn Central* test

In the absence of a permanent physical occupation (*Loretto*)[158] or a regulation that deprives a property of all value (*Lucas*),[159] courts analyzing regulatory takings challenges will turn to the multifactor test first articulated in *Penn Central Transportation Co. v. City of New York*.[160]

In *Penn Central*, the Court addressed whether New York City's comprehensive historic preservation program unlawfully restricted the development of individual landmarks.[161] Writing for the majority, Justice Brennan held that New York's law did not constitute a regulatory taking under the Fourteenth Amendment.[162] Justice Brennan noted that "[t]he restrictions imposed are substantially related to the promotion of the general welfare."[163] In upholding the New York law, Justice Brennan "reject[ed] the proposition that diminution in property value, standing alone, can establish a 'taking.'"[164] He referenced the zoning regulations in *Village of Euclid* and *Hadacheck*, noted above, which were deemed valid even though they diminished the respective property values by 75% and 87.5%.[165]

In *Penn Central*, the Court looked to three factors as part of its regulatory takings analysis: (1) "[t]he economic impact of the regulation on the claimant"; (2) "the extent to which the regulation has interfered with distinct investment backed expectations"; and (3) "the character of the governmental action."[166] In siding with the city, Justice Brennan also referenced principles of fairness and

158. *See supra* notes 104-06 and accompanying text.

159. *See infra* Part III.C.

160. 438 U.S. 104, 124-25 (1978).

161. *Penn Cent.*, 438 U.S. at 107.

162. *Id.* at 138.

163. *Id.*

164. *Id.* at 131.

165. *Id.* (citing Village of Euclid v. Ambler Realty Co., 272 U.S. 365 (1926); and Hadacheck v. Sebastian, 239 U.S. 394 (1915)). *Penn Central* also distinguished zoning laws because they generally "do not affect existing uses of real property." *Id.* at 125, 131. Of note, the Court's decision in *Village of Euclid*, which upheld zoning laws, came in 1926, just four years after *Pennsylvania Coal Co. v. Mahon* was decided. *See supra* note 131 and accompanying text.

166. *Penn Cent.*, 438 U.S. at 124; *see also* Columbia Venture, LLC v. Richland County, 776 S.E.2d 900, 913 (S.C. 2015) (discussing the factors); Byrne, *supra* note 24, at 104 (noting that the "character" factor "seems in practice to include both the type of intrusion involved and the significance of the public purpose being served").

justice ideas first articulated in a 1960 case, *United States v. Armstrong*.[167] These principles have a growing salience for climate adaptation strategies, particularly with the recognition that climate change exacerbates existing inequalities.[168]

The character of the challenged law includes the type of intrusion involved as well as the significance of the public purpose being served.[169] How will climate change inform this character-based inquiry? Courts have upheld land use regulations when the "'health, safety, morals, or general welfare' would be promoted by prohibiting particular contemplated uses of land . . . that destroyed or adversely affected recognized real property interests."[170] Still, as Peter Byrne has argued, such inquiries are prone to "open-ended value judgments."[171] In the climate context, governments are likely to be afforded some level of deference as they attempt to safeguard communities and protect citizens from climate-driven weather events.[172] But it is the second factor—reasonable investment-backed expectations—that appears to be the ripest for doctrinal adaptation as climate change influences the investment calculus for trillions of dollars of coastal property.

2. Applying reasonable investment-backed expectations to climate change

As states and localities take accommodation measures in the coastal zone, they will wrestle with *Penn Central*'s reasonable investment-backed expectations (RIBE) test.[173] While climate risk transparency has increased in recent years within the private sector, the government has lagged in mandating the disclosure of climate and flood risk to prospective property

167. *Penn Cent.*, 438 U.S. at 123-24 (citing Armstrong v. United States, 364 U.S. 40, 49 (1960)).

168. *See* sources cited *supra* note 97. While it is beyond the scope of this Article to fully address the legal and policy implications of climate justice, other scholars have written on this subject. *See, e.g.*, ERIC A. POSNER & DAVID WEISBACH, CLIMATE CHANGE JUSTICE (2010); Daniel A. Farber, *Climate Justice*, 110 MICH. L. REV. 985 (2012) (reviewing POSNER & WEISBACH, *supra*).

169. *See* Byrne, *supra* note 24, at 104.

170. *Penn Cent.*, 438 U.S. at 125 (quoting Nectow v. City of Cambridge, 277 U.S. 183, 188 (1928)).

171. Byrne, *supra* note 24, at 104.

172. *See* James E. Krier & Stewart E. Sterk, *An Empirical Study of Implicit Takings*, 58 WM. & MARY L. REV. 35, 59 tbl.2, 62 (2016) (demonstrating empirically that "courts almost always defer to the regulatory decisions made by government officials").

173. *Penn Cent.*, 438 U.S. at 124-25.

owners.[174] In many states, knowledge of a property's flood history is not revealed prior to a real estate transaction.[175]

Justice Brennan acknowledged that the RIBE test is "essentially ad hoc."[176] How do we apply *Penn Central* today in the context of climate change and investment-backed expectations? Increasingly, the best available climate science predicts that a swath of coastal land will be subject to routine flooding in the future.[177] In response, governments will be called upon to implement regulations that safeguard people and property in an effort to promote the common good. Courts will have to wrestle with applying such adaptation regulations to the *Penn Central* factors in determining whether just compensation is required.[178] There have only been a few cases, discussed below, challenging the local governmental authority to implement adaptation measures in the coastal zone under a regulatory takings theory. These challenges are likely to continue as climate-driven regulation in the coastal zone continues apace.[179]

A 2015 case, *Columbia Venture, LLC v. Richland County*, offers an example of a state court seeking to reconcile the *Penn Central* analysis with a land use regulation designed to minimize climate impacts.[180] In *Columbia Venture*, Richland County prohibited "encroachments" that included construction and substantial improvements in floodways, as part of its compliance with the requirements of the National Flood Insurance Program (NFIP), as administered

174. The Privacy Act of 1974 prohibits the discolure of certain governmental flood records associated held by the NFIP. Pub. L. No. 93-579, 88 Stat. 1896 (codified as amended at 5 U.S.C. § 552a); *see Frequently Asked Questions About NFIP Policies and Claims Data*, NAT'L FLOOD INS. PROGRAM, https://perma.cc/44NM-5SVU (archived Mar. 5, 2024); Jim Morrison, *Climate Change Turns the Tide on Waterfront Living*, WASH. POST MAG. (Apr. 13, 2020), https://perma.cc/DJ9Z-GKL9. Redfin, an online real estate brokerage firm, has developed a rating system that scores climate risk for every ZIP code in the contiguous United States. *See Climate Change and the Housing Market*, REDFIN, https://perma.cc/GXP3-B34V (archived Apr. 2, 2024); Dharna Noor, *Redfin Will Now Tell You How At-Risk Your Dream Home Is to Climate Change*, GIZMODO (Aug. 4, 2021), https://perma.cc/WV7W-D7A2. While it remains unclear how this rating system will impact investment-backed expectations, it does provide prospective homebuyers access to climate risk information.

175. *See* Morrison, *supra* note 174.

176. *Penn Cent.*, 438 U.S. at 124.

177. *See supra* notes 39-44 and accompanying text.

178. A related question is "whether a lack of investment expectations is a relevant factor not only in a case governed by *Penn Central*, but also in a case governed by *Lucas*." Echeverria, *supra* note 42, at 342. See Part III.C below for a full discussion of *Lucas*.

179. *See Coastal Sector Laws and Regulations*, ADAPTATION CLEARINGHOUSE, https://perma.cc/WZ6Q-D7UE (archived May 9, 2024).

180. 776 S.E.2d 900, 903-04, 909-10 (S.C. 2015).

by the Federal Emergency Management Agency (FEMA).[181] The NFIP—and, by association, the county's regulation—seeks to minimize losses caused by flood damage.[182]

In rejecting the developer's regulatory takings challenge, the court focused on two of the *Penn Central* factors as applied to the underlying regulation: reasonable investment-backed expectations and the character of the government action at issue.[183] Applying the first factor, the court observed that the county's regulation long preceded the developer's purchase of the property, and that the developer was a sophisticated party that had actual and constructive notice of the regulation.[184] In applying the second factor, the court highlighted the important public purpose of "mitigating the social and economic costs of flooding . . . served by the County's ordinances."[185] The county's regulation, in turn, furthered an important federal purpose served by the NFIP.[186] While climate science is not explicitly mentioned in the opinion, flooding is a significant climate risk that animated the underlying regulation.[187]

What does *Columbia Venture* mean for future climate adaptation challenges? First, the court emphasized FEMA's role in making scientific and technical determinations to identify flood hazards.[188] As climate science advances, local governments can integrate this kind of scientific forecasting to legitimize adaptation measures. Of course, developers and private interests may argue that climate science remains far too speculative to tie a global problem to localized impacts.[189] But such blanket assertions will lose their salience as climate attribution and detection science continue to make strides, particularly if affirmative notice of climate risk is provided.[190] And where such affirmative notice is provided, prospective property owners will be increasingly unable to claim ignorance of potential climate risks. In sum, climate science's role in informing the government's interest in promoting the common good may well afford local governments with increased discretion to

181. *Id.* at 903-04. Notably, Richland County's regulation was more restrictive than the minimum regulation required by FEMA. *Id.*

182. *Id.* at 903.

183. These are the second and third *Penn Central* factors. *See supra* note 166 and accompanying text.

184. *See id.* at 914.

185. *Id.* at 915.

186. *Id.* at 903, 904 n.4.

187. *See id.*; *supra* notes 39-44 and accompanying text (discussing sea level rise).

188. *See Columbia Venture*, 776 S.E.2d at 905.

189. *But see* METZGER, *supra* note 34, at 6-9.

190. *See* Burger et al., *supra* note 34, at 64-75 (describing the scientific underpinnings of climate change attribution science).

safeguard their communities via an expanding menu of regulatory measures.[191] This climate science shield can illuminate the unique governmental stakes driving adaptation measures and the need for courts to consider new knowledge and changed circumstances.

Columbia Venture also highlights how climate notice and disclosures can shape the reasonable investment-backed expectations analysis. As climate adaptation laws are promulgated, states and localities should consider employing strategies to temper investment-backed expectations by dismantling barriers to climate risk information, such as data on flood and wildfire risk. Myriad diverse interests will combat this renewed focus on climate risk and notifications, including the interests of investors, existing property owners concerned about diminution of property value, and municipal leaders uneasy about losses to property tax bases.[192] The Privacy Act, as interpreted by FEMA, is one of those obstacles.[193] FEMA refuses to provide prospective homebuyers with information about the property's prior flood insurance claims, preventing them from making a climate-informed purchasing decision.[194]

To mitigate such difficulties, state legislators or municipalities could mandate that sellers disclose past flood claims and include climate transparency disclosures that addresses climate risks.[195] This would address a significant problem: By one estimate, millions of United States homeowners are susceptible to flood risk and do not even know about it.[196] Such a climate

191. *See supra* notes 180-87 and accompanying text.

192. *See* Justin Pidot, *Deconstructing Disaster*, 2013 BYU L. REV. 213, 247 (noting that local leaders are incentivized to support the "financial wellbeing of those residing within a jurisdiction").

193. Privacy Act of 1974, Pub. L. No. 93-579, 88 Stat. 1896 (codified as amended at 5 U.S.C. § 552a); *Frequently Asked Questions About NFIP Policies and Claims Data*, *supra* note 174 ("Under current federal statue [sic], a prospective homebuyer is not entitled to receive any information regarding a prior flood insurance claim on the property in question.") It is only after the "prospective homebuyer becomes the new *homeowner*" that "they can receive flood insurance claim and payment information" regarding the property prior to their ownership or tenancy. *Frequently Asked Questions About NFIP Policies and Claims Data*, *supra* note 174.

194. *See supra* note 174; Abigail Darlington, *Little-Known Federal Law Keeps Buyers from Finding Out if a Home Routinely Floods*, POST & COURIER (updated Dec. 10, 2019), https://perma.cc/F26Z-JUBX.

195. This is already occurring in automobile transactions. *See* MARK P. NEVITT, KLEIMAN CTR. FOR ENERGY POL'Y, CLIMATE ADAPTATION STRATEGIES: HOW DO WE MANAGE MANAGED RETREAT? 3 (2020), https://perma.cc/Z28M-SP9P (citing Morrison, *supra* note 174).

196. FIRST ST. FOUND., THE FIRST NATIONAL FLOOD RISK ASSESSMENT: DEFINING AMERICA'S GROWING RISK 8-9 (2020), https://perma.cc/D9VZ-WS49; *see* Lisa Song & Tony Briscoe, *Millions of Homeowners Who Need Flood Insurance Don't Know It—Thanks to FEMA*, PROPUBLICA (June 30, 2020, 12:30 PM EDT), https://perma.cc/DR5L-RYTA; *see also*

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transparency disclosure could be incorporated as part of any real estate transaction in order to shed light on flood risk. In addition, local governments could notify prospective property owners that new climate adaptation regulations and development restrictions are likely in certain climate zones. To be sure, a disclosure requirement linked to the purchase of the home will not solve the flood risk problem for current renters and homeowners, but it would illuminate flood risk information for future homeowners—a substantial and welcome step.

Finally, legislative bodies attempting to pass more robust climate adaptation measures ex ante will be navigating a complex web of regulatory takings jurisprudence. As I discuss in Part V below, governments should favor increased notice of climate risk and place homeowners on alert that governmental services may be withdrawn or suspended in certain critical climate zones. Using notices may help shield governmental actors from regulatory takings challenges and the court's "investment-backed expectations" analysis as property owners would have notice that services may not be available in the future.

These climate-informed legislative efforts offer a credible path forward, particularly if courts provide a healthy dose of deference to legislators pursuing this accommodation strategy.

C. *Lucas v. South Carolina Coastal Council* (1992): The Increasing Importance of Regulatory Takings Exceptions

Since the 1970s, coastal states have developed coastal management plans under the federal Coastal Zone Management Act.[197] The Act establishes a national framework for states and territories to manage coastal resources.[198] It also provides states with funding and incentives to carry out one of Congress's goals: effectively protecting and using land and water resources in the coastal zone.[199] In *Lucas v. South Carolina Coastal Council*, the Supreme Court addressed

supra notes 39-44 and accompanying text (discussing sea level rise). This is also aligned with private sector efforts from the real estate brokerage firm Redfin, which has developed tools to assess the climate risks with greater precision, such that the risks are available to prospective homeowners. *See supra* note 174.

197. Coastal Zone Management Act of 1972, Pub. L. No. 92-583, 86. Stat. 1280 (codified as amended at 16 U.S.C. §§ 1451-1464).

198. *See* EVA LIPIEC, CONG. RSCH. SERV., R45460, COASTAL ZONE MANAGEMENT ACT (CZMA): OVERVIEW AND ISSUES FOR CONGRESS 1(2019), https://perma.cc/EWQ7-ATT3.

199. *See* 16 U.S.C. § 1451. Every coastal state in the United States (except Alaska) now has an NOAA-approved coastal management plan. *See Coastal Zone Management Programs*, OFF. FOR COASTAL MGMT., https://perma.cc/KAH2-BE76 (archived Mar. 5, 2024).

the outer scope of South Carolina's authority to regulate its coastal zone under its coastal management plan.[200]

The facts in *Lucas* are instructive. In 1977, the South Carolina legislature passed its own coastal management act.[201] This law established a narrow critical area near the South Carolina shoreline and required developers to acquire a permit before building any habitable construction in that critical area.[202] As the South Carolina coastline continued to erode in the 1970s,[203] local real estate developer David Lucas and others invested in the Isle of Palms barrier island just outside the critical area.[204] In 1986, Lucas purchased two vacant lots in the Wild Dune development on the Isle of Palms, adjacent to but not within the "critical area."[205] At the time of Lucas's purchase, the coastal erosion threat should have been widely known to any prospective buyer familiar with the land's flooding history—the area was routinely subject to flooding and was fully submerged between 1957 and 1963.[206]

In response to this continual coastal erosion, the South Carolina Coastal Council established a Blue Ribbon Committee on Beachfront Management in 1986.[207] In 1987, the Blue Ribbon Committee found that South Carolina's beaches were in danger and recommended new land use regulations to enlarge the designated critical areas.[208] Accepting the committee's recommendations, the South Carolina legislature passed a new law in 1988, directing a managed retreat from the threatened coastline using "the best available information and data."[209] While the term "climate change" is absent from the statute, the Act

200. 505 U.S. 1003, 1006-07 (1992).

201. *Id.* at 1007-08 (citing Act of May 24, 1977, No. 123, 1977 S.C. Acts 224 (codified as amended at S.C. CODE ANN. tit. 48, ch. 39)).

202. *Id.*; *see also id.* at 1037 (Blackmun, J., dissenting).

203. *See id.* at 1037-39.

204. *See id.* at 1008 (majority opinion).

205. *Id.* at 1008-09; 1038-39 (Blackmun, J., dissenting).

206. *See id.* at 1038-39 (Blackmun, J., dissenting). The Isle of Palms government issued twelve emergency orders for shoreline sandbagging to protect the Wild Dune development between 1981 and 1983. *Id.*

207. *Id.* at 1037-38.

208. *Id.* at 1038; S.C. BLUE RIBBON COMM. ON BEACHFRONT MGMT., REPORT i, 6-14 (1987), https://perma.cc/HZ25-MEHR ("The South Carolina beach/dune system is now in a state of crisis.").

209. Act of June 7, 1988, No. 634, § 3, 1988 S.C. Acts 5130, 5135 (codified as amended at S.C. CODE ANN. § 48-39-280); *Lucas*, 505 U.S. at 1037-38 (Blackmun, J., dissenting). This law was passed a few months before the establishment of the UN Intergovernmental Panel on Climate Change (IPCC) and several years prior to the negotiation of the UN Framework Convention on Climate Change (UNFCCC). *History of the IPCC*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, https://perma.cc/5DC4-LRJF (archived Mar. 5, 2024); *History of the Convention*, U.N. CLIMATE CHANGE, https://perma.cc/F47Q-GPWY (archived Mar. 5, 2024).

states that the beach and dunes system "protects life and property by serving as a storm barrier which dissipates wave energy and contributes to shoreline stability."[210] In its report, the Blue Ribbon Committee referenced an earlier report from the EPA describing the anticipated rate of sea level rise:

> Sea level rise in this century is a scientifically documented fact. Our shoreline is suffering from its effects today. . . . [The EPA] predicts a possible one foot rise in sea level over the next thirty to forty years and approximately three feet over the next hundred years. It must be accepted that regardless of attempts to forestall the process, the Atlantic Ocean . . . is ultimately going to force those who have built too near the beach front to retreat.[211]

The new law enlarged the critical area to a new setback line that included Lucas's newly purchased property.[212] Lucas alleged that the new regulations amounted to a taking.[213] The Supreme Court of South Carolina held that Lucas was not entitled to compensation "regardless of the regulation's effect on the property's value" because the law was designed "to prevent serious public harm."[214]

Lucas appealed to the United States Supreme Court. The Court overturned the prior decision, holding that the land use regulations amounted to a regulatory taking of Lucas's property requiring just compensation.[215] In *Lucas*, the Court added a new taking category to complement *Penn Central*'s three-part inquiry and *Loretto*'s per se rule for physical occupation: A taking occurs when governmental action deprives the owner of "all economically beneficial use" of property.[216]

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210. Act of June 7, 1988, No. 634, § 1(1)(a), 1988 S.C. Acts 5130, 5130 (codified at S.C. CODE ANN. § 48-39-250(1)(a)).

211. S.C. BLUE RIBBON COMM. ON BEACHFRONT MGMT., *supra* note 208, at ii. It is not clear which EPA report the committee is referring to. In October of 1983, researchers from the EPA predicted a global sea level rise between 4.8 and 7 feet by 2100. JOHN S. HOFFMAN, DALE KEYES & JAMES G. TITUS, EPA, NO. 230-09-007, PROJECTING FUTURE SEA LEVEL RISE: METHODOLOGY, ESTIMATES TO THE YEAR 2100, & RESEARCH NEEDS vi (1983), https://perma.cc/M7H2-9NQD.

212. *Lucas*, 505 U.S. at 1008-09.

213. *Id.* at 1009 ("Lucas did not take issue with the validity of the Act as a lawful exercise of South Carolina's police power, but contended that the Act's complete extinguishment of his property's value entitled him to compensation regardless of whether the legislature had acted in furtherance of legitimate police power objectives.").

214. *Id.* at 1010 (quoting Lucas v. S.C. Coastal Council, 404 S.E.2d 895, 899 (1991)).

215. *Id.* at 1030 ("When, however, a regulation that declares 'off-limits' all economically productive or beneficial uses of land goes beyond what the relevant background principles would dictate, compensation must be paid to sustain it.").

216. *See id.* at 1027. *Lucas* is predicated on depriving an owner of *all* beneficial use, which was the finding of the trial court in this case. *See id.* at 1043-45 (Blackmun, J., dissenting). Thus, a regulation that reduces the value of the property by 95%, for example, is not a *per se* taking under *Lucas*. *See* Carol Necole Brown & Dwight H. Merriam, *On the*

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That is not the end of the story. Writing for the majority, Justice Scalia identified three exceptions to this new categorical taking rule. First, the government does not have to compensate landowners if it explicitly prohibits a land use that was already forbidden in the "background principles" of nuisance or property law.[217] Second, those background principles might evolve if "changed circumstances or new knowledge may make what was previously permissible no longer so," permitting the government to expand its regulation.[218] Third, the government may overcome a regulatory takings claim where there is an "actual necessity" or "grave threat[]."[219] These exceptions will take on increased importance as governments look to safeguard massive swaths of the coastline exposed to climate impacts. All three can sidestep a regulatory takings challenge, but whether a challenge proves successful will depend on how courts apply these exceptions to climate accommodation measures.

1. Climate change and "background principles of the State's law of property and nuisance"

In *Lucas*, Justice Scalia wrote that a takings claim will fail if "background principles" of state property or nuisance law preclude the claimant from asserting a property entitlement.[220] These background principles are rooted in pre-existing land ownership restrictions.[221] Justice Scalia wrote:

> Any limitation [that prohibits all economically beneficial use of land] cannot be newly legislated or decreed (without compensation), but must inhere in the title itself, in the restrictions that background principles of the State's law of property and nuisance already place upon land ownership. A law or decree with such an effect must, in other words, do no more than duplicate the result that could have been achieved in the courts—by adjacent landowners (or other uniquely affected persons) under the State's law of private nuisance, or by the

Twenty-Fifth Anniversary of Lucas*: Making or Breaking the Takings Claim*, 102 IOWA L. REV. 101, 109-11 (2017) (discussing subsequent litigation on this issue).

217. *Id.* at 1029 (majority opinion).

218. *Id.* at 1031. The Restatement cited in *Lucas* notes that changes in the character of the locality may make a particular land use "wholly unsuited to that locality twenty years later." RESTATEMENT (SECOND) OF TORTS § 827 cmt. g (AM. L. INST. 1977). The Restatement does not seem to discuss how new scientific understanding might justify a finding that an activity that was previously considered to be unobjectionable now creates a nuisance.

219. *Id.* at 1029 n.16.

220. *Id.* at 1029. The opinion explains, "Where the State seeks to sustain regulation that deprives land of all economically beneficial use, we think it may resist compensation only if the logically antecedent inquiry into the nature of the owner's estate shows that the proscribed use interests were not part of his title to begin with." *Id.* at 1027.

221. *Id.* at 1031.

> State under its complementary power to abate nuisances that affect the public generally, or otherwise.[222]

These background principles implicate both property and tort law. Justice Scalia relied on the Restatement (Second) of Torts in his analysis, highlighting the importance of balancing the "degree of harm to public lands and resources" threatened by the proposed activity with the "social value" of the activity and "suitability to the locality in question."[223] Under a background principles analysis, Justice Scalia wrote that South Carolina must first "identify background principles of nuisance and property law that prohibit the uses [Lucas] now intends in the circumstances in which the property is presently found."[224] Justice Scalia noted, for example, that the owner of a lakebed would not be entitled to compensation when he is denied a permit to "engage in a landfilling operation that would have the effect of flooding others' land," because that land use was "*always* unlawful."[225]

For example, in *Scott v. City of Del Mar*, the city of Del Mar, California, removed privately owned seawalls and patios, arguing that these improvements encroached on a shoreline protection area in violation of the Del Mar municipal code and created a public nuisance.[226] The California Court of Appeals upheld the city's authority to remove the structure on a public nuisance theory.[227] In doing so, it also recognized that governments have the power to destroy property without compensating landowners "under the pressure of public necessity and to avert impending peril" but found that public nuisance was sufficient to rule for the city in this case.[228]

This example suggests that indirect flooding emanating from private property can potentially be prohibited under a background principles analysis. Local governments may seek to prohibit private property owners from armoring their property in the coastal zone out of concern for damage caused to neighboring properties. The outer scope of the background principles exception will be tested as the need to restrict harmful activities on private property along the coastline grows.

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222. *Id.* at 1029.

223. *Id.* at 1030-31.

224. *Id.* at 1031.

225. *Id.* at 1029.

226. 58 Cal. App. 4th 1296, 1300-01 (1997).

227. *Id.* at 1305.

228. *Id.* (quoting House v. L.A. Cnty. Flood Control Dist., 153 P.2d 950, 953 (Cal. 1944)); *see infra* Part III.C.3.

2. Climate science and "changed circumstances or new knowledge"

Second, Justice Scalia acknowledged that "changed circumstances or new knowledge may make what was previously permissible no longer so," suggesting that the background principles test might evolve.[229] Since *Lucas* was decided in 1992, our understanding of climate change's impacts on the coastal zone has been greatly expanded by new scientific knowledge.[230] The United Nations Framework Convention on Climate Change was negotiated the same year that *Lucas* was decided, and the first IPCC report was released just prior.[231] Since that time, our understanding of climate change's impacts has grown by leaps and bounds.[232]

As states and localities seek to protect their coastline, legislators must be wary of *Lucas*-style takings claims. State and local governments should closely examine how they may employ climate conceptions of "new knowledge" to shield themselves from a regulatory takings challenge. Our new climate knowledge demonstrates that sea level rise will swallow large swaths of coastal land in the not-too-distant future.

Justice Kennedy picked up on changing conditions in his concurring opinion in *Lucas*. He noted that coastal properties may have a special status as part of "a fragile land system."[233] He explained, "The State should not be prevented from enacting new regulatory initiatives in response to changing conditions, and courts must consider all reasonable expectations whatever their source."[234] Justice Kennedy concluded, "The Takings Clause does not require a *static* body of state property law . . . ."[235]

Justice Kennedy's emphasis on changing conditions and the importance of considering *all* reasonable expectations cracks the door open for regulations enacted in response to changing climate considerations. How, precisely, this traditional reasonable-expectations analysis will apply to coastal property rights remains to be seen. Nevertheless, Justice Kennedy's concurrence takes on an increased salience as local governments struggle to balance safeguarding the community from climate impacts with ensuring that homeowners do not leave, thereby destroying the municipal tax base.

Justice Kennedy's concurrence noted that an owner's reasonable expectations "must be understood in light of the whole of our legal

229. *Lucas*, 505 U.S. at 1031.

230. *See supra* Part I.A.

231. *See* sources cited *supra* note 209.

232. *See supra* Part I.A.

233. *Lucas*, 505 U.S. at 1035 (Kennedy, J., concurring).

234. *Id.*

235. *Id.* (emphasis added).

tradition."[236] Of course, what is "reasonable" is informed by changing conditions.[237] Justice Kennedy's language offers a small glimmer of hope for efforts designed to safeguard property affected by climate impacts. In passing new coastal regulations, legislators should make clear they are responding to climate change advances as applied to the physical environment. Laws should cite to and actively engage with the latest climate science and changing ecological conditions. Such place-setting could allow regulations to survive the *Lucas* "'total taking' inquiry."[238]

To be sure, the term "climate change" does not appear in any of the *Lucas* opinions. And other scholars have questioned the extent to which "changed circumstances and new knowledge" should inform the regulatory takings analysis.[239] Still, the Court has opened the door to an evolving jurisprudence, and the "new knowledge" exception will be critical to defending climate-focused regulation.[240] As climate science continues to advance, courts considering regulatory takings claims will have to reconcile how to apply this "new climate knowledge" when deciding whether to uphold governmental regulations, particularly if a regulation seeks to safeguard people and property from climate impacts.

3. Applying "necessity," "imminence," and "grave threats" to climate change

Finally, Justice Scalia noted that a state or private parties can be absolved of liability for the "destruction of 'real and personal property, in cases of *actual necessity*, to prevent the spreading of a fire' or to forestall other *grave threats* to the lives and property of others."[241] In doing so, the *Lucas* majority reaffirmed

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236. *See id.* at 1034-35.

237. *Id.* at 1035.

238. *See id.* at 1030-32 (majority opinion) (quotation omitted).

239. Discussing *Lucas*, Timothy Mulvaney writes,

> The Court acknowledged that common law principles can undergo at least some alterations in adapting to new social circumstances. However, the Court noted that the "no right" defense is available only upon a court's "objectively reasonable application of relevant precedents." Indeed, the Court issued a not-so-veiled warning to the South Carolina courts regarding how they might go about interpreting their state's common law on remand, stating: "It seems unlikely that common-law principles would have prevented the erection of any habitable or productive improvements on petitioner's land."

Mulvaney, *supra* note 136, at 848-49 (footnotes omitted) (quoting *Lucas*, 505 U.S. at 1031, 1032 n.18).

240. *Lucas*, 505 U.S. at 1031.

241. *Id.* at 1029 n.16 (emphasis added) (quoting Bowditch v. City of Boston, 101 U.S. 16, 18-19 (1880)) (citing United States v. Pac. R.R., 120 U.S. 227, 238-39 (1887)); *see* Robin Kundis Craig, *Public Trust and Public Necessity Defenses to Takings Liability for Sea Level Rise Responses on the Gulf Coast*, 26 J. LAND USE & ENV'T L. 395, 419 (2011) ("The doctrine of public necessity has garnered far less court and academic interest in the context of

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that certain property rights were never part of an owner's original title.[242] This is an implied limitation that must yield to the police power.[243] Once again, the precise scope of these property limitations—particularly what constitutes an actual or public necessity—will be increasingly important as states embrace forward-looking climate adaptation measures.

In *United States v. Caltex, Inc.*, the Court highlighted the role of imminence and emergency in evaluating a government's necessity defense: "[T]he common law ha[s] long recognized that in times of imminent peril—such as when fire threatened a whole community—the sovereign could, with immunity, destroy the property of a few that the property of many and the lives of many more could be saved."[244] Necessity may be invoked when "[an] act is or is reasonably believed to be necessary for the purpose of avoiding a public disaster."[245] As applied to a necessity defense, "the threat of disaster must reasonably appear to be imminent."[246] For example, a public necessity defense can prevail when an effort is made "to protect against a public enemy, or to prevent or mitigate the effect of conflagration, flood, earthquake, or pestilence."[247] Destroying a home to stop the spread of a fire exemplifies the "quintessential application" of the public necessity defense.[248]

In its brief reference to public necessity, the *Lucas* Court cited two nineteenth-century cases: *Bowditch v. City of Boston* and *United States v. Pacific R.R.*[249] While both cases predate *Pennsylvania Coal* and the regulatory takings doctrine, their re-emergence in *Lucas* could influence climate accommodation

takings claims than either public nuisance or the public trust doctrines. . . . The doctrine of public necessity has long operated as a defense to takings claims because courts recognize that in times of true emergency or public necessity, private rights fall to public need."). Craig notes that attempts at long-term coastal protection will force courts to wrestle with "[the] strict legal requirement of an *imminent* problem or emergency [that] could limit the applicability of a public necessity defense." *Id.* at 420 (emphasis added).

242. *Lucas*, 505 U.S. at 1027.

243. *Id.*

244. United States v. Caltex, Inc., 344 U.S. 149, 154 (1952). In *Caltex*, the Court found that a taking did not occur when the U.S. government destroyed private oil facilities in the Philippines to prevent them from being taken by the Japanese Army during the Second World War. *Id.* at 150-51, 156.

245. RESTATEMENT (SECOND) OF TORTS § 262 (AM. L. INST. 1965).

246. *Id.* cmt. c.

247. *Id.* cmt. b.

248. Note, *Necessity Takings in the Era of Climate Change*, 136 HARV. L. REV. 952, 953 (2023). This was the precise issue in *Bowditch* and the example used by Justice Holmes in *Pennsylvania Coal.* Bowditch v. City of Boston, 101 U.S. 16, 17 (1880); Pa. Coal Co. v. Mahon, 260 U.S. 393, 415-16 (1922).

249. *See* Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1029 n.16 (citing *Bowditch*, 101 U.S. at 18-19; and United States v. Pac. R.R., 120 U.S. 227, 238-39 (1887)).

decisions. Both cases establish that governments are afforded extraordinary deference in times of necessity—to include the destruction of personal property—without providing just compensation to the affected property owners. In *Bowditch*, the Supreme Court found that the city of Boston was not liable for a taking when it demolished a building in its effort to thwart a major fire.[250] In *Pacific R.R.*, the Court held that the government was not liable for the destruction of private property related to military operations during the Civil War.[251]

While the terms "grave threat" and "imminence" are not explicitly mentioned in the fifth National Climate Assessment, the NCA links climate change to deleterious health effects, and those health impacts are occurring now, not in some distant future.[252] How does the Court's discussion of grave threats and necessity apply to our climate-destabilized reality? *Bowditch*'s reasoning takes on renewed importance in shielding governments from regulatory takings challenges in the face of climate change. This is particularly true for regulations that seek to minimize the damage inflicted during the growing wildfire season. For example, governments that seek to preclude development in known wildfire zones could adopt *Bowditch*'s core reasoning and argue that halting development was a precautionary measure to safeguard lives and property.

Consider the ways that state and local governments will respond ex ante to prevent climate-driven harm. First, military emergency responders will be increasingly called upon to suppress wildfires via aerial firefighting,[253] while the National Climate Assessment predicts the increased use of prescribed burning.[254] Prescribed burning mitigates damage from an ongoing fire by destroying the fuel the fire needs to spread.[255] Applying the logic in *Bowditch*

250. *Bowditch*, 101 U.S. at 16-19.

251. *Pac. R.R.*, 120 U.S. at 239.

252. NCA5, *supra* note 30, at 47 ("Climate change is already harming human health across the US, and impacts are expected to worsen with continued warming.").

253. In the aftermath of climate disasters, military disaster relief operations are expanding through a new mission: defense support to civilian authorities. Indeed, climate change is not solely an environmental issue—it is increasingly understood as a multifaceted and complex national security issue that will require military support and resources, particularly in the aftermath of a natural disaster. *See* Nevitt, *supra* note 9, at 440-41.

254. *See* Michael Birnbaum, *As Wildfires Grow, Militaries Are Torn Between Combat, Climate Change*, WASH. POST (Sept. 26, 2022, 6:00 AM EDT), https://perma.cc/MD4Q-X4DK; NCA4 VOL. II, *supra* note 3, at 16, 150. Outside the wildfire context, some nations are even flooding lands in advance of storm events to mitigate follow-on flooding impacts. This is already occurring in the Netherlands. *See* Thomas Erdbrink, *To Avoid River Flooding, Go with the Flow, the Dutch Say*, N.Y. TIMES (Sept. 7, 2021), https://perma.cc/67AQ-DA23.

255. *See* NCA4 VOL. II, *supra* note 3, at 16.

and *Pacific R.R.*, emergency responders may look to destroy properties in the path of a raging wildfire in an effort to avert further destruction. This would appear to be aligned with the facts in *Bowditch*, which applied the necessity exception to fires that ravaged Boston.[256]

Second, if a locality passes a law prohibiting new construction in a critical climate coastal or wildfire zone, a regulatory taking challenge is sure to follow. Yet homes in the direct path of an anticipated wildfire may themselves be a hazard, acting as "habitable kindling" that sparks a larger conflagration.[257] Consistent with the core reasoning in *Bowditch*, surely the local government should be afforded *some* level of deference in taking ex ante steps to halt wildfires and safeguard the broader community, particularly in critical climate zones.

Finally, it does remain difficult to reconcile the Court's reasoning in *Bowditch* and *Pacific R.R.* with the realities of climate change. The emergency exception defense to a regulatory taking only applies to "an existing or imminent public necessity or emergency" where "the destruction or limitation of private property is reasonably necessary to address th[e] threat."[258] For disasters such as wildfires, it is easy to see the application. Once a wildfire strikes, government is focused on emergency response and disaster management[259] and must take quick and decisive action to limit damage. But applying the public necessity defense to more gradual climate impacts is more challenging. We know that climate change creates the underlying conditions for increased fuel aridity, a key factor in setting the conditions for more wildfires.[260] Thus a public necessity defense could apply to larger-scale ex ante adaptation efforts to counteract climate change's role in creating warmer and drier conditions—key factors that increase fuel aridity.[261] Furthermore, a recent IPCC report found that "[l]ow-likelihood, high-impact outcomes could occur at global and regional scales even for global warming within the *very likely* range

256. *See* Bowditch v. City of Boston, 101 U.S. 16, 18-20 (1880); *see also* United States v. Caltex, Inc., 344 U.S. 149, 154 (1952) (holding that the "common law had long recognized that in times of imminent peril—such as when fire threatened a whole community—the sovereign could, with immunity, destroy the property of a few that the property of many and the lives of many more could be saved").

257. *See* Burger et al., *supra* note 34, at 121 ("[T]he expansion of human development and electrical systems into previously-remote forest zones leads to an increase in ignition . . . .").

258. *See* Craig, *supra* note 241, at 420-21; RESTATEMENT (SECOND) OF TORTS § 262 cmt. c. (AM. L. INST. 1965). ("[T]he threat of disaster must reasonably appear to be imminent. . . . [T]he privilege must be exercised in a reasonable manner, and the actor must do no unnecessary damage.").

259. *See supra* notes 253-55 and accompanying text.

260. *See* John T. Abatzoglou & A. Park Williams, *Impact of Anthropogenic Climate Change on Wildfire Across Western US Forests*, 113 PNAS 11770 (2016).

261. *See* Burger et al., *supra* note 34, at 121-22.

for a given GHG emissions scenario."[262] This suggests that public necessity could apply to a broad range of climate adaptation measures that would be necessary to reduce the risk of future climate-driven disasters. Of course, this would require a substantial change to existing public necessity jurisprudence.[263]

In sum, climate science advances will force difficult adaptation decisions as local governments adjust to our climate-destabilized reality. The areas discussed above—background principles, changed circumstances, and grave threats—represent doctrinal touchpoints ripe for adaptation. If doctrine remains static, governments at all levels will embrace relocation efforts as the most viable option; after all, retreat strategies do not suffer from the same legal takings challenges as the resist and accommodate strategies.[264] Still, retreat is a gargantuan undertaking that remains controversial. As "[t]here's no government agency that has the responsibility to relocate a community,"[265] any effort to retreat will be inherently disjointed and ad hoc. Unfortunately, today's retreat "strategy" is unmanaged and serves to exacerbate existing inequalities.

IV. Relocation: Managed and Unmanaged Retreat

> *Whether they raise [the roads] or abandon them, someone is probably going to sue.*[266]

Across the nation, thousands of properties have been rebuilt multiple times: A Mississippi home was rebuilt over thirty times in thirty-two years at a $663,000 cost to taxpayers for a home worth just $69,000.[267]

Given the legal and logistical barriers to each approach, state and local governments face conflicting incentives between investing in adaptation infrastructure and services and retreating from coastal zones.[268] Retreat can occur in either a managed (purposeful and coordinated) or unmanaged (disjointed and ad hoc) manner. Coastal communities often default to an unmanaged retreat "strategy" as they stop repairing critical infrastructure and

262. IPCC 2021 REPORT, *supra* note 33, at 27.

263. *See* Mark P. Nevitt, *Is Climate Change a National Emergency?*, 55 U.C. DAVIS L. REV. 591, 621-25 (2021).

264. *See infra* Part IV.

265. Chris Mooney, *The Remote Alaskan Village that Needs to Be Relocated due to Climate Change*, WASH. POST (Feb. 24, 2015, 12:10 PM EST), https://perma.cc/4PEB-4CJU (quoting Robin Bronen, Director of the Alaska Immigration Justice Project).

266. Alex Harris, *Lawsuits Could Spark 'Existential Crisis' in Cities Trying to Survive Climate Change*, WUSF (Dec. 18, 2019, 9:14 AM EST), https://perma.cc/BQ5R-G8LP.

267. Siders, *supra* note 2, at 219; *see supra* note 64 and accompanying text.

268. *See* Siders, *supra* note 2, at 219.

roads.[269] But failure to upkeep coastal roads—a form of unmanaged retreat—presents its own legal challenges, as failing to follow road abandonment procedures can expose a municipality to litigation.[270] Indeed, some scholars have argued that the enforcement of property rights places a legal duty upon the government to protect these rights against potential infringers.[271] This is somewhat strange. After all, the government's failure to maintain a road or provide a service is not, by itself, inflicting the underlying harm. Climate change is accelerating infrastructure degradation and is the true culprit causing environmental harm.

In this Part, I address the legal, fiscal, and policy implications associated with unmanaged and managed retreat. Governmental actors at all levels must put plans and policies in place to incentivize voluntary, managed retreat. Ideally, state and local governments will prioritize human health and safety and integrate the latest climate science into adaptation planning. I argue that we must replace the dreadful "destroy-rebuild-repeat" cycle with a more proactive "notice-withdraw-retreat" strategy. This three-step process includes (1) advance notice of climate disclosures; (2) systematic withdrawal of governmental services; and, finally, (3) full-scale retreat from the coastal zone when warranted.

A. Unmanaged Retreat: The Default Approach with Broader Legal and Equity Implications

Some localities faced with climate impacts to public infrastructure are ceasing maintenance of critical coastal roads.[272] If communities shut off utilities or emergency services,[273] they will confront the "duty to serve."[274]

269. *See* Brady Dennis, *North Carolina Beach Houses Have Fallen into the Ocean. Is There a Fix?*, WASH. POST (May 15, 2023, 6:00 AM EDT), https://perma.cc/MKM5-WTAA.

270. *See infra* Part IV.A.1.

271. *See, e.g.*, Michael Pappas, *A Right to Be Regulated?*, 24 GEO. MASON L. REV. 99, 103-04 (2016).

272. *See infra* Part IV.A.1.

273. I define "emergency services" capaciously to include fire, police, and emergency first responders, as well as the National Guard.

274. *See* Payne, *supra* note 69, at 608-15 (discussing the duty to serve in the context of climate change). The Supreme Court has held that "the Due Process Clauses generally confer no affirmative right to governmental aid, even where such aid may be necessary to secure life, liberty, or property interests of which the government itself may not deprive the individual." DeShaney v. Winnebago Cnty. Dep't of Soc. Servs., 489 U.S. 189, 196 (1989).

While it may appear to be a sound fiscal approach, a disinvestment strategy can trigger an inverse condemnation challenge.[275]

There are few decisions addressing unmanaged retreat that unpack the contours of the government's legal obligation to maintain services. In what follows, I analyze and describe four cases in which courts have wrestled with infrastructure disinvestment in the Florida, Maryland, California, and Louisiana coastal zones. These cases show that courts will closely scrutinize government's underlying duties to its citizens when services and infrastructure are reduced or eliminated.

1. *Jordan v. St. Johns County* (2011): A failure to follow a statutory process creates an affirmative duty to maintain a road

In *Jordan v. St. Johns County*, property owners living on a coastal barrier community in Summer Haven, Florida, asserted an inverse condemnation claim against the county government.[276] The plaintiffs alleged that the county failed to adequately maintain Old A1A, a key coastal road that provided vehicular access to their homes.[277] Storms and erosion damaged Old A1A, making the road difficult to maintain.[278] St. Johns County chose not to repair Old A1A, and several property owners asserted that the County's intentional failure to maintain the road left it in an unusable condition.[279] In making this decision, the county failed to follow the statutory road abandonment procedures.[280]

In response, the Summer Haven property owners sued St. Johns County, alleging that the county had de facto abandoned Old A1A without following its

275. Inverse condemnation is defined as "[a]n action brought by a property owner for compensation from a governmental entity that has taken the owner's property without bringing formal condemnation proceedings." BLACK'S LAW DICTIONARY (11th ed. 2019). In inverse condemnation proceedings, a claimant sues the government following the passage of a regulation or similar action that imposes such a large economic burden on its property that "in all fairness and justice" the government should provide compensation. Litz v. Md. Dep't of Env't, 131 A.3d 923, 930 (Md. 2016) (quoting Coll. Bowl, Inc. v. Mayor & City Council of Balt., 907 A.2d 153, 157 (Md. 2006)).

276. 63 So. 3d 835, 836-37 (Fla. Dist. Ct. App. 2011).

277. *See id.* Old A1A runs between the Atlantic Ocean and the Intracoastal Waterway.

278. By one estimate, the cost to repair and maintain Old A1A will be approximately $10,000,000 over the next 30 years and $21,000,000 over the next 50 years. *See* ATKINS, DAMAGE ASSESSMENT AND ACCESS RESTORATION OF OLD A1A AND THE SUMMER HAVEN BRANCH OF THE MATANZAS RIVER AT SUMMER HAVEN, ST. JOHNS COUNTY 22 (2023), https://perma.cc/P4JH-8WFM.

279. *See St. Johns County*, 63 So. 3d at 837. While there is not a reason given for the lack of maintenance, the court noted that "Old A1A is subject to repeated damage from natural forces such as storms and erosion, which makes the road difficult to maintain." *Id.*

280. *Id.* at 838.

own abandonment procedures.[281] This abandonment, the plaintiffs asserted, effectuated an inverse condemnation taking of their private property.[282] Under the plaintiffs' theory, St. Johns County had an affirmative duty to repair and maintain the road.[283] In response, St. Johns County claimed that it possessed sole discretion in determining the level of road maintenance that should be provided.[284]

After the plaintiffs were defeated at state trial court, the Florida Fifth District Court of Appeal held that the lower court had gone too far in granting summary judgment on the plaintiffs' initial claims without resolving key differences of fact regarding how much road maintenance the county actually provided.[285] The appellate court found that "the County has a duty to reasonably maintain Old A1A as long as it is a public road dedicated to the public use."[286] The court, however, rejected the claim the County had any "duty to maintain the road in a particular manner or at a particular level of accessibility."[287] Rather, the county was obligated to "provide a *reasonable level of maintenance that affords meaningful access*, unless or until the County formally abandons the road."[288]

In reversing the lower court's decision, the appellate court held that the county's failure to maintain and repair Old A1A could support a cognizable inverse condemnation claim.[289] In doing so, the court referenced an earlier Florida Supreme Court decision that found that inverse condemnation claims do not necessarily require a complete loss of access to the property.[290] Under this reasoning, if a property owner's right of access was "substantially diminished," a taking may result.[291] While the appellate court noted that natural forces played a role in the road's degradation, it held that the county's failure to maintain the road may have effectuated a de facto abandonment depending on the reasonableness of the county's actions—a question for the

281. *Id.* at 839.

282. *Id.* at 837.

283. *See id.*

284. *Id.*

285. *Id.* at 838-39.

286. *Id.* at 838.

287. *Id.*

288. *Id.* (emphasis added).

289. *Id.* at 839 ("We conclude that governmental inaction—in the face of an affirmative duty to act—can support a claim for inverse condemnation.").

290. *Id.* at 839 (citing Palm Beach County v. Tessler, 538 So. 2d 846, 849 (Fla. 1989)). The Supreme Court of Florida never weighed in on this litigation, as the Summer Haven residents ultimately settled with the county. *See* Ruppert, *supra* note 24, at 10925-26 n.129.

291. *See St. Johns County*, 63 So. 3d at 839.

lower court to determine.[292] At least in some jurisdictions in Florida—a state with an expansive coastline vulnerable to climate change—courts will look to ensure that all procedures are followed when a road is not formally abandoned.

St. Johns County has been criticized as a controversial case that carelessly introduces the idea of governmental inaction into takings jurisprudence.[293] Nevertheless, *St. Johns County* may act as a "bellwether" for governments grappling with sea level rise, environmental impacts, and coastal development.[294] It has been cited by at least one court outside Florida that is wrestling with analogous issues.[295] *St. Johns County* is a rare case providing insights into how courts wrestle with a fact pattern that will be increasingly common in our climate-destabilized future. It also raises profound questions concerning what level of governmental inaction is sufficient to trigger a compensable taking. Finally, it provides a somewhat cautionary tale for local governments that specify procedural guidelines for abandonment and choose to ignore them.

These difficult decisions—whether to invest in public infrastructure at great taxpayer cost or disinvest and risk takings claims—will be scrutinized as coastal communities respond to climate-driven sea level rise, extreme weather, and coastal erosion.[296] The North Carolina Outer Banks, for example, have been subject to sea level rise and powerful storms for years.[297] These islands are connected to the mainland by a single coastal road: Highway 12.[298] In Avon, one of the small towns on the Outer Banks, the county government has proposed raising taxes on residents to pay for the expensive beach nourishment necessary to protect the road.[299] Due to climate-driven sea level rise, Avon's beach is "disappearing at a rate of more than six feet per year in

292. *Id.*

293. *See, e.g.*, Ruppert, *supra* note 24, at 10915 (2018).

294. *See id.* at 10927; *see also* Bailey v. Preserve Rural Roads of Madison Cnty., Inc., 394 S.W.3d 350, 361 (Ky. 2011) (noting that if a road closing deprives an owner of reasonable access to his land, "he is entitled to damages," but nonetheless finding no authority that "the county's refusal to maintain road in good repair is an unconstitutional infringement of a landowner's right of access").

295. *See* Litz v. Md. Dep't of Env't, 131 A.3d 923, 932 (Md. 2016).

296. In Alaska, for example, the only road to Denali National Park is in danger of being unusable due to climate impacts. *See* Nathaniel Herz, *At Alaska's Most Popular National Park, Climate Change Threatens the Only Road In and Out*, WASH. POST (Oct. 15, 2021, 5:10 PM EDT), https://perma.cc/V8UW-FSGD.

297. *See* Gaul, *supra* note 19.

298. *Id.*

299. *See* Flavelle, *supra* note 58.

some places."[300] But the decision on whether to raise taxes is politically fraught, and residents are already contemplating moving away.[301]

Avon is just one of several Outer Banks communities wrestling with this issue. Between 2010 and 2020, hurricanes caused $65 million in damage to Highway 12, and one of the islands was evacuated five times.[302] Another island is currently losing thirteen feet of beach each year.[303] In response, local, state, and federal governments have invested about $500 million to protect Highway 12 and these efforts are ongoing.[304] But the inevitability of further sea level rise raises doubt as to whether it will be possible to continue to hold back the ocean. If a decision is ultimately made to abandon Highway 12, governments must be careful to follow all requisite abandonment procedures. These two examples in North Carolina and Florida exemplify the challenges associated with a reactive, truly unmanaged retreat approach to climate impacts.

2. *Litz v. Maryland Department of the Environment* (2016): Reconciling affirmative duties and inverse condemnation claims

In *Litz v. Maryland Department of the Environment*, Gail Litz, a property owner in Maryland, filed an inverse condemnation claim against several governmental units and agencies.[305] Litz's property included a recreational campground used for fishing, camping, and boating.[306] Litz alleged that contaminated water containing human sewage drained from nearby septic fields into a lake on her property, causing significant damage.[307] Specifically, Litz asserted that the town of Goldsboro failed to adequately maintain the septic system, resulting in the contamination of the adjacent streams.[308] The town and the Maryland Department of the Environment (MDE) had previously signed an administrative consent order requiring the town to build a public sewer system.[309] But the consent order was never fully

300. *Id.*

301. *Id.*

302. *Id.*

303. Gaul, *supra* note 19.

304. *Id.*; *see, e.g.*, Sam Walker, *Federal Grant to Pay for Study of N.C. Highway 12 on Pea Island*, ISLAND FREE PRESS (Apr. 15, 2024), https://perma.cc/PU4Q-SVKH.

305. 131 A.3d 923, 925 (Md. 2016). "An inverse condemnation claim is characterized as 'a shorthand description of the manner in which a landowner recovers just compensation for a taking of his property of his property when condemnation procedures have not been instituted.'" *Id.* at 930 (quoting Coll. Bowl, Inc. v. Mayor & City Council of Balt., 907 A.2d 153, 157 (Md. 2006)).

306. *Id.* at 925.

307. *Id.* at 925.

308. *Id.* at 925-26.

309. *Id.* at 926.

implemented.[310] Litz contended that her property's value was substantially diminished due to the pollution, eventually resulting in its foreclosure.[311] This was, she asserted, an unconstitutional taking. She sued several governmental units and agencies, asserting multiple causes of action including inverse condemnation.[312]

On appeal from a lower court decision dismissing Litz's inverse condemnation claim, the Maryland Court of Appeals reversed, finding that Litz's allegations, if true, amounted to a taking.[313] The court acknowledged the difficulty in reconciling takings jurisprudence with governmental inaction that results in damage to private property.[314] Noting that state law was silent on the precise question before the court, the court held that it was "fair and equitable . . . to recognize an inverse condemnation claim based on alleged 'inaction' when one or more of the defendants has an affirmative duty to act under the circumstances."[315] The court held that, at the motion to dismiss stage, the allegation of a consent order was sufficient to assert that the MDE had an affirmative duty to oversee the implementation of the consent order and had failed to do so.[316] In its analysis, the court considered *St. Johns County* as a persuasive example of an inverse condemnation claim based on governmental inaction.[317]

Unlike *St. Johns County*, *Litz* did not directly address a danger caused by climate change, although one could imagine how climate-induced flooding might cause similar water contamination problems. But the *Litz* court relied on at least one climate-related case to come to its holding, suggesting its possible approval of inverse condemnation in a climate context.[318]

310. *Id.* at 927.

311. *Id.*

312. *Id.*

313. *Id.* at 929, 931.

314. *Id.* at 931.

315. *Id.* This reasoning is similar to the *Armstrong* principle. *See supra* note 105.

316. *Litz*, 131 A.3d at 934.

317. *Id.* at 932. The *Litz* court described the holding in *St. Johns County*: "[B]ecause it was the county's responsibility to maintain this road and failed to do so, the pleaded inaction supported maintenance of an inverse condemnation cause of action against the county." *Id.*

318. *Id.* (citing Jordan v. St. Johns County, 63 So. 3d 835 (Fla. Dist. Ct. App. 2011); Arreola v. County of Monterey, 99 Cal. App. 4th 722 (2002)).

3. *Arreola v. County of Monterey* (2002): Failure to address a "known risk" creates a legal obligation

In *Arreola v. County of Monterey*, the California Court of Appeals found liability based on governmental inaction in the face of a known risk.[319] Monterey County officials knew that a river levee was in danger of failing, but they failed to take any action.[320] Floods caused by a breach of the river levee damaged the plaintiffs' property.[321]

In *Arreola*, governmental inaction in the face of actual knowledge of a known risk was sufficient to support an inverse condemnation claim.[322] The court held that to "support liability in inverse condemnation it is enough to show that the entity was aware of the risk posed by its public improvement and deliberately chose a course of action—or inaction—in face of that known risk."[323] The court determined that the county was required to compensate the plaintiffs for the damage to their land because the inaction amounted to a taking under Article I, Section 19 of the California Constitution, a provision that mirrors the federal Takings Clause.[324]

If this "known risk" standard becomes more widely embraced, it will have enormous consequences for local governments that choose to ignore climate impacts. If the reasoning in *Arreola* were to be more liberally applied, new climate knowledge may impose a legal duty to address climate impacts before disaster strikes.

Arreola is more than twenty years old and is limited to a single appellate district in California. But its suggestion that a legal duty flows from knowledge of an underlying risk has broader implications for forward-looking climate adaptation measures. For instance, a known risk standard may chill local governments' willingness to take forward-looking adaptation measures, because doing so would require them to maintain those measures in the future. On the other hand, a known risk standard may spur adaptation action in states with similar state constitutional takings clauses. But this hinges on how future courts treat *Arreola* and if they determine that climate impacts amount to a "known risk." The court in *Arreola* found that the county had the power and duty to maintain a levee project. Its inaction in the face of a known risk resulted in a successful inverse condemnation. Nevertheless, it remains to be seen if

319. 99 Cal. App. 4th at 744.

320. *See id.* at 746 (explaining that the county was previously made aware of the flooding risks).

321. *Id.* at 731, 736-37.

322. *Id.* at 744.

323. *Id.*

324. *Id.* at 765-66.

Arreola's known risk standard will be more broadly applied to encompass adaptation inaction in the face of a known and growing climate risk.

4. *St. Bernard Parish Government v. United States* (2018): An affirmative duty to repair?

Finally, in a 2018 case, *St. Bernard Parish Government v. United States*, property owners in the lower Ninth Ward in New Orleans asserted a claim of inverse condemnation against the federal government, alleging that the government failed to properly maintain or to modify the Mississippi River-Gulf Outlet (MRGO).[325] The owners claimed that the federal government was liable for flood damage to their property caused by Hurricane Katrina and other extreme weather events.[326] They argued that government *action* (construction of the MRGO) and *inaction* (failure to maintain the MRGO) were inextricably linked, thus triggering a taking.[327]

In 1968, the Army Corps of Engineers constructed the MRGO, a navigational channel linking New Orleans and the Gulf of Mexico and designed to increase commerce.[328] Around the same time, Congress also authorized funding for the Lake Pontchartain and Vicinity Hurricane Protection Project (LPV Project), which used material dredged from the MRGO channel to build levees and floodwalls along the channel.[329] The LPV Project was designed to control flooding caused by hurricanes on the Gulf Coast.[330] The plaintiffs asserted that the Army Corps's failure to adequately maintain the MRGO channel caused erosion and created a "funnel effect" that exposed the lower Ninth Ward to increased storm surge risk.[331] During Hurricane Katrina, the LPV Project levees breached and St. Bernard Parish was catastrophically flooded.[332]

The plaintiffs asserted that the damage caused by Hurricane Katrina amounted to a temporary taking because the government was responsible for the increased risk of flooding caused by the MRGO.[333] The plaintiffs won in the Court of Federal Claims, but the Court of Appeals for the Federal Circuit overturned the lower court's decision, concluding "that the allegations of

325. 887 F.3d 1354, 1357 (Fed. Cir. 2018).

326. *Id.*

327. *Id.* at 1357.

328. *Id.* at 1357-58.

329. *Id.* at 1358.

330. *Id.*

331. *Id.*

332. *Id.*

333. *Id.*

government inaction do not state a takings claim, and that plaintiffs have not established that the construction or operation of MRGO caused their injury."[334] In rejecting the plaintiffs' claims, the court noted that they "made no effort to show that the combination of MRGO and the LPV levees caused more flooding than would have occurred without any government action."[335] The court held that private property loss is compensable as a taking only "when the asserted invasion is the direct, natural, or probable result of authorized government action."[336] In its decision, the court distinguished torts claims from regulatory takings claims, highlighting that only affirmative, authorized governmental acts trigger regulatory takings liability.[337] In doing so, the court reaffirmed that "[t]he government's liability for a taking does not turn, as it would in tort, on its level of care."[338]

The court in *St. Bernard Parish* distinguished this case from *Arkansas Game and Fish Commission v. United States*, a Supreme Court decision discussed above that found a temporary taking when the government released water from a dam, damaging property.[339] The United States constructed the MRGO in 1968, and the Army Corps of Engineers maintained the banks of the Mississippi River during a time of erosion.[340] The Court of Federal Claims found that the plaintiffs failed to demonstrate that the government's construction of MRGO caused their injury.[341] Specifically, the plaintiffs "failed to present evidence comparing the flood damage that actually occurred to the flood damage that *would have occurred* if there had been no government action at all."[342] Because "[regulatory takings] liability has uniformly been based on affirmative acts by the government or its agent," and the plaintiffs failed to demonstrate that governmental action caused the underlying injury, the government was not liable in this case.[343]

334. *Id.* at 1368.

335. *Id.* at 1358.

336. *Id.* at 1360 ("On a takings theory, the government cannot be liable for failure to act, but only for affirmative acts by the government.").

337. *Id.*

338. *Id.* (quoting Moden v. United States, 404 F.3d 1335, 1345 (Fed. Cir. 2005)).

339. *Id.* at 1359; *see supra* notes 113-18 and accompanying text.

340. *St. Bernard Parish*, 887 F.3d at 1358, 1362.

341. *Id.* at 1367 ("Under the correct legal standard, plaintiffs failed to establish that government action, including the construction of MRGO and the levees, caused their injury.").

342. *Id.* at 1358 (emphasis added).

343. *Id.* at 1361, 1367-68.

5. Reconciling case law with climate retreat

Taken together, these four cases are difficult to completely reconcile, but they do offer some generalized guidance for governments struggling to grapple with their legal exposure in the face of climate impacts. As climate change destabilizes the physical environment, governments will face pressure to embrace new and innovative climate adaptation strategies—and may increasingly consider disinvestment and retreat as legitimate adaptation strategies. But they must proceed with attention to how proactive climate adaptation measures change the legal relationship between the government and its citizens. Affirmative acts and subsequent neglect can both impose tort liability and require just compensation under the Takings Clause. But this doctrinal area has yet to fully take into account the unique legal, fiscal, and policy challenges that climate change imposes on coastal communities. In the face of such doctrinal challenges, state and local governments should incentivize managed retreat, which is less reliant on doctrinal adaptation.[344]

In what follows, I offer five observations to help guide local governments, policymakers, and judges as they wrestle with this doctrinal area in the face of increased climate-driven physical destabilization.[345]

First, local governments, policymakers, and judges must acknowledge the scope, scale, and difficulty of the climate adaptation problem. Climate change is poised to trigger a slew of new inverse condemnation claims as localities stop upgrading and maintaining climate-exposed roads, bridges, and levees. Governments at all levels must walk an adaptation tightrope that balances action and inaction—a difficult task under the best of circumstances. This balancing act must take into account public safety concerns, climate impacts, taxpayer stewardship, and respect for private property rights.

Second, while *St. Johns County*, *Litz*, *Arreola*, and *St. Bernard Parish* did not specifically discuss climate change—and not all were successful—these cases nevertheless highlight that governments at all levels will face legal challenges in property and tort when governments fail to act in the face of environmental changes. In *St. Johns County*, the plaintiffs asserted that the county failed to follow its own procedures when it abandoned a key coastal road.[346] In *Litz*, disregarding a consent order in the face of a known danger created liability.[347]

344. *See infra* Part IV.B.

345. The National Climate Assessment highlighted the importance of coastal communities in challenging legal frameworks: "In response to actual or projected climate change losses and damages, coastal communities will be among the first in the Nation to test existing climate-relevant legal frameworks and policies against those impacts and, thus, will establish precedents that will affect both coastal and non-coastal regions." NCA4 VOL. II, *supra* note 3, at 83.

346. *See supra* Part IV.A.1.

347. *See supra* Part IV.A.2.

In *Arreola*, refusal to act in the face of a known danger was enough to impose liability.[348] The plaintiffs in *St. Bernard Parish* were ultimately unsuccessful, but this case leaves open the possibility of succeeding on a takings claim if future plaintiffs can establish that a specific government action caused their injury.[349]

One theme that emerges from these cases is that courts will inquire as to whether there is an affirmative legal duty owed by the government to its citizens. This inquiry may well create perverse adaptation incentives. For example, the city of Miami has adopted an "invest more" approach to mitigating climate impacts.[350] And Florida legislators have directed hundreds of millions of tax dollars to sea level rise and sewer projects.[351] These attempts may change the private property owners' expectations about the level of service to be provided by the government in the future.

In addition, state and local government often have statutory procedures in place that address the process to abandon roads and disinvest from coastal areas.[352] In light of future climate impacts, local governments should self-audit their code to ensure they are providing adequate procedural protections to their citizens without inviting liability that will constrain future adaptation decisionmaking. Once again, this requires walking an adaptation tightrope, balancing deeply entrenched procedural rights against the new realities of climate impacts.

Third, these cases highlight that courts will inquire into the extent to which states or localities have actual knowledge of the underlying threat, resulting in potentially broad implications for climate adaptation planning. Governments are aware of the increased risk posed by sea level rise, extreme weather, and flooding. Advances in climate science modeling only increase the body of climate knowledge.[353] In *Litz* and *Arreola*, the county governments had specific knowledge regarding the underlying environmental problem and yet still failed to act. While it remains unclear what level of knowledge would suffice to meet the *Lucas* "new knowledge" threshold,[354] advances in climate

348. *See supra* Part IV.A.3.

349. *See supra* Part IV.A.4.

350. Patricia Mazzei, *A 20-Foot Sea Wall? Miami Faces the Hard Choices of Climate Change.*, N.Y. TIMES (updated June 22, 2023), https://perma.cc/WEF6-MR6E.

351. *See id.* Similarly, in New York City, the Army Corps of Engineers unveiled a massive proposal to protect the metropolitan area from future flooding. *See generally* U.S. ARMY CORPS OF ENG'RS, N.Y. DIST., NEW YORK-NEW JERSEY HARBOR AND TRIBUTARIES COASTAL STORM RISK MANAGEMENT FEASIBILITY STUDY (2022), https://perma.cc/KL3V-SE74.

352. *See, e.g.*, Jordan v. St. Johns County, 63 So. 3d 835, 838 (Fla. Dist. Ct. App. 2011).

353. *See* Burger et al., *supra* note 34, at 64-65; *see also* NCA4 VOL. II, *supra* note 3, at 2 (noting reliance climate modeling).

354. *See supra* Part III.C.2.

modeling and climate attribution science are proceeding.[355] But this cuts both ways. "New knowledge" may thwart regulatory takings under one of the *Lucas* exceptions, but failure to act in the face of known danger may impose a tort and inverse condemnation claim if the logic in *Arreola* is more widely adopted.

Fourth, for governmental entities that fail to maintain storm systems and levees exposed to climate hazards, *St. Bernard Parish* appears to bolster a government's defense to inverse condemnation claims from affected property owners. This is particularly true for parts of the nation that have older levees and complex water control systems, like the MRGO system in *St. Bernard Parish*. To prevail, plaintiffs will have to be careful to not cherry-pick any one governmental action and will instead need to address the totality of governmental actions in context.

Finally, the federal court in *St. Bernard Parish* emphasized that plaintiffs have the burden to demonstrate that the governmental action caused the injury.[356] Plaintiffs must establish that the damage would not have occurred without governmental action.[357] In *St. Bernard Parish*, the plaintiffs failed to take into account how governmental actions mitigated the underlying flood damage; this includes the construction of the LPV project levees that are designed to protect against hurricane damage.[358]

As states and localities implement hard armoring and other adaptation measures, property owners may establish a "before and after" record that demonstrates that these new adaptation effort measures caused property damage. The court in *St. Bernard Parish* referenced the remand decision of *Arkansas Game* to reinforce that the causation analysis must take into account all government actions.[359] So any single climate adaptation effort will not be analyzed in isolation and will take into account the broader context.[360] Even unmanaged retreat and disinvestment, then, can trigger liability under a property or tort theory. Absent a doctrinal change or clarity from the Supreme

355. *See* Burger et al., *supra* note 34, at 71-72 (discussing the advances and limitations of climate modeling).

356. St. Bernard Par. Gov't v. United States, 887 F.3d 1354, 1362-63 (Fed. Cir. 2018).

357. *See id.*

358. *Id.* at 1363-64.

359. *Id.* at 1364-65 (citing Ark. Game & Fish Comm'n v. United States, 736 F.3d 1364, 1372 n.2 (Fed. Cir. 2013)).

360. Richard Lazarus refers to this as fragmentation: "Ecological injury resists narrow redress—due to the highly interrelated nature of the ecosystem, it is almost always a mistake to suppose that one can isolate a single, discrete cause as the source of an environmental problem. A broader overview that accounts for the full spatial and temporal dimensions of the matter is needed." Richard J. Lazarus, *Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future*, 94 CORNELL L. REV. 1153, 1181 (2009).

Court on the outer scope of such claims, governments should incentivize managed retreat, which is less reliant on doctrinal adaptation. I turn to this concept below.

B. The Preferred Relocation Path: Managed, Voluntary Retreat

Managed retreat is defined as the "the planned, purposeful, coordinated movement of people and assets away from risk."[361] For many coastal communities, retreat will eventually become unavoidable.[362] Due in part to the legal uncertainty associated with unmanaged retreat, it is far preferable to anticipate climate impacts before they occur and incentivize governments to engage in proactive, coordinated retreat.

Since 1989, different forms of managed retreat have occurred, but governmental officials have failed to capture the lessons learned.[363] As such, managed retreat remains somewhat overlooked as a bona fide climate adaptation strategy.[364] Managed retreat has historically occurred through buyout programs.[365] Buyouts are often expensive options that tap into taxpayer coffers and result in lost tax revenue as property owners move outside the initial tax district.[366] And eminent domain is politically fraught and expensive.[367] Ideally, managed retreat can be facilitated by a forward-looking, comprehensive federal adaptation policy that embraces adaptation realism and takes into account climate risk. Such a strategy would put structures and systems in place to incentivize truly voluntary retreat for climate-vulnerable communities. Voluntary, managed retreat largely sidesteps the takings and torts claims that straitjacket the resistance and accommodation strategies.[368]

While managed retreat does not invite the same thorny doctrinal issues that are associated with resistance, accommodation, and unmanaged retreat, it has its own challenges. Any managed retreat strategy must take into account psychological barriers (such as "place attachment"), institutional barriers (such

361. Siders, *supra* note 2, at 216.

362. NCA4 VOL. II, *supra* note 3, at 55 ("Many millions of Americans live in coastal areas threatened by sea level rise; in all but the very lowest sea level rise projections, retreat will become an unavoidable option in some areas along the U.S. coastline . . . .").

363. *See* Siders, *supra* note 2, at 220. In her article, Siders highlights 1,000 U.S. communities that have engaged in some form of managed retreat. *Id.*

364. *See id.* at 216 ("US adaptation policy can no longer afford to ignore one of the most potentially transformative tools available.").

365. *See* SIDERS, *supra* note 14, at 103.

366. *See id.*

367. *See supra* Part II.A.

368. *See supra* Parts II-III.

as financial incentives that disfavor retreat), and practical barriers.[369] Voluntary managed retreat is largely limited by policy, financial, psychological, and institutional barriers, not legal ones. There is a growing body of interdisciplinary scholarship examining the psychology of retreat, demonstrating that humans lack the capacity to fully evaluate risk.[370] The "it can't happen here" mentality continues to be fueled by a deep and understandable attachment to homes and communities.[371]

While there are some examples of managed retreat orchestrated at the state and local level, the federal government has now entered the arena. In 2016, the federal government provided $48 million to move a community on Isle de Saint Charles, Louisiana, further inland.[372] The actual relocation took many years, with the first homes completed in 2022.[373] More recently, the Biden administration's Department of Interior announced an ambitious effort to relocate Native American communities threatened by climate change.[374] In 2021, Congress passed the Bipartisan Infrastructure Law, providing $130 million for tribal community relocation and $86 million for tribal climate adaptation planning.[375] These nascent efforts suggest a reinvigorated role for the federal government in managed retreat leadership, particularly for the nation's most vulnerable communities. But this will prove challenging to scale due to the costs and associated challenges with implementation.

In sum, federally-driven managed retreat is a growing adaptation strategy for the most vulnerable communities—and one that avoids the contentious legal issues associated with resistance, accommodation, and unmanaged retreat. Still,

369. *See* Siders, *supra* note 2, at 218-220.

370. *See, e.g.*, ARDEN ROWELL & KENWORTHEY BILZ, THE PSYCHOLOGY OF ENVIRONMENTAL LAW 219-59 (2021) (discussing the psychology of climate law and how this influences decisionmaking and policy).

371. *See* Siders, *supra* note 2, at 219. This problem is exemplified by one Mississippi home that has been rebuilt thirty-four times. *See id.*

372. Christopher Flavelle, *Here's Where the U.S. Is Testing a New Response to Rising Seas*, N.Y. TIMES (updated Nov. 10, 2022), https://perma.cc/5G8W-XAQK. A report by Climate Central estimates that 8.7% of Louisiana's total land area will fall behind the tidal boundary line by 2050. CLIMATE CENT., SINKING TAX BASE: LAND & PROPERTY AT RISK FROM RISING SEAS 6 tbl.1 (2022), https://perma.cc/64VM-BVSK; *see* Brady Dennis, *Rising Seas Could Swallow Millions of U.S. Acres Within Decades*, WASH. POST (updated Sept. 8, 2022, 2:59 PM EDT), https://perma.cc/ZMF4-VXAG.

373. Tristan Baurick, *The Last Days of Isle de Jean Charles: A Louisiana Tribe's Struggle to Escape the Rising Sea*, NOLA.COM (Aug. 28, 2022), https://perma.cc/YR5Y-G4CG.

374. *See* Press Release, U.S. Dep't of the Interior, Biden-Harris Administration Makes $135 Million Commitment to Support Relocation of Tribal Communities Affected by Climate Change (Nov. 30, 2022), https://perma.cc/J7ZQ-ES9W.

375. *See* WHITE HOUSE, BUILDING A BETTER AMERICA: A GUIDEBOOK TO THE BIPARTISAN INFRASTRUCTURE LAW FOR STATE, LOCAL, TRIBAL, AND TERRITORIAL GOVERNMENTS, AND OTHER PARTNERS 314, 328 (2022), https://perma.cc/5M7Q-VJ76.

such measures are prohibitively costly. Top-down managed retreat remains a strategy that can only be reserved for the most critical climate zones and communities. In the face of its costs and doctrinal uncertainty, governments at all levels must turn to plans, policies, and regulations that incentivize and favor voluntary, resident-led retreat. Such an approach avoids the fiscal, psychological, and doctrinal pitfalls associated with other adaptation strategies.

The table below provides a visual snapshot of these adaptation challenges. In the next Part, I propose several principles to guide adaptation strategies, with the goal of increasing climate transparency that incentivizes voluntary, bottom-up, managed retreat.

Table A

Climate Adaptation Strategies

Adaptation Strategy	**Examples**	**Doctrinal and Other Limitations**
Resist	Hard and Soft Armoring	Physical Takings
Accommodate	Coastal Regulation and No-Build Zones	Regulatory Takings and Exceptions
Managed/Involuntary Retreat	Eminent Domain	Defining Public Use; Fiscal and Political Limitations
Managed/Voluntary Retreat ("Top-Down")	Voluntary, Funded Relocation	Fiscal Limitations
Managed/Voluntary Retreat ("Bottom Up")	Voluntary, Unfunded Relocation	Difficult to Manage at Scale
Unmanaged Retreat	Failure to Upkeep Roads	Inverse Condemnation Challenges

V. Principles to Address the Legal Crisis Within the Climate Crisis

> *Successful adaptation has been hindered by the assumption that climate conditions are and will be similar to those in the past. Incorporating information on current and future climate conditions into design guidelines, standards, policies, and practices would reduce risk and adverse impacts.*
>
> —Fourth National Climate Assessment (2018)[376]

With their pre-constitutional roots in the English common law, property and tort law doctrines have evolved steadily, drawing on longstanding

376. NCA4 VOL. II, *supra* note 3, at 164.

principles of certainty[377] while balancing private rights with the public good.[378] But climate change—with its disruptive physical environmental impacts—challenges our conception of those longstanding principles. Governments at all levels struggle to balance inaction with action in a world transformed by climate impacts. Consider the following ways that climate change disturbs these principles.

- *Certainty.* Property law values certainty and stability,[379] while climate change injects massive uncertainty into existing property rights. Extreme weather, heat, wildfires, and storms are growing in frequency and severity.[380] Whether we can reconcile property law's focus on certainty in the face of climate destabilization remains an open question.
- *Fairness.* Climate change's impacts are manifestly unfair, raising fundamental questions of environmental and climate justice.[381] The poorest communities lack the resources to adapt to sea level rise, storm surge, and extreme weather. In the event of a natural disaster, they are the most vulnerable.[382] Poorer communities may desire to retreat from the coastal zone but lack the resources to do so. Courts have emphasized principles of justice and fairness,[383] but they have not fully wrestled with the broader implications embedded in climate justice.
- *Balancing Private Rights and Public Interests (Investment-Backed Expectations).* This principle, derived from the regulatory takings analysis articulated in *Penn Central*,[384] may require a fundamental reassessment in the face of climate change. Future sea level rise estimates will impact investment-backed expectations. It remains unclear how actual or constructive knowledge of climate risk will affect this balance and the *Penn Central* test.

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377. *See* Flatt, *supra* note 136, at 1402-03.

378. *See* Penn Cent. Transp. Co. v. City of New York, 438 U.S. 104, 124 (1978).

379. *See generally* Joseph William Singer, *The Rule of Reason in Property Law*, 46 U.C. DAVIS L. REV. 1369 (2013).

380. *See* Herring et al., *supra* note 47, at S1-S2.

381. For a discussion of climate justice in a multinational context, see generally Eric A. Posner & Cass R. Sunstein, *Climate Change Justice*, 96 GEO. L.J. 1565 (2008).

382. *See* NCA4 VOL. II, *supra* note 3, at 12 ("People who are already vulnerable, including lower-income and other marginalized communities, have lower capacity to prepare for and cope with extreme weather and climate-related events and are expected to experience greater impacts. Prioritizing adaptation actions for the most vulnerable populations would contribute to a more equitable future within and across communities.").

383. Armstrong v. United States, 364 U.S. 40, 49 (1960).

384. Penn Cent. Transp. Co. v. City of New York, 438 U.S. 104, 124-25 (1978).

The mere threat of litigation driven by forward-looking innovation measures such as no-build zones may chill accommodation efforts.[385] This is particularly likely for municipalities that seek to regulate development by terminating services in areas suffering from sea level rise. Discussing South Florida and other coastal communities, some have argued for a "slow and graceful depopulation, rather than a sudden and catastrophic one."[386] But municipalities that do not take adequate measures to protect private property from climate impacts in the face of a known risk run the risk of being held liable in property or tort.[387]

If governmental officials seek to address climate change head-on with forward-looking regulations that run afoul of *Penn Central*, *Lucas*, or *Loretto*, a constitutional taking may result. But inaction and refusal to repair or maintain key coastal access roads is also legally problematic. This was reinforced in *St. Johns County*, where the county was ordered to upkeep Old A1A at great expense "unless or until the County formally abandons the road."[388]

In what follows, I offer three principles to guide government actors, with an eye toward facilitating greater climate adaptation flexibility. These principles are designed to integrate climate science within legislative choices, with the ultimate goal of moving people out of harm's way.

A. Principle One: Embrace "Notice-Suspend-Retreat" with Increased Climate Transparency

Federal, state, and local governments should commit to greater climate transparency and provide climate notice requirements that incorporate the latest climate science. This requires a shift from a "destroy-rebuild-repeat" approach to a "notice-suspend-retreat" approach. This favors notice (through increased climate transparency), suspension (through the halting of

385. See *Zellmer*, *supra* note 134, at 194 (citing Robert Haskell Abrams & Jacqueline Bertelsen, *Downstream Inundations Caused by Federal Flood Control Dam Operations in a Changing Climate: Getting the Proper Mix of Takings, Tort, and Compensation*, 19 U. DENV. WATER L. REV. 1, 11 (2015)).

386. Elizabeth Kolbert, *The Siege of Miami*, NEW YORKER (Dec. 13, 2015), https://perma.cc/YS6V-H79R (quoting Philip Stoddard, Mayor of South Miami).

387. *See supra* Part IV.A.3. For a discussion of climate impacts in Miami, see Kolbert, note 386 above.

388. Jordan v. St. Johns County, 63 So. 3d 835, 838 (Fla. Dist. Ct. App. 2011). As Byrne has noted, "[t]he paucity of decisions, mostly in lower state courts, and the brief, precedent-minded opinions make it difficult to predict how vigorous a constraint [regulatory takings] might be for a locality facing mounting costs for damaged or threatened infrastructure." J. Peter Byrne, *The Cathedral Engulfed: Sea-Level Rise, Property Rights, and Time*, 73 LA. L. REV. 69, 103 (2012).

governmental services), and retreat (primarily via voluntary buyouts from climate hazard zones).

Embracing climate transparency could likewise help accelerate a doctrinal shift, as courts would be forced to reconcile new climate knowledge with longstanding conceptions of investment-backed expectations and regulatory takings exceptions. It also may help shield regulators from regulatory takings challenges and the court's investment-backed expectations analysis, as property owners will have notice that services may not be available in the future.

1. Federal and state action to expose climate risk

The private sector has begun to embrace climate risk transparency, with real estate firms providing information to prospective homebuyers on climate and flood risk.[389] Despite these advances, several federal laws and policies obfuscate climate risk. For example, the Stafford Act plays a critical role in federal disaster response by providing federal assistance to a state during an emergency or major disaster declared by the president.[390] Once an emergency or major disaster is declared, federal funds and assistance flow to the state that requested federal assistance.[391] This perpetuates a destroy-rebuild-repeat cycle—at great taxpayer cost. Meanwhile, the Privacy Act of 1974 disguises climate risk for prospective homeowners by hiding prior flood history as a protected record,[392] and the NFIP underwrites building in the critical climate zone through the subsidization of flood insurance.[393] All three should better account for climate risk. This could be done through a variety of methods. For example, Congress could shift Stafford Act funding to favor ex ante hazard

389. *See supra* note 174; CLIMATE CENT., *supra* note 30, at 6 (using data from Zillow to show that we are on a path to place 3.4 million existing homes worth $1.75 *trillion* at increased flood risk by the end of this century); *see also* John Travis Marshall & Ryan Max Rowberry, *Urban Wreckage and Resiliency: Articulating a Practical Framework for Preserving, Reconstructing, and Building Cities*, 50 IDAHO L. REV 49, 79-80 (discussing problems with ex post disaster payments).

390. The Disaster Relief and Emergency Assistance Amendments of 1988, Pub. L. No. 100-707, 102 Stat. 4689 (codified as amended at 42 U.S.C. ch. 68); *see* Mark P. Nevitt, *Domestic Military Operations and the Coronavirus Pandemic*, 11 J. NAT'L. SEC. L. & POL'Y 107, 113 (2020) (discussing federal natural disaster responses following the declaration of an emergency or major disaster under the Stafford Act).

391. *See* Nevitt, *supra* note 390, at 113.

392. *See supra* note 174.

393. *See* Christine A. Klein, *The National Flood Insurance Program at Fifty: How the Fifth Amendment Takings Doctrine Skews Federal Flood Policy*, 31 GEO. ENV'T L. REV. 285, 298-300 (2019) (critiquing the failures of the NFIP, noting that it was never intended to be a permanent federal subsidy for flood-prone properties).

mitigation efforts over ex post disaster relief. Or the NFIP could be reformed to prohibit multiple bailouts of repetitive loss properties.[394]

Day-to-day real estate transactions already hide climate risk, aided by federal laws. The Privacy Act protects people from disclosing their property's flood risk and history to prospective buyers as a protected "record."[395] In turn, FEMA only provides *current* owners with access to a home's flood claims history.[396] The Privacy Act should be amended to provide prospective owners with full access to a home's flood risk and history.[397] Alternatively, FEMA could reconsider its interpretation of "record" via the agency rulemaking process. However, this would have to satisfy administrative law doctrines and the "arbitrary and capricious" standard.[398]

Further, mandatory flood disclosures vary state by state. Prospective homeowners must rely upon state and local real estate disclosure laws that are literally all over the map.[399] Local governments should take into account the long-term costs of this information asymmetry. Municipalities might also consider the growing benefits of providing ex ante climate risk notices. This may include "hold harmless" provisions that make clear that municipal services may be eliminated or roads may not be repaired. Alternatively, local governments might contemplate purchasing future executory interests in property vulnerable to climate change.[400] Following a natural disaster, the government could take title to the property and discontinue its use, thereby shifting away from the disastrous "destroy-rebuild-repeat" cycle that has plagued many communities.[401] Doing so would set the conditions for a phased withdrawal and retreat.

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394. This would prevent the Mississippi home from being bailed out thirty-four times. *See supra* note 267 and accomapnying text.

395. *See supra* note 174; 5 U.S.C. § 552a(b) (listing conditions of disclosure).

396. *See* Darlington, *supra* note 194.

397. *Cf.* NCA4 VOL. II, *supra* note 3, at 66 (noting that the "frequency, depth, and extent of tidal flooding are expected to increase in the future").

398. *See* 5 U.S.C. § 706(2)(A); Motor Vehicle Mfrs. Ass'n of U.S. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 42-43 (1983) (applying the arbitrary and capricious standard to agency review).

399. *See* Nevitt, *supra* note 195, at 3 ("At last count, 21 states—to include Virginia—do not require home sellers to notify prospective buyers that a home is in a flood zone." (citing Morrison, *supra* note 174)).

400. For a more complete discussion of how this might work, see Danaya C. Wright, *Weaponizing Private Property and the Chilling Effect of Regulatory Takings Jurisprudence in Combating Global Warming*, *in* THE CAMBRIDGE HANDBOOK OF DISASTER LAW AND POLICY: RISK, RECOVERY, AND REDEVELOPMENT 327, 347 (John Travis Marshall, Ryan Rowberry & Susan S. Kuo eds., 2022).

401. *See id.*

One additional measure would be to develop a robust federal Climate Adaptation Plan modeled after the newly-released National Climate Resilience Framework, which seeks to "reimagin[e] the Federal Government's role in advancing climate resilience" by identifying key objectives and follow-on actions to protect the nation against climate change.[402] Some cities, such as Jacksonville, have developed resilience plans that highlight areas most vulnerable to climate change impacts.[403] For decades, federal policy has subsidized building in the flood zone via the NFIP.[404] While it is beyond the scope of this Article to fully address reforms to the Stafford Act and the NFIP,[405] Congress must play an increased role in de-mystifying climate risk and breaking the pernicious cycle of "destroy-rebuild-repeat." Congress could start by leveling the information playing field and ensuring that homeowners and renters alike are fully aware of the climate risks. This could build upon existing private efforts already underway.[406] At a minimum, statutory barriers to climate information should be dismantled to embrace climate transparency.

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402. *See* WHITE HOUSE, NATIONAL CLIMATE RESILIENCE FRAMEWORK 5 (2023), https://perma.cc/JZC9-3DEV.

403. Jacksonville's plan is particularly innovative with its emphasis on relocation and the identification of place-based strategies that are tailored to meet the vulnerabilities of each community. *See* CITY OF JACKSONVILLE, RESILIENT JACKSONVILLE 5, 144-49 (2023), https://perma.cc/JR5N-DT2F. A.R. Siders has advocated for the creation of a National Seashore—a vast public land circling much of the United States. Siders, *supra* note 2, at 222.

404. *See* Klein, *supra* note 393, at 289-301 (providing an overview of the design and mechanics of the NFIP).

405. In 2018, for example, Congress passed the Disaster Recovery Reform Act in an effort to "improve pre-disaster planning and mitigation, response, and recovery, and increase FEMA's accountability." ELIZABETH M. WEBSTER ET AL., CONG. RSCH. SERV., R46774, THE DISASTER RECOVERY REFORM ACT OF 2018 (DRRA): IMPLEMENTATION UPDATE TABLES FOR SELECT PROVISIONS 1 (2021), https://perma.cc/483M-TZAK (discussing Disaster Recovery Reform Act of 2018, Pub. L. No. 114-254, div. D, 132 Stat. 3186, 3438-69 (codified as amended at 42 U.S.C. ch. 68)).

406. *See, e.g.*, *What Will Climate Change Cost You?*, RISK FACTOR, https://perma.cc/3KVY-WJKV (archived Mar. 6, 2024). This website allows users to enter in a specific property address and receive a score reflecting climate-induced risk, which includes flooding, fire, wind, and heat. In addition to private sector efforts, the EPA has developed a Climate Resilience Screening Index, which presents an "index score for climate resilience at the county level . . . [that] represents both the vulnerability of the entity to multiple climate events and the potential recoverability of these entities from climate events." *Development of a Climate Resilience Screening Index (CRSI): An Assessment of Resilience to Acute Meteorological Events and Selected Natural Hazards*, U.S. CLIMATE RESILIENCE TOOLKIT (Oct. 2017), https://perma.cc/YW7W-7V76. *See generally* J. KEVIN SUMMERS ET AL., EPA, EPA600/R-17/238, DEVELOPMENT OF A CLIMATE RESILIENCE SCREENING INDEX (CRSI): AN ASSESSMENT OF RESILIENCE TO ACUTE METEOROLOGICAL EVENTS AND SELECTED NATURAL HAZARDS (2017), https://perma.cc/G28B-VFS3.

2. Climate science and notice's role in reasonable investment-backed expectations

As a general matter, governments do not have an affirmative legal duty to notify homeowners of the increased risk of sea level rise and other climate impacts.[407] But providing such notice could help protect those governments from regulatory takings challenges because it would affect a homeowner's reasonable investment-backed expectations—part of the regulatory takings analysis articulated in *Penn Central*.[408] Reasonable investment-backed expectations rely upon the market's assessment of a rate of return, but precise climate risk can be difficult to ascertain. State and local legislators should emphasize climate information sharing and invest ex ante in localized flood and hazard maps that can be shared with homeowners and investors.[409] Prospective buyers would have a better understanding of the underlying climate risk, an important factor in determining expectations for the property's use.

There are sound reasons for cities and localities to provide such notice. Yet political obstacles remain. Municipalities rely upon a property tax base to fund critical services, and officials may be worried that increased climate disclosure could frighten investors and prospective property owners. And current homeowners may worry about the effect such warnings would have on their home values. But improved climate notice and disclosure requirements—such as flood risk history—would empower private property owners with a fuller understanding of their property's underlying climate risk. Such affirmative notice requirements might also influence a court's reasonable investment-backed expectations analysis when the regulatory takings challenge emerge.[410]

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407. *See* Clark v. City of Kansas City, 99 F. Supp. 2d 1064, 1068 (W.D. Mo. 2000) ("[I]t would be desirable for cities to warn their citizens of impending natural disasters . . . [but it] is not necessarily required."); *cf.* DeShaney v. Winnebago Cnty. Dep't of Soc. Servs., 489 U.S. 189, 201-03 (1989) (finding no due process violation when Wisconsin failed to protect a child from abuse inflicted by his father); Ecological Dev., Inc. v. Walton County, 558 So. 2d 1069, 1071 (Fla. Dist. Ct. App. 1990) ("[A] county is not obligated, nor can it be compelled, to perform or provide for any particular construction or maintenance, except such as it voluntarily assumes to do.").

408. *See* Penn Cent. Transp. Co. v. City of New York, 438 U.S. 104, 124-25 (1978).

409. Regarding mapping, the Department of Homeland Security recently submitted legislative proposals to Congress that included, among other things, reforms to FEMA's mapping authority to produce maps that include future climate projections. *See Legislative Proposals for the National Flood Insurance Program*, FED. EMERGENCY MGMT. AGENCY, https://perma.cc/GL2E-KEMW (last updated Mar. 25, 2024).

410. *See* Ruppert, *supra* note 24, at 10932 ("[L]ocal governments should begin to pass policies and disseminate information that helps to appropriately shape the long-term expectations of property owners about which infrastructure in which areas will likely be able to be maintained.").

A 1995 report prepared by the University of Maine's Marine Law Institute and others in response to changes in state coastal regulations reinforces the importance of providing advance notice of sea level rise to owners in the coastal zone.[411] As the report explains, such affirmative notice requirements can play an important role in managing property owners' expectations, potentially assisting a government in its defense against a takings challenge:

> The earlier that the public is on notice of the likelihood of rising sea level and the policy choice of a retreat strategy, the more likely the regulations are to withstand legal challenge. Property that is purchased [in the coastal zone] after the regulations are adopted will be bought subject to the expectations that the development restrictions will be applied in light of sea-level rise. . . . When these expectations are clarified, if it is necessary to carry out removal conditions or enforce revised coastal setbacks, the effect will be a minimal disruption of settled expectations.[412]

As courts wrestle with future regulatory takings challenges, notice requirements can help manage investment-backed expectations in the coastal zone—a critical *Penn Central* factor.[413]

Indeed, a well-thought-out climate notice that takes into account "changed circumstances or new knowledge" can assist with both a takings claim and public nuisance challenge.[414] To be sure, the reasonable investment-backed expectations analysis remains an ad hoc inquiry that takes into account many factors. Still, in undertaking that inquiry, courts would examine "whether the plaintiff was aware of the problem that spawned the regulation at the time it purchased the allegedly taken property . . . and . . . whether the plaintiff could have 'reasonably anticipated' the possibility of such regulation in light of the 'regulatory environment' at the time of purchase."[415] Nevertheless, efforts should be made to embrace climate transparency as a means of empowering prospective homeowners. It may also serve as a shield to future regulatory

411. *See* BARBARA A. VESTAL, ALISON RIESER, JOSEPH KELLEY & KATHLEEN LEYDEN, MARINE L. INST. ET AL., ANTICIPATORY PLANNING FOR SEA-LEVEL RISE ALONG THE COAST OF MAINE, at Summary-11 (1995), https://perma.cc/7HPG-7KQJ.

412. *Id.*; *see also* Maye C. Emlein, Comment, *Rising to the Challenge: Managed Retreat and the Takings Clause in Maine's Climate Change Era*, 73 ME. L. REV. 169, 211 (2021) (concluding that "the government has a good chance of surviving a takings claim against a rebuilding restriction").

413. *See* Thomas Ruppert, *Reasonable Investment-Backed Expectations: Should Notice of Rising Seas Lead to Falling Expectations for Coastal Property Purchasers?*, 26 J. LAND USE & ENV'T L. 239, 246, 257-60 (2011) (discussing the role that notice plays in the reasonable investment-backed expectations analysis).

414. *See supra* Part III.C.

415. *See* Appolo Fuels, Inc. v. United States, 381 F.3d 1338, 1349 (Fed. Cir. 2004) (quoting Commonwealth Edison Co. v. United States, 271 F.3d 1327, 1348 (Fed. Cir. 2001)); *see also* Palazzolo v. Rhode Island, 533 U.S. 606, 633 (O'Connor, J., concurring) ("[T]he regulatory regime in place at the time the claimant acquires the property at issue helps to shape the reasonableness of [the reasonable investment-backed] expectations.").

takings claims, although it remains unclear how these notice requirements will precisely factor into regulatory takings exceptions articulated in *Lucas*.[416] Further, passing regulations to protect the safety, health, and welfare of citizens would help shape the "character of the governmental action" prong of the *Penn Central* analysis.[417]

Local legislators should pass climate-informed adaptation laws that emphasize uniform burdens and also highlight the important public health and safety interests underpinning the legislation in question. Providing advance notice of sea level rise and other climate risks helps property owners make informed choices and can shape a court's treatment of the reasonable investment-backed expectations analysis.[418] In sum, embracing climate transparency by providing advance notice of climate risks can help shape the regulatory takings analysis. While adopting such laws is not an absolute shield to a regulatory takings claim, courts have shown a willingness to examine the facts animating reasonable investment-backed expectations and whether the property owner was "aware of the problem that spawned the regulation at the time it purchased the allegedly taken property."[419]

An affirmative climate notice requirement could clarify that roads may not be maintained in the future and emergency services may not be provided following a natural disaster. Ideally, such a climate notice would address both the risk of sea level rise using the best available science and also the likelihood that governmental regulation will follow, such as raising roads, hard or soft armoring, or infrastructure disinvestment.

To be sure, limited case law governs how much weight should be given to climate notices, but this may be changing. In *Columbia Venture*, the Supreme Court of South Carolina found that "[the developer's] lack of reasonable investment-backed expectations coupled with the legitimate and substantial health and safety-related bases for the County's floodplain development restrictions outweigh [the developer's] economic injury, and under *Penn Central*, no regulatory taking occurred."[420]

As I noted earlier, existing property owners living in the coastal zone may fear a diminution of their property's value.[421] And it is hard to determine with precision how affirmative notice measures will shape the contours of regulatory takings jurisprudence. Still, providing better notice and climate risk

416. *See supra* Part III.C.

417. Penn Cent. Tranp. Co. v. City of New York, 438 U.S. 104, 124 (1978).

418. *See* Ruppert, *supra* note 413, at 257.

419. *See, e.g.*, *Appolo Fuels*, 381 F.3d at 1349.

420. Columbia Venture, LLC v. Richland County, 776 S.E.2d 900, 916 (S.C. 2015); *see supra* notes 180-96 and accompanying text.

421. *See supra* note 192 and accompanying text.

information could effectively serve as an ex ante climate adaptation tool, limiting investment in climate-vulnerable coastal zones via information empowerment. At a minimum, private property owners would assume some degree of risk of living in a coastal zone, cognizant that infrastructure maintenance may degrade over time.

In sum, providing climate notices and linking climate regulations to health and safety concerns could influence how a court addresses investment-backed expectations. Adequate and better notice procedures also shine a light on the risk for current and future homeowners. Of course, political challenges remain but they are not insurmountable. For example, municipal leaders will be worried about the loss of the property tax if this causes a decrease in home valuations.

B. Principle Two: Favor Voluntary, Managed Retreat over Unmanaged Retreat

Voluntary, managed retreat avoids doctrinal challenges and should be preferred over our existing climate adaptation model—unmanaged retreat. As discussed in Part IV above, the default for most states, counties, and municipalities is to eschew purposeful, managed retreat in favor of a disjointed, ad hoc unmanaged retreat. When unmanaged retreat involves abandoning key coastal roads, tort and property lawsuits are likely to follow—particularly if a jurisdiction has taken on affirmative duties.

In Florida, additional private property rights are enshrined in state law. The Bert J. Harris, Jr. Private Property Rights Protection Act created a new state cause of action—separate and distinct from the law of takings—for Florida property owners seeking relief when governmental actions are unfairly affecting their property.[422] Specifically, the law states that just compensation must be paid for any governmental action that "inordinately burden[s], restrict[s], or limit[s]" private property rights.[423] This is independent of takings claims brought pursuant to the U.S. or Florida Constitutions.[424] And while *St. Johns County* was complicated by disputed facts, the Florida court found that "governmental inaction—in the face of an affirmative duty to act—can support a claim for inverse condemnation."[425] Still, local governmental budgets are limited. Local governmental officials will face a difficult choice as they decide whether to reinvest in climate-exposed public infrastructure for fear of being sued or make the tough but responsible decision to abandon key coastal access roads.

422. Bert J. Harris, Jr., Private Property Rights Protection Act, ch. 95-181, § 1(1)-(2), 1995 Fla. Laws. 1651, 1652 (codified as amended at FLA. STAT. § 70.001 (2023)).

423. *Id.*

424. *Id.*

425. Jordan v. St. Johns County, 63 So. 3d 835, 839 (Fla. Dist. Ct. App. 2011).

Successfully managing climate retreat will require leadership and novel institutional designs that favor long-term thinking over short-term gratification and political costs.[426] Yet climate change is aptly described as a "super wicked problem."[427] For the first time in American history, the United States is funneling large sums of money toward retreat from climate-exposed communities, focusing on climate-impacted tribal communities.[428]

Much of the discussion of relocation and managed retreat focuses on the loss of the physical environment, property, and community. But retreat also offers the possibility of revival for other parts of the nation. Consider parts of the Rust Belt and Great Lakes regions, areas that may see an influx of climate migrants as people retreat from the coast and other areas of the nation exposed to extreme heat and weather. Think Detroit, Milwaukee, Syracuse, Buffalo, and Akron. These areas have been losing populations for decades but enjoy several climate advantages with abundant water supplies, mild summers, and winters that are poised to cool.[429] Many of these cities possess infrastructure designed for a far more populous era.[430] Climate-driven relocation to these areas would not only promote human safety but also economic and social revitalization.

Ultimately, government-incentivized managed retreat must be realistic about its capacity to shape larger internal migration patterns. Historical migration patterns have been driven by individualized, bottom-up decisions. African Americans fleeing the American South during Jim Crow saw opportunity in Northern industrial cities, leading to the Great Migration.[431] Farmers in Oklahoma fleeing the Dust Bowl saw economic opportunity and a fresh start in California during the Great Depression.[432] But perhaps governments can play a role in incentivizing relocation as well.[433]

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426. *See* Lazarus, *supra* note 360, at 1201-03 (offering the method that Congress employs to close military bases as one model for climate governance).

427. *Id.* at 1159 (capitalization altered).

428. *See* Flavelle, *supra* note 62.

429. *See* Abrahm Lustgarten, *America's Climate Boomtowns Are Waiting*, ATLANTIC (Mar. 23, 2024), https://perma.cc/NXN8-7LCZ.

430. *See id.*

431. *See generally* ISABEL WILKERSON, THE WARMTH OF OTHER SUNS: THE EPIC STORY OF AMERICA'S GREATEST MIGRATION (2010) (telling the personal stories of African Americans fleeing the Jim Crow South). Of course, the Great Migration is a complicated story, as African Americans continued to face hostility in the North. For a discussion of this theme in the context of a climate migration, see JAKE BITTLE, THE GREAT DISPLACEMENT: CLIMATE CHANGE & THE NEXT AMERICAN MIGRATION xvi-xvii (2023).

432. *See generally* TIMOTHY EGAN, THE WORST HARD TIME: THE UNTOLD STORY OF THOSE WHO SURVIVED THE GREAT AMERICAN DUST BOWL (2006).

433. *See* Lustgarten, *supra* note 429 (quoting an urban planner who argues that "[t]he Great Lakes region should market itself as a climate refuge . . . and then build an economy

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Finally, in favoring managed retreat, terminology matters. The word "retreat" is associated with loss and fear. Some have argued that "managed retreat" is synonymous with defeat.[434] Perhaps a better term for managed retreat is "strategic advance" or "[c]ommunity-led resettlement."[435] This small change in language can influence the psychological components of environmental decisionmaking.[436] It also acknowledges that governmental action must work hand in hand with shifts in climate migration patterns that are truly voluntary and independent of government action. Regardless of what phrase is used, policymakers and governmental officials alike must be sensitive to climate linguistics and how we talk about different climate strategies. Failure to do so can do significant harm and hamper the community's embrace of otherwise sound strategies.

C. Principle Three: Embrace "Climate Constitutionalism"

In recent years, plaintiffs have turned to existing constitutional provisions as part of a broader effort to assert climate-related rights. In *Juliana v. United States*, for example, the plaintiffs argued that the government violated their constitutional rights under the Due Process Clause of the Fifth Amendment.[437] Specifically, the plaintiffs argued that the federal government failed to provide "a climate system capable of sustaining human life."[438] The Ninth Circuit ruled that the plaintiffs lacked standing because they could not show that the court had the power to redress their injuries.[439] Outside of *Juliana* and federal constitutional claims, state plaintiffs have had some success in alleging that the state constitution must take into account climate change as part of the environmental decisionmaking process.[440] I label these new litigation

that makes use of its attributes: the value of its water, its land, its relative survivability"); WIS. POL'Y F., WORKER INCENTIVES GAINING POPULARITY IN MIDWEST, BUT STILL RARE IN WISCONSIN 2 fig.1 (2022), https://perma.cc/N3K9-JEH3 (noting that worker relocation incentives are clustered in the Midwest).

434. *See* Helen Bromhead, *"Managed Retreat" Is a Terrible Way to Talk About Responding to Climate Change*, SLATE (Apr. 4, 2022, 5:50 AM), https://perma.cc/9FBP-RTWS.

435. *Id.*

436. *See* ROWELL & KENWORTHEY, *supra* note 370, at 219-59 (discussing the psychology of climate law and how this influences decisionmaking and policy).

437. No. 15-cv-01517, 2023 WL 9023339 (E.D. Or. Dec. 29, 2023).

438. *Id.* at *4, *6.

439. *See* Juliana v. United States, 947 F.3d 1159, 1164-65 (9th Cir. 2020). The Ninth Circuit recently issued a writ of mandamus compelling the district court to dismiss the case. *See In re* United States of America, No. 24-684 (9th Cir. May 1, 2024), ECF No. 24; Jennifer Hijazi, *Justice Department Wins Bid to Quash Juliana Youth Climate Suit*, BLOOMBERG L. (May 1, 2024, 2:21 PM PDT), https://perma.cc/QZM5-93RS.

440. *See, e.g.*, Held v. Montana, No. CDV-2020-307 (Mont. Dist. Ct. Aug. 14, 2023), https://perma.cc/BQ6U-Q675, *appeal docketed*, No. DA-23-0575 (Mont. Oct. 2, 2023).

strategies "climate constitutionalism"—using existing federal and state constitutions provisions to mandate that the government incorporate climate change into their decisionmaking process or arguing for a broader substantive due process right to a healthy environment.

1. Federal climate constitutionalism

Climate constitutionalism at the federal level could take many forms. One potential constitutional amendment could address the outer scope of the regulatory takings doctrine or even abolish it altogether. For example, a constitutional amendment could provide a clear, textual basis to bolster regulatory authority over the coastal zone. Such an approach could go as far as overriding the regulatory takings doctrine in its entirety—a so-called "doctrinal extinction" event.

Alternatively, an amendment could breathe life into the common law regulatory takings exceptions, providing state and local governments with additional legal authorities within the accommodation adaptation strategy. This may include legislating no-build zones in critical climate zones or express authority to impose restrictive covenants in vulnerable areas. Similarly, an amendment could address the growing adaptation paradox where local governments may unwittingly take on affirmative duties—and corresponding legal exposure—for taking sensible, prescriptive adaptation measures. Finally, a climate-focused amendment could address the unique challenges associated with unmanaged retreat and inverse condemnation. Such an approach could limit just compensation exposure when governments fail to repair or maintain key infrastructure in climate-exposed communities.

Going further, a constitutional amendment could enshrine a substantive constitutional right to a stable and healthy environment, a right the *Juliana* plaintiffs sought to locate in the Fifth and Ninth Amendments.[441] Of course, any such effort will face headwinds from governmental officials who assert that climate policy should not be handled by courts but instead should be left to political branches. But the scope, scale, and complexity of the climate crisis will eventually require an innovative legal response.[442] While it is beyond the scope of this Article to fully address the many possibilities for a climate constitutional amendment, some scholars have argued that constitutional amendments are irrelevant, as they merely reflect a changed social consensus.[443]

441. 2023 WL 9023339, at *6.

442. *See, e.g.*, James R. May, *Climate Change, Constitutional Consignment, and the Political Question Doctrine*, 85 DENV. UNIV. L. REV. 919, 920 (2008) (proposing the use of federal common law to address climate change when other avenues have failed to do so).

443. *See, e.g.*, David A. Strauss, *The Irrelevance of Constitutional Amendments*, 114 HARV. L. REV. 1457, 1459 (2001).

At this time, a climate constitutional amendment seems highly unlikely. Still, a groundswell of public interest in addressing the climate crisis has emerged in recent years. This cultural and societal shift *could* set the conditions for a broader political and, ultimately, constitutional shift. In just the past decade, climate change has emerged as a leading political issue.[444] In 2019, millions of young people around the world gathered to urge transformational action on climate change.[445]

As David Strauss has argued, constitutional amendments "often do no more than ratify changes that have already taken place in society without the help of an amendment."[446] If this theory is applied to the current political moment, there appears to be a growing interest in addressing climate change via the political process.[447] A constitutional amendment is the most direct way to rebalance the interests of the public and of private property owners, but it remains to be seen if the growing public interest in climate action will translate into a new constitutional amendment.

Yet the political system of the United States is grappling with a period of particular political dysfunction, making a constitutional amendment unlikely for the foreseeable future.[448] As such, a federal constitutional amendment to break the doctrinal logjam is extremely unlikely at this time. But the climate mitigation strategy is failing, our emissions gap grows, and the physical world is on the verge of irreversible and catastrophic harm.

2. State climate constitutionalism

While a federal constitutional amendment appears implausible at this time, there are efforts underway for states to amend their constitutions via "Green Amendments" to guarantee stronger environmental and climate-related rights.[449] Alternatively, litigants may follow the lead of plaintiffs in

444. *See* Alec Tyson, *How Important Is Climate Change to Voters in the 2020 Election?*, PEW RSCH. CTR. (Oct. 6, 2020), https://perma.cc/4F65-MRBL (highlighting that, in the 2020 election, "a majority of registered voters in the United States say climate change will be a very (42%) or somewhat (26%) important issue in making their decision about whom to vote for").

445. *See* Somnini Sengupta, *Protesting Climate Change, Young People Take to Streets in a Global Strike*, N.Y. TIMES (updated Sept. 21, 2019), https://perma.cc/73D9-DLR5.

446. Strauss, *supra* note 443, at 1459.

447. *See, e.g.*, John Schwartz, *Climate Is Taking On a Growing Role for Voters, Research Suggests*, N.Y. TIMES, (Aug. 24, 2020), https://perma.cc/4HMY-E5RT.

448. *See generally* SANFORD LEVINSON & JACK M. BALKIN, DEMOCRACY AND DYSFUNCTION (2019) (discussing the perilous state of democracy in the United States).

449. *See* Saul Elbein, *National Push for 'Green Amendments' Puts States at Forefront of Climate Fight*, HILL (Feb. 7, 2024, 6:00 AM ET), https://perma.cc/FQ5F-UKGL; *Green Amendments in 2023: States Continue Efforts to Make a Healthy Living Environment a Legal Right*, NAT'L CAUCUS OF ENV'T LEGISLATORS (Mar. 27, 2023), https://perma.cc/5PVP-

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Montana and assert a climate-related constitutional right based upon existing constitutional provisions.[450] Those plaintiffs successfully challenged a state law that prohibited state regulators from taking global climate considerations into account when conducting environmental reviews.[451] Such efforts that seek to operationalize state constitutional rights to take into account climate change may prove to be a fruitful litigation strategy as several states already protect environmental rights within their constitutions.[452] According to one analysis, twenty-three states and Puerto Rico have an environmental or natural resource provision in the text of their state constitution.[453] An additional four states have a fund for environmental and natural resource projects within the state.[454] For example, Alabama's constitution declares that the state must "promote a proper balance among population growth, economic development, environmental protection, and ecological diversity."[455] And the Illinois constitution states, "The public policy of the State and the duty of each person is to provide and maintain a healthful environment for the benefit of this and future generations."[456] While the scope of these rights has yet to be tested in Illinois and Alabama, litigation elsewhere is ongoing following the success of *Held v. Montana*.[457]

Plaintiffs have sued states to operationalize these rights, arguing that these constitutional provisions provide a basis for actionable environmental claims, such as requiring states to take into account climate impacts in decisionmaking. For example, a group of plaintiffs recently sued the state of Washington, arguing that there is a right to a stable climate within the state constitution.[458] While an appellate court rejected this claim on separation of powers grounds, it

F5YU (highlighting that at least nine states have considered Green Amendment legislation).

450. *See* Held v. Montana, No. CDV-2020-307, slip op. at 1-2 (Mont. Dist. Ct. Aug. 14, 2023), https://perma.cc/BQ6U-Q675, *appeal docketed*, No. DA-23-0575 (Mont. Oct. 2, 2023).

451. *Id.* at 70, 94-101.

452. *See, e.g.*, PA. CONST. art. I, § 27 ("The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.").

453. *See* Krysten Tomaier, How States Can Adapt to Climate Change Through State Constitutional Amendments 58 tbl.10 (May 2020) (M.A. thesis, Harvard University), https://perma.cc/8S8W-8L63.

454. *See id.*

455. ALA. CONST. art. XI, sec. 219.07, § (1)(A).

456. ILL. CONST. art. XI, § 1.

457. *See, e.g.*, Navahine F. v. Dep't of Transp., No. 1CCV-22-0000631 (Haw. Cir. Ct. Apr. 6, 2023), https://perma.cc/F89P-C79Y.

458. *See* Aji P. *ex rel.* Piper v. Washington, 480 P.3d 438, 444-46 (Wash. Ct. App. 2021).

acknowledged that "the right to a stable environment should be fundamental" and that "[t]he Youths deserve a stable environment and a legislative and executive branch that work hard to preserve it."[459] And the trial judge encouraged the plaintiffs to fight for protections via other avenues.[460]

In addition, there are efforts underway to urge states to adopt "Green Amendments" to affirm environmental rights.[461] Such an approach is consistent with states serving as "laborator[ies]" for "novel social and economic experiments [that are undertaken] without risk to the rest of the country."[462]

Looking ahead, state constitutional amendments may empower local governments to exert greater authority over land use matters. A new state constitutional amendment could include requiring climate notice provisions in property contracts to ensure that property owners have actual knowledge and informed consent prior to moving into a vulnerable area. Alternatively, states may attempt to limit their exposure arising from disinvestment decisions by restricting the scope of the sovereign immunity waiver. Such attempts may target specific coastal areas where local governments have broader discretion to decide make maintenance and repair decisions. Finally, states may attempt to limit their exposure to regulatory takings challenges by limiting the compensation amount within the constitution's text.

Conclusion

Climate change demands that we look with fresh eyes at age-old doctrines designed for simpler, more predictable times. Sea level rise threatens massive swaths of the coastal United States,[463] wildfires rage at unprecedented frequency and speed,[464] and heat waves and extreme weather have become the new normal.[465] The law can no longer ignore what the science is telling us:

459. *Id.* at 445, 458.

460. Aji P. *ex rel.* Piper v. Washington, No. 18-2-04448-1, 2018 WL 3978310 at *5 (Wash. Super. Ct. Aug. 14, 2018) ("The young people who are the plaintiffs in this case can (and must) continue to help solve the problems related to climate change."), *aff'd* 480 P.3d 438 (Wash. Ct. App. 2021).

461. *See* sources cited *supra* note 449.

462. New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting).

463. *See supra* Part I.A.

464. *See* James MacCarthy, Jessica Richter, Sasha Tyukavina, Mikaela Weisse & Nancy Harris, *The Latest Data Confirms: Forest Fires Are Getting Worse*, WORLD RES. INST. (Aug. 29, 2023), https://perma.cc/GR47-7FDV.

465. *See* Mark Poynting & Esme Stallard, *How Climate Change Worsens Heatwaves, Droughts, Wildfires and Floods*, BBC (Apr. 25, 2024), https://perma.cc/5ZMY-7GW7.

The earth is changing, humans are exposed to climate risks, and we must take steps today to ensure a safe and more secure environment tomorrow.[466]

Climate change is challenging our historical understanding of the balancing of property rights with the public interest. Sadly, some of the states most vulnerable to climate change have put in place supplemental private rights that exceed baseline protections.[467] But to paraphrase Justice Robert Jackson, private property rights are *not* a suicide pact, and climate change will force us to reconsider whether we have struck the correct balance between protecting private property rights and preserving the public good.[468] Embracing adaptation realism is the first step to avoid a collision course with climate disaster.

As leaders realize the urgency behind adaptation action, they will confront difficult policy choices exacerbated by doctrinal status quo. Adaptation is now front and center as climate change's destabilizing impacts have been validated and revalidated by climate scientists. Today, nations, states, and localities are struggling to adapt to climate change's present-day effects. Legal scholars, homeowners, and governmental officials are addressing the sheer magnitude of the challenge and what it means for land use, property, and environmental law—but much more needs to be done.[469]

Whether we resist, accommodate, or retreat will be influenced by legal doctrine and its capacity to evolve. Absent change, longstanding legal doctrine will cast a shadow over innovative climate adaptation measures, discouraging courageous climate action. Just as climate change will force communities to adapt to their changing physical environment, legal doctrine must adapt to take into account the climate challenge. Antiquated doctrine cannot rise to meet climate change's destabilizing effects. Just as we need adaptation measures in the physical environment, we need a large-scale *legal adaptation* to address climate dynamism.

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466. *See supra* Part I.A.

467. *See, e.g.*, Bert J. Harris, Jr., Private Property Rights Protection Act, FLA. STAT. § 70.001(1)-(2) (2023).

468. *See* Terminiello v. City of Chicago, 337 U.S. 1, 37 (1949) (Jackson, J., dissenting); *see also* Wright, *supra* note 400, at 336-38.

469. *See generally* J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental Law*, 40 ENV'T L. 363, 370-71 (2010) (arguing that the demands of climate change adaptation is beginning to transform environmental law).