FEDERAL FLOOD POLICY & MALADAPTATION:
A STORY OF COLLECTIVE FORGETTING

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> *"Transformative adaptation involves fundamental shifts in systems, values, and practices, including assessing potential trade-offs, intentionally integrating equity into adaptation processes, and making systemic changes to institutions and norms."*[1]

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[1] FIFTH NAT'L CLIMATE ASSESSMENT, U.S. GLOBAL CHANGE RESEARCH PROGRAM: REPORT IN BRIEF 64 (2023).

INTRODUCTION

This is a story of collective forgetting, tragedy, and opportunity. For nearly two centuries, flood management policy at all levels of government in the United States has failed to reverse or even flatten the steep upward trajectory of flood hazard exposure and costs,[2] a trajectory that is becoming ever steeper as the population residing and doing business in the nation's flood hazard areas grows, sea levels rise, and coastal and inland storms become more frequent and intense.[3] Those familiar with the history of U.S. flood policy know that, since its inception, the federal policy has supported the development of the nation's flood prone lands[4] in ways that have precipitously—and predictably—increased the exposure of people, buildings, infrastructure, and cultural and environmental resources to flood hazards.[5]

What has been forgotten, so to speak, is that Congress explicitly structured the National Flood Insurance Act of 1968 ("NFIA")[6] to shift the paradigm of the nation's flood policy from development accommodation to what we now refer to as hazard area avoidance, managed retreat, and preservation of ecosystem services[7]—adaptation strategies that reduce the exposure of people, homes, businesses, and infrastructure to flood risk by directing new development away from flood hazard areas, facilitating relocation of vulnerable populations to less hazardous areas, and increasing the natural capacity of floodplains to mitigate flood risk.[8]

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[2] *See infra* Section IV.A (regarding maladaptive effects of federal flood policy).

[3] *See infra* Part I.

[4] I use the terms "flood hazard areas" and "flood prone areas" to refer to areas at heightened risk of fluvial (riverine flooding), pluvial (flooding from rain falling directly onto land and hard surfaces), and coastal flooding. *See generally* Paul D. Bates, Niall Quin, Christopher Sampson, Andrew Smith, Oliver Wing, Jeison Sosa, James Savage, Gaia Olcese, Jeff Neal1, Guy Schumann, Laura Giustarini, Gemma Coxon, Jeremy R. Porter, Mike F. Amodeo, Ziyan Chu, Sharai Lewis-Gruss, Neil B. Freeman, Trevor Houser, Michael Delgado, Ali Hamidi, Ian Bolliger, Kelly E. McCusker, Kerry Emanuel, Celso M. Ferreira, Arslaan Khalid, Ivan D. Haigh, Anaïs Couasnon, Robert E. Kopp, Solomon Hsiang & Witold F. Krajewski, *Combined Modeling of U.S. Fluvial, Pluvial, and Coastal Flood Hazard Under Current and Future Climates*, 57 WATER RSCH. (2020).

[5] *See infra* Part I.A.

[6] National Flood Insurance Act of 1968, Pub. L. No. 90-448, § 1302, 82 Stat. 572, 572–73 (1968) (codified as amended at 42 U.S.C. §§ 4001–4132). The regulations implementing the NFIA are found in Title 44 of the Code of Federal Regulations, Subchapter B.

[7] *See infra* notes 216–219 and accompanying text (citing and discussing congressional and executive record references to floodplain management strategies that have since come to be known as "hazard area avoidance," "managed retreat" and the preservation of "ecosystem services").

[8] *See infra* Section II.B; *see also infra* Part III (analyzing text and legislative history of NFIA); Flood Disaster Protection Act of 1973, Pub. L. 93-234, § 2, Dec. 31, 1973, 87 Stat. 975 (codified at 42 U.S.C. § 4002) ("The Congress finds that—(1) annual losses throughout the Nation from floods and mudslides are increasing at an alarming rate, largely as a result of the accelerating development of, and concentration of population in, areas of flood and mudslide hazards.").

Contrary to the prevailing understanding,[9] Congress did not intend the provision of federal flood insurance to be the primary operative feature of the federal program. Rather, the NFIA created a program in which federal flood insurance plays an integral role, but that role is principally to provide an incentive for state and local governments to adaptively manage floodplain land uses, while also providing a short-term financial safety net for floodplain occupants and shifting some of the costs of flood disaster recovery to those occupants.[10] The primary purpose of the National Flood Insurance Program ("NFIP"),[11] per the NFIA, is to decrease the cost of flood disasters by using valuable federal benefits, including access to otherwise unavailable flood insurance, to incentivize communities[12] to use their police power authority to limit floodplain development.[13] This was the formula the Congress of 1968 believed would, over time, reverse a century of rising flood costs.

To accomplish this, the NFIA instructed the implementing agency, which is now the Federal Emergency Management Agency (FEMA),[14] to assess "the adequacy of State and local measures in flood-prone areas as to land management and use, flood control, flood zoning, and flood damage prevention,"[15] and, based on these assessments, develop federal criteria that make a community's access to

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[9] *But see* Beth Davidson, Note, *How Quickly We Forget: The National Flood Insurance Program and Floodplain Development in Missouri*, 19 WASH. U. J.L. & POL'Y 365 (2005) (recognizing Congressional intent that National Flood Insurance Program incentivizes state and local land use lawmaking to reduce development in floodplains); Charles T. Griffith, Note, *The National Flood Insurance Program: Unattained Purposes, Liability in Contract, and Takings*, 35 WM. & MARY L. REV. 727 (1994) (same); AM. INST. RES., A CHRONOLOGY OF MAJOR EVENTS AFFECTING THE NATIONAL FLOOD INSURANCE PROGRAM 10 (Oct. 2002) (describing the Johnson administration's intent that flood insurance serve "both as a means to help individuals bear the risks of flood damage and, equally, as a means to discourage unwise occupancy of flood plains").

[10] *See supra* notes 207–208 and accompanying text.

[11] The NFIP is a program of flood insurance coverage, technical guidance including mapping, and floodplain management administered by the FEMA pursuant to the NFIA and regulations that FEMA promulgates to implement the NFIA. 44 C.F.R. § 60.1 (2024).

[12] The NFIP defines "community" as "any State or area or political subdivision thereof, or any Indian tribe or authorized tribal organization, or Alaska Native village or authorized native organization, which has authority to adopt and enforce flood plain management regulations for the areas within its jurisdiction." 44 C.F.R. § 59.1 (2023).

[13] *See infra* Section II.B and Part III; Pub. L. No. 90-448 § 1361(c), 82 Stat. 587 (codified at 42 U.S.C. § 4102(c)); *see also* 42 U.S.C. § 4001(e) (declaring that a purpose of the NFIA is to "encourage State and local governments to make appropriate land use adjustments to constrict the development of land which is exposed to flood damage and minimize damage caused by flood losses").

[14] The NFIA established the Federal Insurance Administrator ("FIA"), a position within the Department of Housing and Urban Development ("HUD"), to administer the NFIP. Pub. L. No. 90-448 § 1105, 82 Stat. 567. Congress subsequently established FEMA, after which it transferred the agency to the Department of Homeland Security. Reorganization Plan No. 3 of 1978, 92 Stat. 3788 (June 19, 1978) (presidential proposal to consolidate emergency management authority into one federal agency); Exec. Order No. 12127, 44 Fed. Reg. 19367 (April 3, 1979) (effectuating Congressionally authorized reorganization plan); Homeland Security Act of 2002, Pub. L. No. 107-296, § 503(1), 116 Stat. 2135 (transferring FEMA to newly created DHS).

[15] Pub. L. No. 90-448, § 1361(a), 82 Stat. 587.

the flood program's benefits contingent on the community adopting and enforcing zoning and other land use laws that "to the maximum extent feasible" guide new development away from flood hazard areas and constrict existing development in flood hazard areas "where appropriate."[16] This restructuring of the federal flood policy responded to the recommendations of state and local government officials and land use planning professionals who urged that the availability of federal flood insurance and other federal benefits be contingent on state or local adoption of zoning, subdivision regulations, and other land use laws that facilitate hazard area avoidance and managed retreat.[17]

In this way, Congress intended the NFIP to incentivize "wise" land use management of the nation's flood hazard areas to gradually reduce the people and property in harms' way and thereby decrease federal disaster costs, and the tragic social, environmental and economic costs of floods.[18] Promulgation of NFIP eligibility criteria requiring participating communities to manage floodplain land uses to restrict floodplain development is so critical to the statutory scheme that Congress and the Johnson administration repeatedly emphasized that without such criteria, federal insurance would undermine the purpose of the NFIA by increasing development in the nation's flood-prone areas, "exacerbat[ing] the whole problem of flood losses,"[19] and "frustrating the purpose for which such assistance[, including federal flood insurance,] was extended."[20]

However, the feature of the NFIP that was necessary to the entire statutory scheme achieving its purpose was never implemented. Instead, the regulatory criteria provide the federal benefits but fail to make their availability contingent on adoption of land use laws that "avoid [development of] the base floodplain whenever practicable" and "preserv[e] and restor[e] . . . natural and beneficial floodplain values."[21] As implemented, the NFIP includes voluntary measures that

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[16] Pub. L. No. 90-448 § 1361(c), 82 Stat. 587 (codified at 42 U.S.C. § 4102(c)).

[17] *See infra* notes 183–185 and accompanying text.

[18] TASK FORCE ON FEDERAL FLOOD CONTROL POLICY, A UNIFIED NATIONAL PROGRAM FOR MANAGING FLOOD LOSSES 17 (Aug. 2, 1966) [hereinafter TASK FORCE REPORT (1966)].

[19] *Id.* at 17; *see also* Robert C. Weaver, Letter of Transmittal (Aug. 8, 1966), in H.R. 11539, 89th Cong., 2d Sess. (transmitting the Task Force Report to John W. McCormack, Speaker of the House of Representatives) (quoting TASK FORCE REPORT (1966), *supra* note 18).

[20] Flood Disaster Protection Act of 1973, Pub. L. No. 93-234, § 2(a)(1)-(3), 87 Stat. 975, 975–76; *see also infra* notes 216–219 and accompanying text (regarding Congress and the Johnson administration's predictions that, absent hazard area avoidance and retreat-oriented flood zoning eligibility criteria, the NFIP would support floodplain development and thereby undermine the purpose of the NFIA).

[21] U.S. WATER RES. COUNCIL, A UNIFIED NATIONAL PROGRAM FOR FLOOD PLAIN MANAGEMENT (Jul. 1976) (report to the President reviewing implementation of the NFIA). I found no smoking guns, so to speak, in the administrative record explaining *why* the flood zoning criteria were not promulgated. The socio-economic-political preferences and power structures that entrenched development accommodation as the organizing logic of pre-1968 flood policy likely contributed to early promulgation of structural criteria. *See* 41 Fed. Reg. 46962, 46965–67, 46976–77 (Oct. 26, 1976) (promulgating criteria requiring anchoring and elevation of buildings and delaying adoption of criteria relating to coastal setbacks and wetland protections pending

encourage land use regulatory strategies to shift development away from flood hazard areas.[22] Yet, rather than being reflected in the eligibility criteria that form the heart of the national program, these components are relegated to the periphery.

The predictable result has been the widespread maladaptive management of lands prone to flooding or flood hazard areas.[23] This result follows naturally from three features that have characterized federal flood policy since at least 1849, features the partial implementation of the NFIA amplifies.[24] The first, as discussed above, is an organizing logic of development accommodation. The second is misplaced faith in the capacity of human engineering and technology to protect floodplain development from flood hazards.[25] The third is the failure to provide states and local governments with the support they need to overcome intractable barriers to the use of their broad police powers to adaptively manage land uses in flood-prone areas.[26] These features persist today, notwithstanding that—since at least the 1950s—the federal government and many state and local governments have recognized that (1) hazard area avoidance and managed retreat are needed to stem the rising cost of floods;[27] (2) state and local governments continue to face barriers to the adoption of laws that implement these adaptation strategies;[28] and (3) federal flood policy fortifies these barriers.[29]

Heeding these historical lessons,[30] Congress succeeded in restructuring the federal flood program to provide sufficiently powerful incentives to influence state

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further study); *see also id.* at 46962–63, 46965 (referencing objections that proposed regulations failed to promote "wise" floodplain management, failed to prohibit new construction in flood hazard areas, "inappropriately restrict[ed] landowners," and burdened small communities). Other implementation barriers likely included state and local objections to federal criteria that threaten local sources of revenue and concerns about regulatory takings. *See infra* Sections IV.D.2–D.3.

[22] *See infra* notes 486, 511–528 and accompanying text (discussing voluntary Community Rating System); *see also infra* Section IV.D.3 (discussing NFIP regulations that strongly suggest, but do not require, various planning considerations).

[23] *See infra* Section IV.A (regarding widespread and rapid floodplain development following creation of NFIP). *See also infra* notes 216–219 and accompanying text (regarding Congress and the Johnson administration's prediction that, absent retreat-oriented flood zoning criteria, the NFIP would support floodplain development and thereby undermine the purpose of the NFIA).

[24] *See infra* Part II and Section IV.A (describing features of pre- and post-1968 flood policies and their maladaptive consequences).

[25] INTERAGENCY FLOODPLAIN MGMT. REV. COMM., SHARING THE CHALLENGE: FLOODPLAIN MANAGEMENT INTO THE 21ST CENTURY 68 (Jun. 1994) ("Through most of the past two centuries, the nation's approach to floodplain management has focused on reducing flood impacts through structural means. Floodplain management has been flood control.").

[26] *See infra* Section IV.B (analyzing principles of adaptive floodplain management); *infra* Section IV.D (analyzing barriers to local action).

[27] *See infra* Section II.B (identifying existing regulatory hazard area avoidance and managed retreat strategies).

[28] *See infra* Section IV.A.

[29] *Id.*; *see also* Sarah J. Adams, *Land Law Localism and the Climate Resilience Paradox*, 36 STAN. L. & POL. REV. (forthcoming 2025) (analyzing entrenchment of rigid localism norms that, paradoxically, undermine local capacity to comprehensively and equitably respond to the maladaptation problem).

[30] *See infra* Part III (analyzing text and legislative history of NFIA).

and local management of floodplain development.[31] However, FEMA's choice to myopically focus the eligibility criteria on building construction and design standards had the perverse effect of further entrenching an approach to local land use regulation that facilitates floodplain development. In so doing, the program successfully increased the structural resilience of homes and businesses in flood hazard areas[32] while simultaneously supporting widespread and intensive floodplain development that exposes people, homes, businesses, and infrastructure to flood hazards, even in areas with repetitive catastrophic flooding, mudslides, and erosion, and areas projected to be uninhabitable within the next fifty years.[33]

It is well documented that the intensive development of flood hazard areas significantly increases the social, environmental, and economic costs of floods,[34] costs that disparately affect historically marginalized communities residing in flood hazard areas.[35] Robust research also demonstrates that the adaptation strategies of hazard area avoidance and managed retreat can "proactively move people, structures, and infrastructure out of harm's way before disasters or other threats occur to avoid damage, maximize benefits, and minimize costs for communities and ecosystems."[36] Zoning and other land use regulations that de-intensify land uses[37] in floodplains are essential components of hazard area avoidance and managed retreat—adaptation strategies that recognize that abandonment and displacement are occurring and will continue to occur, whether managed or not, as the destabilization of the Earth's climate system increasingly makes floodplains too costly to safely inhabit.[38]

The resilience lawmaking literature also tends to agree that because the maladaptation problem is a land use management problem, local governments are uniquely equipped to address it.[39] Evidence also abounds of local governments adopting land use laws and making land use decisions that increase the resilience

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[31] *See infra* Section II.B, Part III, notes 384–402 and accompanying text (regarding NFIP's maladaptive transformation of local management of floodplain land uses).

[32] *See infra* note 388 and accompanying text.

[33] *See infra* Section IV.A (regarding maladaptive effects of federal flood policy).

[34] *See infra* Part I.

[35] *See infra* notes 79–85 and accompanying text, Sections IV.B & D.1.

[36] KATIE SPIDALIERI & ANNIE BENNETT, MANAGED RETREAT TOOLKIT, https://www.georgetownclimate.org/adaptation/toolkits/managed-retreat-toolkit/introduction.html [https://perma.cc/KV6A-PVUM]; *see also infra* Part I (discussing and citing research regarding flood risk, development, and managed retreat).

[37] I use the phrase "de-intensification of land uses" to refer to changes in land use plans and laws that have the effect of decreasing the quantity of people, structures or infrastructure exposed to flood hazards. *See generally infra* Sections I.B (discussing de-intensification of land uses as a managed retreat strategy) and IV.C (discussing amendments to federal minimum criteria that would promote de-intensification of land uses in floodplains).

[38] *See infra* Part I.

[39] *See infra* Sections I.B, IV.A–IV.B (regarding local capacity to adaptively manage floodplain land uses); Part III and Section IV.A (regarding barriers to effective state and local governance); Adams, *supra* note 29 (forthcoming article identifying and critically examining attributes of local land use governance that "climate researchers identify as essential components of effective and equitable climate resilience planning and lawmaking").

of their communities.[40] With few exceptions, however, local governments throughout the United States continue to permit development of flood hazard areas[41]—despite over seventy years of local, state, and federal recognition that adaptation strategies centered on hazard area avoidance and managed retreat are necessary to reverse, or even to slow, more than a century of rising flood costs.[42]

This is not to say, however, that local governments are solely or even primarily responsible for the tremendous social, environmental, and economic costs of floods attributable to widespread development of the nation's flood hazard areas. Rather, the failure to stem these costs, and worse, the adoption of policies that drive these costs, are indicative of governance failures at all levels of government.

To be clear, FEMA plays a vital role in helping communities prepare for flood disasters and responding to state requests for disaster assistance, at least when authorized by the President to do so.[43] Among other essential services, the agency deploys thousands of workers trained to assist in the complex and costly process of recovery, and it distributes billions of dollars in insurance claims and other disaster relief funding that communities need and states do not have the resources to provide.[44] FEMA planners and other staff also assist states, local governments, and other federal agencies in managing natural hazard risks, planning for disaster

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[40] *See, e.g.*, *infra* notes 528–533 (discussing example); *see also infra* notes 479–482 (discussing studies suggesting communities throughout the United States may use commonplace land use regulatory tools to direct some development away from flood hazard areas).

[41] *See* Stephen R. Miller, *The Local Official and Climate Change*, *in* CONTEMPORARY ISSUES IN CLIMATE CHANGE LAW AND POLICY: ESSAYS INSPIRED BY THE IPCC 105 (Robin Kundis Craig & Stephen R. Miller eds., 2016) (analyzing "institutional conundrum whereby the entity with the greatest potential to solve the problem [local government] . . . lacks the capacity to do so"); *see generally* John R. Nolon, *Calming Troubled Waters: Local Solutions*, 44 VT. L. REV. 1, 62–66 (2019) (identifying general consensus among land use governance theorists that local government role in land use problem solving is both essential and constrained); *see also infra* Section IV.A.

[42] *See infra* Section II.B (citing and discussing examples of local, state and federal recognition of need for federal intervention to support adaptive floodplain land use management).

[43] *See* 44 C.F.R. § 206.36 (regarding the major disaster declaration process). Under the second Trump administration, FEMA has begun denying state requests for major disaster declarations. *See, e.g.*, Letter from Cameron Hamilton, FEMA Interim Administrator, to Jay Inslee, Washington State Governor (Apr. 11, 2025); *see also* Luke Barr, *GOP Gov. Sarah Huckabee Sanders, Arkansas Republican Lawmakers Urge Trump to Reconsider Denial of Disaster Relief*, ABC NEWS (Apr. 23, 2025, 6:01 PM), https://abcnews.go.com/Politics/sarah-huckabee-sanders-arkansas-lawmakers-urge-trump-reconsider [https://perma.cc/7GJY-T8QZ] (reporting on denial of major disaster declaration and disaster funds for disaster recovery in Arkansas and North Carolina).

[44] Lauren Sommer, *Trump Wants States to Handle Disasters. States Aren't Prepared*, NPR (Mar. 21, 2025, 4:08 PM), https://www.npr.org/2025/03/21/nx-s1-5327595/trump-order-fema-states-disaster-response [https://perma.cc/46SA-CQ3M].

recovery, and promoting community resilience[45]—or at least they did so before the second Trump administration gutted the agency.[46]

Full implementation of the NFIA provides an opportunity to restructure U.S. flood policy to promote the kind of dynamic federalism needed to address governance failures driving the continued maladaptive development of flood hazard areas. Amending the NFIP eligibility criteria to include criteria that, when implemented by participating communities, center hazard area avoidance and managed retreat within a community's suite of flood resilience strategies could be instrumental in increasing local capacity—broadly defined to include political will—to adaptively regulate land uses in flood hazard areas.[47] Carefully crafted, this intervention can also align with principles of adaptive land use management,

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[45] *See New Resilience Organization Established within FEMA May 28*, ASSOC. STATE FLOODPLAIN MGRS. (May 22, 2018), https://www.floods.org/news-views/new-resilience-organization-established-within-fema-may-28 [https://perma.cc/U8PK-73V9] (consolidating FEMA's preparedness and mitigation programs and grants, among other functions); *see, e.g.*, FEMA Press Release, R5-24-NR-30, FEMA Awards $1.9M to Michigan Department of Licensing and Regulatory Affairs to Develop Code Training and Outreach Programs (Nov. 26, 2024) (awarding funds to support proactive initiatives to decrease natural hazard risk to homes and buildings); FEMA Press Release, R5-25-NR-009, FEMA Awards $933K to the City of Detroit to Develop Flood Mitigation Strategies (Jan. 22, 2025) (awarding funds to support city in "design[ing] a cost-effective flood mitigation project within and adjacent to the Michigan-Martin neighborhood on Detroit's west side to help alleviate ongoing flooding issues in the downtown area").

[46] *See* Jennifer Shutt, *Trump Moves to Abolish FEMA, Shift Disaster Response to States*, GOVERNING (Feb. 4, 2025), https://www.governing.com/resilience/trump-moves-to-abolish-fema-shift-disaster-response-to-states [https://perma.cc/6EHS-8W46]; Leah Douglas, Tim Reid, Nichola Groom & Nathan Layne, *FEMA Cuts Emergency Training Under Trump as Hurricane Season Looms*, REUTERS (May 11, 2025, 3:08 AM), https://www.reuters.com/business/environment/fema-cuts-emergency-training-hurricane-season-looms-2025-05-11 [https://perma.cc/KHN7-NQ7A] (reporting on termination of approximately 2,000 employees, or approximately one third of FEMA's full-time staff; termination of training for state and local emergency managers; and firing of FEMA Acting Chief after he urged Congress to preserve the agency); *see also, e.g.*, FEMA Press Release, HQ-25-40, FEMA Ends Wasteful, Politicized Grant Program, Returning Agency to Core Mission of Helping Americans Recovering from Natural Disasters (Apr. 4, 2025) ("ending the Building Resilient Infrastructure and Communities (BRIC) program," "canceling all BRIC applications from Fiscal Years 2020-23," and halting distribution of grant funds to "states, tribes, territories and local communities"); *see also* U.S. GOV'T ACCOUNTABILITY OFF., GAO-24-107351, OPPORTUNITIES EXIST TO ADDRESS MISSION CHALLENGES AND INCREASED WORKLOAD (2024) (reporting on GAO finding of significant gap between FEMA staffing levels and nation's needs); David Maurstad, *FEMA's Former Resilience Exec Sounds the Alarm on Ending BRIC*, ASSOC. STATE FLOODPLAIN MGRS. (Apr. 11, 2025), https://www.floods.org/news-views/fema-news/femas-former-resilience-exec-sounds-the-alarm-on-ending-bric [https://perma.cc/7AUM-7PCH] (warning that termination of BRIC "inevitably result in greater loss of life, property damage, and increased expenditures at the local, state, and federal levels").

[47] *See infra* Section IV.B (analyzing what constitutes "adaptive" or "effective" flood hazard management). *But see* Section IV.D (considering limits of reforming federal floodplain management criteria to incorporate managed retreat as an adaptation strategy).

which include prioritizing the local flexibility needed to meaningfully respond to communities' local knowledge, individual needs, and values.[48]

Although NFIP reform generally, and the reform framework that I propose below specifically, would entail difficult tradeoffs and would not address all the drivers of maladaptive development or all the obstacles to robust resilience lawmaking,[49] land use regulations constricting the development of flood hazard areas are one of the few regulatory strategies that have the potential to significantly mitigate the massive social, environmental, and economic costs of flood-related disasters.[50] Moreover, as a practical matter, FEMA has the statutory authority to reform the NFIP eligibility criteria to provide powerful incentives for local and state governments to use their police powers to proactively guide people, structures, and infrastructure out of harm's way.[51]

Recognizing this, amendment of the federal floodplain management criteria to center hazard area avoidance and managed retreat is not only consistent with the text, structure, and legislative history of the NFIA but also essential to supporting the capacity of state and local governments to adaptively manage the nation's flood-prone lands. To be clear, this reform on its own will not be sufficient to close the ever-widening climate preparedness gap characteristic of communities throughout the United States. No single reform offers a panacea within the complex context of natural hazard- and climate-change-related risk and land use management.[52] Nor can any climate adaptation strategy meaningfully raise the threshold at which increasingly frequent and intense floods will exceed tolerable living conditions unless those strategies are coupled with the rapid drawdown of greenhouse gas emissions and the preservation and restoration of natural resources that sequester carbon—processes collectively referred to as "climate mitigation."[53] Rather,

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[48] *See infra* Section IV.B.

[49] *See infra* Sections IV.C (proposing and analyzing NFIP reform), IV.A (discussing drivers of maladaptive development) and IV.D (analyzing obstacles, limits, and tradeoffs of proposed reform).

[50] *See infra* Section I.A (regarding projected costs attributable to floodplain development and climate change, respectively). Development limitations combined with rapid drawdown of greenhouse gas emissions are needed to mitigate flood-related losses beyond 2050. *See id.*; *see also* IPCC, CLIMATE CHANGE 2022: IMPACTS, ADAPTATION AND VULNERABILITY 170 (Hans-Otto Pörtner et al. eds., 2022) [hereinafter IPCC, CLIMATE CHANGE 2022] ("Every increment of global warming will intensify multiple and concurrent hazards (*high confidence*). Deep, rapid, and sustained reductions in greenhouse gas emissions would lead to a discernible slowdown in global warming within around two decades.").

[51] *See infra* Part III (analyzing FEMA's statutory authority to promulgate flood zoning criteria).

[52] *See infra* Sections IV.A–IV.B (regarding complexity of the flood hazard governance problem, need for empowerment of local communities, development to address housing shortages, connection between local revenue and development, tendency of local land use laws to displace burdens onto low-income households and households of color, and industry capture of regulatory and legislative agenda at local, state and federal levels); *infra* Sections IV.C–IV.D (suggesting retreat-oriented reform responsive to these complexities and analyzing limits of retreat as a strategy considering these complexities).

[53] *See infra* I.A; Adams, *supra* note 29 (forthcoming article discussing resilience thresholds).

reforming the federal criteria is one potentially pivotal step in supporting effective state and local regulation of floodplain land uses.

This paper proceeds in four parts. Part I introduces recent advancements in flood risk modeling, which provide compelling evidence that one of the few remaining opportunities to decrease the precipitous increase in the social and economic costs of floods that U.S. communities will experience over the next twenty-five years is a paradigm shift in how the nation's flood-prone lands are managed. Through an examination of the 175-year history of federal flood policy, Part II demonstrates that, since its inception, federal flood policy has consistently failed to respond to a recognized need for federal intervention to support local capacity to adaptively manage floodplain land uses. Part III examines FEMA's authority to amend the minimum floodplain management criteria to center hazard area avoidance, managed retreat, and ecosystem services,[54] considering FEMA's contrary interpretation and long-standing practice of myopically focusing on the design and construction of buildings. Part IV examines opportunities to increase resilience at the community scale by proposing a framework for reforming the federal criteria that addresses the stubbornness of the maladaptation problem, incorporates principles of adaptative land use management, and aligns with the text and legislative intent of the NFIA. Part IV wraps up with an exploration of three particularly sticky obstacles to the local adoption and implementation of comprehensive, robust, and equitable resiliency measures—namely, the persistence of structural land law racism,[55] local governments' dependence on property taxes as a primary source of revenue for funding essential services and amenities,[56] and the specter of regulatory takings liability.[57]

I. CLIMATE DESTABILIZATION, FLOOD RISK, AND THE POWER TO ZONE

Amendment of zoning, subdivision regulations, and other land use laws that govern development patterns offers one of the only means to significantly increase the climate- and natural hazard-resilience of U.S. communities over the next twenty-five years. Despite this, land use law reform remains pervasively underutilized as a floodplain management strategy.

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[54] Natural floodplain ecosystems provide several flood mitigation benefits, or "services." For example, natural floodplains can reduce flood heights, flood velocities, and rates of erosion, in addition to providing habitat for wildlife, filtering water, and regulating flows into rivers and lakes. FEMA, Benefits of Natural Floodplains, https://www.fema.gov/floodplain-management/wildlife-conservation/benefits-natural [https://perma.cc/3YTH-MDCZ].

[55] *See infra* Section IV.D.1.

[56] *See infra* Section IV.D.2.

[57] *See infra* Section IV.D.3.

A. HAZARD + EXPOSURE + VULNERABILITY

The social and economic costs of floods will continue to rise along with average global temperatures, sea levels, and other manifestations of the climate crisis. Illustrating the severity of the crisis, an interagency assessment of coastal storm risks in the southeastern United States concluded that "it is probable that major ports, roadways, evacuation routes, bridges and thousands of cultural resources will be inundated [by rising sea levels] and potentially lost in the next 50 to 100 years without additional actions to compensate for SLR [sea level rise]."[58] Increasingly robust modeling paints an equally precarious picture of inland flooding.[59] These cost increases are driven in large measure by anthropogenic climate change, which is increasing flood frequency and intensity as the hydrological cycle intensifies and sea levels rise,[60] and the continued development of flood hazard areas.[61]

Flood hazard increases as the frequency, intensity, and geographic scope of flood events increases.[62] Climate attribution science provides robust evidence that climate change is driving dramatic increases in extreme precipitation, coastal storm frequency and intensity, sea level rise, and erosion rates.[63] For example, even

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[58] INST. FOR WATER RES. [IWR], U.S. ARMY CORPS OF ENG'RS, SOUTH ATLANTIC NATIONAL SHORELINE MANAGEMENT STUDY 69 (2022).

[59] *See, e.g.*, Oliver E. J. Wing, William Lehman, Paul D. Bates, Christopher C. Sampson, Niall Quin, Andrew M. Smith, Jeffrey C. Neal, Jeremy R. Porter & Carolyn Kousky, *Inequitable Patterns of Flood Risk in the Anthropocene*, 12 NATURE CLIMATE CHANGE 156, 157 (2022) [hereinafter Wing et al., *Patterns of Flood Risk*] (model incorporates current and future climate and demographic change, existing flood protection, historic flood claims information, and observations of real flood events). These projections utilized a model developed by Bates and colleagues and subsequently adapted by Wing and colleagues. *Id*. *See* Bates et al., *supra* 4; Oliver E. J. Wing, Andrew M. Smith, Michael L. Marston, Jeremy R. Porter, Mike F. Amodeo, Christopher C. Sampson & Paul D. Bates, *Simulating Historical Flood Events at the Continental Scale: Observational Validation of a Large-Scale Hydrodynamic Model*, 21 NAT. HAZARDS EARTH SYS. SCI. 559 (2021) [hereinafter Wing et al., *Historical Flood Events*]. Bates and colleagues model significantly improved the accuracy and robustness of flood hazard risk assessment. Ayat Al Assi, Rubayet Bin Mostafiz, Carol J. Friedland & Robert V. Rohli, *Theoretical Boundaries of Annual Flood Risk for Single-Family Homes Within the 100-Year Floodplain*, 18 INT'L J. ENV'T RSCH. 3 (2024).

[60] Robert E. Kopp, Radley M. Horton, Christopher M. Little, Jerry X. Mitrovica, Michael Oppenheimer, D. J. Rasmussen, Benjamin H. Strauss & Claudia Tebaldi, *Probabilistic 21st and 22nd Century Sea-Level Projections at a Global Network of Tide-Gauge Sites*, *in* 2 EARTH'S FUTURE 383 (2014); IPCC, THE OCEAN AND CRYOSPHERE IN A CHANGING CLIMATE (Hans-Otto Pörtner et al. eds., 2019).

[61] *See infra* notes 69–78 and accompanying text.

[62] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 157.

[63] *See* Daniel L. Swain, Oliver Wing, Paul D. Bates, James M. Done, Kris A. Johnson & David R. Cameron, *Increased Flood Exposure Due to Climate Change and Population Growth in the United States*, 8 EARTH'S FUTURE 1–2 (2020) (reporting on "strong theoretical, numerical modeling, and observation-based evidence pointing toward [climate change driven increases in] . . . precipitation extremes"); s*ee also, e.g.*, Leanne Archer, Jeffrey Neal, Paul Bates, Emily Vosper, Dereka Carroll, Jeison Sosa & Daniel Mitchell, *Current and Future Rainfall-Driven*

conservative modeling projects that between 2020 and 2049, on average, extreme precipitation events will increase in frequency by 87% and in magnitude by 10.5% across nearly the entire conterminous United States, "with frequency increases locally exceeding 200% and magnitude increases exceeding 20%."[64] The picture is even more sobering beyond 2050. Between 2050 and 2079, extreme precipitation events are projected to increase in frequency by 223% and in magnitude by 20%, on average, across the entire conterminous United States, "with large regions experiencing frequency increases exceeding 300% (i.e., a three-fold increase) and magnitude increases exceeding 25%."[65]

The greenhouse gas emissions and destruction of carbon sequestering lands, waters, and plant and animal species that drive increases in flood intensity and frequency between now and 2050 have already occurred.[66] Consequently, the projected increases in hazard risk and cost between 2020 and 2050 "hold even if dramatic decarbonization is undertaken immediately,"[67] although rapid and deep decarbonization is needed to reduce disaster risk on a larger timescale.[68]

But climate disruption is not the only significant driver of the massive increases in expected flood risk and costs over the next twenty-five years. Changes in risk are also driven by changes in the hazard, exposure to the hazard, and vulnerability to the hazard.[69] Unlike short-term future climate destabilization,

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Flood Risk from Hurricanes in Puerto Rico Under 1.5 and 2 °C Climate Change, 24 NAT'L HAZARDS EARTH SYS. SCI. 375, 375–96 (2024); Carly Lawyer, Li An & Erfan Goharian, *A Review of Climate Adaptation Impacts and Strategies in Coastal Communities: From Agent-Based Modeling Towards a System of Systems Approach*, 15 WATER 2635:5 (2023).

[64] Swain et al., *supra* note 63, at 9. These figures were calculated under a "medium warming" scenario, which the study authors intended "to be interpreted as a plausible, high-likelihood prediction for extreme precipitation-related impacts" that are likely to manifest notwithstanding "ongoing and future climate mitigation activities." *Id.* at 9–12.

[65] *Id.* at 9. The authors of this 2020 paper describe the scenario these longer-term projections were based on as a more speculative, but "plausible," "high warming" scenario, in which countries continue to fail to meet their commitments under the Paris Climate Agreement "or in which amplifying natural Earth system feedbacks are stronger than currently anticipated." *Id.* at 3. The Paris Agreement is intended to "[h]old . . . the increase in the global average temperature to well below 2°C above pre-industrial levels and pursu[e] efforts to limit the temperature increase to 1.5°C above pre-industrial levels." Paris Agreement to the United Nations Framework Convention on Climate Change, art. 2.1(a), Dec. 12, 2015, T.I.A.S. No. 16-1104. The commitments, however, are no longer enough to limit warming to even 2.0°C, and current national policies, which fall short of the commitments, are projected to result in approximately 2.7°C warming above pre-industrial levels by 2100. CLIMATE ANALYTICS AND NEWCLIMATE INST., CLIMATE ACTION TRACKER, 2100 WARMING PROJECTIONS: EMISSIONS AND EXPECTED WARMING BASED ON PLEDGES AND CURRENT POLICIES (Dec. 2023).

[66] Swain et al., *supra* note 63; *see id.*, at 3 ("warming and subsequent climate impact trajectories are largely [emissions] scenario-independent . . . through the mid-21st century[] and begin to strongly diverge thereafter").

[67] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 157.

[68] Swain et al., *supra* note 63, at 3.

[69] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 157; *see also* U.S. ARMY CORPS OF ENG'RS, KEY USACE FLOOD RISK MANAGEMENT TERMS 20 (2015) [hereinafter USACE, FLOOD

exposure and vulnerability are not entirely locked in. Although legal reform can do little to affect flood hazard frequency or intensity over the next twenty-five years, legal reform may limit—or exacerbate—exposure and vulnerability within this time frame.[70]

Floodplain development is the primary driver of increased exposure between now and 2050,[71] although climate destabilization within this period also increases the population and property exposed to flood hazards.[72] Exposure to flood hazards increases as more people, property, and infrastructure encroach on floodplains.[73] Encroachment may take the form of new development of undeveloped areas or increases in the intensity of land uses in existing developments.[74] Employing robust modelling, Oliver Wing and colleagues project that future floodplain development alone will nearly double the average annual exposure of the U.S. population to riverine and rainfall-driven floods by 2050,[75] increasing the average annualized cost of flood damage from $32.1 billion in 2020 and 2021 to over $40 billion by 2050.[76]

Vulnerability refers to the extent to which those exposed to the hazard are susceptible to harm. For example, structures in flood hazard areas that are not elevated above projected flood depths are significantly more susceptible to damage from flooding and, thus, more vulnerable than elevated structures.[77] The characteristics of the people, property, and environment exposed to flood hazards

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RISK MANAGEMENT TERMS] ("As used in this [training] manual, risk is the function of five factors: hazard, performance, exposure, vulnerability and consequences. Risk involves exposure to a chance of injury or loss.").

[70] *See infra* Section I.B.

[71] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 157.

[72] *See* Swain et al., *supra* note 63, at 14 ("[T]he combined effects of [climate change] and [population growth] are not simply additive . . . . [T]he total population exposure increase is substantially greater than would be estimated from the simple sum of [climate change] and [population growth]."). Swain and colleagues attribute this to the climate-driven growth of floodplains, which increases the geographic scope of the hazard, combined with population growth in these areas. *Id.*; *see also* EPA, GREEN INFRASTRUCTURE: MITIGATE FLOOD RISK, https://www.epa.gov/green-infrastructure/manage-flood-risk [https://perma.cc/G5BT-9NHM] (projecting 45% increase in size of "average 100-year floodplain" by 2100).

[73] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 157; *see also* USACE, FLOOD RISK MANAGEMENT TERMS, *supra* note 69, at 12 ("Exposure describes who and what may be harmed by the flood hazard," considering "where the flooding occurs at a given frequency, . . . what exists in that area.").

[74] Land use intensity increases when, for example, development leads to more impervious land area, traffic, or pollution. *See supra* note 37 (defining de-intensification of land uses).

[75] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 159 (projecting an increase of 97.3% between the early 2020s and 2050). I use "riverine" and "rainfall-driven" flooding to describe fluvial and pluvial flooding, respectively. *See supra* note 4 (defining terms). Wing and colleagues modeled fluvial and pluvial flood hazards; their projections do not include increases in the population exposed to coastal flood hazards such as storm surge flooding, increased erosion, hurricanes, and tsunamis.

[76] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 159.

[77] *See infra* notes 426–430 and accompanying text (regarding structure elevation).

also significantly affect their susceptibility to harm from exposure to the flood hazards.[78]

The intensity and location of development are dictated in large measure by zoning, subdivision regulations, and other land use laws, which are typically enacted and enforced by municipalities and counties.[79] Land use law is also a major driver of social, economic, and racial development patterns that increase vulnerability, as illustrated by the use of zoning and discretionary land use decisions—both intentionally and unconsciously—to sequester low-income households and communities of color in undesirable areas, including areas at heightened risk of flooding.[80] Thus, although little can be done to limit the frequency or magnitude of the hazard within the next twenty-five years, land use law reform provides both an opportunity to limit the exposure and vulnerability of communities to flood hazards *and* to do so within this timeframe.[81]

The significance and justice implications of this reform opportunity are substantial: over the next twenty-five years, "future development patterns [are] projected to be four times more impactful than climate change in elevating national flood losses," losses that will disproportionately impact Black communities.[82] To be clear, near- and long-term community resilience requires climate adaptation *in conjunction with* climate mitigation.[83] Summarizing the state of climate science, the IPCC reports that

> Every increment of global warming will intensify multiple and concurrent hazards (*high confidence*). Deep, rapid, and sustained reductions in greenhouse gas emissions would lead to a discernible slowdown in global warming within around two decades (*high confidence*).[84]

In other words, the efficacy of climate adaptation—and climate justice—relies on rapid and robust climate mitigation.[85]

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[78] USACE, FLOOD RISK MANAGEMENT TERMS, *supra* note 69, at 28.

[79] *See infra* Section I.B.

[80] *See infra* Section IV.D.1 (discussing this and other ways institutionalized racism within land use law increases vulnerabilities and inequities).

[81] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 158; *see also infra* Section IV.C (discussing potential legal and policy reform to decrease flood hazard exposure and vulnerability).

[82] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 156, 159.

[83] *See id.* at 157.

[84] IPCC, CLIMATE CHANGE 2022, *supra* note 50, at 12; *see also* Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 157

[85] E. Lisa Schipper, Aromar Revi, Benjamin L. Preston, Edward. R. Carr, Siri H. Eriksen, Luis R. Fernández-Carril, Bruce Glavovic, Nathalie J.M. Hilmi, Debora Ley, Rupa Mukerji, M. Silvia Muylaert de Araujo, Rosa Perez, Steven K. Rose & Pramod K. Singh, *2022: Climate Resilient Development Pathways*, *in* CLIMATE CHANGE 2022: IMPACTS, ADAPTATION AND VULNERABILITY 2655, 2658 (Hans-Otto Pörtner et al. eds., 2022).

B. REGULATING EXPOSURE TO FLOOD HAZARDS

Land use laws can be structured to increase the resilience of communities and natural areas, or they can be structured to maladaptively increase the exposure of people, property, and infrastructure to flood hazards and contribute to the degradation of natural areas and their ability to mitigate flood hazards. The strategies employed to adapt to sea level rise, intensified storm surge, inland flooding, and other flood hazards are often classified as protection, accommodation, hazard area avoidance, or retreat strategies.[86] Protection and accommodation strategies prioritize the development of flood-prone lands,[87] whereas avoidance and retreat strategies prioritize long-term resilience of communities and ecosystems.[88] While this categorization of climate adaptation strategies helps with analysis and planning, empirical research increasingly shows that effective adaptation[89] typically requires a combination of all four approaches, with avoidance and managed retreat becoming more crucial.[90]

Protection strategies attempt to prevent flood hazards from reaching developed areas of floodplains.[91] Examples of protection strategies include laws that allow or require hard-armoring or nature-based infrastructure. Hard armoring refers to the use of structures such as dams, levees, seawalls, or riprap.[92] Nature-based infrastructure projects are designed to mimic natural features that mitigate floods, such as the installation of stormwater basins, retention ponds, wetlands, mangrove stands, or "living shorelines," a term that refers to the use of plants, sand, rocks and other natural materials to stabilize shorelines.[93] As discussed in Part II, federal flood policy from the mid-nineteenth century to the mid-twentieth century consisted primarily of modifying, hardening, and shaping coastline and riverine

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[86] *See, e.g.,* Lawyer et al., *supra* note 63, at 5–7; Poh Poh Wong, Iñigo J. Losada, Jean-Pierre Gattuso, Jochen Hinkel, Abdellatif Khattabi, Kathleen L. McInnes, Yoshiki Saito & Asbury Sallenger, *Coastal Systems and Low-Lying Areas*, *in* IPCC, CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY, CONTRIBUTION OF WORKING GROUP II TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 170 (2014); *see also* Sarah J. Adams-Schoen, *Beyond Localism: Harnessing State Adaptation Lawmaking to Facilitate Local Climate Resilience*, 8 MICH. J. ENV'T. & ADMIN. L. 185, 199 (2018) (citing examples).

[87] *See infra* notes 91–101 and accompanying text.

[88] *See infra* notes 107–116 and 125–135 and accompanying text.

[89] *See infra* Section IV.A (analyzing what constitutes "effective adaptation" or "adaptively managing land uses").

[90] *See infra* Section IV.A (citing and discussing research).

[91] Adams-Schoen, *supra* note 86, at 199.

[92] *Id.*; Rachel K. Gittman, F. Joel Fodrie, Alyssa M. Popowich, Danielle A. Keller, John F. Bruno, Carolyn A. Currin, Charles H. Peterson & Michael F. Piehler, *Engineering Away Our Natural Defenses: An Analysis of Shoreline Hardening in the US*, 13 FRONTIER ECOLOGY & ENV'T 301, 301 (2015) (defining "[s]horeline hardening or armoring . . . as the construction or placement of vertical seawalls or bulkheads, sloped riprap (eg rocks) revetments, groins, jetties, or breakwaters along a shoreline").

[93] Bates et al., *supra* note 4, at 15; Wong et al., *supra* note 86, at 387.

areas to hold flood waters at bay[94]—an approach that facilitated more floodplain development [95] and exposed the communities located in the floodplain to heightened flood risk when engineered protection systems failed.[96]

Accommodation strategies tend to be characterized by alteration of the built environment to decrease its vulnerability to flood hazards, or, in other words, designing buildings and infrastructure to accommodate and withstand anticipated flooding.[97] Examples include "freeboard" requirements, which are regulations that require residences or other structures to be elevated above what is known as the "base flood elevation" ("BFE")[98] and require the portion of the structure below BFE to either be open or enclosed with breakaway walls to decrease lateral pressure on the structure during a flood by allowing flood waters to flow through the structure.[99] I refer to accommodation strategies like these as "building-scale" resilience strategies because they focus on increasing the capacity of individual structures to withstand flooding.[100] Accommodation strategies also include non-structural measures like early warning systems, increasing a community's shelter capacity, and the provision of flood insurance and other financial safety nets.[101]

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[94] *See infra* Section II.A; *see also* Gittman et al., *supra* note 92, at 301 (regarding extent and rate of coastal armoring from 1900 to 2015).

[95] *See* Gittman et al., *supra* note 92, at 305 (finding that the best predictor of armoring is housing density).

[96] *See* Abolfazl Hojjat Ansari, Alfonso Mejia & Raj Cibin, *Flood Teleconnections from Levees Undermine Disaster Resilience*, 1 NAT. HAZARDS 1 (2024) ("We find that due to levees, the 100-year flood inundation extent grows by 25% of the total levee-protected area regionally, and the flood inundation depth increases by up to 2 m at specific locations. Levees also increase the vulnerability of unprotected, marginalized communities to flooding."); Gittman et al., *supra* note 92, at 306 (noting "uncertainty associated with the performance of bulkheads and seawalls during . . . storm events"). *See generally* G.A. Tobin, *The Levee Love Affair: A Stormy Relationship*, 31 J. AM. WATER RES. ASS'N 359 (1995); *see also infra* Section II.A (discussing repeated, devastating failures of flood control infrastructure).

[97] *See* Adams-Schoen, *supra* note 86, at 199; John R. Nolon, *Land Use and Climate Change: Lawyers Negotiating Above Regulation*, 78 BROOK. L. REV. 521, 545 (2013).

[98] BFE refers to the water level (i.e., water surface elevation) of a "base flood," also called a "100-year flood," which is based on a statistical projection of the flooding that would result from the worst storm likely to occur in 100 years—or, in other words, a storm with a 1% chance of occurring in any given year. 42 U.S.C. § 4004(a)(1); 44 C.F.R. § 59.1 (defining base flood, flood plain, and water surface elevation for purposes of FEMA's implementation of the NFIA and NFIP). The 100-year floodplain is the area that would be inundated with flood waters in such a flood. 44 C.F.R. § 9.4.

[99] *See* 44 C.F.R. § 59.1 (defining breakaway wall as "a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system").

[100] *See* Wesley E. Highfield, Samuel D. Brody & Russell Blessing, *Measuring the Impact of Mitigation Activities on Flood Loss Reduction at the Parcel Level: The Case of the Clear Creek Watershed on the Upper Texas Coast*, 74 NAT. HAZARDS 687, 688 (2014) ("First-line approaches to flood mitigation in the USA have traditionally relied on structural measures. These strategies involve building and construction projects that actively protect human settlements from flood risk.").

[101] Wong et al., *supra* note 86, at 387.

In contrast to development-centered protection and accommodation strategies, hazard area avoidance and managed retreat facilitate changes in development patterns that can flatten the sharp upward risk trajectory over the short and long term. Land use regulations are the most direct and effective method for changing development patterns and reducing future flood risk,[102] although a wide range of regulatory and incentive-based policies also influence development decisions, including education programs, flood forecasting and warning systems, and tax incentives.[103]

The specter of takings liability, lost revenue from property taxes, and political backlash pose formidable obstacles to the adoption and implementation of local and state laws that that limit new development in hazard areas.[104] Managed retreat as a strategy frequently engenders fierce opposition from community members fearing displacement and property owners fearing devaluation of their property.[105] These obstacles and reactions reflect the complex and difficult tradeoffs implicated by climate adaptation policies, whether the policies center accommodation and protection, avoidance and retreat, or a mix of all four strategies. But they also reflect several fundamental misunderstandings. These misunderstandings include the misperception that hazard area avoidance and managed retreat necessarily require absolute prohibitions on future development and the involuntary removal of existing development, as well as the misplaced belief that retreat from flood hazard areas can be avoided, although resistance to retreat strategies can also be attributable to the use of inflexible strategies that fail to address community needs.[106] While hazard area avoidance and managed retreat can include complete bans on development[107] and condemnation of private property,[108] avoidance and retreat strategies need not be so blunt. Rather, avoidance and managed retreat regulatory strategies include limiting—without outright prohibiting—new development in flood hazard areas and the de-intensification of existing and permissible future land uses in developed flood hazard areas.[109] Regulatory strategies that limit new development or incrementally decrease land

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[102] *Id.* at 689; *see also infra* Section IV.B (citing and discussing other sources).

[103] *See infra* Section IV.B.

[104] *See infra* Section IV.D.

[105] Eric Pawson & Thomas Blakie, *Managed Retreat and Experimentation: Realising Opportunity in the Ōtautahi Christchurch Residential Red Zone, Aotearoa New Zealand*, KŌTUITUI: N.Z. J. OF SOC. SCIS. 1, 2–3 (June 2024).

[106] *See infra* notes 108–118 and accompanying text; Hebe Nicholson, *Resistance, Acceptance, and Misalignment of Goals in Climate-Related Resettlement in Malawi*, *in* GLOBAL VIEWS ON CLIMATE RELOCATION AND SOCIAL JUSTICE 88, 88–98 (Idowu Jola Ajibade & A.R. Siders eds., 2022).

[107] Nolon, *supra* note 97, at 549.

[108] Adams-Schoen, *supra* note 86, at 200 (citing ANNE SIDERS, MANAGED COASTAL RETREAT: A LEGAL HANDBOOK ON SHIFTING DEVELOPMENT AWAY FROM VULNERABLE AREAS 128 (2013)).

[109] Adams-Schoen, *supra* note 86, at 200; James G. Titus, Daniel E. Hudgens, Daniel L. Trescott, Michael Craghan, William H. Nuckols, Carlton H. Hershner, Jennifer M. Kassakian, Christopher J. Linn, Peter G. Merritt, Tara M. McCue, Jim F. O'Connell, Jay Tanski & Jue Wang, *State and Local Governments Plan Development of Most Land Vulnerable to Rising Sea Level Along the US Atlantic Coast*, 4 ENV'T. RES. LETTERS 2 (2009).

use intensity in existing developments include hard-armoring prohibitions, static or rolling setbacks,[110] and rezoning to limit the types of land uses that are permissible by right.[111]

Zoning codes that allow the transfer of development rights ("TDR") from hazardous areas to less hazardous areas are a frequently cited example of a regulatory strategy that de-intensifies, without necessarily prohibiting, land uses in areas that are vulnerable to flooding.[112] In the context of natural hazards, TDRs involve the creation of sending zones—where a development right may be discouraged, limited, or prohibited—and receiving zones—which designate areas with properties that can receive the transferred development right.[113] For example, Deschutes County, Oregon has an innovative TDR program that incentivizes owners of properties in a floodplain to sell development "credits" to properties in a specified area of the county.[114] The program does not impose development restrictions on properties in the sending area, but it conditions development of properties in the receiving area on ownership of a certain number of credits.[115] When a property owner in the sending area transfers their credits to one or more receiving area properties, a conservation easement is placed on the sending area property that prohibits, among other things, residential use of the property while allowing various low-intensity uses such as camping, wood cutting, and vegetation management.[116]

TDRs that are combined with development restrictions in the sending zone can allow sending-zone property owners to recoup some of the lost return on investment attributable to the development restrictions by transferring their development rights to a property in the receiving zone. The seminal regulatory taking case, *Penn Central Transportation Co. v. New York City*,[117] involved precisely this regulatory approach. There, the City's Landmarks Preservation Law

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[110] Highfield et al., *supra* note 100, at 689 (identifying these and other land use regulatory strategies for guiding development away from flood hazard areas).

[111] *Id.*; *see also infra* Section IV.C (analyzing potential NFIP reform to include wide range of managed retreat strategies).

[112] *See* Adams-Schoen, *supra* note 86, at 200–202 & nn. 114–30 (collecting sources and discussing examples, including JESSICA GRANNIS, ADAPTATION TOOL KIT: SEA LEVEL RISE COASTAL LAND USE 16–44, 57–59 (2011); Brion Blackwelder, *Presidential Executive Orders Duel Over Floodplain Definition as S.E. Florida Prepares for Sea Level Rise*, 29 FORDHAM ENV'T. L. REV. 156, 177 (2017); and Rick Pruetz & Noah Standridge, *What Makes Transfer of Development Rights Work?: Success Factors from Research and Practice*, 75 J. AM. PLAN. ASS'N 78, 78 (2008)).

[113] *See, e.g.*, DESCHUTES COUNTY, OR., DESCHUTES COUNTY CODE § 11.12; Staff Report from Kristen Maze to Deschutes Board of County Commission (Dec. 29, 2008) (describing objectives of transferrable development credit program as reducing "the overall impact from development in flood plains, wetlands, deer migration corridors, and areas susceptible to groundwater pollution from nitrates" and helping to "maintain open space . . . by reducing the overall density of development that would otherwise exist in the future if a dwelling were built on every legal lot").

[114] DESCHUTES COUNTY, OR., DESCHUTES COUNTY CODE § 11.12.020.

[115] *Id.*

[116] *Id.*

[117] Penn Cent. Transp. Co. v. New York City, 438 U.S. 104 (1978).

restricted how Penn Central Transportation could use its air rights to construct a high-rise addition atop Grand Central Terminal but expanded the range of properties to which Penn Central Transportation could transfer its air rights.[118]

In the absence of development restrictions in flood hazard sending zones, other factors like market forces, risk perception, or unavailability of insurance may motivate property owners to use their TDRs to voluntarily transfer some of their development rights to another parcel.[119] Historically, properties in flood hazard zones—even including properties that have recently suffered catastrophic flooding—have tended to retain their market value,[120] suggesting that market forces have yet to provide a sufficient incentive for property owners in flood hazard areas to voluntarily limit their development rights by transferring them to properties in less hazardous areas—although property values in some flood hazard areas in the United States have begun to fall.[121] Owners and prospective purchasers also appear to significantly underestimate present and future risks from flooding and related hazards like erosion and mudslides[122] while overestimating the ability of the government to protect properties in flood hazard areas from those risks.[123] For these and other reasons, voluntary avoidance and retreat strategies have yet to gain significant traction.[124]

A less frequently discussed or utilized avoidance and retreat strategy that imposes gradual development restrictions involves amending the zoning code to

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[118] *Id.* at 113–15, 130; *see also id.* at 138 (holding the landmark preservation law did not affect a regulatory taking as applied to Grand Central Station). The Landmarks Preservation Law expanded the range of receiving properties that could receive not only air rights but also whatever rights the law restricted to a greater extent than the zoning code. *Id.* at 135–36.

[119] *See* PETER PLASTRIK & JOHN CLEVELAND, CAN IT HAPPEN HERE? IMPROVING THE PROSPECT FOR MANAGED RETREAT BY US CITIES 6–18 (2019) (discussing disaster- and market-driven retreat).

[120] *See* Handi Chandra-Putra & Clinton J. Andrews, *An Integrated Model of Real Estate Market Responses to Coastal Flooding*, 24 J. INDUS. ECOLOGY 424 (2020) (finding that "coastal real estate markets capitalize flood risk into property values [following a flood] but this discount diminishes rapidly as time passes between storm events"); Marion Babcock & Bruce Mitchell, *Impact of Flood Hazard on Residential Property Values in Galt (Cambridge), Ontario*, 16 WATER RES. BULL.532–37 (1980); *see also* U.S. ARMY CORPS OF ENG'RS, EMPIRICAL STUDIES OF THE EFFECT OF FLOOD RISK ON HOUSING PRICES 9–14, 31–33 (1998) (reviewing the literature and noting numerous relevant variables that are difficult to measure, including the variability across and within floodplains, effect of flood insurance, potential disaster recovery assistance, and risk perception and tolerance on prices).

[121] Michael Pappas & Victor B. Flatt, C*limate Changes Property: Disasters, Decommodification, and Retreat*, 82 OHIO ST. L.J. 331, 370–71 (2021).

[122] Jesse D. Gourevitch, Carolyn Kousky, Yanjun (Penny) Liao, Christoph Nolte, Adam B. Pollack, Jeremy R. Porter & Joakim A. Weil, *Unpriced Climate Risk and the Potential Consequences of Overvaluation in US Housing Markets*, 13 NATURE CLIMATE CHANGE 250, 250–53 (2023).

[123] *See* Toon Haer, Trond G. Husby, W.J. Wouter Botzen & Jeroen C.J.H. Aerts, *The Safe Development Paradox: An Agent-Based Model for Flood Risk Under Climate Change in the European Union*, GLOB. ENV'T CHANGE 1, 1 (2020) (finding government protection and accommodation measures tend to stabilize property values).

[124] Pappas & Flatt, *supra* note 121, at 371.

designate existing vulnerable land uses, such as residential land uses in flood hazard zones, as non-conforming. Non-conforming land uses are uses that were legally permissible when they were established but subsequent adoption or amendment of a zoning code made them impermissible.[125] For example, commercial use such as a retail store established before the city zoned the area for exclusively residential land uses would be a non-conforming use. Generally, zoning codes allow non-conforming uses—i.e., the commercial store in my example—to remain as long as they are not expanded, abandoned, or destroyed.[126]

Some zoning codes also require non-conforming uses that are particularly incompatible with surrounding conforming uses or the welfare of the community to terminate within a fixed timeframe, a regulatory approach known as amortization of the non-conforming use.[127] Typically, zoning codes only require amortization of non-conforming uses that are noxious or that create health and safety concerns for nearby conforming uses,[128] and some states do not allow local governments to require amortization of non-conforming uses.[129] Amortization periods must be reasonable in light of various factors, including whether the property owner has recouped their investment and the extent of the harm to the public welfare from allowing the use to continue.[130] Thus, for land uses that are particularly vulnerable to flood-related hazards, a local government could designate the use as non-conforming subject to termination within a reasonable period—at least if the use increases flood hazard risk for other properties or creates health and safety risks for residents of other properties or the community generally. I am not, however, aware of any zoning codes that use this strategy.

Another avoidance and managed retreat strategy that has been employed for more than fifty years, albeit sparsely and with much controversy, is the imposition of "rolling easements." Notwithstanding its name, this approach does not involve an easement[131] but rather involves the demarcation of a hazard area in which development is restricted, and which migrates (or rolls) as the area at risk expands—for example, as sea levels rise. An example is the erosion setback line that was at issue in the seminal *per se* regulatory takings case *Lucas v. South Carolina Coastal Council*.[132] Pursuant to the South Carolina Beachfront Management Act, the Coastal Council established an ambulatory erosion line seaward of which new habitable structures were prohibited.[133] As various forces like wave action, sea level rise, and increasingly frequent and intense coastal storms

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[125] PATRICIA E. SALKIN, 2 AMERICAN LAW OF ZONING § 12:1 (5th ed., 2024).
[126] *Id.* § 12:18–12:22.
[127] *Id.* § 12:23.
[128] *Id.*
[129] *Id.*
[130] *Id.*
[131] An easement is a condition that burdens one property for the benefit of one or more other properties. For example, an inland property may be benefited by an access easement that allows the property owner to traverse a waterfront property to access the water.
[132] Lucas v. South Carolina Coastal Council, 505 U.S. 1003, 1004 (1992).
[133] *Id.*

eroded the shore, the erosion line moved landward, eventually transversing private property and thereby prohibiting the construction of habitable structures on the portion of the property seaward of the erosion line. Although the application of South Carolina's erosion line to Lucas's properties famously did not survive a Fifth Amendment takings challenge,[134] a myriad of other regulatory strategies exists for structuring a more legally resilient rolling easement.[135]

While protection and accommodation strategies certainly have their place,[136] flood policy that has development accommodation as its primary organizing principle will expose millions more people and trillions more dollars of assets to increasingly intense and frequent flood events[137]—two data points that highlight the urgency of the flood hazard management problem while simultaneously obscuring the full scope of suffering that will follow continued intensive development of flood hazard areas. As sea level rise expert James Titus cautions, "[i]f some lands must give way to the rising sea, the economic, environmental, and human consequences could be much less if the abandonment occurs according to a plan rather than unexpectedly."[138] In other words, failure to stem the tide of flood hazard development and manage retreat increases the risk of more disruptive and costly *unmanaged* retreat.

II. NEARLY TWO CENTURIES OF MALADAPTIVE FEDERAL FLOOD POLICY

Over the course of the 175-year history of U.S. flood policy, the federal government has attempted to induce state and local governments to use their police power authority to reduce flood risks and costs.[139] Two interrelated attributes of federal flood policy, however, have undermined these efforts. The first is that, since its inception, federal flood policy has primarily centered on engineered solutions for developing the nation's flood-prone lands.[140] The second is that federal flood policy consistently overestimates the ability of voluntary measures and information

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[134] *Id.* at 1032.

[135] *See, e.g.*, S.C. CODE ANN. §§ 48-39-280 to -290 (requiring setback lines, prohibiting some construction seaward of setback lines, and requiring special permits for some construction seaward of setback lines); § 48-39-330 (requiring contracts for sale or deed of real property seaward of setback line to contain disclosures including the local rate of erosion); *see also infra* Section IV.D.3 (identifying and suggesting various hazard avoidance and retreat strategies that are less likely to constitute regulatory takings).

[136] *See infra* Section IV.B (regarding principles of adaptive floodplain management).

[137] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 159 (reporting that even "states with little climate risk may still see large increases in flood risk unless future development patterns are managed appropriately"); *see supra* Section I.A.

[138] JAMES G. TITUS, ROLLING EASEMENTS 4–10 (U.S. Environmental Protection Agency 2011).

[139] *See* USACE, FLOOD RISK MANAGEMENT TERMS, *supra* note 69, at 23 (describing the objective of "policies and programs in managing the nations' flood risk" as including "policies and programs intended to inform and to influence the decisions made by Federal, state, and local government agencies, individuals, businesses and communities in their choice of flood risk reduction measures and to locate assets in floodplain").

[140] *See infra* Section II.A.

resources to counterbalance the tremendous development pressures state and local governments face,[141] pressures the federal government contributes to by centering development accommodation.[142] The result has been massive federal spending on flood control and flood disaster relief, a national flood program that is deeply in arrears,[143] and tragic social costs as homes and other structures in flood hazard zones are destroyed and their occupants displaced.[144]

A. 1849–1968: ACCOMMODATING DEVELOPMENT THROUGH DOMINION OVER NATURE

Since the federal government's first foray into flood control, federal flood policy sought to accommodate floodplain development. The Swamp Land Acts of 1849 and 1850 transferred title to lower Mississippi Delta "swamp and overflowed lands" from the federal government to states along the lower Mississippi River with the condition that the states use revenue from sales of the lands to build levees and drainage channels.[145] The Acts had the effect of putting millions of acres of Mississippi bottomlands into agricultural use.[146]

The 1850 Act also led to two federally funded surveys of the Mississippi Delta, one of which resulted in the publication of a report that formed the basis for a federal flood policy centered on accommodation of development through dominion over nature.[147] Surveyors Andrew Atkinson Humphreys and Henry Abbott called for "reclaiming" the Mississippi lowlands for development through the adoption of a "levees only" policy.[148] Their report asserted that construction of levees along the lower Mississippi would promote navigability and mitigate flood

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[141] *See infra* notes 510–528 and accompanying text (regarding voluntary measures).

[142] *See* U.S. COMPTROLLER GENERAL, GAO/CED 82-105, NATIONAL FLOOD INSURANCE (1982) (concluding that the program increases, rather than decreases, development in flood-prone areas); *see also infra* Section IV.A (regarding same).

[143] *See* U.S. GOV'T ACCOUNTABILITY OFF., GAO-17-425, FLOOD INSURANCE: COMPREHENSIVE REFORM COULD IMPROVE SOLVENCY AND ENHANCE RESILIENCE 8 (2017) [hereinafter GAO-17-425] (finding that Congress repeatedly increased FEMA's borrowing limit and NFIP's debt has been growing from 2005 to 2017); U.S. GOV'T ACCOUNTABILITY OFF., GAO-15-515, HURRICANE SANDY: AN INVESTMENT STRATEGY COULD HELP THE FEDERAL GOVERNMENT ENHANCE NATIONAL RESILIENCE FOR FUTURE DISASTERS 51 (2015) [hereinafter GAO 15-515] ("From fiscal years 2004 to 2013, FEMA obligated over $95 billion in federal assistance for disaster recovery for presidentially declared major disasters during that period, and the number of major disaster declarations has increased significantly in recent decades.").

[144] *See infra* Section VI.A.

[145] Swamp Land Act of 1849, ch. 87, 9 Stat. 352 (1849); Swamp Land Act of 1850, ch. 84, 9 Stat. 519 (1850).

[146] JAMES M. WRIGHT, THE NATION'S RESPONSES TO FLOOD DISASTERS 5 (2000).

[147] ANDREW A. HUMPHREYS & HENRY L. ABBOT, REPORT UPON THE PHYSICS AND HYDRAULICS OF THE MISSISSIPPI RIVER; UPON THE PROTECTION OF THE ALLUVIAL REGION AGAINST OVERFLOW; AND UPON THE DEEPENING OF THE MOUTHS (1861). *See* Christine A. Klein & Sandra B. Zellmer, *Mississippi River Stories: Lessons from A Century of Unnatural Disasters*, 60 SMU L. REV. 1471, 1479–80 (2007).

[148] HUMPHREYS & ABBOTT, *supra* note 147, at 373.

risk by constraining flood waters to the river's central channel, thereby increasing the volume of water in the river, accelerating the current and, as a result, improving navigation by deepening the river channel.[149] In adopting Humphreys and Abbott's "levees-only" policy, the federal government rejected another surveying team's competing policy recommendation that would have taken advantage of the "reservoir influence" of the Mississippi River's bottomlands.[150]

When the levees-only policy failed to prevent massive devastation from the back-to-back Mississippi River floods of 1912 and 1913, Congress and the U.S. Army Corps of Engineers saw the floods as evidence that the states lacked the ability to effectively construct and maintain levees and other flood control infrastructure.[151] Congress responded by passing the Flood Control Act of 1917,[152] which left the levees-only policy in place while shifting responsibility for its implementation from the state governments to the federal government.[153] The Act appropriated more than fifty million dollars for the construction of flood-control infrastructure, expanded the jurisdictional scope of the U.S. Army Corps of Engineers from solely navigation to include flood control, extended the Corps' existing levees-only navigation policy to a levees-only flood control policy, and expanded the geographic scope of the Corps' responsibilities beyond the Mississippi River basin to include the largest watershed in California—the Sacramento River basin.[154]

Ten years later, despite assurances levees built to the Corps' standards would hold,[155] the levees did not hold. Instead of protecting the developed Mississippi Delta from flooding, the levees contributed to one of the most devastating floods in the nation's history. One hundred twenty-one levees failed in total; massive walls of water crashed down on the developed floodplain, ultimately flooding nearly eighteen million acres of land and widening the river to form an inland sea almost a hundred miles wide.[156] The death toll and devastation were

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[149] *Id.* at 445; *see* Klein & Zellmer, *supra* note 147, at 1479–80.

[150] Klein & Zellmer, *supra* note 147, at 1479–80.

[151] CHRISTINE A. KLEIN & SANDRA B. ZELLMER, MISSISSIPPI RIVER TRAGEDIES: A CENTURY OF UNNATURAL DISASTERS 56 (2014).

[152] Flood Control Act of 1917, Pub. L. No. 64-367, 39 Stat. 948 (1917) (providing "for the control of the floods of the Mississippi River" and referencing only levees as a means to control flooding); Klein & Zellmer, *supra* note 147, at 1479–80 (discussing history of national flood policy and noting that 1917 Act was first federal enactment explicitly appropriating money for river improvements other than navigation).

[153] KLEIN & ZELLMER, *supra* note 151, at 66–67 (observing that levees remained a "local affair, for the most part" even after the 1917 act because local entities had responsibility for securing necessary rights-of-way, contributing to construction costs, and maintaining the levees post-construction).

[154] Pub. L. No. 64-367 ¶¶ (a), (d) & §§ 2–3, 39 Stat. 948–951; *see* AM. ACAD. OF ACTUARIES FLOOD INS. SUBCOMM., THE NATIONAL FLOOD INSURANCE PROGRAM: PAST, PRESENT, AND . . . FUTURE? 31 (2011) [hereinafter FLOOD INSURANCE SUBCOMMITTEE MONOGRAPH]; KLEIN & ZELLMER, *supra* note 151, at 66.

[155] KLEIN & ZELLMER, *supra* note 151, at 68.

[156] *Id.* at 69–70.

unprecedented.[157] Congressman Gifford Pinchot called the levees-only policy "the most colossal blunder in engineering history."[158] Noting that the policy precipitated the Great Flood of 1927, Pinchot lamented that rather than being "a natural disaster," it was "a manmade disaster."[159]

Congress reacted swiftly by passing the Flood Control Act of 1928. But rather than questioning the wisdom of a federal flood policy organized around development accommodation through flood control infrastructure, the 1928 Act doubled down on the policy.[160] It massively expanded the federal budget, authorizing more than $325 million for surveys, mapping, and infrastructure improvements in the Mississippi River basin, while leaving the states responsible for maintenance of the flood control infrastructure.[161] The Act also ordered the Corps to study the use of reservoirs and forestry practices for flood control[162] and authorized the federal government to purchase land and flowage easements, but only where levees were not feasible.[163]

In these ways, the 1928 Act replaced the levees-only policy with a levees-plus policy[164] and cemented the nation's transition from purely local to shared federal-local jurisdiction over flood control.[165] Over the following decades, Congress reacted to successive flood disasters by expanding federal authority over flood control, including through the creation of the Tennessee Valley Authority in 1933[166] and the passage of the Flood Control Act of 1936.[167] Notwithstanding at least some recognition that regulating the location of development "would assure

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[157] Susan Scott Parrish, *The Great Mississippi Flood of 1927 Laid Bare the Divide Between the North and the South*, SMITHSONIAN MAG. (Apr. 11, 2017), https://www.smithsonianmag.com/history/devastating-mississippi-river-flood-uprooted-americas-faith-progress-180962856 [https://perma.cc/4UCD-FYNG] ("In all, water covered 27,000 square miles, land in seven states where about a million people lived; 13 major crevasses occurred; roughly 637,000 people became homeless, approximately 555,000 of whom were racial or ethnic minorities; somewhere between 250 and 1,000 people died; and financially, direct property losses totaled $250 to 500 million, while indirect losses brought that figure up to $1 billion. Floodwaters did not fully drain until the end of the summer.").

[158] Gifford Pinchot, *Some Essential Principles of Water Conservation as Applied to Mississippi Flood Control*, 135 ANNALS AM. ACAD. POL. & SOC. SCI. 57, 59 (1928).

[159] KLEIN & ZELLMER, *supra* note 151, at 74–75; *see also* Gifford Pinchot, *Prevention First*, 58 SURVEY 367–69 (1927).

[160] *See generally* Flood Control Act of 1928, Pub. L. No. 70-391, 45 Stat. 534 (1928).

[161] *Id.* at §§ 3, 5, 10–11, 45 Stat. at 534–38.

[162] *Id.* §§ 10–11, 45 Stat. at 538.

[163] Id. § 3, 45 Stat. at 536.

[164] The Act called for the use of levees, spillways, floodways, and artificial reservoirs. 45 Stat. at 534–35 (1928).

[165] *Id. See* KLEIN & ZELLMER, *supra* note 151, at 76–78.

[166] Tennessee Valley Authority Act of 1933, ch. 32, 48 Stat. 58 (creating Tennessee Valley Authority, a public corporation, "[t]o improve the navigability and to provide for the flood control of the Tennessee River; to provide for reforestation and the proper use of marginal lands in the Tennessee Valley; to provide for the agricultural and industrial development of said valley . . . and for other purposes").

[167] Flood Control Act of 1936, ch. 688, § 1, 49 Stat. 1570.

safety" and save millions of dollars,[168] each iteration of the federal flood policy adhered to the organizing principle of development accommodation through flood control infrastructure.[169]

The private insurance market recognized what Congress would not. As early as 1929, the risk to properties developed in the nation's floodplains was so great that the private sector essentially stopped covering flood losses.[170] In 1933, Congress passed the first law authorizing the federal government to provide direct disaster assistance to private citizens, specifically in the form of loans to people who suffered property losses from the earthquake in Long Beach, California.[171] Congress followed the 1933 model of temporary, post-disaster authorizations until it created a permanent system for disaster relief in 1950.[172] But not even one year later, floodwater topped the levees on the Mississippi and Missouri Rivers and their tributaries, inundating Kansas City and causing major flooding across North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, and Illinois—resulting in the largest flood-related losses in the nation's history to date.[173]

It was not until the late 1950s that Congress recognized that the accommodation of development in the nation's floodplains was itself a significant part of the problem and that zoning that limited floodplain development was an essential component of the solution. President Truman responded to the devastation of the 1951 floods by urging Congress to create a "national system of flood disaster insurance."[174] Truman appointed a Commission on Organization of the Executive Branch of the Government, known as the Hoover Commission,[175] to evaluate and recommend changes to federal programs, including the federal flood control

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[168] In March 1937, the editorial staff of the Engineering News-Record asked, apparently rhetorically, "[i]s it sound economics to let such property be damaged year after year, to rescue and take care of the occupants, to spend millions for their 'local protection', when a slight shift of location would assure safety?" ENGINEERING NEWS-RECORD, Mar. 11, 1937, at 385; *see also* Allison Dunham, *Flood Control Via the Police Power*, 107 U. PA. L. REV. 1098, 1132 (1959) (recognizing generally that land use regulation was essential to reducing costs of floods).

[169] *See, e.g.*, Watershed Protection and Flood Prevention Act, ch. 656, 68 Stat. 666 (1954); Flood Control Act of 1960, Pub. L. No. 86-645, § 206(a), 74 Stat. at 500; *see also supra* notes 145–167 and *infra* 170–189 and accompanying text.

[170] FLOOD INSURANCE SUBCOMMITTEE MONOGRAPH, *supra* note 154, at 31; AM. INST. FOR RSCH., A CHRONOLOGY OF MAJOR EVENTS AFFECTING THE NATIONAL FLOOD INSURANCE PROGRAM 3 (Dec. 2005).

[171] AM. INST. FOR RESEARCH, *supra* note 170, at 3.

[172] FLOOD INSURANCE SUBCOMMITTEE MONOGRAPH, *supra* note 154, at 31.

[173] TASK FORCE ON FEDERAL FLOOD CONTROL POLICY, A UNIFIED NATIONAL PROGRAM FOR MANAGING FLOOD LOSSES 8 (Aug. 2, 1966) [hereinafter TASK FORCE REPORT (1966)]; *see also* Robert C. Weaver, Letter of Transmittal (Aug. 8, 1966), *in* H.R. 11539, 89th Cong., 2d Sess. (transmitting the Task Force Report to John W. McCormack, Speaker of the House of Representatives).

[174] FLOOD INSURANCE SUBCOMMITTEE MONOGRAPH, *supra* note 154, at 31.

[175] President Truman appointed former President Herbert Hoover to chair the commission, thereby giving rise to its popular name.

program.[176] Heeding this charge, the Hoover Commission's Task Force on Water Resources and Power published a report in 1955 urging that any system of federal flood insurance should be combined with zoning to decrease the encroachment of development into floodplains.[177] The Task Force found that floodplain development drives federal costs related to flood control and flood disasters and that flood control infrastructure cannot adequately protect communities residing in floodplains from the enormous costs of flood disasters.[178] Congress responded by passing the Federal Flood Insurance Act of 1956,[179] which made federal flood insurance and loans contingent on the community in which the insured property was located adopting and keeping in effect "flood zoning laws" that the administrator deemed necessary "to reduce, within practicable limits, damages from flood in such location[s]."[180] But Congress failed to appropriate funding to implement the 1956 Act,[181] effectively leaving in place the nation's longstanding development accommodation policy coupled with a system of federal disaster relief that provided a limited financial safety net to the growing population inhabiting the nation's floodplains.[182]

State governments and land use planning officials also recognized the need for federal intervention to facilitate state and local adoption of floodplain zoning. In 1958, the Council of State Governments, the American Society of Planning Officials, and the American Institute of Planners, among others, jointly sponsored a conference on floodplain regulation and insurance.[183] The conference attendees concluded that federal flood insurance should be contingent on state or local adoption of "flood zoning," consisting of "zoning, subdivision regulations, housing and building codes, encroachment lines, and other land-use regulations" that limit the development of floodplains.[184] Following the conference, the Fourteenth Biennial General Assembly of the States issued a resolution urging state and federal implementation of the conference recommendations:

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[176] *See* COMM'N ON ORG. OF THE EXEC. BRANCH OF THE GOV'T, REPORT OF THE WATER RESOURCES AND POWER TASK FORCE 725 (1955) [hereinafter TASK FORCE REPORT (1955)] (describing responsibilities of Task Group on Flood Control).

[177] *Id.* After Truman's second term ended in 1953, the Commission continued under President Dwight Eisenhower.

[178] TASK FORCE REPORT (1955), *supra* note 176; *see also* Dunham, *supra* note 168, at 1099–100 (examining the history of efforts to reduce flood damage through land use controls and discussing Task Force Report).

[179] Federal Flood Insurance Act of 1956, Pub. L. No. 84-1016, § 12(b)–12(c), 70 Stat. 1078. The 1956 Act, "passed after the disastrous New England floods of 1954 and 1955[,] in effect required states to adopt some kind of zoning." Dunham, *supra* note 178, at 1101–02.

[180] Federal Flood Insurance Act of 1956, Pub. L. No. 1016, § 12(b)–12(c), 70 Stat. 1078.

[181] S. Rep. 93-583 (1973) (accompanying the Flood Disaster Protection Act of 1973, Pub. L. No. 93-234, 87 Stat. 975 (Dec. 31, 1973).

[182] *But see* Flood Control Act of 1960, Title II of Pub. L. No. 86-645, 74 Stat. 480, 488, 502.

[183] *Resolutions Adopted by the General Assembly of States*, 32 STATE GOV'T: J. STATE AFFAIRS, Winter 1959, at 30, 31*; see also* Dunham, *supra* note 178, at 1098 (discussing conference).

[184] *Conclusions Adopted at the Conference on Flood Plain Regulation and Insurance*, 32 STATE GOV'T: J. STATE AFFAIRS, Winter 1958, at 126, 126–27 (1959); *see also* Dunham, *supra* note 178, at 1098 & n.2 (analyzing resolution on flood insurance and floodplain management).

> The Fourteenth Biennial General Assembly of the States, recognizing the need for action to cope with this problem, commends to the attention of the states and the federal government the conclusions reached by the conference and urges their implementation by necessary administrative and legislative action[, including:]
>
> > 3. Each state should promptly review its existing legislation and administration to determine what steps are needed to authorize the use of zoning, sub-division regulation, building codes and other means of land use regulation to prevent flood losses . . . .
> >
> > 7. All future expenditures of federal funds for protective works yielding primarily localized benefits should be contingent upon regulatory action by state and local governments to control further encroachment upon flood ways . . . .[185]

This resolution added to the already ample evidence the federal government had that a shared federalism framework was necessary to support state and local governments' capacity to use their police powers to restrict land uses in floodplains.

The Flood Control Act of 1960 recognized "the increasing use and development of the flood plains of the rivers of the United States" and the need for land use regulations to "avoid[] future flood hazards"[186]—or, in other words, to facilitate states and local governments using their police power authority to avoid new hazard area development and to manage retreat from developed portions of the nation's flood-prone lands. The 1960 Act sought to support this state and local action by directing the Corps "to compile and disseminate information on floods and flood damages, including identification of areas subject to inundation by floods of various magnitudes and frequencies, and general criteria for guidance in the use of floodplain areas; and to provide engineering advice to local interests for their use in planning to ameliorate the flood hazard."[187] In this way, the 1960 Act provided state and local governments with technical resources they could use to guide decisions about where to restrict land uses.[188] The Act did not, however, make federal flood control funding or other federal benefits contingent on state or local adoption of flood zoning, as had been recommended by the General Assembly of States, nor did the 1960 Act contain other mechanisms to encourage or require state and local governments to use the Act's technical resources.[189]

Before and after the passage of the 1960 Act, development of the nation's floodplains continued to outpace development elsewhere, increasing the population, structures, and infrastructure exposed to flood hazards,[190] as illustrated by Figure 1.[191] The photograph shows a shopping district in Kansas City that the

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[185] Dunham, *supra* note 178, at 1098 & n.2.

[186] Flood Control Act of 1960, Title II of Pub. L. No. 86-645, § 206(a), 74 Stat. 480, 500.

[187] *Id.*

[188] *See, e.g.*, *id.*

[189] *Id. Id.*

[190] *See supra* Sections I.A. and IV.A (regarding historic and projected floodplain development).

[191] U.S. ARMY CORPS OF ENG'RS, KANSAS CITY DISTRICT, FLOOD PLAIN INFORMATION (1970) [hereinafter USACE, KANSAS CITY DISTRICT INFORMATION].

USACE projected would be inundated by nearly 2 feet of flood waters during a 100-year flood and nearly 8 feet of flood waters during a 500-year flood.[192] The flood control structures intended to protect Kansas City failed in 1951, leading to massive flood damage and displacement.[193]

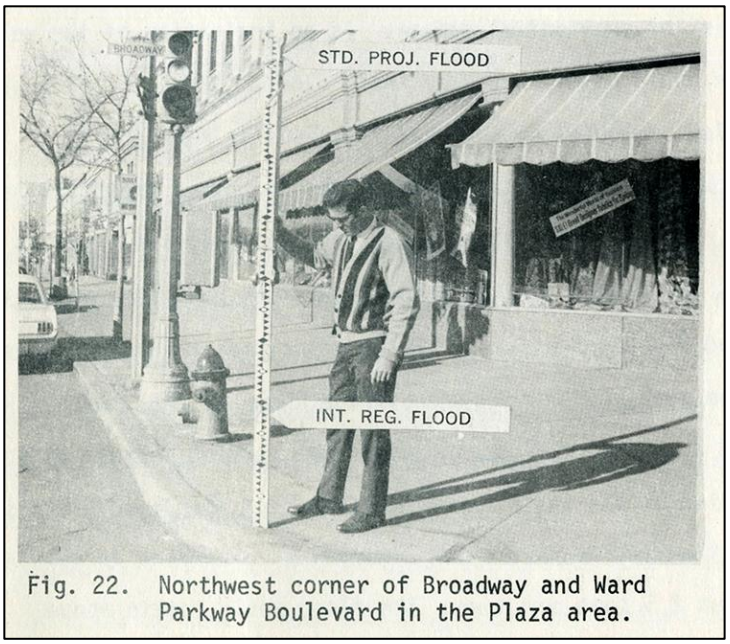

Fig. 1. Illustration from USACE report showing Brush Creek flood levels in Kansas City.[194]

B. 1968: ATTEMPTING TO SHIFT THE PARADIGM TO HAZARD AREA AVOIDANCE AND MANAGED RETREAT

The Johnson administration and Congress envisioned a paradigm shift in federal flood policy that centered land use strategies as the primary means to adaptively manage the nation's flood-prone lands. After a century of mounting flood costs, they concluded that hazard area avoidance and managed retreat were necessary to decrease the exposure of people and structures to flood hazards, preserve and enhance the flood-mitigating functions of floodplains, and limit federal fiscal exposure.[195] The NFIA responded to the growing recognition that accommodation of floodplain development was a major problem, declaring that "annual losses throughout the nation from floods and mudslides are increasing at an alarming rate, largely as a result of the accelerating development of, and

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[192] *See* INTERAGENCY FLOODPLAIN MGMT. REV. COMM., SHARING THE CHALLENGE: FLOODPLAIN MANAGEMENT INTO THE 21ST CENTURY 60 (1994) (defining standard project flood).

[193] U.S. ARMY CORPS OF ENG'RS, PROJECT HISTORY, POST-CONSTRUCTION HISTORY: FLOODS AND DROUGHTS, NAMING OF TUTTLE CREEK DAM, https://www.nwk.usace.army.mil/Locations/District-Lakes/Tuttle-Creek-Lake/History [https://perma.cc/TS8F-YF3Z].

[194] USACE, KANSAS CITY DISTRICT INFORMATION, *supra* note 191.

[195] *See, e.g.*, *supra* note 173. *See infra* notes 198–200, 216–217 and accompanying text.

concentration of population in, areas of flood and mudslide hazards."[196] With this renewed effort to reform the national flood policy, Congress finally integrated into the federal program both access to a financial safety net—in the form of federal flood insurance—and powerful incentives for state and local governments to adopt and enforce land use laws that would decrease the number of people and the amount of developed property exposed to flood hazards.[197] In this way, Congress appears to have heeded the General Assembly of States' recommendation made a decade earlier that federal spending on local flood protection be contingent on the adoption of state and local regulations that limit the development of flood hazard areas.

In crafting the NFIA, Congress and the Johnson administration recognized that without measures to restrict floodplain development, any flood insurance program would have the perverse effect of increasing development in the nation's flood-prone areas and thereby "exacerbate the whole problem of flood losses."[198] In urging passage of the NFIA, President Johnson stressed that the Act mitigated this moral hazard[199] by "promot[ing] wise use of flood plains."[200] After many decades under the levees-plus policy that did not protect the nation "against growing exposure to future flood losses" from floodplain development,[201] Congress stated that any form of federal financial assistance to develop properties in flood-prone areas, including flood insurance, would frustrate the purpose of the NFIA:

> [T]he availability of Federal loans, grants, guaranties, insurance, and other forms of financial assistance are often determining factors in the utilization of land and the location and construction of public and of private industrial, commercial, and residential facilities; [and] property acquired or constructed with grants or other Federal assistance may be exposed to risk of loss through floods, thus frustrating the purpose for which such assistance was extended[.][202]

To avoid the moral hazard inherent in federal flood insurance and other direct and indirect federal support of floodplain development, Congress structured the NFIA to make federal benefits contingent on state and local governments adopting and enforcing land use laws that facilitate hazard avoidance, managed retreat, and preservation of the flood-mitigating ecosystem services of natural floodplain features like wetlands, estuaries, and marshes.[203] The result was a congressionally mandated national flood program with three integrated features:

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[196] Flood Disaster Protection Act of 1973, Pub. L. No. 93-234, § 2(a)(1), 87 Stat. 975, 975–76 (codified at 42 U.S.C. § 4002) (describing intent of NFIA).

[197] National Flood Insurance Act of 1968, Pub. L. No. 90-448, § 1302, 82 Stat. 572, 572–73 (1968) (codified as amended at 42 U.S.C. § 4001).

[198] *See* Johnson, *supra* note 173 (quoting TASK FORCE REPORT (1966), *supra* note 173).

[199] "Moral hazard," which evolved as a term to describe and critique insurance markets, refers to the idea that the provision of insurance causes the insured to undertake higher-risk behavior that results in an increase in the insured risk. David Rowell & Luke B. Connelly, *A History of the Term "Moral Hazard*,*"* 79 J. RISK & INS. 1051, 1052–53 (Dec. 2012).

[200] Johnson, *supra* note 173 (quoting TASK FORCE REPORT (1966), *supra* note 173).

[201] NFIA § 1302(a), 82 Stat. at 572–73 (codified as amended at 42 U.S.C. § 4001(a)).

[202] Flood Disaster Protection Act of 1973, Pub. L. No. 93-234, § 2(a)(1)-(3), 87 Stat. 975, 975–76.

[203] *See infra* notes 208–226 and accompanying text.

flood insurance,[204] floodplain land use criteria,[205] and technical data and guidance that included the federal mapping of flood hazard areas.[206]

Congress envisioned the first integrated component of the program—federal flood insurance—as "a reasonable method of sharing the risk of flood losses."[207] The idea was that flood insurance coverage, which was not available through the private insurance market, would spread more of the risk to flood-prone property owners than the pre-NFIA method of funding flood disaster assistance solely from federal budget appropriations.[208]

The second integrated feature of the program leverages the provision of federal flood insurance to incentivize, or "encourage," state and local governments to adopt and enforce land use laws that constrict existing development in, and guide future development away from, flood hazard areas.[209] Congress found that by making the availability of federal flood insurance in a community contingent on the adoption and enforcement of flood zoning that meets or exceeds certain federal criteria, the flood insurance program could "promote the public interest by . . . encouraging sound land use" that minimizes "exposure of property to flood losses."[210] Thus, to be issued a new federal flood insurance policy, a property must be located in a community with adequate land use and control measures that are consistent with federal "comprehensive criteria for land management and use" developed pursuant to the Act.[211] Additionally, state or local zoning authorities must determine that the property is not in violation of "laws, regulations, or ordinances . . . intended to discourage or otherwise restrict land development or occupancy in flood-prone areas."[212]

To stem the tide of development and population concentration in flood-prone areas, the NFIA directs FEMA to study "the adequacy of State and local measures in flood-prone areas as to land management and use, flood control, flood zoning, and flood damage prevention"[213] and develop flood zoning criteria that encourage the de-intensification of land uses in flood hazard areas. Specifically, section 1361(c) of the NFIA directs the agency, "on the basis of such studies," to:

> [D]evelop comprehensive criteria designed to encourage, where necessary, the adoption of permanent State and local measures which, to the maximum extent feasible, will–

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[204] *See infra* notes 207–208 and accompanying text.

[205] *See infra* notes 209–226 and accompanying text.

[206] *See infra* notes 220–221 and accompanying text; *see also* TASK FORCE REPORT (1966), *supra* note 173, at 17 (describing structure and purpose of integrated program).

[207] TASK FORCE REPORT (1966), *supra* note 173, at 17.

[208] *Id.*

[209] Pub. L. No. 90-448, § 1361(c), 82 Stat. 587 (codified at 42 U.S.C. § 4102).

[210] Pub. L. No. 90-448, § 1302(c), 82 Stat. 573(codified at 42 U.S.C. § 4001(c).

[211] Pub. L. No. 90-448, § 1305(c), 82 Stat. 573 (codified at 42 U.S.C. § 4012(c); Pub. L. No. 90-448, § 1315, 82 Stat. 580 (codified at 42 U.S.C. § 4022(a)).

[212] Pub. L. No. 90-448, § 1316, 82 Stat. 580 (codified at 42 U.S.C. § 4023).

[213] Pub. L. No. 90-448, § 1361(a), 82 Stat. 587.

> (1) constrict the development of land which is exposed to flood damage where appropriate,
>
> (2) guide the development of proposed construction away from locations which are threatened by flood hazards,
>
> (3) assist in reducing damage caused by floods, and
>
> (4) otherwise improve the long-range land management and use of flood-prone areas.[214]

In other words, the Act requires FEMA to assess whether state and local land use laws, including zoning codes, are adequately preventing flood damage; and, based on these assessments, to develop federal criteria that make participation in the NFIP contingent on the community's adoption and enforcement of land use laws and flood control regulations that constrain hazard area development, facilitate managed retreat from flood hazard areas, reduce flood damage, and—according to the NFIA's legislative history—increase the capacity of floodplains to provide ecosystem services.[215]

Congress and the Johnson administration envisioned a clear break from the earlier paradigm of development accommodation. Read together, the first two mandates of section 1361(c) instruct FEMA to adopt criteria that constrict existing development in flood-prone areas "where appropriate" and shift new development (or "the development of proposed construction") away from flood-prone areas.[216] Significantly, although all four mandates are subject to the overarching qualifiers "where necessary" and "to the maximum extent feasible," Congress's choice to include "where appropriate" in the first mandate (relating to existing development) and omit it from the second mandate (relating to new development) is consistent with managed retreat and hazard avoidance strategies that allow for gradual retreat from developed areas and apply more aggressive development limitations to undeveloped areas.[217]

The flood zoning criteria, in turn, support the Act's ecosystem services objectives by initially decreasing the pace of new development in the nation's flood hazard areas and, in the long term, decreasing the geographic scope of pre-NFIP development as existing development is destroyed and not rebuilt.[218] The meaning of section 1361(c)(4)'s requirement that the criteria "otherwise improve the long-range land management and use of flood-prone areas" is less clear. However, the language is consistent with Congress and the Johnson administration's intention that the federal program encourage "wise" long-range land management and use by

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[214] Pub. L. No. 90-448 § 1361(c), 82 Stat. 587.

[215] *See infra* notes 218–219 and accompanying text.

[216] Pub. L. No. 90-448 § 1361(c), 82 Stat. 587.

[217] *See infra* Sections IV.B–IV.D (analyzing and proposing managed retreat strategies).

[218] *See* Floodplain Management Guidelines for Implementing Executive Order 11988, 43 Fed. Reg. 6030, 6030 (Feb. 10, 1978) (reporting "widespread recognition that the natural and beneficial values of floodplains, wetlands and coastal barrier islands must be restored and preserved").

incentivizing state and local governments to preserve and restore the capacity of undeveloped floodplains to mitigate flood risk.[219]

The third feature of the NFIA's integrated flood management program is the requirement that FEMA study flood, mudslide, and flood-related erosion risks and designate Special Flood, Mudslide, and Erosion Hazard Areas.[220] Special Flood Hazard Areas are delineated on the NFIP's Flood Insurance Rate Maps ("FIRMs"), along with base flood elevations ("BFEs") and the boundaries of the various risk premium zones.

Although Congress initially thought the availability of flood insurance alone would be sufficient encouragement for state and local governments to adopt flood zoning that meets or exceeds the federal criteria, Congress subsequently amended the Act to more effectively incentivize program participation.[221] The resulting incentives are so powerful that some characterize the program as mandatory.[222] For instance, to obtain or renew a mortgage from a federally regulated lender on real estate located in a Special Flood Hazard Area ("SFHA"), the borrower must buy and maintain flood insurance for the life of the loan.[223] Because federal flood insurance is the only affordable insurance for most properties located in SFHAs, the consequences of program ineligibility are severe: in addition to property owners losing access to federal flood insurance, which has tended to be highly subsidized,[224] the lender can purchase costly non-subsidized flood insurance

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[219] *See, e.g.*, Johnson, *supra* note 173, at 15.

[220] 44 C.F.R. § 59.1 ("*Area of special flood hazard* is the land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year."); *see also id.* ("*Special hazard area* means an area having special flood, mudslide (i.e., mudflow), or flood-related erosion hazards, and shown on an FHBM or FIRM as Zone A, AO, A1–30, AE, AR, AR/A1–30, AR/AE, AR/AO, AR/AH, AR/A, A99, AH, VO, V1–30, VE, V, M, or E."); *see also infra* note 245 (defining 100-year flood and base flood).

[221] Flood Disaster Protection Act of 1973, Pub. L. No. 93-234, § 102, 87 Stat. 975, codified at 42 U.S.C. § 4012a.

[222] *See, e.g.,* Christine M. McMillan, Comment, *Federal Flood Insurance Policy: Making Matters Worse*, 44 HOUS. L. REV. 471, 478–83 (2007); *contra* Nat'l Wildlife Fed'n v. FEMA, 345 F. Supp. 2d 1151, 1156 (W.D. Wash. 2004) (observing that communities participate in the NFIP voluntarily).

[223] 42 U.S.C. § 4012a(b); *see also* 44 C.F.R. § 60.1(a) ("The Act provides that flood insurance shall not be sold or renewed under the program within a community, unless the community has adopted adequate flood plain management regulations consistent with Federal criteria."); 24 C.F.R. § 203.16a(b); FEMA, MANDATORY PURCHASE OF FLOOD INSURANCE GUIDELINES 186 (May 1997).

[224] Although the NFIA requires NFIP premiums to be actuarially sound, 42 U.S.C. § 4015(c), the Act provides numerous non-actuarial premium discounts. *See, e.g.*, § 4014(a)(2) (discounts for properties built before FEMA published a community's flood insurance rate map (FIRM) or December 31, 1974, whichever is later); § 4014(e)-(f) & 4014 Note (discounts for properties behind levees under construction or repair); § 4015(i) (discounts for properties in newly mapped SFHA); § 4056 (discounts for properties in new NFIP communities and communities for which FEMA has not published a FIRM). The program has also significantly underestimated risk for all categories of insured properties. *See* OFC. MGMT. & BUDGET, ANALYTICAL PERSPECTIVES: BUDGET OF THE U.S. GOVERNMENT FISCAL YEAR 2023, at 281 (2023) (NFIP "premiums are

on the mortgagor's behalf and pass the cost on to the mortgagor if a mortgaged property in a Special Flood Hazard Area fails to obtain or maintain flood insurance.[225] Properties located in Special Flood Hazard Areas in communities that do not participate in the NFIP are also ineligible for federal disaster assistance, Small Business Administration or Veterans Administration loans, FEMA temporary housing, low-interest disaster loans, and outward disaster assistance grants.[226] Through these powerful incentives, the NFIA encourages state and local governments to adopt flood zoning that meets or exceeds the federal criteria.

This is not to say that the NFIA does not also encourage the floodproofing of buildings to supplement the hazard avoidance and managed retreat criteria. The Task Force Report emphasized the need to stop relying so heavily on flood control infrastructure (e.g., levees) and instead focus on "flood proofing and land regulation."[227] However, floodproofing only plays a small role in the Act and its legislative history compared to land use management, which is one of the three integrated features of the NFIA. Conversely, floodproofing plays the starring role—and essentially the only role—in FEMA's minimum criteria, which focus myopically on building-scale resilience.

C. POST-1968: DOUBLING DOWN ON DEVELOPMENT ACCOMMODATION

Rather than using the Act's powerful incentive structure to promote state and local adoption of adaptative land use laws, however, the implementing agencies ultimately responded to the NFIA's mandate by developing program eligibility criteria dictating *how* structures are built but not *where* structures are located.[228] None of the criteria incorporate any of the myriad land use regulatory tools that

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subsidized at two-thirds the actuarially fair market rate"); *id.* (noting that FIRM is based on hazard assessment at the time of adoption or update and does not reflect future increases in the hazard); FIRST STREET FOUNDATION, THE COST OF CLIMATE: AMERICA'S GROWING FLOOD RISK 10 (2021) (reporting that the economic risk to properties in SFHAs is 4.2 times more than average estimated NFIP premiums); *see also id.* (economic risk for properties outside SFHAs is 5.2 times greater than the average estimated NFIP premium).

FEMA began phasing out some subsidies under the Biggert-Waters Flood Insurance Reform Act of 2012, P.L. 112-141 (Jul. 6, 2012) [BW-12], and implemented a new pricing methodology, "Risk Rating 2.0," in 2021 and 2022. *See* CONG. RES. SERV., NATIONAL FLOOD INSURANCE PROGRAM RISK RATING 2.0: FREQUENTLY ASKED QUESTIONS 1 (updated May 28, 2024). Risk Rating 2.0 is intended to increase the equity and actuarial soundness of NFIP premiums, although statutory subsidies and limits on premium increases remain. *Id.* at 1–2; OFC. MGMT. & BUDGET, *supra* at 282.

[225] 42 U.S.C. §§ 4012a(a), (b), (e); FEMA, MANDATORY PURCHASE OF FLOOD INSURANCE GUIDELINES (May 1997).

[226] *See* 42 U.S.C. §§ 4002(b)(4), 4012a(b), 4022.

[227] TASK FORCE REPORT (1966), *supra* note 173, at 15.

[228] *See* 44 C.F.R. § 60.3 (criteria for regulation of areas of Special Flood Hazard), 60.4 (criteria for regulation of areas of Special Mudslide Hazard). Although FEMA promulgated criteria for regulation of flood-related erosion hazards, § 60.5, FEMA has yet to issue maps designating areas of Special Erosion Hazard. Participating communities must meet the standards in section 60.5(a) but have six months from delineation of areas of Special Erosion Hazard to meet the standards in section 60.5(b). § 60.2(c).

decrease the intensity of development in flood hazard areas or retain and protect the flood-mitigating natural functions of floodplains,[229] with two mostly ineffectual exceptions.[230] The hazard avoidance and managed retreat standards were relegated to regulations that strongly encourage various "planning considerations"[231] and a voluntary program that does not appear to provide sufficient incentives to facilitate state and local adoption of avoidance- and retreat-oriented floodplain management regulations.[232] The regulatory criteria focus so myopically on the structural resilience of buildings and so utterly neglect the location of development that they are often referred to as "building code" or "new construction" standards.[233] Even FEMA describes the regulations as "minimum building design criteria."[234] The predictable result of implementing the insurance part of the NFIA's integrated three-part structure while failing to implement the part requiring hazard area avoidance and managed retreat flood zoning criteria has been precisely the fiscal insolvency and moral hazard Congress designed the three-part structure to avoid.[235]

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[229] *See infra* Section II.C.

[230] *See infra* notes 242–243 and accompanying text (discussing prohibition of development below the mean high tide line and prohibition of some development in the central portion of a riverine floodplain needed to carry the deeper, faster moving water during a flood).

[231] *See* 44 C.F.R § 60.22 (listing "planning considerations for flood-prone areas"); *id.* § 60.21 (providing that purpose of section 60.22 is to "encourage the formation and adoption of overall comprehensive management plans for flood-prone . . . areas" and, while "adoption by a community of the standards in this subpart is not mandatory, the community shall completely evaluate these standards"); *see also infra* Section IV.D.3.

[232] The NFIP includes a voluntary program, the Community Rating System (CRS), which provides decreased flood premiums for communities that exceed the federal minimum standards. The CRS designates dozens of potential regulatory and non-regulatory methods a community can undertake to qualify for premium reductions, including regulatory methods for managing retreat from flood hazard areas. *See infra* notes 486, 511–528 and accompanying text.

[233] *See, e.g.,* GOV'T ACCOUNTABILITY OFF., GA0-10-1063T, NATIONAL FLOOD INSURANCE PROGRAM: CONTINUED ACTIONS NEEDED TO ADDRESS FINANCIAL AND OPERATIONAL ISSUES 4 (2010); Justin Pidot, *Deconstructing Disaster*, 2 BYU L. REV. 213, 219 (observing that NFIP requires communities to adopt "standards for new construction"); *id.* at 219–20, n. 27 (observing that NFIP requires communities to adopt "building code standards"); Bryant J. Spann, Note, *Going Down for the Third Time: Senator Kerry's Reform Bill Could Save the Drowning National Flood Insurance Program*, 28 GA. L. REV. 593, 593–94 (1994) ("In return for receiving insurance, participating communities must enact a set of federal building codes that require all new construction to be built above flood level.").

[234] FEMA, TECHNICAL BULLETIN 2: FLOOD DAMAGE-RESISTANT MATERIALS REQUIREMENTS 1 (2008); *see also* FEMA, *Manage Floodplain Risk*, https://www.fema.gov/floodplain-management/manage-risk [https://perma.cc/6BCP-RLZK] (describing NFIP requirements in terms of accommodating development of "new buildings and infrastructure").

[235] *See infra* Section IV.A (regarding fiscal insolvency and moral hazard resulting from failure to implement retreat-oriented flood zoning criteria); *see infra* notes 300–303 and accompanying text (regarding congressional and executive warnings that the flood zoning criteria were necessary to prevent such outcomes).

Although the building design criteria vary depending on the level of flood hazard designation applicable to the location,[236] they do not constrict or limit the development of flood hazard areas. Instead, the criteria allow both new development and rebuilding of destroyed structures in even the "most hazardous part of the coastal floodplain,"[237] which FEMA designates as "coastal high hazard" areas or "V" zones.[238] V zones "extend[] from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources."[239] An area is subject to high velocity wave action when it is subject to waves that "generally carr[y] enough energy to break a wall panel away from a floor to which it has been nailed."[240] Although the most stringent criteria apply in these coastal high hazard areas,[241] none of the federal criteria limit development in these areas—with one exception that prohibits the development of land seaward of the mean high tide line.[242] This development limitation is essentially redundant as the land and water seaward of the mean high tide line are owned by the state, which has a legal duty to hold them in trust for the people to use for recreation, fishing, and navigation.[243]

The applicable criteria in coastal high hazard areas allow residential and commercial development subject to building design and construction standards that

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[236] The specific standards that apply to a particular development depend on the flood hazard designations FEMA has identified for the development's location, the level of detail of the data FEMA provides to the community, the size of the development, whether the development is residential or non-residential, and whether exceptions apply to the location. 44 C.F.R. § 60.2(h).

[237] FEMA, MANAGING FLOODPLAIN DEVELOPMENT THROUGH THE NATIONAL FLOOD INSURANCE PROGRAM 3-25 (1998), https://www.fema.gov/pdf/floodplain/is_9_complete.pdf [https://perma.cc/5V89-5JD7].

[238] 44 C.F.R. § 64.3(1). FEMA maps distinguish between coastal and inland flooding by designating areas with 1% or greater annual chance of flooding from wave action or storm surge as V zones and areas with 1% or greater annual chance of flooding from inland sources of flooding as A zones. See Devin Lea & Sarah Pralle, *To Appeal and Amend: Changes to Recently Updated Flood Insurance Rate Maps*, 13 RISKS, HAZARDS & CRISIS IN PUB. POL'Y 28 (2021).

[239] 44 C.F.R. § 59.1.

[240] FEMA, *supra* note 237.

[241] 44 C.F.R. § 59.1 ("*Coastal high hazard area* means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.").

[242] 44 C.F.R. § 60.3(e)(3); *see* FRENCH WETMORE, GEORGE BERNSTEIN, DAVID CONRAD, CYNTHIA DIVINCENTI, LARRY LARSON, DOUG PLASENCIA & RUSSELL RIGGS, AM. INST. FOR RSCH., THE EVALUATION OF THE NATIONAL FLOOD INSURANCE PROGRAM FINAL REPORT 14–20 (2006) (evaluating the program's two limited retreat provisions, and concluding that "[a]lthough these two provisions prevent much development in very small parts of coastal floodplains and in mapped floodways, the NFIP has no other regulatory provisions for keeping floodplains clear, even in high hazard areas").

[243] *Phillips Petroleum Co. v. Mississippi*, 484 U.S. 469, 476 (1988) ("[W]e reaffirm our long standing precedents which hold that the States, upon entry into the Union, received ownership of all lands under waters subject to the ebb and flow of the tide."); *Ill. Cent. R.R. Co. v. Illinois*, 146 U.S. 387, 453 (1892) ("The State can no more abdicate its trust over property in which the whole people are interested, like navigable waters and soils under them, so as to leave them entirely under the use and control of private parties . . . than it can abdicate its police powers in the administration of government and the preservation of the peace.").

only differ in degree from those applicable in less hazardous flood-prone areas.[244] For example, whereas some structures in relatively lower-risk parts of the floodplain may have a garage, storage area, or building access below the base flood elevation—which is the water level of a 100-year flood[245]—structures in V zones may not have useable space below the BFE.[246] Such structures must also be anchored on pilings that resist flotation, collapse, or lateral displacement from the combined wave and wind forces of a base flood,[247] and the portion of the structure below the BFE must be left open or enclosed with "breakaway" walls that allow floodwater to pass through the structure.[248]

Additionally, although FEMA advises state and local governments that a "basic rule" of the program is that "[d]evelopment must not increase the flood hazard on other properties,"[249] the agency has promulgated only two criteria that require consideration of whether a development will increase flood hazards on other properties. First, FEMA's regulations require maintenance of the flood carrying capacity of a watercourse when a development alters or relocates the watercourse.[250] Second, a community may not permit development in a "regulated floodway" that would increase the water surface elevation of a 100-year flood.[251] FEMA defines the regulatory floodway as "the channel of a river or other watercourse and the adjacent land areas that must be reserved to discharge the base flood without cumulatively increasing the water surface elevation more than a

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[244] *See* 44 C.F.R. § 60.3(e) (setting forth criteria applicable to V zones). Unlike FEMA's standards applicable to residential and commercial development, the standards appliable to public service facilities such as wastewater treatment plants do address the location of the facilities, requiring that public service facilities be located and designed to minimize contamination of flood waters and flood damage to the facilities. 44 C.F.R. § 60.3(a)(4).

[245] "Base flood" means the flood which has a one percent chance of being equaled or exceeded in any given year, also known as a 100-year flood. 42 U.S.C. § 4004(a)(1); 44 C.F.R. § 9.4. The 100-year flood is based on a statistical projection of the flooding that would result from the worst storm likely to occur in 100 years, or, in other words, a storm with a 1% chance of occurring in any given year. *See* 44 C.F.R. §§ 9.4, 59.1. The 100-year floodplain is the entire area that would be at or under the water level in such a flood.

[246] *See, e.g.,* 44 C.F.R. § 60.3(c)(3) (allowing new and substantially improved non-residential buildings in A zones to have floodproofed floors below BFE), 60.3(c)(5) (setting forth design criteria for parking, storage, and building access areas below BFE of new and substantially improved buildings in A zones), 60.3(e) (V zones standards).

[247] 44 C.F.R. § 60.3(e)(4)–(e)(5). Mobile homes anywhere in the 100-year floodplain must also be elevated and anchored to resist flotation, collapse, and lateral movement. § 60.3(b)(8).

[248] 44 C.F.R. § 60.3(e)(4); *see also id.* § 59.1 (defining a breakaway wall as "a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system").

[249] FEMA, *supra* note 237, at 5–21.

[250] 44 C.F.R. § 60.3(b)(7).

[251] *Id.* § 60.3(d)(3).

designated height,"[252] which FEMA requires to be one foot or less.[253] Essentially, this means that the regulatory floodway is the central portion of a riverine floodplain "needed to carry the deeper, faster moving water" during a flood.[254] Within this central portion of the riverine floodplain, a participating community must "prohibit encroachments, including fill, new construction, substantial improvements, and other development," unless "hydrologic and hydraulic analyses" demonstrate "that the proposed encroachment would not result in any increase in flood levels within the community" during a 100-year flood.[255]

Notwithstanding that these are the only criteria that implement the "basic rule," FEMA provides for a waiver of the requirement that floodway development not increase flood heights (and thus flood risk to other properties) through processes known as "map amendments," "conditional map amendments," and "conditional approvals."[256] In essence, these processes allow a property owner to initiate an administrative review of whether their property has been incorrectly included in a regulatory floodway or the proposed development will elevate their property such that the property will no longer be in the regulatory floodway.[257] Pursuant to these procedures, property developers can seek and receive conditional approval to build in the regulatory floodway based on the proposed use of fill material to raise the height of the new development such that it will no longer be in the regulatory floodway.[258]

The remaining criteria focus entirely on building-scale resilience by requiring that the structural design and construction materials of buildings in flood hazard areas increase the capacity of the buildings to withstand floods. Per the federal criteria, a community that participates in the NFIP must require a permit for all development in designated flood-prone areas.[259] New and substantially improved buildings must be designed and anchored to prevent flotation, collapse, and lateral movement and constructed using materials, methods, and practices that minimize flood damage.[260] Depending on the availability of flood-risk data, the

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[252] *Id.* § 59.1.

[253] *Id.* § 60.3(d)(2). Some communities opt to enlarge the regulatory floodway by setting an allowable rise of less than one foot. *See* ARDEN H. RATHKOPF, DAREN A. RATHKOPF & EDWARD H. ZIEGLER, JR., RATHKOPF'S THE LAW OF ZONING AND PLANNING § 7:27 (4th ed., May 2024 update) (citing examples and observing that one-foot rise is the standard in most jurisdictions).

[254] FEMA, *supra* note 237, at 5–21; 44 C.F.R. § 59.1.

[255] 44 C.F.R. § 60.3(d)(3). When FEMA has designated the BFE within a community but has not yet identified regulatory floodways within the community, these prohibitions apply to other flood zones within the community unless the community or developer demonstrates "that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community." 44 C.F.R. § 60.3(c)(10).

[256] 44 C.F.R. §§ 60.3(c)(13), 60.3(d), 65.12, 70.3, 70.9.

[257] FEMA, NATIONAL FLOOD INSURANCE PROGRAM: FINAL NATIONWIDE PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT, at 1-16 to 1-17 (Sept. 2017) [hereinafter NFIP NATIONWIDE IMPACT STATEMENT].

[258] *Id.* at 1-17.

[259] 44 C.F.R. § 60.3.

[260] *Id.* § 60.3(a)(3), (b)(2), (c)(1), (e)(1).

federal criteria also require new and substantially improved buildings to be elevated such that some or all floors are at or above the BFE.[261] Other building-scale requirements include adequate drainage of building sites, subdivisions, and manufactured home parks[262] and the collection and maintenance of data regarding the design and construction of new and improved structures.[263]

Whatever Congress meant by its direction to FEMA to adopt criteria that, "to the maximum extent feasible . . . constrict the development of land which is exposed to flood damage where appropriate," it certainly did not mean to allow the development of all areas exposed to flood hazards except land below the mean high tide line and the central portion of a riverine floodplain needed to carry the deeper, faster-moving water of a 100-year flood. Such an expansive reading of "where appropriate" disregards the legislative directive to adopt criteria that constrict existing floodplain development "where appropriate" to the "maximum extent feasible" and ignores the directive to develop criteria that, also to the maximum extent feasible, "guide the development of proposed construction away from locations which are threatened by flood hazards"—a directive that is not qualified by "where appropriate."[264]

III. FEMA'S AUTHORITY TO PROMULGATE FLOOD ZONING CRITERIA

FEMA has characterized limiting development of flood hazard areas as an "ancillary" purpose of the NFIA and has suggested that the agency lacks the "land use authority" needed to even influence local regulation of land uses in the nation's floodplains.[265] The agency's narrow interpretation of the NFIA's objectives and denunciation of its authority, however, ignores its (exceedingly)[266] clear statutory mandate[267] and rests on the erroneous premise that it would need "land use authority" to promulgate federal criteria that encourage state and local governments to limit floodplain development.[268]

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[261] *See, e.g., id.* § 60.3(b)(8) (elevation of manufactured homes), 60.3(c)(6) (same), 60.3(c)(12) (same), 60.3(c)(2)–(c)(3) (elevation of residential and non-residential structures in A1–30, AE and AH zones), (e)(4) (elevation of structures in V zones).

[262] *Id.* §§ 60.3(a)(3) (building sites), and (a)(4) (subdivisions and manufactured home parks).

[263] *See, e.g., id.* § 60.3(e)(2) (requiring community to obtain and maintain data on design and elevation of structures in V zones).

[264] Pub. L. No. 90-448, § 1361(c), 82 Stat. 587 (codified at 42 U.S.C. § 4102).

[265] NFIP NATIONWIDE IMPACT STATEMENT, *supra* note 257, at 1-3, 1-7.

[266] The "exceedingly clear statement" rule invoked by *EPA v. Sackett* to shrink the jurisdiction of the Clean Water Act does not appear to applicable to the NFIA, but the possibility certainly exists that courts may respond to *Sackett's* rhetoric by stretching the rule to encompass even a voluntary federal benefits program. *See Sackett v. EPA*, 598 U.S. 651 (2023); *infra* Section III.B.

[267] *See infra* Section III.A (analyzing FEMA's contention that the Act's purpose of promoting managed retreat is secondary and ancillary to its purpose of providing flood insurance).

[268] *See infra* Section III.B (analyzing FEMA's police power argument).

A. THE HEART OF THE NFIA: TRANSFORMATION OF LOCAL FLOODPLAIN LAND USE MANAGEMENT

As a matter of statutory interpretation, the text, context, and history of the NFIA clearly evince Congress's intent to use federally subsidized flood insurance and other federal benefits as a means toward an end—namely, limiting the people, structures, and infrastructure exposed to flood hazards and preserving and restoring the natural functions of floodplains.[269] In enacting the NFIA, Congress enumerated several objectives of the Act, including providing floodplain residents with flood insurance and encouraging the communities in which they live to manage land uses to minimize the community's exposure to flood hazards.

> (d) It is . . . the purpose of this chapter to (1) authorize a flood insurance program . . . and (2) provide flexibility in the program so that such flood insurance may be based on workable methods of pooling risks, minimizing costs, and distributing burdens equitably among those who will be protected by flood insurance and the general public.
>
> (e) It is the further purpose of this chapter to (1) encourage State and local governments to make appropriate *land use* adjustments to constrict the development of land which is exposed to flood damage and minimize damage caused by flood losses, (2) guide the development of proposed future construction, where practicable, away from locations which are threatened by flood hazards . . . and (5) authorize continuing studies of flood hazards in order to provide for a constant reappraisal of the flood insurance program and its *effect on land use requirements*.[270]

FEMA's claim that the Act's objective of encouraging land use adjustments is ancillary relies almost entirely on these two paragraphs of section 1302 of the Act. Specifically, FEMA points to the following as support for this assertion: the list order of the stated purposes, the inclusion of the word "further" before the word "purpose" in section 1302(e), Congress's use of the word "encourage" as opposed to a word like "require," and the fact that significantly more of the text of the NFIA is devoted to the insurance side of the program.[271] Based on these observations alone, FEMA concluded that "[t]he primary purpose and objective of the NFIP is to provide flood insurance,"[272] "the NFIP is first and foremost a program for the provision of flood insurance,"[273] and "a secondary purpose of the NFIP is to undertake a unified program for floodplain management with the purpose of

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[269] *See* REPORT OF THE COMM. ON BANKING AND CURRENCY ON THE NATIONAL FLOOD INSURANCE ACT OF 1967, 90TH CONG., S. REP. NO. 549, at 14 (Aug. 29, 1967) (explaining the structure and operation of the Act and stating that subsidized flood insurance "should be viewed as part of a program of land use adjustment, aimed at ultimate reduction in the exposure to flood hazard").

[270] Pub. L. No. 90-448, § 1302(d)–1302(e), 82 Stat.573 (codified at 42 U.S.C. § 4001(e)–4001(d)) (emphasis added).

[271] NFIP, NATIONWIDE IMPACT STATEMENT, *supra* note 257, at 1-2.

[272] *Id.* at 1-1.

[273] *Id.* at 1-2.

encouraging sound land use practices related to the minimization of damages caused by flood losses."[274]

In addition to drawing meaning not conveyed by the text of sections 1302(d) and (e), this argument omits other relevant provisions of section 1302 and fails entirely to consider the statutory objectives set forth in the next section of the Act (§ 4002 as codified in the U.S. Code).[275] For example, section 1302(c) (which I might note precedes section 1302(d))[276] confirms the integral nature of the floodplain land use management side of the program, finding that encouraging land use management that limits floodplain development is a means by which the flood insurance side of the program will promote the public interest:

> The Congress further finds that (1) a program of flood insurance can promote the public interest by providing appropriate protection against the perils of flood losses *and encouraging sound land use by minimizing exposure of property to flood losses*; and (2) the objectives of a flood insurance program should be *integrally related to a unified national program for flood plain management* .[277]

The Senate Report, which described the findings and declarations of purpose in the part of the bill that would become § 4001, also confirmed that "a critical ingredient of [a flood insurance] program will be the encouragement of State and local governments to adopt land use regulations to govern the development of land exposed to flood damage."[278] This analysis also characterized the creation of a unified national program for floodplain management as mandatory.[279]

Congress set forth additional findings and legislative objectives in § 4002, which it added to the statutory scheme in 1973.[280] This section begins by finding that floodplain development is the key driver of the rapidly rising cost of floods and the availability of federal financial assistance, including flood insurance and federally backed loans, frustrates the purpose of the federal program by contributing to floodplain development.

> (a) The Congress finds that—
>
> (1) annual losses throughout the Nation from floods and mudslides are increasing at an alarming rate, largely as a result of the accelerating development of, and concentration of population in, areas of flood and mudslide hazards;

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[274] *Id.*

[275] Flood Disaster Protection Act of 1973, Pub. L. No. 93-234, § 2, Dec. 31, 1973, 87 Stat. 975 (codified at 42 U.S.C. § 4002).

[276] I make this point somewhat tongue-in-cheek in response to the meaning FEMA appeared to derive from the list order of U.S.C. § 4001(d) and (e).

[277] 42 U.S.C. § 4001(c).

[278] S. Rep. No. 90-549, at 14 (1967). *See also infra* notes 303–305 and accompanying text (analyzing other provisions of this report).

[279] S. Rep. No. 90-549, at 14 (1967).

[280] Flood Disaster Protection Act of 1973, Pub. L. 93-234, § 2, 87 Stat. at 975 (codified at 42 U.S.C. § 4002).

> (2) the availability of Federal loans, grants, guaranties, insurance, and other forms of financial assistance are often determining factors in the utilization of land and the location and construction of public and of private industrial, commercial, and residential facilities;
>
> (3) property acquired or constructed with grants or other Federal assistance may be exposed to risk of loss through floods, thus frustrating the purpose for which such assistance was extended . . . .[281]

Based on these findings, § 4002 reiterates that the objectives of the Act include "requir[ing] States or local communities, *as a condition of future Federal financial assistance*, to participate in the flood insurance program and to adopt adequate floodplain ordinances with effective enforcement provisions consistent with Federal standards to reduce or avoid future flood losses."[282]

The NFIA is also clear about how the agency is to administer the Act to achieve the objectives identified in §§ 4001 and 4002. To determine what constitutes "adequate" and "effective" floodplain ordinances, the NFIA directs FEMA to study "the adequacy of State and local measures in flood-prone areas as to *land management and use* . . . [and] flood *zoning*,"[283] including state and local "laws, regulations, or ordinances relating to encroachments and obstructions on stream channels and floodways, the orderly *development and use* of flood plains of rivers or streams, floodway encroachment lines, and *flood plain zoning*, building codes, building permits, and *subdivision* or other building restrictions."[284] The Act then directs the agency to use these assessments to develop "comprehensive criteria" designed to encourage state and local adoption of laws that, "to the maximum extent feasible," will "constrict the *development of land*" and "*guide the development of proposed construction* away from *locations* . . . threatened by flood hazards," "assist in reducing damage caused by floods," and "otherwise improve the *long-range land management and use* of flood-prone areas."[285]

This statutory text clearly communicates Congress's intent to use the criteria to influence local regulation of land uses in flood hazard areas. When drafting the NFIA, Congress was aware that land use laws, including zoning and subdivision ordinances, are the principal legal mechanisms for managing the location of land uses and improving long-range land management and use.[286] In describing the

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[281] 42 U.S.C. § 4002(a).

[282] *Id.* § 4002(b) (emphasis added).

[283] Pub. L. No. 90-448, § 1361(a), (c), 82 Stat.587 (emphasis added); *see also supra* Section II.B (regarding required studies and objectives of minimum criteria).

[284] Pub. L. No. 90-448, §1361(b), 82 Stat. at 587 (emphasis added).

[285] *Id.* § 1361(c), 82 Stat. at 587.

[286] *See, e.g.,* TASK FORCE REPORT (1966), *supra* note 173, at 25 ("Although the Federal agencies can exercise direct control over Federal installations in the flood plain, the far greater number of decisions affecting new development are made by private individuals and corporations within the limits set by State and local plans and regulations."); *id.* (recognizing that federal mechanisms like occupancy charges for influencing floodplain development would be constrained by state and local laws and policies including "land use regulations and plans," "financing conditions," and "the layout of utilities planned by local agencies"); *see also* Johnson, *supra* note 173.

objectives of the Act and how they were to be achieved, Congress chose to focus on constricting and limiting the development of locations exposed to flood hazards. It deliberately chose to direct FEMA to study "State and local measures in flood-prone areas as to land management and use[,] . . . flood zoning," and "subdivision" ordinances, and it repeatedly referenced "land uses," "management of land uses," and "development" of "land."[287]

These instructions also leave no room for interpreting the use of the word "encourage" to mean the agency can opt to omit development limitations from the program's eligibility criteria and relegate them to entirely optional parts of the program.[288] Rather, the statutory text unambiguously instructs FEMA, after studying the adequacy and effectiveness of state and local management of floodplain land uses, to develop "criteria" that incentivize communities to amend their land use regulations to limit floodplain development. This reference to "criteria" undoubtably refers to the program eligibility criteria, as these are the only criteria referenced throughout the entire statutory scheme and its legislative history.

These textual choices are consistent with the integrated three-part structure of the Act[289] and its legislative and statutory history, each of which reflects Congress's clear intent that the Act shift the paradigm of the national flood program from the accommodation of development to floodplain avoidance and managed retreat. In a letter transmitting the Task Force Report to Congress, President Lyndon Johnson urged Congress to address the maladaptive development of the nation's floodplains, explaining that doing so was the only way Congress could decrease the costs of floods and preserve floodplains for their flood mitigation and "recreation and wildlife purposes."[290] Thus, Johnson wrote that "[t]he key to resolving the problem lies, above all else, in the intelligent planning for and State and local regulation of [the] use of lands exposed to flood hazard[s]."[291]

The Floodplain Task Force reported that the drafting of the NFIA asserted that all levels of the government shared responsibility for contributing to

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[287] Pub. L. No. 90-448 § 1361, 82 Stat. at 587.

[288] *See infra* notes 484 and 506–524 and accompanying text (discussing voluntary Community Rating Program that provides incentives unrelated to program eligibility to exceed the federal criteria, including by limiting development of the floodplain). In addition to the CRS program, 44 C.F.R. §§ 60.21–26 sets forth standards that communities are required to evaluate but are not required to adopt for program eligibility. *See, e.g.*, § 60.22(a) (suggesting that community flood plain management regulations "[p]ermit only that development of flood-prone areas which (i) is appropriate in light of the probability of flood damage and the need to reduce flood losses, (ii) is an acceptable social and economic use of the land in relation to the hazards involved, and (iii) does not increase the danger to human life"); § 60.22(c)(1) (suggesting that "in adopting flood plain management regulations, each community shall consider . . . [h]uman safety; . . . [d]iversion of development to areas safe from flooding in light of the need to reduce flood damages and in light of the need to prevent environmentally incompatible flood plain use; . . . [and a]dverse effects of flood plain development on existing development").

[289] *See supra* Section II.B (describing integrated three-part structure consisting of insurance, mapping, and land use criteria).

[290] Johnson, *supra* note 173; *see also* TASK FORCE REPORT (1966), *supra* note 173, at 25.

[291] Johnson, *supra* note 173.

widespread floodplain development and were essential to reform of the nation's maladaptive flood policy. The report recognized land use control as an essential, retained power of the states and—to the extent state and local governments "sanction[ed] unfettered flood plain development"—that they shared responsibility for the resulting flood damages.[292] But the states did not act alone. Federal flood and disaster policy "unintentionally nurture[d] apathy with respect to the most economic solutions for avoiding or abating flood damages."[293] For the Task Force, guiding new development away from, and controlling existing land uses in, flood-prone areas was instrumental to the most economical solution.[294]

Ultimately, Congress, President Johnson, and the Task Force saw this paradigm shift to prioritizing adaptive land use regulation in federal flood policy as necessary to "bring[] the moral, legal, and fiscal responsibilities of all parties involved into effective alinement."[295]

> In its concern for the general welfare, the Federal Government has a proper interest in measures to hold flood damages to an economic minimum. It has a responsibility to discourage flood plain development which would impose a later burden on the Federal taxpayer, which would benefit some only at the expense of others, and which would victimize unsuspecting citizens. It does not follow, however, that the Federal Government should be held solely responsible for [the] success of a program *to make wise use of flood plains*. Attempts to resolve the problem of rising flood losses within the framework of the Nation's traditional value system should focus on promoting sound investment decisions by individuals, local governments, and States.[296]

By requiring property owners to pay flood insurance premiums, property owners bore some of the cost of their decision to reside in flood hazard areas—in contrast to the pre-NFIA system of federally funded flood prevention infrastructure coupled with federally funded disaster relief.[297] The federal government shared in the cost through its administration of the program and provision of flood insurance to properties that would otherwise be uninsurable.[298] The NFIA shifted significant responsibility for maladaptive floodplain development to state and local governments by making program participation contingent on the adoption of zoning practices that restrict future floodplain development.[299]

The Johnson administration and Congress were also keenly aware that economic support for residents of floodplains would have the perverse effect of encouraging floodplain occupation.

> To the extent that new flood plain occupance is subsidized by indemnities or protection at less than cost, greater use of flood plains is encouraged than is

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[292] *Id.* at 14.
[293] *Id.*
[294] *Id.*
[295] *Id.* at 15.
[296] *Id.* (emphasis added).
[297] *Id.*
[298] *Id.*
[299] *Id.*

> warranted by the economies of flood plain location. The effect of subsidy is to start a round of unwarranted investment. Damage potential is needlessly increased. Unnecessary losses accumulate. Then, if the development is to be salvaged, further subsidy is required . . . .
>
> [N]o matter how great a subsidy might be made, it could never be sufficient to offset the tragic personal consequences which would follow enticement of the population into hazard areas . . . . [T]o the extent that insurance were used to subsidize new capital investment, it would aggravate flood damages and constitute gross public irresponsibility.[300]

This acute moral and fiscal hazard is precisely what motivated Congress to make program participation contingent on the adoption of flood zoning that constricted and guided development away from flood hazard areas. As the Task Force cautioned, the new federal policy would be morally tenable only if it "discourage[d] needless occupation of hazard areas."[301]

This sentiment was expressed repeatedly throughout the legislative history of the NFIA and is reflected in the integrated structure of the program the law attempted to create.[302] For example, the Senate Report that accompanied the introduction of Senate Bill 1985, which ultimately became the NFIA, explained that encouraging state and local adoption of land use controls to restrict development of land exposed to flood hazards was "a most important public purpose" of the Act.

> S. 1985 would authorize a national program under which flood insurance can be made available to occupants of flood-prone areas . . . . A most important public purpose which the program will serve will be to encourage State and local governments to adopt and enforce appropriate *land use provisions to restrict future development of land which is exposed to flood hazard* . . . . The program will expand, as additional areas with special flood hazards are identified, actuarial rates required in these areas are determined, and *as appropriate land use controls are adopted*.[303]

FEMA's characterization of the NFIA's mandate that it promulgate minimum criteria—which, when implemented by participating communities, constrict and limit development in flood hazard areas as "ancillary"—fails to account for this and many other references throughout the legislative history to this aspect of the law as essential. For example, the Senate Report also explained that the NFIA has "[t]he twin objectives" of providing a financial safety net to existing floodplain residents and "minimiz[ing] the future risk of flood losses in locations and situations where the risk of loss exceeds the prospect of gain from use of the

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[300] TASK FORCE REPORT (1966), *supra* note 173, at 16–18.

[301] *Id.* at 16.

[302] *See supra* Section II.B (discussing three-part integrated structure of NFIA flood program).

[303] S. Rep. No. 90-549, at 1–2 (1967) (emphasis added). *See also id.* at 11 (describing the bill as containing four titles, one of which pertains to "coordination of flood insurance with *land* management programs in flood-prone areas") (emphasis added).

site."[304] To this end, the report emphasized that managing the use of floodplain lands is by no means an ancillary feature of the statutory scheme, explaining that this feature is directed at local land use planning, zoning, and other regulations of the location and intensity of development.

> Achieving a sensible *use* of flood-prone lands is equally as important as indemnification of loss. This requires farsighted *land use planning and control*. *Zoning of land against occupancy, or against certain kinds of uses* is one mechanism for achieving this aim; building codes, which establish mandatory requirements for methods of building construction, are another means of keeping flood damages down; health regulations, *to avoid occupancy* of areas subject to frequent overflow and threats to health as a result, are another; and *reluctance to approve subdivision proposals* in doubtful flood-prone areas may be another.[305]

The Senate Report's section-by-section analysis of the bill further confirms Congress's intent to make program eligibility contingent on state or local adoption of hazard avoidance- and retreat-oriented land use regulations. The report describes the program's eligibility conditions as requiring adoption by states and local governments of "permanent land use and control measures,"[306] explaining that section 112 provides that "no new flood insurance coverage (including renewals) will be provided in any area unless an appropriate public body had [sic] adopted permanent land use and control measures . . . consistent with the comprehensive criteria for land management and use prescribed under section 302."[307] Complementing section 112, section 113 "[p]rohibits any new flood insurance (including renewals) for propert[ies] which violate[] State or local laws, regulations, or ordinances which are intended to discourage or otherwise restrict land development or occupancy in flood-prone areas."[308] The Report describes section 302 as authorizing the implementing agency to "develop comprehensive criteria" to encourage state and local adoption of permanent measures that will "improve the long-range management and use of flood-prone areas, and inhibit, to the maximum extent feasible, unplanned and economically unjustifiable future development in such areas."[309]

Consistent with this legislative history, the agency implementing the NFIP submitted a report to the President in 1976 that described the "collective purposes" of NFIA and "the closely related Flood Disaster Protection Act of 1973 (P.L. 93-234)" as including an "emphas[is on] local flood plain regulation to reduce flood losses."[310] To achieve this, the report specified that the federal criteria should encourage states to coordinate floodplain planning and floodplain land use regulation and "assure that State and local planning takes proper and consistent

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[304] *Id.* at 5–6.
[305] *Id.* at 6 (emphasis added).
[306] *Id.* at 15.
[307] *Id.*
[308] *Id.*
[309] *Id.* at 24.
[310] U.S. WATER RES. COUNCIL, *supra* note 21, at V-5.

account of flood hazard[s]."[311] This vision of the land use criteria as an essential feature of the federal program stretched back to the Truman administration's initial conceptualization of a federal flood insurance program, which recognized that "[i]ndiscriminate development and settlement on natural flood plains constitute a policy of doubtful wisdom."[312]

> Overriding and constituting one of the most essential parts of flood management would be the setting of standards by states and river communities through zoning or otherwise, for the use of flood plains, for activities and purposes such that inundations would come and go with a minimum of damage or dislocation.[313]

Indeed, for the decade leading up to and the decade following the NFIA's passage, one theme remained consistent throughout the congressional and administrative record: "[u]nder a unified flood-management approach we would recognize[] at all times the hazards of flood-plain occupancy and take the many steps necessary and essential to lessen the hazard."[314] FEMA's pronouncement that the purpose of the NFIA was, first and foremost, to provide flood insurance and its characterization of the land use aspects of the statutory scheme as secondary, and apparently optional, simply finds no support in the text of the statute or its legislative and administrative history.

B. FEDERAL LAND USE CRITERIA AND THE POLICE POWER

FEMA also erroneously suggested in 2017 that its promulgation of federal criteria that encourage limiting floodplain development would entail an invalid exercise of the states' reserved police power.[315] "Police power" refers to the sovereign authority to adopt and enforce laws for the public health, safety and welfare.[316] Police power laws include zoning ordinances, subdivision regulations, floodplain ordinances, and building codes.[317] The sovereign authority to adopt and enforce these and other police power laws is reserved by the U.S. Constitution to the states and the people,[318] and every state has delegated the authority to adopt and

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[311] *Id.* at V-4.

[312] William G. Hoyt & Walter V. Langbein, *Flood Management Through Zoning, Insurance, and Forecasting*, *in* TASK FORCE REPORT (1955), *supra* note 176, at 1253.

[313] *Id.* at 1252.

[314] *Id.*

[315] NFIP, NATIONWIDE IMPACT STATEMENT, *supra* note 257, at 1–7.

[316] Berman v. Parker, 348 U.S. 26, 32–33 (1954) ("Public safety, public health, morality, peace and quiet, law and order—these are some of the more conspicuous examples of the traditional application of the police power to municipal affairs. Yet they merely illustrate the scope of the power and do not delimit it.").

[317] PATRICIA E. SALKIN, 1 AMERICAN LAW OF ZONING § 2:1 (5th ed., Nov. 2024 update) (land use laws); 3 MATTHEWS MUNICIPAL ORDINANCES § 44:18.50 (3d ed., Mar. 2025 update) (floodplain management regulations).

[318] U.S. CONST. amend. X.

enforce land use laws and other police power laws to at least some of its sub-state units of government.[319]

FEMA is correct in that federal floodplain management criteria that condition NFIP participation on a community's adoption and enforcement of land use laws that limit floodplain development will likely influence how state or local governments exercise their police powers. But FEMA's suggestion that federal flood zoning criteria would unconstitutionally invade these reserved powers fails to recognize that the federal criteria are not police power regulations but rather are the eligibility criteria for a federal benefits program.[320]

As such, the criteria are not mandates.[321] Notwithstanding some commentators' characterization of program participation in SFHAs as mandatory in light of the severe consequences of not participating,[322] the coercive power of civil or criminal penalties is absent.[323] Nor are the "consequences" of non-participation the loss of entitlements. State and local governments voluntarily comply with the criteria as a precondition to receiving valuable privileges, including access to federal flood insurance and eligibility for federally backed mortgages on properties located in flood hazard areas.[324] Even in communities that choose to participate, FEMA does not gain the power to require or approve permits, inspect properties, or cite violators,[325] although the program gives FEMA authority to audit communities' continuing compliance with the conditions of program eligibility.[326]

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[319] SALKIN, *supra* note 317, at § 2:5.

[320] NFIP Nationwide Programmatic Environmental Impact Statement, Notice, 82 Fed. Reg. 17,023, 17,023 (Apr. 7, 2017) ("The NFIP is a voluntary Federal program through which property owners in participating communities can purchase Federal flood insurance as a protection against flood losses. In exchange, communities must enact local floodplain management regulations to reduce flood risk and flood-related damages.").

[321] *See supra* Section II.B. (describing how the NFIA structured the NFIP); 34 Fed. Reg. 9553, 9554 (June 18, 1969) (first rules adopted to implement NFIA describing NFIP as a federal benefits program).

[322] *See infra* note 212 (citing example).

[323] *Compare* Nat'l Wildlife Fed'n v. Fed. Emergency Mgmt. Agency, 345 F. Supp. 2d 1151, 1156 (W.D. Wash. 2004) (observing that communities participate in NFIP voluntarily), *with* Sackett v. Env't Prot. Agency, 598 U.S. 651, 660–61 (2023) (justifying application of exceedingly clear statement rule in part on "severe criminal penalties" with low mens rea and civil penalties "nearly as crushing as their criminal counterparts"). Note, however, that some commentators characterize program participation as mandatory considering the severe consequences of not participating.

[324] Adolph v. Fed. Emergency Mgmt. Agency, 854 F.2d 732, 735–36 & 738 n.7 (5th Cir. 1988); *id.* at 735 ("By conditioning the availability of federally subsidized insurance upon enactment of local flood-plain management ordinances in accordance with federal standards, the NFIP represents a voluntary federal program."); *see also infra* notes 213–217 (regarding federal benefits of NFIP participation).

[325] *Compare* 82 Fed. Reg. 17023 (Apr. 7, 2017) (describing FEMA as having no land use law authority or direct involvement in land use law administration), *with Sackett*, 598 U.S. at 660–61.

[326] 42 U.S.C. § 4012; 44 C.F.R. § 59.22.

Courts have recognized that the powerful nature of the program's incentives does not transform the voluntary program into a mandatory one.[327] Consistent with this, FEMA has recognized that its administration of the NFIP does not entail an exercise of the police power, albeit while simultaneously arguing that influencing floodplain development would be an invalid exercise of the police power:

> [T]he power to regulate floodplain development, including requiring and approving permits, establishing permitting requirements, inspecting property, and citing violations, requires land use authority. The regulation of land use falls under the State's police powers, which the Constitution reserves to the States, and the States delegate this power down to their respective political subdivisions. FEMA has no direct involvement in the administration of local floodplain management ordinances or in the permitting process for development in the floodplain.[328]

Thus, whether the floodplain management criteria continue to focus myopically on building-scale resilience or FEMA amends the criteria to encourage constriction and limitation of floodplain development as required by the NFIA, the minimum criteria are hortatory. As such, the criteria do not have the compulsory power necessary to supersede state or local land use laws.[329] Their power lies not in their compulsory nature but in their persuasive nature—that is, in the desirability of the federal benefits that are only available to communities that elect to participate in the NFIP.

The Supreme Court has long recognized that leveraging federal benefits to incentivize sub-federal action is a legitimate way for the federal government to address problems of national importance that the states, acting independently, cannot effectively address[330]—which is precisely the justification invoked by

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[327] *See Adolph*, 854 F.2d at 736 (holding that NFIP is not unconstitutionally coercive, does not impose the minimum criteria on the states, and cannot therefore affect a taking); Texas Landowners Rts. Ass'n v. Harris, 453 F. Supp. 1025 (D.D.C. 1978) (same).

[328] 82 Fed. Reg. 17023 (Apr. 7, 2017). FEMA made this statement in the context of its argument that the NFIP does not affect floodplain development and thus should not be subject to jeopardy consultations based on the threat to listed species from floodplain development. *Id.* The fact that FEMA is not exercising the police power to directly regulate local land uses misses the point. *See infra* note 391 (citing government report and cases rejecting this argument).

[329] Although the NFIA does not preempt state or local land use authority, it is worth noting that the Supreme Court has upheld federal statutes that partially and fully preempt local land use authority. *See* John R. Nolon, *Historical Overview of the American Land Use System: A Diagnostic Approach to Evaluating Governmental Land Use Control*, 23 PACE ENV'T. L. REV. 821, 840–41 (2006) (discussing and citing cases recognizing partial or full preemption of local land use authority by the Federal Aviation Act of 1958, 49 U.S.C. § 40101; Fair Housing Act, 42 U.S.C. § 3604; Telecommunications Act of 1996, 47 U.S.C. § 377; and Religious Land Use and Incarcerated Persons Act, 42 U.S.C. § 2000cc).

[330] *See, e.g.*, Oklahoma v. U.S. Civ. Serv. Comm'n, 330 U.S. 127, 144 (1947) ("The offer of benefits to a state by the United States dependent upon cooperation by the state with federal plans, assumedly for the general welfare, is not unusual."); *id.* at 144 n.20 (citing examples); South Dakota v. Dole, 483 U.S. 203, 210 (1987) (holding that conditioning federal highway funds on state setting minimum drinking age of 21 did not infringe on states' authority over alcohol

Congress throughout its long history of enacting flood control legislation.[331] Referring to the need to enact legislation that would effectively encourage states to limit development in floodplains, President Johnson wrote to then-Speaker of the House, John McCormack: "[t]he Federal interest in this matter is beyond doubt."[332]

As with other federal benefits programs,[333] FEMA's administration of the NFIA to influence state and local governments to use their land use authority to center hazard area avoidance and managed retreat would not entail federal regulation of land uses pursuant to the police power. The Coastal Zone Management Act of 1972[334] ("CZMA") provides a particularly cogent example of a federal statutory scheme that Congress enacted pursuant to its interstate commerce powers in response to the inability of state and local governments to "exercise their full [police power] authority" to manage coastal land and water uses sustainably.[335] Like the NFIA, the CZMA encourages state and local governments to comprehensively manage land and water uses within their coastal zones consistent with the federal policies set forth in the Act.[336] Both Acts were born from joint efforts by the federal executive and legislative branches to respond to a national crisis. In the case of the CZMA, Congress was concerned that "burgeoning populations congregating in ever larger urban systems" in coastal areas were "creating growing demands for commercial, residential, recreational, and other development, often at the expense of natural values that include some of the most productive areas found anywhere on earth" and leading to "extensive degradation of highly productive estuaries and marshlands."[337]

The CZMA, like the NFIA, responded to the crisis with a federal program designed to address the institutional conundrum in which the governmental entities with the greatest potential to address the crisis lacked the capacity to do so.[338] Congress understood that the degradation of the nation's coastal resources could most effectively be addressed through comprehensive land use planning and land use regulations, which state and local governments adopt pursuant to their reserved

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guaranteed by the Twenty-first Amendment to the U.S. Constitution); *see also* Fullilove v. Klutznick, 448 U.S. 448, 474 (1980) ("Congress has frequently employed the Spending Power to further broad policy objectives by conditioning receipt of federal moneys upon compliance by the recipient with federal statutory and administrative directives. This Court has repeatedly upheld against constitutional challenge the use of this technique to induce governments and private parties to cooperate voluntarily with federal policy.").

[331] *See infra* Section II.A.

[332] Johnson, *supra* note 173 (transmitting TASK FORCE REPORT (1966), *supra* note 173).

[333] *See infra* notes 334–352 and accompanying text (analyzing parallels between NFIP and other federal benefits programs).

[334] 16 U.S.C. §§ 1451–64.

[335] *Id.* § 1451.

[336] *Id.*

[337] S. Rep. No. 92-753, at 1 (1972), *as reprinted in* 1972 U.S.C.C.A.N. 4776.

[338] *See* Miller, *supra* note 41 (analyzing institutional conundrum); Norfolk S. Corp. v. Oberly, 822 F.2d 388, 395 (3d Cir. 1987) ("The CZMA's legislative history reinforces the conclusion that Congress viewed the CZMA as a grant-in-aid statute intended to encourage and assist states in the task of developing and implementing statewide coastal zone management programs.").

police power authority.[339] In designing the shared vertical governance structure of the CZMA, Congress appreciated both that state and local governments were not effectively managing coastal land uses[340] and that states have sovereign authority over the lands and near-shore waters of the nation's coastal areas.[341] Congress further appreciated that local governments are uniquely equipped to manage land uses because effective land use management typically is preceded by participatory local planning processes intended to facilitate incorporation of local knowledge, values, and conditions into land use regulations.[342]

Like the NFIA, the CZMA uses powerful incentives to influence the contents of state and local coastal land use plans, zoning, and other police power laws to further federal objectives.[343] When the Secretary of Commerce approves a state coastal management plan as consistent with the federal policies set forth in the CZMA, the state qualifies for grants and other assistance[344] and obtains a kind of reverse supremacy whereby federal actions that affect the state's coastal zone must be consistent with the "enforceable policies" (i.e., laws) in the state's coastal management plan.[345] Notwithstanding this intrusion into "the core of traditional state authority,"[346] the CZMA's incentives to participate in the program are so powerful that all thirty eligible coastal states had federally approved coastal management plans within three years of the law's enactment and, except for Alaska, all eligible coastal states continue to participate in the program.[347]

The Coastal Barrier Resource Protection Act of 1982 ("CBRA")[348] also responded to the institutional conundrum that arises from the need to guide development away from flood hazard areas. Congress passed the CBRA in response to the rapid development of the biologically rich and ecologically sensitive barrier islands that protect the Atlantic, Gulf, and Great Lakes coastlines, Puerto Rico, and the Virgin Islands.[349] Rather than providing powerful incentives to encourage state and local development restrictions, the Act targets the NFIP's role in exacerbating

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[339] PATRICIA E. SALKIN, 4 AMERICAN LAW OF ZONING § 36A:2 (5th ed., May 2024 update).

[340] S. Rep. No. 92-753, at 1.

[341] The states have primary authority over their nearshore waters and the lands beneath them, but the federal government has overlapping authority over coastal waters. SALKIN, *supra* note 339, § 36A:2.

[342] S. Rep. No. 92-753, at 1.

[343] Daniel R. Mandelker & Thea A. Sherry, *The National Coastal Zone Management Act of 1972*, 7 URB. L. ANN. 119, 136 (1974) (concluding that the CZMA "represents the first national effort, through congressional initiative, to bring about a re-allocation of these land use control powers" from local governments back to the states).

[344] 16 U.S.C. §§ 1456a–1456d, 1455, 1455a.

[345] *Id.* § 1456.

[346] Sackett v. Env't Prot. Agency, 598 U.S. 651, 679 (2023).

[347] David T. Deal, Thomas A. Nelson, Jr., Jerry L. Haggard & Thomas W. Houghton, *Public Lands and Land Use Committee*, 9 NAT. RES. LAW. 304, 308 (1976). Except for Alaska, all coastal states still participate in the program. SALKIN, *supra* note 339, § 36A:11.

[348] Coastal Barrier Resources Act of 1982, (codified at 16 U.S.C. §§ 3501 to 3510).

[349] 16 U.S.C. § 3501.

the institutional conundrum.[350] Recognizing that the provision of federal flood insurance in the absence of development restrictions fueled the surge in barrier island development,[351] the CBRA limits the availability of federal flood insurance and other federal benefits that encourage the development of barrier islands.[352]

FEMA's contention that criteria focused on the location and intensity of floodplain development would unconstitutionally intrude on states' reserved police powers also fails to recognize that the current building-scale criteria already influence how participating communities exercise their police powers. State and local governments adopt and enforce floodplain ordinances and building codes pursuant to their police powers.[353] As such, participating communities already choose to limit their police power authority in exchange for the NFIP's valuable privileges.

Any assertion that FEMA lacks authority to influence local floodplain development is also contradicted by the direct influence the NFIP already has on land use management. Recall, for example, that although the existing federal criteria focus on building-scale resilience, two criteria at least purport to limit development in certain locations: the prohibition of development seaward of the mean high tide line and the qualified prohibition of development in the regulatory floodway.[354] Further illustrating the NFIP's reach into local zoning matters, the program regulations require participating communities to report all zoning variances to FEMA[355] and prohibit them from granting variances (i.e., exceptions to land use laws) that would relieve property owners from complying with floodplain regulations, even when applicants would otherwise satisfy the state or local criteria for a variance.[356] A municipality's issuance of a variance that, for example, allows a residence to be built with the bottom floor below the required elevation can result in increased flood insurance premium rates for the affected property and can threaten the entire community's program eligibility.[357] The NFIP also limits the right of municipalities to interpret their floodplain regulations,[358] which FEMA recognizes include "zoning . . . and subdivision regulations"[359] and other "applications of [the] police power."[360] FEMA has also consistently

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[350] *Id.* § 3504 (limiting federal expenditures including NFIP).

[351] *Id.* § 3501 (finding "certain actions and programs of the Federal Government have subsidized and permitted development on coastal barriers and the result has been the loss of barrier resources, threats to human life, health, and property, and the expenditure of millions of tax dollars each year").

[352] *Id.*; *see generally* Deal et al., *supra* note 347.

[353] 3 MATTHEWS MUNICIPAL ORDINANCES, *supra* note 317, § 44:18.50.

[354] *See supra* Section II.C.

[355] RATHKOPF ET AL., *supra* note 253, § 7:30.

[356] *Id.*

[357] *Id.*

[358] *Id.*

[359] 44 C.F.R. §§ 59.1, 59.22(a)(3).

[360] *Id.* § 59.1 (providing that the term "floodplain regulation" includes "other applications of police power" and "such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction").

recognized that the NFIA requires participating communities to "take into account flood, mudslide (i.e., mudflow) and flood-related erosion hazards, to the extent that they are known, in all official actions relating to land management and use."[361] NFIP regulations also require participating communities to assure FEMA that their comprehensive land use plans are "consistent with the flood plain management objectives" of the NFIP[362] and their floodplain regulations supersede "any less restrictive conflicting local laws, ordinances or codes."[363] The granting of variances, official actions relating to land management and use, zoning and subdivision regulations, and comprehensive land use plans are all undertaken pursuant to the police power.[364] Additionally, even when a state's delegation of home rule authority would protect a municipality from state supersession of its zoning authority or a state law would not otherwise preempt local zoning law, the NFIP allows a state to step in and enforce state regulations that meet the federal criteria when a municipality fails to do so.[365]

Ultimately, amending the federal criteria to center hazard area avoidance and managed retreat is consistent with the text and intent of the NFIA and responsive to the overwhelming evidence that state and local governments lack the institutional capacity on their own to guide people out of harm's way. Critically, the federal criteria can be amended to incentivize local adoption of hazard avoidance and retreat strategies without usurping the local flexibility needed to meaningfully respond to the individual needs and values of the community, although the challenge of striking this balance should not be underestimated.

IV. CENTERING COMMUNITY RESILIENCE

Reform of the NFIP eligibility criteria is required to administer the flood program consistently with the primary objective of the NFIA: the reduction of economic, social, and environmental costs of floods, which Congress attributed to maladaptive floodplain development.[366] Amending the federal criteria to center hazard avoidance, managed retreat, and the preservation and restoration of the natural functions of floodplains also responds to the overwhelming evidence that FEMA's partial implementation of the NFIA not only missed an opportunity to increase state and local governments' institutional capacity to manage floodplain land uses adaptively but had the opposite effect.[367] Amending the NFIP eligibility criteria to include criteria that, when implemented by state and local governments, guide development away from flood hazard areas also aligns with principles of

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[361] *Id.* § 60.1(c).
[362] *Id.* § 60.2(g).
[363] *Id.* § 60.1(b).
[364] Sara C. Bronin & Dwight H. Merriam, *Nature and Operation of Zoning Ordinances—Implementation and Administration*, *in* RATHKOPF ET AL., *supra* note 253, § 1:3.
[365] RATHKOPF ET AL., *supra* note 253, § 7:30
[366] *See supra* Section II.B.
[367] *See infra* Section IV.A.

adaptive land use management.[368] These principles recognize both that hazard avoidance and managed retreat must be central features of most adaptive land use strategies[369] and that supra-local interventions are needed to help local governments overcome intractable barriers to adaptively managing land uses.[370]

Critically, these principles also urge that, notwithstanding the need for powerful supra-local interventions, adaptive land use management requires retention of the local flexibility needed to meaningfully respond to communities' local knowledge, individual needs, and values.[371] The NFIP eligibility criteria can be reformed to support both objectives.[372]

A. THE ENTRENCHMENT OF MALADAPTIVE FLOODPLAIN MANAGEMENT

Whether characterized as "sticky," "messy," or "super wicked,"[373] some policy problems persistently resist solutions. Maladaptive management of land uses in hazard areas is one such problem.[374] Various collective action problems,

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[368] *See infra* Section IV.B.

[369] *See infra* Section IV.B.

[370] *See infra* Adams, *supra* note 29 (forthcoming article asserting that supra-local interventions can help local governments overcome intractable barriers to the use of their broad zoning powers to adaptively manage land uses).

[371] *See infra* Section IV.B.

[372] *See infra* Sections IV.B–IV.C (proposing and analyzing a reform framework to strike this balance); *but see infra* Section IV.D (identifying and analyzing limits of reform of NFIP criteria to incorporate hazard avoidance and managed retreat); Adams, *supra* note 29 (forthcoming article analyzing practical, legal, and theoretical barriers to proposed NFIP reform)..

[373] *See* Jonathan M. Gilligan & Michael P. Vandenbergh, *Beyond Wickedness: Managing Complex Systems and Climate Change*, 73 VAND. L. REV. 1777, 1778–82 (2020) (identifying these and other terms in the policymaking literature); Horst W. J. Rittel & Melvin M. Webber, *Dilemmas in a General Theory of Planning*, 4 POL'Y SCI. 155, 160–69 (1973) (introducing wicked problem construct); Kelly Levin, Benjamin Cashore, Steven Bernstein & Graeme Auld, *Playing It Forward: Path Dependency, Progressive Incrementalism, and the "Super Wicked" Problem of Global Climate Change* 5–8 (June 3, 2010) [hereinafter Levin et al., *Playing It Forward*] (introducing super wicked construct); Kelly Levin, Benjamin Cashore, Steven Bernstein & Graeme Auld, *Overcoming the Tragedy of Super Wicked Problems: Constraining Our Future Selves to Ameliorate Global Climate Change*, 45 POL'Y SCI. 123, 124 (2012) [hereinafter Levin et al., *Overcoming the Tragedy of Super Wicked Problems*].

[374] Sarah J. Adams-Schoen, *Taming the Super Wicked Problem of Waterfront Hazard Mitigation Planning: The Role of Municipal Communication Strategies*, *in* CONTEMP. ISSUES IN CLIMATE CHANGE L. & POL'Y: ESSAYS INSPIRED BY THE IPCC 123, 136–37 (Robin Kundis Craig & Stephen R. Miller, eds., 2016) (applying the super-wicked construct to maladaptive development to coastal floodplains); Adams-Schoen, *supra* note 86, at 202–15 (analyzing features of maladaptive development of flood and wildfire hazard areas within the super-wicked construct); Jamison E. Colburn, *Retreat Alternatives in NEPA: A Tool for the Perplexed*, 33 J. ENV'T. L. & LITIG. 3, 27 (2018) ("land use planning in the . . . [wildland urban interface] has become a 'wicked' problem"); Blake Hudson, *Land Development: A Super-Wicked Environmental Problem*, 51 ARIZ. ST. L.J. 1124 (2019).

including inter-generational freeriding, also contribute to the stickiness of the maladaptive development problem.[375]

> Complicating collective action even further is the fact that, as detailed in Levin et al.'s definition of a super-wicked problem, the very people who have an interest in [preventing maladaptive development] also maintain countervailing interests since they too want affordable housing, strong local economies, jobs, and goods and services facilitated by land development.[376]

Ultimately, these constructs describe policy problems that require urgent resolution but remain intractable "even when the catastrophic implications of [failing to respond effectively] are far greater than any real or perceived benefits of inaction."[377]

I first identified maladaptive development of hazard areas as a super-wicked problem in 2016 and subsequently analyzed the capacity of state-local shared governance frameworks to move the needle toward the robust adaptation that is urgently needed.[378] Several other scholars have analyzed related attributes of maladaptive development that embody super-wickedness.[379] This scholarship analyzes the attributes of the maladaptive development problem that make it "highly resistant to resolution"[380] despite the existence of myriad land use regulatory strategies for adaptively managing development of flood hazard areas,[381] federal incentives to adopt these strategies,[382] and wide recognition of the increasingly dire need to proactively avoid new development of, and manage retreat from, flood hazard areas.[383] These analyses will not be repeated here.

Instead, this discussion focuses on the NFIP's role in further entrenching these and other attributes of the maladaptation problem. Congress ultimately succeeded in designing a flood program with federal benefits powerful enough to

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[375] *See* Adams-Schoen, *supra* note 86, at 202–15 (identifying and analyzing temporal free-riding problem that contributes to maladaptive development); Hudson, *supra* note 374, at 1138–39 (identifying three collective action problems that contribute to maladaptive development).

[376] Hudson, *supra* note 374, at 1138.

[377] Levin et al., *Overcoming the Tragedy of Super Wicked Problems*, *supra* note 373, at 124. Levin and colleagues theorized that super wicked problems like anthropogenic climate change are characterized by the key features of wicked problems plus additional features including those enumerated here. Levin et al., *Playing It Forward*, *supra* note 373, at 5–8. *See* Rittel & Webber, *supra* note 373, at 161–64 (identifying ten characteristics of wicked problems including: the problems are difficult to define, not entirely solvable, socially complex, and characterized by interdependencies that can result in conflicting goals for the various stakeholders).

[378] Adams-Schoen, *supra* note 374, at 136–37; Adams-Schoen, *supra* note 86, at 202–15.

[379] *See, e.g.*, Colburn, *supra* note 374; Hudson, *supra* note 374, at 1126–58.

[380] AUSTL. PUB. SERV. COMM'N, TACKLING WICKED PROBLEMS: A PUBLIC POLICY PERSPECTIVE iii (2007).

[381] *See supra* Section I.B (identifying regulatory managed retreat strategies); *infra* Sections IV.C & IV.D.3 (proposing NFIP reform to incorporate these strategies into the federal criteria).

[382] *See infra* notes 486 and 511–528 and accompanying text (discussing voluntary CRS program).

[383] *See supra* Section II.B (discussing historic recognition of urgent need to manage retreat from flood hazard areas); *infra* Section IV.B (discussing current recognition of same).

transform local floodplain management. Despite the nearly universal and unflinching localism norm with respect to the regulation of land use,[384] more than twenty-two thousand municipalities have adopted zoning and other floodplain regulations that meet or exceed the NFIP criteria,[385] thereby allowing more than five million properties in flood hazard areas to receive over $1.2 trillion in flood insurance coverage.[386] The result is that the NFIP has shaped state and local floodplain management in FEMA-identified flood hazard areas throughout the United States. In this way, the federal flood management program has been remarkably successful.

As discussed above, however, FEMA only partially implemented the NFIA.[387] Because FEMA promulgated criteria that almost exclusively accommodate floodplain development, the transformation of local floodplain management policies further entrenched development accommodation while failing to provide support for hazard area avoidance or managed retreat. Although protection and accommodation strategies—in particular, the increased structural integrity of buildings constructed according to the NFIP's building-scale criteria—have somewhat offset the costs of floods,[388] the program's success in decreasing the damage rate to individual structures does not account for the economic, social, and environmental consequences of the program's facilitation of intensive development of the nation's floodplains[389] combined with climate-change-driven increases in the frequency and magnitude of floods.[390]

Rather, the partial solution of the NFIP as implemented by FEMA—i.e., the combination of federal flood insurance, access to other forms of federal financial assistance, and federal criteria that accommodate development in even the highest risk flood hazard areas—facilitated development that placed millions of people and trillions of dollars of assets in high-risk flood areas and contributed to (1) the degradation of flood-mitigating and carbon-sequestering natural areas and (2) the substantial and steady increase over time of the cost of flood disasters.[391] Following

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[384] *See supra* Section III.B.

[385] GAO-17-425, *supra* note 143, at 40.

[386] National Flood Insurance Program Nationwide Programmatic Environmental Impact Statement, Notice, 82 Fed. Reg. 17023, 17023 (Apr. 7, 2017).

[387] *See supra* Section II.C.; *see also infra* notes 419–430 and accompanying text (discussing other aspects of the program designed by Congress that have been only partially implemented).

[388] WETMORE ET AL., *supra* note 242, at 29.

[389] GAO/CED 82-105, NATIONAL FLOOD INSURANCE, *supra* note 142; Coal. for a Sustainable Delta v. Fed. Emergency Mgmt. Agency, 812 F. Supp. 2d 1089 (E.D. Cal. 2011) (regarding NFIP's contribution to pace and scale of floodplain development); Nat'l Wildlife Fed'n v. Fed. Emergency Mgmt. Agency, 345 F. Supp. 2d 1151, 1156–57 (W.D. Wash. 2004).

[390] IPCC, CLIMATE CHANGE 2022, *supra* note 8, at 12–14.

[391] *See* GAO/CED 82-105, NATIONAL FLOOD INSURANCE, *supra* note 142 (regarding cost); Ecological Rts. Found. v. Fed. Emergency Mgmt. Agency, 384 F. Supp. 3d 1111, 1114–15 (N.D. Cal. 2019) (citing biological opinions that concluded NFIP was likely to contribute to development that jeopardize ESA-listed species and denying summary judgment "[b]ecause the record establishes that FEMA acted arbitrarily and capriciously in excluding floodplain development from the ESA evaluation"); *Coal. for a Sustainable Delta*, 812 F. Supp. 2d 1089 at

the creation of the NFIP, state and local governments throughout the United States adopted land use laws that, while compliant with the federal criteria, allowed development of currently undeveloped flood hazard areas and increased development intensity in existing floodplain developments.[392] Consistent with FEMA's building-scale criteria, these communities' land use laws typically allow redevelopment of areas and rebuilding of structures that have already been devastated by flood waters, sometimes repeatedly.[393] Such permissive land use laws are so pervasive that each of the most recent regional assessments of coastal storm management risk by the Institute for Water Resources concluded that:

> 1. Significant coastal storm risk and consequential flooding exists throughout the study area and will dramatically increase as sea level rises and critical thresholds are surpassed.
>
> 2. Significant risk exists where development practices have created areas of dense infrastructure with limited or nonexistent adaptive capacity to contend with changing conditions.[394]

Similarly, neither federal law nor most state and local laws limit coastal hard armoring even though hard armoring increases flood hazards for many properties and results in "the loss of critical ecosystem services," including mitigation of flood hazards that beaches, dunes, estuaries, and coastal wetlands provide.[395]

The continued reliance on protection and accommodation strategies that support the development of flood hazard areas has persisted notwithstanding knowledge across the vertical governance spectrum that these strategies increase the population exposed to flood risk and the magnitude of the hazard to which they are exposed.[396] More than forty years ago, the U.S. Comptroller General concluded that rather than reducing exposure to flood hazards, the NFIP increases

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1132 (finding that the complaint stated sufficient facts regarding NFIP's likely contribution to development that jeopardize ESA-listed species); Fla. Key Deer v. Paulison, 522 F.3d 1133 at 1133 (11th Cir. 2008) (finding that the NFIP is a relevant "cause" of development that jeopardizes ESA-listed species and affirming denial of summary judgment); *Nat'l Wildlife Fed'n*, 345 F. Supp. 2d 1151, 1157.

[392] WETMORE ET AL., *supra* note 242, at 6.

[393] *See generally* RATHKOPF ET AL. *supra* note 253, § 7:31 ("An emerging problem is the public habit of building and rebuilding in flood prone areas and the associated repetitive claims, for structures which are insured, damaged or destroyed, rebuilt with insurance proceeds, and again damaged by flooding.").

[394] U.S. ARMY CORPS ENG'RS, INST. FOR WATER RES., S. ATL. NAT'L SHORELINE MGMT. STUDY 219 (2022).

[395] Gittman et al., *supra* note 92, at 305–06 (estimating that 14% of contiguous U.S. shoreline was hardened and "64% of armoring has occurred along Atlantic and Pacific sheltered shorelines, such as estuaries, lagoons, and tidally influenced rivers," data that indicates "shoreline hardening is likely a substantial . . . means by which humans modify and degrade coastal ecosystems in the US").

[396] *See supra* Section II.B (discussing federal, state and local recognition of inability of engineered solutions to adequately protect the development they facilitate and connection between floodplain protection and destruction of floodplain ecosystem services).

development of flood-prone areas[397]—a finding that has since been echoed in scholarly studies,[398] court opinions,[399] federal agency assessments,[400] and federal legislation.[401] A FEMA commissioned study also concluded that the availability of flood insurance through the NFIP creates an incentive to develop in floodplains and is one of the two most significant drivers in floodplain development decisions.[402]

This intensive development results in a climate preparedness gap in the United States that has already led to massive economic and noneconomic costs that will worsen over time.[403] The U.S. population is expected to grow to 420 million by 2050, and 89 million new or replaced homes and 190 billion square feet of nonresidential buildings are projected to be constructed between 2007 and 2050.[404] A significant portion of this development will occur in areas that are already at risk of flooding and areas that will become at risk of flooding within the lifespan of the development.[405] The coastal population growth rate is more than double the national growth rate, and demographic migration trends in the West also show significant new development of inland flood hazard areas.[406]

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[397] GAO/CED 82-105, NATIONAL FLOOD INSURANCE, *supra* note 142.

[398] *See, e.g.*, Pablo Herreros-Cantis, Veronica Olivotto, Zbigniew J. Grabowski & Timon McPhearson, *Shifting Landscapes of Coastal Flood Risk: Environmental (In)justice of Urban Change, Sea Level Rise, and Differential Vulnerability in New York City*, 2 URB. TRANSFORMATIONS, art. 9, Jul. 29, 2020, at 1 ("dominant drivers of coastal flood risk in NYC are ongoing real estate development and continued increases in sea level rise and storm severity").

[399] *See supra* note 391 (citing cases).

[400] *See, e.g.*, National Marine Fisheries Service, Endangered Species Act Section 7(a)(2) Jeopardy and Adverse Modification of Critical Habitat Biological Opinion, ESA Section 7(a)(2) '"Not Likely to Adversely Affect'" Determination, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Implementation of the National Flood Insurance Program in the State of Oregon 138 (April, 14 2016); U.S. Fish and Wildlife Service, Biological Opinion, Amendment to the June 16, 1997, Biological Opinion on the Effects of the FEMA's Continued Administration of the NFIP in Monroe County, Florida, and Atlanta, Georgia (2003).

[401] *See, e.g.*, *supra* notes 328–32 and accompanying text (discussing passage of the Coastal Barrier Resource Protection Act of 1982 as a response to the rapid development of coastal barrier islands resulting from the provision of federal flood insurance in the absence of development restrictions).

[402] *See* WETMORE ET AL., *supra* note 242, at 6.

[403] *See* U.S. GOV'T ACCOUNTABILITY OFF., GAO-15-28, CLIMATE CHANGE: BETTER MANAGEMENT OF EXPOSURE TO POTENTIAL FUTURE LOSSES IS NEEDED FOR FEDERAL FLOOD AND CROP INSURANCE 1 (2014) ("Scientific and industry studies GAO reviewed generally found that increasing growth and property values in hazard-prone areas have increased losses to date and that climate change may compound this effect . . . . According to the studies GAO reviewed, climate change may substantially increase losses by 2040 and increase losses from about 50 to 100 percent by 2100.").

[404] Oliver E. J. Wing, Paul D. Bates, Andrew M. Smith, Christopher C. Sampson, Kris A. Johnson, Joseph Fargione & Philip Morefield, *Estimates of Present and Future Flood Risk in the Conterminous United States*, ENV. RES. LETT. 13:034023 (2018) [hereinafter Wing et al., *Estimates of Present and Future Flood Risk*].

[405] *See supra* Part I.

[406] Adams-Schoen, *supra* note 86, at 206 (citing sources).

Ultimately, widespread adoption of floodplain regulations that meet or exceed the federal criteria failed to "reduce threats to lives and . . . minimize damages to structures and water systems during flood events"[407] or decrease federal spending on flood disasters.[408] Until 2005, the NFIP mostly covered its own costs,[409] but since 2005, FEMA has had to borrow more than $39 billion from the U.S. Treasury to meet its obligations, largely as a result of widespread devastation to intensively developed areas of the inland and coastal floodplains following increasingly frequent and intense storms.[410] Post-2005, the NFIP made $2.82 billion in principal repayments and paid $6.17 billion in interest,[411] and Congress cancelled $16 billion of the debt when the program reached its $30.425 billion borrowing limit following the 2017 hurricane season,[412] subsequently declining FEMA's request that it cancel the remaining $20.5 billion NFIP debt and provide interest-free loans going forward.[413] In fiscal year 2023, the NFIP paid $309 million in interest and accrued $1.7 million in interest daily.[414] The program's insolvency, as well as inconsistencies between the program's objectives and its implementation, have contributed to the NFIP being on the U.S. Government Accountability Office's

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[407] Nat'l Wildlife Fed'n v. Fed. Emergency Mgmt. Agency, 345 F. Supp. 2d 1151, 1156 (W.D. Wash. 2004).

[408] *See* GAO-17-425, *supra* note 143, at 8 (Congress keeps increasing FEMA's borrowing limit and NFIP's debt has been growing from 2005 to 2017); GAO-15-515, *supra* note 143, at 51 ("From fiscal years 2004 to 2013, FEMA obligated over $95 billion in federal assistance for disaster recovery for presidentially declared major disasters during that period, and the number of major disaster declarations has increased significantly in recent decades.").

[409] CONG. RSCH. SERV., NATIONAL FLOOD INSURANCE BORROWING AUTHORITY 1–2 (updated Apr. 1, 2024); *see also id.* at 1 ("The NFIP is funded . . . from the premiums of flood insurance policies, including fees and surcharges; direct annual appropriations for specific costs . . . [related to] flood mapping[]; and borrowing from the Treasury when the [program fund's] balance has been insufficient to pay the NFIP's obligations (e.g., insurance claims).").

[410] *Id.* at 2-3 (updated Apr. 1, 2024) (listing annual amount borrowed); U.S. GOV'T ACCOUNTABILITY OFF., GAO-23-106203, HIGH-RISK SERIES: EFFORTS MADE TO ACHIEVE PROGRESS NEED TO BE MAINTAINED AND EXPANDED TO FULLY ADDRESS ALL AREAS 33 (Apr. 2023) [hereinafter GAO-23-106203] (noting that borrowing tends to follow intense storms, which are becoming more common as a result of climate change).

[411] CONG. RSCH. SERV., NATIONAL FLOOD INSURANCE BORROWING AUTHORITY, *supra* note 409, at 1.

[412] P.L. 115-72, Title III, §308; CONG. RSCH. SERV., NATIONAL FLOOD INSURANCE BORROWING AUTHORITY, *supra* note 409, at 3; *see also* U.S. GOV'T ACCOUNTABILITY OFF., GAO-20-509, NATIONAL FLOOD INSURANCE PROGRAM: FISCAL EXPOSURE PERSISTS DESPITE PROPERTY ACQUISITIONS 1 (2020) (reporting that Congress canceled this portion of the agency's debt following the unprecedented 2017 hurricane season); CONG. RSCH. SERV., NATIONAL FLOOD INSURANCE BORROWING AUTHORITY, *supra* note 409, at 2–3 (reporting on debt limit increasing from $250 million at the NFIP's inception to the $30.425 billion in 2013 following Hurricane Sandy).

[413] *See* Fed. Emergency Mgmt. Agency, RISING INTEREST EXPENSES (last updated Mar. 6, 2023) (describing FEMA's request to 117th Congress (2021–22) for debt relief); CONG. RSCH. SERV., NATIONAL FLOOD INSURANCE BORROWING AUTHORITY, *supra* note 409, at 3 (reporting on NFIP debt accumulation, payments, and cancelation from 1980 to 2023).

[414] CONG. RSCH. SERV., NATIONAL FLOOD INSURANCE BORROWING AUTHORITY, *supra* note 409, at 1.

("GAO") "high-risk list" since 2006.[415] The high-risk list identifies federal operations that are especially vulnerable to fraud, waste, abuse, or mismanagement, or that need "transformation to address economy, efficiency, or effectiveness challenges."[416] Relatedly, the federal government's fiscal exposure from climate change has been on the high-risk list since 2013.[417] Unsurprisingly, the GAO warns that, "[w]ithout reforms, NFIP's financial condition will likely continue to worsen."[418]

This is not to suggest, however, that the NFIP's contribution to floodplain development is simple or solely attributable to the myopic focus of the federal criteria on building-scale resilience. Designation of a property as within a Special Flood Hazard Area communicates to property owners and buyers some risk of flooding, potentially placing downward pressure on property values and thereby somewhat decreasing the incentive to invest in properties in designated floodplains.[419] Similarly, the added cost of the flood insurance required for properties in mapped flood hazard areas that are secured by federally backed mortgages and the added construction costs associated with meeting FEMA's building-scale criteria also factor into the economics of floodplain development.[420]

Additionally, the combination of federal financial incentives to develop floodplains combined with FEMA's primarily accommodation-based criteria are not the only features of the NFIP that contribute to the preparedness gap that continues to characterize most communities throughout the United States. The other two essential functions of the integrated federal flood policy also have not been implemented as Congress intended. Contrary to Congress's initial design of the program, the NFIP provides subsidized federal flood insurance to new and reconstructed properties in flood hazard areas[421]—a departure from the initial program design that increased the federal financial support of floodplain development and thereby further amplified the moral hazard Congress intended to offset by making flood zoning that centers hazard area avoidance and managed retreat a condition of program participation.[422] FEMA also has not implemented the mapping function of the program as Congress intended, although this shortcoming

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[415] GAO-23-106203, *supra* note 410, at 33.

[416] *Id.* at 1.

[417] *Id.* at 34.

[418] *Id.* at 253. The GAO identifies FEMA's historic focus on the affordability of premiums as a primary driver of the agency's fiscal insolvency and recommends statutory and operational reforms aimed almost exclusively at the insurance and mapping functions of the program. *See, e.g., id.*

[419] *See infra* Section IV.D.2 (analyzing economics of floodplain development).

[420] *Id.*

[421] *See supra* note 224 (regarding premium discounts, various ways premiums fail to reflect the insured risks, and FEMA's new pricing methodology, Risk Rating 2.0, which is intended to make premiums more equitable by better reflecting risk).

[422] Recall that Congress designed the program to reduce the economic hardship on floodplain residents by providing subsidized rates to pre-NFIP properties and, through local adoption and enforcement of the federal criteria, slowly eliminating the need for coverage as substantially damaged structures were not rebuilt and undeveloped areas of the floodplain remained undeveloped. *See supra* Section III.A and *infra* notes 501–504 and accompanying text.

may have resulted in less floodplain development than would have occurred otherwise.[423] Since the NFIP began in 1967, FEMA has modeled "only 33% of the rivers and streams in the country to variable levels of quality."[424] One result of this discrepancy is that, while FEMA identifies 13 million people in the 100-year floodplain, more robust modeling shows an "estimated 41 million people residing in this high-risk zone."[425]

Because program participation only requires floodplain management that meets or exceeds the federal criteria within the 100-year floodplain, mapping deficiencies also contribute to the ineffectiveness of FEMA's building-scale criteria within areas FEMA designates as flood zones. It is well-established in the literature that FEMA's use of historic flood data and other modeling deficiencies results in significant discrepancies between FEMA's estimates of flood frequency and magnitude such that many areas designated as within the 500-year floodplain, for example, should be designated as within the 100-year floodplain.[426] Additionally, even within the mapped 100-year floodplain, the freeboard requirement that is the focus of FEMA's building-scale criteria—which requires structures to be elevated at or above the estimated level of the 100-year flood—only provides "meaningful risk reduction . . . [in] areas with a 100-year flood depth of less than 1 foot."[427] For example, for single-unit residential properties located in the mapped 100-year riverine floodplain (that is, within designated A Zones) with 100-year flood depths of less than 1 foot, recent modeling showed that a 1-foot elevation "results in a risk reduction of more than 99% for the smallest observed flood," "a 33% risk reduction for the median observed flood," and "a 19% risk reduction for the greatest observed flood risk."[428] Problematically, however, this modeling also showed that the median flood depth in these areas is more than six feet.[429] This study did not consider the coastal floodplain (or V Zones), which is exposed to higher flood risks.[430]

In combination, these governance failures contribute to the stickiness and increasing urgency of the gap between the risks attributable to the climate emergency and the preparedness of communities. The United Nations International Panel on Climate Change ("IPCC") concluded in 2014 that "development continues

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[423] Although I am unaware of research that explicitly models the effect of this mapping discrepancy on floodplain development, research that correlates program participation to increased floodplain development suggests that the mapping discrepancy may contribute to lower rates of floodplain development.

[424] Bates et al., *supra* note 4, at 2. Bates and colleagues modeling revealed that, as of 2020, "1,007,000 km^2 of land lies within the median 100 years magnitude flood zone (~13% of the total land area)," an estimate of the extent of the 100-year floodplain that "is significantly greater than the 572,000 km^2 identified by FEMA, but in line with other estimates." *Id.*

[425] Al Assi et al., *supra* note 59, at 2 (reporting on the "aging quality of FEMA's flood models" in addition to "their limited coverage of smaller catchments"); *see also* Wing et al., *Historical Flood Events*, *supra* note 59.

[426] Wing et al., *Historical Flood Events*, *supra* note 59.

[427] Al Assi et al., *supra* note 59, at 8.

[428] *Id.*

[429] *Id.* at 13.

[430] *Id.* at 15.

in high-risk coastal areas, coastal ecosystems continue to degrade in many regions, coastal freshwater resources are being overexploited in many highly populated areas, and vulnerability to coastal disasters grows."[431] Since then, the gap between existing risk levels and effective adaptation has continued to widen even as more extreme risks have manifested and the climate projections have become more dire.[432] In the nine years between the IPCC's Fifth and Sixth Assessment Reports ("AR5" and "AR6" respectively), they found "increased evidence of maladaptation" and compelling evidence that this maladaptation "especially affects marginalised and vulnerable groups adversely."[433] Moreover, the upward trajectory of climate-related risks between AR5 and AR6 holds even under the most conservative climate pathways, although "[r]isks and projected adverse impacts and related losses and damages from climate change escalate with every increment of global warming (*very high confidence*)."[434]

> Compared to the AR5, global aggregated risk levels are assessed to become high to very high at lower levels of global warming due to recent evidence of observed impacts, improved process understanding, and new knowledge on exposure and vulnerability of human and natural systems, including limits to adaptation (high confidence).
>
> In the near term, every region in the world is projected to face further increases in climate hazards (*medium to high confidence*, depending on region and hazard), increasing multiple risks to ecosystems and humans (very high confidence).[435]

The stickiness of the maladaptive development problem will continue increasing as climatic and non-climatic risks increasingly interact, creating compound and cascading risks that are more complex and difficult to manage.[436]

Absent policy reform, the United States is on track to harden nearly one-third of its continental coastline by 2100, doubling the proportion that was hardened as of the early 2010s.[437] Within this period, sixty percent of the land on the Atlantic coast that is one meter or less above sea level is projected to be developed and

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[431] Wong et al., *supra* note 86, at 392.

[432] Some communities have adopted local laws that promote robust adaptation to flood risks, but they remain outliers. *See* Nolon, *supra* note 82, at 549 (discussing examples). The number of states supporting soft armoring like living shorelines has also increased, but these states remain a minority. *See supra* note 395.

[433] IBIDUN ADELEKAN, ANTON CARTWRIGHT, WINSTON CHOW, SARAH COLENBRANDER, RICHARD DAWSON, MATTHIAS GARSCHAGEN, MARJOLIJN HAASNOOT, MASAHIRO HASHIZUME, IAN KLAUS, JAGDISH KRISHNASWAMY, MARIA FERNANDA LEMOS, DEBBIE LEY, TIMON MCPHEARSON, MARK PELLING, PRATHIJNA POONACHA KODIRA, AROMAR REVI, LILIANA MIRANDA SARA, NICHOLAS P. SIMPSON, CHANDNI SINGH, WILLIAM SOLECKI, ADELLE THOMAS & CHRISTOPHER TRISOS, THE SUMMARY FOR URBAN POLICYMAKERS OF THE IPCC'S SIXTH ASSESSMENT REPORT VOLUME II: WHAT THE LATEST SCIENCE ON IMPACTS, ADAPTATION AND VULNERABILITY MEANS FOR CITIES AND URBAN AREAS 8 (Indian Institute for Human Settlements 2022) [hereinafter AR6 SUMMARY FOR URBAN POLICYMAKERS].

[434] *Id.* at 14.

[435] *Id.* at 12.

[436] *Id.* at 14.

[437] Gittman et al., *supra* note 92, at 306 (projecting that nearly one-third of contiguous US coastline will be hardened by 2100 and observing that projected rate is "probably conservative").

hardened.[438] Robust modeling estimates that 1,007,000 square kilometers of land lies within the median 100-year floodplain, which is approximately 13% of the total land area of the conterminous United States.[439] Wing and colleagues estimated that 150,000 square kilometers of land in fluvial and pluvial floodplains is currently developed, and this figure will increase by 37% to 72% by 2100.[440] This development trajectory is expected to double the $5.5 trillion value of assets located in those floodplains.[441] Notably, Wing and colleagues' projections were based on 2018 climactic conditions, did not include coastal flood hazards, and did not include increased exposure to flood hazards in Hawai'i, Alaska, the Commonwealth of Puerto Rico, or U.S. territories.[442]

B. PRINCIPLES OF ADAPTIVE FLOODPLAIN LAND USE MANAGEMENT

This paper uses the term "adaptive land use management" to refer to land use regulatory strategies that increase the capacity of human communities and ecosystems to withstand present and future flood hazards.[443] "Withstand" encompasses a continuum from thriving to existing without significant or widespread (1) declines in health and morbidity, (2) displacement of people and species, (3) exacerbation of existing disparate allocations of benefits and burdens, (4) destruction of public and private community resources, or (5) increases in the vulnerability of community members to catastrophic losses such as the loss of the primary home, livelihood, or essential support networks.[444] This continuum

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[438] *Id.*

[439] Bates et al., *supra* note 4, at 21.

[440] Wing et al., *Estimates of Present and Future Flood Risk*, *supra* note 404, at 5. Wing and colleagues' model improved on FEMA and other modelling by "explicit[ly] incorporati[ng] flood defences . . . [and providing] higher vertical accuracy and finer horizontal resolution of terrain data; better representation of fluid physics; and coverage of all basin scales." *Id.* at 2 and supplementary section 2.1; *see also* Oliver E.J. Wing, Paul D. Bates, Christopher C. Sampson, Andrew M. Smith, Kris A. Johnson & Tyler A. Erickson, *Validation of a 30m Resolution Flood Hazard Model of the Conterminous United States*, 53 WATER RES. RSCH. 7968 (2017) (describing development and validation of model).

[441] Wing et al., *Estimates of Present and Future Flood Risk*, *supra* note 404, at 3. The model showed that, as of 2017, 40.8 million people (or 13.3% of the population) were exposed to a 100-year fluvial or pluvial flood in the conterminous United States, "which translates to a GDP exposure of $2.9 trillion (15.3% of total GDP)." *Id.* at 3. FEMA reported in 2023 that "the program protects over $1.3 trillion in assets for nearly 5 million policyholders." FEMA, THE NATIONAL FLOOD INSURANCE PROGRAM: ANSWERS TO QUESTIONS ABOUT THE NFIP 4 (2023).

[442] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 157–58.

[443] This definition is based on my work with local, state, and federal government officials and community-based organizations to increase community resilience, more than a decade of climate change adaptation research, and is influenced by many of the researchers cited in this article. *See generally, e.g.*, Lawyer et al., *supra* note 63; Wong et al., *supra* note 86, at 387; *see also, e.g.*, AR6 SUMMARY FOR URBAN POLICYMAKERS, *supra* note 433, at 12–14.

[444] *See* Mary Paille, Margaret Reams, Jennifer Argote, Nina S.-N. Lam & Ryan Kirby, *Influences on Adaptive Planning to Reduce Flood Risks Among Parishes in South Louisiana*, 8 WATER 57:5 (2016) ("a key attribute of resilience [is] the ability to withstand repeated

recognizes significant local variation in the range of feasible adaptation measures.[445]

By focusing on the resilience of communities—as opposed to, for example, individual households or structures—this definition of adaptive management recognizes that human communities are themselves complex ecosystems composed of interdependent components. Disruption of one element of a natural area can lead to cascading effects through the ecosystem that threaten its ability to continue functioning.[446] Likewise, the capacity of human communities to recover from disturbances can be compromised by threats to one or more components of the community, including the people, social networks, cultural and environmental resources, structures, and infrastructure.[447]

The centering of community-scale adaptation is also consistent with the IPCC's and U.S. Global Change Research Program's ("USGCRP")[448] conclusions that, even with emissions reductions sufficient to meet the Paris Agreement goals, "transformational adaptation" is urgently needed to respond to the "transformative changes in the Earth's climate and ecosystems caused by human actions."[449] In characteristically staid prose,[450] AR6 warns that current adaptation efforts, even if

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disturbances, like large-scale storms and floods, while still maintaining essential structures, processes and feedbacks within the system" (internal quotation marks omitted)).

[445] *See* Lawyer et al., *supra* note 63, at 2 ("[T]here . . . [is] no one-size-fits-all solution for coastal communities, each with their own increasingly complex and interconnected economic, social, and biophysical systems.").

[446] *See generally* Christie A. Bahlai, Clarisse Hart, Maria T. Kavanaugh, Jeffrey D. White, Roger W. Ruess, Todd J. Brinkman, Hugh W. Ducklow, David R. Foster, William R. Fraser, Hélène Genet, Peter M. Groffman, Stephen K. Hamilton, Jill F. Johnstone, Knut Kielland, Douglas A. Landis, Michelle C. Mack, Orlando Sarnelle & Jonathan R. Thompson, *Cascading Effects: Insights from the U.S. Long Term Ecological Research Network*, ECOSPHERE 12(5), at e03430 (2021).

[447] Christian L. E. Franzke, Alessio Ciullo, Elisabeth A. Gilmore, Denise Margaret Matias, Nidhi Nagabhatla, Anton Orlov, Shona K. Paterson, Jürgen Scheffran & Jana Sillmann, *Perspectives on Tipping Points in Integrated Models of the Natural and Human Earth System: Cascading Effects and Telecoupling*, ENV'T. RSCH. LETTERS, 17:015004, at 1–2 (2022).

[448] The Global Change Research Act ("GCRA") of 1990 required the USGCRP to develop and coordinate "a comprehensive and integrated United States research program which will assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change." Pub. L. No. 101-606, 104 Stat. 3096-3104, sect. 1010, codified at 15 U.S.C. §§ 2921–2961.

[449] Rawshan Ara Begum, Robert J. Lempert, Elham Ali, Tor Arve Benjaminsen, Thomas Bernauer, Wolfgang Cramer, Xuefeng Cui, Katharine Mach, Gustavo Nagy, Nils Christian Stenseth, Raman Sukumar & Philippus Wester, *Point of Departure and Key Concepts*, *in* IPCC, CLIMATE CHANGE 2022: IMPACTS, ADAPTATION AND VULNERABILITY. CONTRIBUTION OF WORKING GROUP II TO THE SIXTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 179 (Hans-Otto Pörtner et al. eds., 2022) [hereinafter AR6 WGII]; *id.* at 125 (regarding urgency and inadequate speed and scale of current adaptation responses).

[450] The IPCC is the United Nations body tasked with assessing the science related to climate change. IPCC reports thus follow scientific communication norms, which include the communication of degrees of certainty that can lead non-scientist audiences to misinterpret the IPCC's prescriptions. Adam Harris, Adam Corner, Juemin Xu & Xiufang Du, *Lost in Translation?*

expanded, "can reduce some climate risks," but fundamental changes in existing systems "may be needed to avoid intolerable risks from climate change."[451] Likewise, USGCRP's Fifth National Climate Assessment ("NCA5")[452] concluded that current adaptation responses throughout the United States are "insufficient to reduce today's climate-related risks and keep pace with future changes in the climate."[453] Current adaptation responses are "incremental" and "marginal" and include engineered protective measures like levees and seawalls and structural accommodation measures like freeboard requirements.[454] Absent the implementation of new adaptation approaches that require "fundamental shifts in systems," in addition to the acceleration of current adaptation efforts, USGCRP estimates that the economic costs of climate change could "reach into the hundreds of billions of dollars by the end of the century."[455]

Ultimately, the organizations tasked with summarizing the science on climate change and assessing the current and future vulnerability of communities throughout the United States and the globe are reporting that (1) adaptation is urgently needed; (2) expansion of current approaches to adaptation is needed, but even if expanded, current approaches are not enough to protect communities from the unavoidable transformational effects of climate change; and (3) existing governance and socioeconomic systems are limited in their capacity to adopt adaptation measures that better align with the scale, scope and speed of the climate emergency.[456] The focus of transformational adaptation is thus on the restructuring of governance and other systems that impose "soft limits" on the capacity of

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Interpretations of the Probability Phrases Used by the Intergovernmental Panel on Climate Change in China and the UK, 121 CLIMATIC CHANGE 415, 416 (2013); *see also* ADAM CORNER, CHRIS SHAW & JAMIE CLARKE, PRINCIPLES FOR EFFECTIVE COMMUNICATION AND PUBLIC ENGAGEMENT ON CLIMATE CHANGE: A HANDBOOK FOR IPCC AUTHORS 17 (Climate Outreach 2018) ("It is often the case that uncertainty in science is misinterpreted by the public as ignorance and it is well established that in many countries around the world, members of the public dramatically overestimate the uncertainty associated with climate change science and underestimate the level of scientific consensus.").

[451] Ara Begum et al., *supra* note 449, at 179.

[452] USGCRP, FIFTH NATIONAL CLIMATE ASSESSMENT (2023) [hereinafter NCA5]. As one of USGCRP's statutorily mandated quadrennial assessment reports, NCA5 "documents observed and projected vulnerabilities, risks, and impacts associated with climate change across the United States." Alexa K. Jay, Christopher W. Avery, Travis A. Dahl, Rebecca S. Dodder, Benjamin D. Hamlington, Allyza Lustig, Kate Marvel, Pablo A. Méndez-Lazaro, Adam Terando, Emily S. Weeks & Ariela Zycherman, *Overview: Understanding Risks, Impacts, and Responses*, *in* NCA5, *supra*, at 1-1 (Emily K. Laidlaw eds. 2023).

[453] Jay et al., *supra* note 452, at 1-10.

[454] Ara Begum et al., *supra* note 449, at 125, 179.

[455] Emily Wasley, Travis A. Dahl, Caitlin F. Simpson, Laura West Fischer, Jennifer F. Helgeson & Melissa A. Kenney, *Adaptation*, *in* NCA5, *supra* note 452, at 31-24; *id.* at 31-14 (regarding necessity of "[t]ransformative adaptation, which involves fundamental shifts in systems, values, and practices"); Wasley et al., *supra* at 31-25 (noting "limitations in estimating aggregate climate damages, costs of adaptation options, and avoided damages from adaptation implementation that create uncertainty").

[456] Ara Begum et al., *supra* note 449, at 125; Jay et al., *supra* note 452, at 1-10; Wasley et al., *supra* note 455, at 31-17.

adaptation measures to maintain community resilience at or above "tolerable levels."[457]

The reform of land use regulations to establish a program that avoids hazard areas and enables managed retreat in communities facing significant climate-related hazards has the potential to exemplify transformational adaptation.[458] The IPCC projects with high confidence that reforming "governance systems at all scales can contribute to land-related adaptation" and land use plans and laws, including zoning, that promote "land degradation neutrality can . . . support food security, human wellbeing and climate change adaptation and mitigation."[459] Land degradation neutrality requires a balance between sustainable land use management measures and measures that preserve healthy lands and rehabilitate degraded lands.[460]

The increasingly robust literature on climate adaptation identifies several core attributes of adaptive land management that are consistent with the literature on transformative adaptation. For example, broad consensus exists that long-term resilience is only possible with land use management that limits the uses of floodplains.[461] Other measures have their place in comprehensive adaptation strategies, but failure to include land use regulations that limit development of flood hazard areas reduces the efficacy of these other measures.[462]

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[457] *See* Ara Begum et al., *supra* note 449, at 169 ("Soft adaptation limits occur when options may exist but are currently not available to avoid intolerable risks through adaptive actions and hard adaptation limits occur when no adaptive actions are possible to avoid intolerable risks . . . . Intolerable risks threaten core social objectives associated with health, welfare, security or sustainability."); *id.* at 172 (recognizing disparate access to coping strategies that allow "powerful groups" to tolerate risks that would be intolerable for "marginalized groups"); Brian O'Neill et al., *Key Risks Across Sectors and Regions*, *in* AR6 WGII, at 2436 ("Evidence of transformative adaptation is assessed based on the scope, speed, depth and ability to challenge limits of [current adaptation] responses . . . .").

[458] Ara Begum et al., *supra* note 449, at 179; Katherine J. Mach & A.R. Siders, *Reframing Strategic, Managed Retreat for Transformative Climate Adaptation*, 372 SCI. 1294, 1295 (2021).

[459] IPCC, *Summary for Policymakers*, *in* CLIMATE CHANGE AND LAND: AN IPCC SPECIAL REPORT ON CLIMATE CHANGE, DESERTIFICATION, LAND DEGRADATION, SUSTAINABLE LAND MANAGEMENT, FOOD SECURITY, AND GREENHOUSE GAS FLUXES IN TERRESTRIAL ECOSYSTEMS 29 (Priyadarshi R. Shukla et al. eds., 2019); *see also* NCA5 *supra* note 452, app. 5 (defining transformational adaptation as "[a]daptation that changes the fundamental attributes of a social-ecological system, often involving persistent, novel, and significant changes to institutions, behaviors, values, and/or technology in anticipation of climate change and its impacts"). The report is a comprehensive compilation of the most recent scientific, technical, and socio-economic literature dealing with climate change. *Id.* at vii.

[460] *Id.*

[461] S*ee, e.g.*, Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 157–59; THOMAS EGLI, NON STRUCTURAL FLOOD PLAIN MANAGEMENT: MEASURES AND THEIR EFFECTIVENESS 7 (Int'l Comm. for Prot. Rhine, ed., 2002).

[462] *See* IPCC, *Summary for Policymakers*, *supra* note 459, at 29 (discussing need for "policy mixes"); *see also, e.g.*, Mach & Siders, *supra* note 458, at 1295; EGLI, *supra* note 461, at 19 ("Land use control is . . . the basis of all measures aimed at managing damage potential. It may guide the extent and type of development . . . [T]he effectiveness of this tool develops over a longer period.").

Moreover, because unmanaged retreat from some hazard areas is inevitable—and indeed already occurring—and disparately burdens low-income and other vulnerable communities, the inclusion of hazard avoidance and managed retreat regulatory strategies in a community's adaptation policy mix will generally be "more effective at reducing risk, more socially equitable, and more economically efficient" than reactionary, unmanaged retreat.[463] To avoid undermining these outcomes, hazard area avoidance and managed retreat, like other adaptation strategies, should be "designed and executed in ways that promote broader societal goals."[464] Consistent with this, adaptation scientists and researchers tend to agree that adaptive land use management must integrate justice principles.[465] Justice principles include prioritizing distributive justice, which "refers to the allocation of burdens and benefits," procedural justice, which refers to "who decides and participates in decision-making," and the related and overlapping concept of "recognition," which "entails basic respect and robust engagement with[,] and fair consideration of[,] diverse cultures and perspectives."[466] Additional related priorities "include a focus on the poor, vulnerable, and marginalized"[467] and current and future capacity building at multiple levels.[468]

The literature also identifies the need for flexibility[469] and avoidance of strategies that further narrow the range of feasible and effective adaptation options. Flexibility is required to allow adaptation responses to evolve with the rapidly changing scale, intensity, and frequency of climate hazards and the shifting landscape of human vulnerability to these hazards.[470] Relatedly, because "[r]isks and projected adverse impacts and related losses and damages from climate change escalate with every increment of global warming (*very high confidence*)," adaptation strategies that contribute to climate change should be avoided and strategies that provide mitigation co-benefits should be pursued, when possible.[471] In other words, adaptation strategies that are consistent with mitigation goals are needed to avoid further narrowing the range of feasible adaptation options; however, flexibility is also necessary because climactic and non-climatic risks are

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[463] Mach & Siders, *supra* note 458, at 1294; *see infra* Section IV.1 (regarding justice implications of unmanaged retreat and status quo adaptation strategies).

[464] Mach & Siders, *supra* note 458, at 1294.

[465] *See* Lawyer et al., *supra* note 63, at 2 ("[I]t is of growing importance that we understand the outcomes and possible redistributed effects of our adaptation decisions."); IPCC, CLIMATE CHANGE 2022, *supra* note 50, at 160.

[466] IPCC, CLIMATE CHANGE 2022, *supra* note 50, at 7.

[467] Wong et al., *supra* note 86, at 392.

[468] *Id.*; *see also* NCA5, *supra* note 452, at 13-23 ("There is high confidence that environmental justice requires transparent and inclusive processes, as the literature and government policy clearly indicate that equal access to decision-making processes is a key element of environmental justice.").

[469] IPCC, CLIMATE CHANGE 2022, *supra* note 50, at 19 ("Maladaptation can be avoided by flexible, multi-sectoral, inclusive, long-term planning and implementation of adaptation actions, with co-benefits to many sectors and systems. (*high confidence*).").

[470] AR6 SUMMARY FOR URBAN POLICYMAKERS, *supra* note 433, at 14.

[471] *Id.*

increasingly interacting, "creating compound and cascading risks that are more complex and difficult to manage (*high confidence*)."[472]

Researchers have coalesced around the need for comprehensive adaptation planning and integration of the best available climate science into that planning.[473] Such climate-science informed planning must consider not only the lifespan of structures and infrastructure[474] but also the potential that changes in development patterns will influence in-migration to, or create barriers to out-migration from, areas that are now or will be vulnerable to flood hazards, recognizing the multi-generational timespan associated with development and migration patterns.[475]

The integration of climate science and other complex variables into adaptation planning and lawmaking must not become a basis, however, for further delaying the adoption and enforcement of adaptation measures that facilitate managed retreat and hazard area avoidance. The science supporting the urgent need for these measures is well-established[476] and local governments already use bread-and-butter land use laws to effectively steer development into areas where development is deemed compatible and away from areas deemed incompatible.[477] Indeed, the most basic feature of zoning is the designation of geographic districts in which some land uses are permitted and others are prohibited.[478] Other tools local governments use to dictate where and at what intensity various types of development can occur include subdivision regulations, clustering of development, conservation overlay zones, and transfer of development rights, each of which can and has been used to direct growth away from vulnerable areas.[479] A recent study of local limits on the development of undeveloped flood hazard areas concluded that many local governments "use commonplace municipal plans, regulations, and programs . . . , rather than the legal or policy innovations often thought necessary," to avoid some floodplain development.[480] The study found that development

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[472] *Id.*

[473] The report is a comprehensive compilation of the most recent scientific, technical, and socio-economic literature dealing with climate change. *Id.* at vii.

[474] IPCC, CLIMATE CHANGE 2023: SYNTHESIS REPORT. CONTRIBUTION OF WORKING GROUPS I, II AND III TO THE SIXTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 105 (H. Lee and J. Romero, eds., 2023).

[475] *Id.* at 98.

[476] *See supra* note 461 (citing sources); *supra* Section I.A.

[477] A.R. Siders, Jennifer Niemann Morris, Miyuki Hino, Elizabeth Shields, Lidia Cano Pecharroman, Tess Doeffinger, Logan Gerber-Chavez, Ju-Ching Huang, Alexandra Lafferty, Salvesila Tamima, Caroline Williams, Armen Agopian, Christopher Samoray & Katharine J. Mach, *How Local Governments Avoid Floodplain Development Through Consistent Implementation of Routine Municipal Ordinances, Plans, and Programs*, OXFORD OPEN CLIM. CHG., Sept. 19, 2024, at 1.

[478] *See supra* notes 91–106 and accompanying text (discussing land use regulatory strategies for managed retreat and hazard area avoidance).

[479] Highfield et al., *supra* note 100, at 687 (identifying commonplace land use regulations that can be used to limit floodplain development).

[480] Siders et al., *supra* note 477, at 4 (concluding that most municipalities in the study area "limit floodplain development to some extent, even in challenging contexts, and do so with

outside the regulatory floodplain outpaced development within the floodplain and the existence of more local technical or financial capacity did not predict this outcome. Rather, it appeared that the towns in the study area used basic land use regulatory mechanisms to limit residential development of the floodplain—leading the study authors to suggest that "floodplain avoidance" can be reframed as "an achievable standard rather than an ambitious aspiration."[481] While this study was limited to towns in New Jersey, similar findings in a subsequent nationwide study suggest that communities throughout the United States possess the technical capacity to adopt and implement hazard area avoidance regulatory strategies, although substantial maladaptive development continues.[482]

Ultimately, the precipitous trajectory of development in flood hazard areas, even in the face of known risks, suggests that transformative adaptation may be more about restructuring governance frameworks to help local governments overcome barriers to the use of commonplace land use law tools to facilitate retreat and avoidance of new hazard area development at a scale commensurate with current and future climate risks. Accordingly, the climate resilience literature emphasizes the need to identify and eliminate regulatory barriers to robust climate adaptation, including barriers to adoption and implementation of regulatory hazard area avoidance and managed retreat strategies, and the need for guidelines, mandates, enforcement, and outcome assessments to ensure implementation of those strategies.[483]

C. BALANCING FEDERAL INTERVENTION WITH LOCAL AUTONOMY

Effective adaption thus requires local participation and control while recognizing the need for federal intervention tailored to address local institutional barriers to managing retreat from flood hazard areas. The objective of this discussion is not to propose a complete package of NFIP reforms that would strike the optimal balance between local control and federal interventions—a task that is not only beyond the scope of this paper but that also requires dynamic, collaborative engagement with a diverse group of interested and affected persons, consistent with the principles of adaptive land use management just discussed. Instead, the objective of the following discussion is to provide examples of reforms that have the potential to support this balance in a way that is consistent with the text and

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traditional land use management and hazard mitigation tools and with modest levels of government capacity").

[481] *Id.* at 1.

[482] *See* Armen Agopian et al., *A Nationwide Analysis of Community-Level Floodplain Development Outcomes and Key Influences*, EARTH'S FUTURE, vol. 12, e2024EF004585, at 1 (2024) (analyzing proportion of development in SFHAs to development outside SFHAs in more than 18,000 communities); *id.* at 14 (finding "extensive" development continued in floodplains); *see also* Adams, *supra* note 29 (forthcoming article discussing and analyzing implications of both studies and suggesting future empirical analyses of nationwide dataset).

[483] Wong et al., *supra* note 86, at 391; AR6 SUMMARY FOR URBAN POLICYMAKERS, *supra* note 433, at 14.

legislative history of the NFIA and principles of adaptive land use management and, in so doing, stimulate transformative research, policymaking, and activism. To this end, one approach that could achieve these objectives is to amend the NFIP eligibility criteria to do the following:

(1) Set the floor for community management of retreat from flood hazard areas;

(2) Require limits on new construction in flood hazard areas;

(3) Require continual monitoring and adjustment of the land use criteria incorporating climate science and justice principles;

(4) Require robust resilience planning akin to a "community resilience element;"[484]

(5) Provide a menu of hazard area avoidance and managed retreat regulatory strategies that would satisfy the eligibility criteria from which participating communities must choose while also allowing communities to adopt novel strategies tailored to local needs and conditions; and

(6) Include a hardship exception that allows communities to retain the flexibility needed to elect not to adopt managed retreat strategies if the community demonstrates that managed retreat will increase inequities or vulnerabilities.

Both the NFIA and the existing NFIP provide a roadmap for some elements of this framework. With respect to the first two elements, the NFIA makes NFIP eligibility contingent on a community adopting and enforcing floodplain management standards at least as restrictive as the federal criteria,[485] thereby structuring the criteria as a baseline that does not interfere with the participating communities' authority to adopt more stringent criteria. The NFIP currently uses its voluntary Community Rating System ("CRS") to encourage communities to exceed the minimum criteria by, among other measures, limiting new floodplain development and constricting existing floodplain development.[486] Moving some or all those limits from the CRS to the NFIP eligibility criteria could begin to shift hazard area avoidance, managed retreat, and preservation of ecosystem services from the periphery of the floodplain management program to its center. This shift from the periphery to the center is consistent with the NFIA's instructions to

[484] This concept draws on the "housing element" and other state legal strategies for helping sub-state units of government overcome local institutional barriers that stymie the production of housing and affordable housing. *See infra* notes 502–504 and accompanying text (discussing this aspect of the reform framework).

[485] 44 C.F.R. § 60.1 (2024).

[486] *See infra* notes 511–528 and accompanying text (discussing the CRS).

FEMA,[487] administrative and legislative intent,[488] and the reality that the voluntary CRS program does not provide sufficient incentives to offset local institutional barriers to the adoption of flood zoning that centers avoidance and retreat.[489]

At a minimum, requiring limits on new construction in flood hazard areas is consistent with the NFIA's unqualified approach to new construction[490] and Congress's intent to end encroachment into flood hazard areas and preserve the flood-mitigating benefits of undeveloped floodplains.[491] Although limits on encroachment into undeveloped portions of the floodplain—or "greenfield" development[492]—may appear to be the low-hanging fruit of adaptive land use management, communities continue to permit significant new development of the riverine and coastal floodplains, with many of the most hazardous areas of the floodplain outpacing development elsewhere. These data suggest that successful (and rapid) transformation of floodplain management in U.S. communities to limit greenfield development could have substantial economic, social, and environmental benefits.

The third element of this reform framework is consistent with the NFIA's requirement that FEMA study "the adequacy of State and local measures in flood-prone areas as to land management and use, flood control, flood zoning, and flood damage prevention" and use these assessments to design minimum criteria that, "to the maximum extent feasible," encourage state and local governments to de-intensify existing land uses "where necessary," restrict new floodplain development, and "otherwise improve the long-range land management and use of flood-prone areas."[493] Although neither the NFIA nor its legislative and executive record refer to climate science, the NFIA requires FEMA to base the criteria on an assessment of whether existing sub-federal land use measures are adequate to meet the Act's objectives of decreasing the cost of floods by reducing the exposure of people and property to flood hazards, preserving the natural capacity of floodplains

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[487] *See* Pub. L. No. 90–448 § 1361(a)-(b), 82 Stat. 587 (instructing FEMA to develop criteria that constrain floodplain development and limit new development in floodplains); *supra* Section II.B (analyzing same).

[488] *See supra* Section II.B (regarding legislative and executive intent underlying NFIA).

[489] *See infra* note 528 and accompanying text (regarding minimal effect of CRS on floodplain development).

[490] *See* Pub. L. No. 90-448 § 1361(a), 82 Stat. at 587; *supra* Section II.B (regarding minimum criteria).

[491] *See supra* Section II.B (regarding legislative intent).

[492] In this context, greenfields are lands that have not previously been developed, as contrasted with previously developed lands, or brownfields. *See generally* Lauren Cox & Sue Rodway-Dyer, *The Underappreciated Value of Brownfield Sites: Motivations and Challenges Associated with Maintaining Biodiversity*, 66 J. ENV'T PLAN. & MGMT. 2009, 2009–10 (2022) (defining terms and noting significant variation in definitions throughout the literature).

[493] Pub. L. No. 90-448 § 1361(a), (c), 82 Stat. at 587; *see also supra* Section II.B (regarding required studies and objectives of minimum criteria).

to mitigate flood damage, and limiting damage to structures in the floodplain.[494] This assessment necessarily requires consideration of the frequency, intensity, and geographic scope of flood and flood-related hazards, each of which is informed by climate science.[495]

The NFIA also does not expressly direct FEMA to base the criteria on equity considerations; however, consensus appears to be building in the adaptation literature that to be effective, adaptation policy must reflect justice and equity considerations.[496] Incorporating these considerations into the assessments, and thus into the minimum criteria, is also consistent with Congress and the Johnson administration's attempt to structure the federal flood program to mitigate the moral hazard of directly and indirectly supporting floodplain development while also recognizing the need to mitigate the hardship that forced relocation of existing homes and businesses would cause.[497] For example, to lessen this hardship, the NFIA requires the minimum criteria to "constrict" existing development only "where appropriate."[498] Whereas, for new construction, the NFIA requires the minimum criteria to simply "guide the development of proposed construction away from locations which are threatened by flood hazards."[499] Congress also intended the program to provide subsidized flood insurance to existing homes in the floodplain until the homes were eventually destroyed,[500] thereby providing time and an economic safety net to facilitate eventual relocation and recognizing that actuarily based rates would impose an untenable economic hardship on existing floodplain residents.

The incorporation of a "community resilience element" into the federal criteria would also be consistent with the NFIA's requirement that the criteria, to the maximum extent feasible, constrict existing floodplain development where appropriate, limit new development, and "otherwise improve the long-range land management and use of flood-prone areas."[501] This novel concept draws from land use and housing law reform that leverages shared vertical governance to help local

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[494] *See supra* notes 275–286 and accompanying text. To be clear, the NFIA also sought to reduce the federal costs of flood disasters by shifting some of the post-disaster costs to property owners through the provision of federally backed flood insurance. *See supra* notes 207–208 and accompanying text.

[495] EGLI, *supra* note 461, at 7.

[496] *Supra* notes 465–468 and accompanying text.

[497] For example, to lessen this hardship, the NFIA requires the minimum criteria to "constrict" existing development only "where appropriate." Pub. L. No. 90-448 § 1361(c)(1), 82 Stat. at 587. Whereas, for new construction, the NFIA requires the minimum criteria to simply "guide the development of proposed construction away from locations which are threatened by flood hazards." *Id.* § 1361(c)(2).

[498] Pub. L. No. 90-448 § 1361(c)(1), 82 Stat. at 587.

[499] *Id.* § 1361(c)(2).

[500] National Flood Insurance Act, S. 1, 90th Cong. § 105(c) (1967); S. Rep. No. 90-549, at 15 (1967) (explaining that section 105(c) "[p]rovides that after an area has been identified as flood-prone and this information was published in the area, then newly constructed property or substantially improved property can be insured only at rates which are not less than the estimated (full cost) risk premium rate").

[501] Pub. L. No. 90-448 § 1361(c), 82 Stat. at 587.

governments overcome institutional barriers to the development of fair and affordable housing, a policy problem that shares many of the sticky attributes of the maladaptive development problem.[502] California's housing element law, like other state interventions in local land use laws that effect the cost, production, and location of housing, responds to the conundrum in which "local lawmakers who understand that California needs to accommodate a lot more housing are stuck in a political bind" that entrenches anti-housing land use policies. [503]

While not all features of California's housing element law could or should be incorporated into the NFIP eligibility criteria,[504] some features are transferable to the flood governance conundrum. For example, California's housing element law requires cities to adopt and periodically update a state-approved plan that includes enforceable policies (i.e., laws) that will allow the city to meet its share of the region's housing needs, based on robust community engagement and "inventories of developable sites, assessments of zoned capacity, and analyses of constraints on housing development and . . . barriers to racial and socioeconomic integration."[505] The floodplain management criteria could help local governments overcome institutional constraints on adaptative management of floodplain land uses by requiring participating communities to produce periodic adaptation plans—with community resilience elements—based on robust community engagement, "inventories of developable sites, assessments of zoned capacity,"[506] and analyses of local constraints on the adoption and implementation of hazard area avoidance and managed retreat strategies. Scholars have reported that local planning processes that involve "[s]erious consideration of retreat, even if subsequently rejected, can help communities articulate why remaining in place is a core value, what costs they are able to endure or what opportunities they can forego to remain in place, and what responses sustainably support individual and community priorities."[507] By facilitating such robust community engagement, a required community resilience element may help communities grapple with the difficult tradeoffs inherent in

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[502] *See* CHRISTOPHER S. ELMENDORF, ERIC BIBER, PAAVO MONKKONEN & MOIRA O'NEILL, "I WOULD, IF ONLY I COULD": HOW CITIES CAN USE CALIFORNIA'S HOUSING ELEMENT TO OVERCOME NEIGHBORHOOD RESISTANCE TO NEW HOUSING 4 (UCLA Lewis Ctr. for Reg'l Pol'y Stud., 2020) (arguing that housing element helps local officials who value production of more affordable housing to overcome local resistance).

[503] *Id.*

[504] For example, a floodplain management criterion akin to the housing element law's pro-housing default rule, which supersedes local land use authority over housing when cities fail to timely and substantially comply with the housing element law, is unnecessary because the NFIA already provides powerful incentives to participate in the NFIP and thus to meet or exceed the eligibility criteria. Such a penalty would also be subject to potential invalidation based on its interference with state police power authority over private land uses without any clear authorization in the NFIA to include such a penalty.

[505] ELMENDORF ET AL., *supra* note 502, at 5.

[506] *Id.*

[507] Mach & Siders, *supra* note 458, at 1294.

floodplain occupancy and further the education, empowerment, and community leadership components of adaptive land use management.[508]

The fifth and sixth elements of the reform framework are aimed at supporting local governance capacity by providing technical resources, flexibility and accountability. The inclusion in the federal criteria of a menu of hazard avoidance and managed retreat regulatory strategies helps inform communities about the wide range of regulatory strategies that can facilitate community-scale resilience and provides a jumping off point for the adaptation planning required by the community resilience element. Caution must be exercised, however, when designing reform strategies that increase procedural hurdles, opportunities for public engagement, and flexibility, as each of these features of local governance have contributed to the persistence of the maladaptation problem, exclusionary zoning, racially and economically segregated neighborhoods, and the concentration of amenities in more affluent, whiter neighborhoods and undesirable land uses such as industrial polluters near and in neighborhoods where more people of color live.[509]

A "menu" approach can already be found within the NFIP, albeit in the voluntary CRS program.[510] The CRS uses discounts on flood insurance premiums as an incentive for communities to exceed the federal criteria.[511] The program does this by providing a menu of creditable adaptation strategies, called "activities."[512] The level of premium discount the policyholders in a community qualify for is based on the community's CRS class, which is based on the quantity and types of adaptation measures the community adopts.[513] The following CRS-creditable activities support hazard area avoidance and managed retreat: prohibiting new buildings and fill in the floodway, V Zones, or other parts of the floodplain;[514]

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[508] *Id.* at 1298–99; *see also supra* Section IV.B (discussing principles of adaptive land use management).

[509] *See* Anika Singh Lemar, *Overparticipation: Designing Effective Land Use Public Processes*, 90 FORDHAM L. REV. 1083, 1086–87 (2021) (regarding local control, community participation, and persistent injustices); *id.* at 1137–1150 (proposing reform of public participation processes); Adams, *supra* note 29 (forthcoming article analyzing attributes of local governance and localism that contribute to the maladaptation problem); *see also* ENVIRONMENTAL JUSTICE, N.J. DEP'T ENV'T PROTECTION, https://dep.nj.gov/ej/law/ [https://perma.cc/M3MK-NM5T] (explaining and providing links to New Jersey law requiring environmental justice reviews and providing an administrative procedure for challenging concentration of industrial land uses in overburdened communities).

[510] *See* FEMA, NATIONAL FLOOD INSURANCE PROGRAM COMMUNITY RATING SYSTEM: CRS COORDINATOR'S MANUAL (2017) [hereinafter FEMA, 2017 CRS COORDINATOR'S MANUAL] (identifying the credits and credit criteria for the CRS program); FEMA, NATIONAL FLOOD INSURANCE PROGRAM COMMUNITY RATING SYSTEM: ADDENDUM TO THE 2017 CRS COORDINATOR'S MANUAL (2021) [hereinafter FEMA, 2021 ADDENDUM TO THE 2017 CRS COORDINATOR'S MANUAL] (amending the 2017 manual to remove its 2020 expiration date and add and update various credit criteria).

[511] FEMA, 2017 CRS COORDINATOR'S MANUAL, *supra* note 510, §§ 432.d–432.e.

[512] *See generally* FEMA, 2017 CRS COORDINATOR'S MANUAL, *supra* note 510; FEMA, 2021 ADDENDUM TO THE 2017 CRS COORDINATOR'S MANUAL, *supra* note 510.

[513] FEMA, 2021 ADDENDUM TO THE 2017 CRS COORDINATOR'S MANUAL, *supra* note 510.

[514] FEMA, 2017 CRS COORDINATOR'S MANUAL, *supra* note 510, § 422.a.

zoning to minimize the number of buildings in the floodplain;[515] other regulations that maintain the natural capacity of the floodplain to store and transport floodwaters, and preserve floodplain lands as open space;[516] maintaining the natural condition of watercourses and shorelines;[517] prohibiting alteration of dunes outside V Zones;[518] and imposing a floodway standard more restrictive than one foot.[519] Some other creditable activities also indirectly support hazard avoidance and managed retreat, such as developing floodplain species assessments and natural functions plans.[520] Moving these and other creditable activities to the minimum criteria would support local hazard avoidance and managed retreat activities.[521]

The CRS is recognized as providing the flexibility communities need to adaptively manage local conditions based on local needs, values, and engagement with local stakeholders.[522] As an entirely voluntary program, however, the CRS lacks the powerful incentives that led approximately twenty-two thousand communities to adopt and enforce laws that meet the NFIP eligibility criteria.[523] Only eight percent of NFIP communities participate in the CRS.[524] Moreover, the communities that elect to participate in the CRS tend to underutilize the land use management activities—instead obtaining premium reductions based primarily on

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[515] *Id.* § 422.f.

[516] *Id.* § 432.a.

[517] *Id.* § 422.g.

[518] *Id.* § 432.n.

[519] *Id.* § 412.e.

[520] FEMA, 2021 ADDENDUM TO THE 2017 CRS COORDINATOR'S MANUAL, *supra* note 510.

[521] *See, e.g.*, FEMA, 2017 CRS COORDINATOR'S MANUAL, *supra* note 510, § 432.f (requiring critical facilities such as hospitals and hazardous materials storage sites to be protected from higher flood levels); *id.* § 452.c ("requiring erosion and sedimentation control during construction projects to reduce siltation and the resulting loss of channel carrying capacity"); *id.* § 452.e (prohibiting dumping or placing debris in stream channels).

[522] Jessica A. Bacher & Tiffany B. Zezula, *Increasing Coastal Community Resilience Through Facilitated Land Use Training, Assessment, and Amendments*, 41 ZONING & PLAN. L. REP., Nov. 2018, at 6.

[523] *See supra* notes 368–70 and accompanying text (discussing success of NFIP in transforming local floodplain management throughout the United States).

[524] The CRS provides premium discounts for the approximately 1,500 communities that elect to participate in the program. FEMA, COMMUNITY RATING SYSTEM OVERVIEW AND PARTICIPATION (2021), https://www.fema.gov/fact-sheet/community-rating-system-overview-and-participation [https://perma.cc/VXB5-68XA] (reporting that 1,520 communities participate in the CRS). This is approximately 8% of approximately 22,000 sub-state communities that participate in the NFIP. GAO-17-425, *supra* note 143, at 40.

education[525] and mapping activities[526] and by imposing more stringent building-scale requirements.[527]

This is not to say, however, that CRS communities do not also undertake land use management activities.[528] Benton County, Oregon, for example, uses its zoning authority over the unincorporated lands within its boundaries to prohibit, with limited exceptions, new residential and non-residential structures, expansion of existing dwellings, placement of manufactured dwellings, and substantial improvements to existing non-residential structures in the floodplain if a property has sufficient "buildable land outside the floodplain to allow reasonable development of the property."[529] The county also regulates the subdivision and partition of properties to limit floodplain development.[530] Depending on an area's designation,[531] the Benton County Code limits removal of native vegetation, development that increases the amount of impervious land, and "encroachments, including fill, new construction, substantial improvements, and other development."[532] The code also designates a wider floodway than the NFIP requires, and it prohibits development within the floodway that would increase the base flood elevation by any amount,[533] in contrast to the NFIP's 1-foot standard.

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[525] *See, e.g.*, FEMA, 2017 CRS COORDINATOR'S MANUAL, *supra* note 510, § 342.b (requiring developers to disclose flood hazards on property).

[526] *See, e.g.*, *id.* § 412.a (credits for new floodway mapping, providing regulatory flood elevations where they are not available, for extending regulatory flood elevations from large new development where elevations are available to all new development).

[527] *See, e.g.*, *id.* § 432.b (credits for requiring freeboard higher than the base flood depth, imposing freeboard requirement on broader range of construction than required by the minimum criteria and to areas where freeboard is not required by the minimum criteria); § 432.g (credits for requiring areas below the base flood elevation to be open, as opposed to open or enclosed with breakaway walls); § 432.k (credits for extending V-Zone standards to coastal A-Zones); § 310 (keeping records of FEMA elevation and floodproofing certificates).

[528] *See* Highfield et al., *supra* note 100, at 691–92 (reporting on adoption of open space preservation activities accounting for reductions in flood losses of more than half a million dollars annually).

[529] BENTON CNTY. CODE §§ 83.610 (non-residential structures) & 83.620.3(A) (residential structures) (current as of Jul. 27, 2024).

[530] *Id.* § 83.520 (prohibiting subdivisions, partitions and property line adjustments if resulting parcels would not have adequate buildable land outside the 100-year floodplain and requiring deed restrictions limiting construction of primary structure to area outside floodplain).

[531] The code recognizes the FEMA Special Flood Hazard Area and FEMA zones within that area, such as, for example, A-Zones and the regulatory floodway, and uses designations such as "high protection floodplain," "urban fringe," and "floodway fringe." *See, e.g.*, *id.* § 83.110.

[532] The code strictly limits development in the floodway, floodway fringe, and portions of the urban fringe, which is the unincorporated area within the City of Corvallis's urban growth boundary. *Id.*; § 83.700.3(a) (generally prohibiting removal of native vegetation in urban fringe high protection floodplain); § 83.700.3(b)(A)-(B) (prohibiting placement of impervious surfaces, structures, or fill, among other things, in floodway and floodway fringe within urban fringe with limited exceptions).

[533] *E.g.*, *id.* § 83.700.3(b)(A).

The low participation rate and tendency of CRS communities to focus their creditable activities on protection and accommodation strategies[534] highlight the need for more powerful incentives and accountability mechanisms to achieve the transformation in floodplain land use management that Congress intended the NFIP to facilitate, which, not surprisingly, are largely consistent with adaptive land use management principles. The reform framework addresses this in part by moving the hazard avoidance and retreat creditable activities in the CRS from the voluntary program to the eligibility criteria and requiring communities to assess the appropriateness of the strategies for their communities through the community resilience element.

Finally, the fifth and sixth elements include flexibility mechanisms that support local capacity to meaningfully engage the community in designing a suite of adaptation strategies that respond to local needs and values. The fifth element does this by incorporating a provision for communities to design and adopt novel hazard avoidance and retreat strategies other than those included in the menu after demonstrating that the new strategies are more responsive to local circumstances and align with the NFIA objective to guide people out of harm's way and enhance and preserve the natural values of floodplains. This provision effectively makes the strategies in the menu default strategies that communities can choose not to adopt when local planning processes point to the need for locally tailored hazard avoidance and retreat strategies. Similarly, the sixth element's hardship exception supports local capacity to respond to local needs and conditions by recognizing that, in some circumstances or some areas of the floodplain, avoidance and retreat regulatory strategies may increase inequities or vulnerabilities.[535]

The community resilience element, menu of retreat options, and provision for substitution of novel, locally crafted hazard avoidance and retreat strategies, and hardship exception also support the local control and flexibility needed to tailor adaptation strategies to local needs by considering the location-specific, complex, interrelated, and conflicting nature of various land use needs and goals.[536] For

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[534] *See* Samuel D. Brody, Sammy Zahran, Wesley E. Highfield, Sarah P. Bernhardt & Arnold Vedlitz, *Policy Learning for Flood Mitigation: A Longitudinal Assessment of the Community Rating System in Florida*, 29 RISK ANALYSIS 912 (2009) (reporting that CRS communities appear to prefer public information and mapping activities and increasing freeboard and other building-scale activities); Sammy Zahran, Samuel D. Brody, Wesley E. Highfield & Arnold Vedlitz, *Non-Linear Incentives, Plan Design, and Flood Mitigation: The Case of the Federal Emergency Management Agency's Community Rating System*, 53 J. ENV'T. PLAN. & MGMT. 219 (2010) (communities pursue easiest gains embedded in CRS program)*;* Jingyuan Li & Craig E. Landry, *Flood Risk, Local Hazard Mitigation, and the Community Rating System of the National Flood Insurance Program*, 94 LAND ECON. 175 (2018) (same).

[535] *See infra* note 540–543 and accompanying text (discussing potential conflicts between managed retreat strategies and a community's need to promote housing production); *see also infra* Section IV.D (discussing tradeoffs and potential unintended consequences of managed retreat).

[536] *See generally* Stina Ellevseth Oseland & Håvard Haarstad, *Displacing Conflicting Goals in Planning for Sustainability? Insights from Three Norwegian Cities*, 23 PLAN. THEORY & PRAC. 233, 233 (2022) ("The problem of conflicting goals is widely recognized in studies of sustainability governance and planning.").

example, transportation, climate, and other "smart growth"-related goals tend to support the adoption of land use regulatory tools that promote dense development near commercial centers and transit corridors.[537] Housing and equity goals may support a requirement that some portion of this development be affordable housing.[538] In many cities, however, commercial centers and transit corridors were developed on flood-prone lands along rivers or near seaports.[539] In these circumstances, promoting density in existing high-amenity urban areas could support climate mitigation, housing, and equity goals by reducing greenhouse gas emissions from cars and encouraging the production of affordable housing close to amenities, while simultaneously undermining climate mitigation, adaptation, and equity goals by further degrading the capacity of waterways and floodplains to sequester carbon and further increasing population density and vulnerability in flood hazard areas. To address such complexities and conflicts consistent with principles of adaptative land use management, the community resilience element could be designed to require consideration, prioritization, or adoption of a suite of flood adaptation strategies that includes limits on new construction, avoids or minimizes strategies that contribute to climate change, incorporates strategies with mitigation co-benefits, and requires consideration of housing supply and affordability.

With respect to housing production supply and affordability, it may appear counterintuitive to look to the housing element as a potential model for a reform of the NFIP reform that incorporates restrictions on new development, and facilitates managed retreat from existing developments, and prioritizes equity. The objective of state housing law reforms like California's housing element is to stimulate development of affordable housing, while the objective of the NFIP reform would be to limit development. This conflict highlights underscores the need to incorporate consideration of the effects of climate adaptation policies on a community's housing supply into local resilience planning.[540] A community resilience element modeled on the housing element could facilitate this. For example, the NFIP criteria could require participating communities to produce (1) inventories of housing inside and outside the floodplain; (2) sites inside and outside

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[537] *See, e.g.*, Massachusetts Smart Growth Zoning Overlay District Act, A.L.M. GL, ch. 40R, § 3 (2024) (providing incentives for local governments to adopt zoning overlay districts that align with "smart growth" principles by increasing zoned capacities and affordable housing development near transit, retail areas, commercial centers, and other amenities).

[538] *See, e.g.*, UTAH CODE ANN. 10-9a-403(2) (2024) (requiring municipal general plan to include planning commission's recommendation for a "moderate income housing element" and encouraging inclusion in the element of land use regulations that allow "higher density or moderate income residential development in commercial or mixed-use zones near major transit investment corridors, commercial centers, or employment centers").

[539] *See generally* Yu Fang & James W. Jawitz, *The Evolution of Human Population Distance to Water in the USA from 1790 to 2010*, NATURE COMMC'N. (2019) at 1–3 (reporting on denser human populations closer to rivers and analyzing historic development of U.S. cities near waterways).

[540] *See generally* Deborah Helaine Morris, *The Climate Crisis is a Housing Crisis: Without Growth We Cannot Retreat*, *in* GLOBAL VIEWS ON CLIMATE RELOCATION AND SOCIAL JUSTICE (Idowu Jola Ajibade & A.R. Siders eds., 2022).

the floodplain which, under current local law, could be developed as housing; (3) the value of housing, infrastructure, and other assets currently at risk of flooding; (4) the value that would be at risk if flood hazard areas were developed to their zoned capacity; (5) infrastructure costs that would be incurred by developing flood hazard areas to their zoned capacity; (6) demographic studies that map flood hazard vulnerabilities currently and vulnerabilities if flood hazard areas were developed to their zoned capacity; and (7) other data that government officials, community members, and other affected groups could use to grapple with the difficult tradeoffs inherent in climate adaptation planning.

D. OBSTACLES, LIMITS, AND TRADEOFFS

The climate science and policy literature is clear: centering hazard area avoidance, managed retreat, and preservation of natural floodplains as strategies to increase resilience is necessary to address the increasing tragedy of unmitigated development of hazard areas,[541] a tragedy like many others that disparately burdens communities of color, impoverished communities, and other communities that continue to be harmed by the structural inequities that characterize dominant law and policy regimes within the United States.[542]

No adaptation strategy in isolation is capable of counterbalancing the myriad governmental and nongovernmental actions that increase inter- and intra-local inequities and vulnerabilities related to flood hazards.[543] Like any adaptation policy, federal criteria that center hazard area avoidance, managed retreat, and preservation of natural floodplains cannot address all the institutional barriers to robust climate adaptation lawmaking that communities face.[544] Whether or not FEMA promulgates such criteria, the suite of adaptation strategies adopted by a community necessarily entails not only difficult tradeoffs but also tradeoffs that disparately allocate benefits and burdens among various community members.[545] Accordingly, a large body of research underscores the need for deliberate integration of environmental justice and climate resilience strategies along the

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[541] A.R. Siders et al., *supra* note 477, at 1 ("Avoiding floodplain development is critical for limiting flood damage . . . . One of the most effective ways to limit flood damage is to avoid building new infrastructure and housing in flood-prone areas."); Mach & Siders, *supra* note 458, at 1295 (analyzing transformative and just adaptation pathways and reporting that most climate-driven transformations will include retreating from developed hazard areas and avoiding development of undeveloped hazard areas in combination with some protection and accommodation measures).

[542] *See* Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 156, 159; *supra* Section IV.A (summarizing climate science and policy literature).

[543] *See, e.g.*, *infra* Section IV.D.1 (discussing institutional racism as a barrier to adoption of equitable managed retreat strategies).

[544] *See, e.g.*, *infra* Section IV.D.2–3 (discussing specter of liability for regulatory takings and financial constraints as institutional barriers to adoption of managed retreat strategies).

[545] Mach & Siders, *supra* note 458, at 1294–1295.

vertical governance axis and throughout the recursive process of climate resilience planning, plan implementation, and evaluation.[546]

1. Land Law Racism

Consistent with the justice concept of recognition,[547] adaptation planning and regulation at all levels of government must meaningfully and respectfully engage with the community members who are particularly vulnerable to flood hazards, food and housing insecurity, and other manifestations of climate change.[548] For example, most of the infrastructure that will be at risk of flooding by 2050 are located in communities of color,[549] which the land use law system and other legal regimes have intentionally and unintentionally disadvantaged.[550] Future flooding will also disparately burden public and affordable housing.[551] Compounding this, households of color tend to bear disproportionately higher burdens post-disaster, including higher rates of unrecoverable property damage, job loss, displacement, mortality, and long-term social and economic disruption.[552]

Meaningful and respectful engagement requires understanding and respect for the ways in which the land use law system and other legal regimes have been used intentionally and unintentionally to perpetuate these inequities.[553] Within this context, regulatory retreat is reminiscent of many other land use and local law policies that displace and disadvantage people of color, including urban renewal programs, so called "slum clearance," condemnation of Black-owned property to promote economic development, and redrawing of municipal boundaries to exclude people of color.[554]

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[546] *See id.* (citing and analyzing research); Graham Diedrich, *Municipal Action Plans Through the Lens of Resilience and Environmental Justice*, 3 PLOS CLIM., at 3–4 (Sept. 2024) (same).

[547] *See supra* note 466 and accompanying text (regarding concept of recognition).

[548] People of color, immigrants, low-income households, renters, and disabled and elderly people, for example, are more vulnerable to a host of climate-related risks including food insecurity, excessive urban heat and involuntary displacement. Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 160.

[549] *Looming Deadlines for Coastal Resilience: Rising Seas, Disruptive Tides, and Risks to Coastal Infrastructure,* UNION OF CONCERNED SCIENTISTS, June 2024, at 1. These projections assume "[p]opulation, demographics, and the location and number of infrastructure assets are . . . constant at present-day levels" and existing defense structures like levees function as intended. *Id.* at 14.

[550] *Id.* at 1.

[551] *Id.*

[552] *The 2018 Kinder Houston Area Survey*, RICE: KINDER INST. FOR URB. RSCH., Apr. 2018.

[553] *See generally* Sarah J. Adams-Schoen, *The White Supremacist Structure of American Zoning Law*, 88 BROOK. L. REV. 1225, 1225 (2023).

[554] SHERYLL CASHIN, WHITE SPACE, BLACK HOOD: OPPORTUNITY HOARDING AND SEGREGATION IN THE AGE OF INEQUALITY 113, 118–26 (2021) (discussing "slum clearance" and disinvestment); JESSICA TROUNSTINE, SEGREGATION BY DESIGN 5–7, 98–120 (2018) (discussing slum clearance, urban renewal, and disinvestment); DORCETA E. TAYLOR, TOXIC COMMUNITIES: ENVIRONMENTAL RACISM, INDUSTRIAL POLLUTION, AND RESIDENTIAL MOBILITY 149 (2014) (discussing boundary changes); Adams-Schoen, *supra* note 553, at 1255 & nn. 11–17 (discussing same and citing additional sources).

These and other policies tended to concentrate people of color in areas at heightened risk of flooding where systemic underinvestment in public amenities like parks, open spaces, and critical infrastructure have increased and continue to increase the vulnerability of these areas to flooding and other climate hazards.[555] As I previously reported, "[d]ata also suggests that local governments routinely used and still use discretionary land use decisions to favor whiter . . . neighborhoods and disfavor . . . neighborhoods where more People of Color live."[556] For example, an empirical analysis of local legislative decisions on conditional use applications in Baltimore found that, "in each decade from 1940 to 2000, the Zoning Board of Appeals and the City Council approved conditional uses such that African American neighborhoods hosted significantly higher numbers of disamenities than did white neighborhoods" and "race was the critical causal factor in the siting patterns."[557] Although this study focused on a single city, its findings align with a "significant body of research demonstrating that locally undesirable land uses . . . such as noxious industrial polluters and solid or hazardous waste landfills . . . are disproportionately concentrated in areas inhabited by People of Color."[558] Storage of industrial pollutants and hazardous waste in flood-prone areas also increases the risk of long-term catastrophic harm to nearby residents.[559]

Evidence also suggests that cities where more people of color live receive significantly less federal aid for infrastructure improvements both to increase community resilience pre-disaster and to repair and improve infrastructure post-disaster.[560] This finding is consistent with a robust body of empirical research demonstrating "that disasters disproportionately affect those who are already socio-economically marginalized in a community, subjecting them to even greater depths of poverty."[561] Moreover, the two variables described above, geographic clustering near hazards and systemic under-resourcing, drive the "high exposure and vulnerability to extreme events" experienced in the United States by "[l]ow-income communities, communities of color, and Tribes and Indigenous Peoples."[562]

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[555] Craig Anthony "Tony" Arnold, *Planning Milagros: Environmental Justice and Land Use Regulation*, 76 DENV. U. L. REV. 1, 114–15 & 119 (1998); CASHIN, *supra* note 554, at 113, 118–26 (discussing disinvestment); TROUNSTINE, *supra* note 554 (discussing disinvestment); Adams-Schoen, *supra* note 553, at 1267–70 (discussing same and citing additional sources).

[556] Adams-Schoen, *supra* note 553, at 1269.

[557] Charles Lord & Keaton Norquist, *Cities as Emergent Systems: Race as a Rule in Organized Complexity*, 40 ENV'T L. 551, 557 (2010).

[558] Adams-Schoen, *supra* note 553, at 1269–70; *see also id.* at n. 309 (citing sources cataloguing empirical studies consistent with Lord and Norquist's' findings).

[559] EGLI, *supra* note 461, at 8.

[560] Simone J. Domingue & Christopher T. Emrich, *Social Vulnerability and Procedural Equity: Exploring the Distribution of Disaster Aid Across Counties in the United States*, 49 AM. REV. PUB. ADMIN. 897 (2019).

[561] U.S. DEP'T HOMELAND SEC., NATIONAL ADVISORY COUNCIL REPORT TO THE FEMA ADMINISTRATOR 7 (2020).

[562] FIFTH NATIONAL CLIMATE ASSESSMENT, U.S. GLOBAL CHANGE RESEARCH PROGRAM 1-17 (2023).

While managed retreat is in the long-term best interest of many communities facing disproportionately high risks of flooding, unconfronted institutionalized racism is likely to result in any adaptation strategy—whether it centers protection, accommodation, hazard avoidance, or managed retreat—being designed and implemented such that it disparately burdens communities of color.[563] This is especially so because many local governments unintentionally or unconsciously continue to adopt and implement land use policies that perpetuate environmental racism.[564] Thus, without an intentional reckoning with the institutional racism within legal systems, including the land use law system, it seems likely that managed retreat policies will also be designed or implemented in a way that perpetuates existing disparities.[565]

However, a tendency to examine the potential inequities of managed retreat in isolation has amplified the misperception that retreat has the potential to be more inequitable than other adaptation strategies.[566] Climate adaptation policy experts Mach and Siders's literature survey shows that as of 2024, assessments of managed retreat, broadly defined to include hazard area avoidance, tended to "consider a fuller range of harms and benefits" than assessments of other adaptation strategies.[567] This isolated focus on managed retreat obscures the ways in which other adaptation strategies also affect agency, equity, place-based identity, and other connections to place. For example, Mach and Siders report that:

> Protective structures . . . can alter place attachment when they fundamentally change a community's layout or reduce access to open spaces, but it is relatively uncommon to consider the implications of in situ adaptation for place attachment. Remaining in a place that experiences environmental degradation can cause painful emotions as relationships with that place are altered.[568]

Similarly, building codes that meet or exceed the NFIP criteria have displaced existing affordable housing when the cost to rebuild smaller, more

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[563] Evidence already exists that managed retreat measures are implemented in a way that disparately burdens lower-income and historically marginalized populations. *See, e.g.*, Kimberly M.S. Cartier, *Equity Concerns Raised in Federal Flood Property Buyouts*, EOS (Oct. 9, 2019), https://eos.org/articles/equity-concerns-raised-in-federal-flood-property-buyouts [https://perma.cc/G6BG-T9Y6] ("Cases have also shown that vulnerable populations have been pressured into buyouts, lied to about flood risk, and relocated to equally flood-prone areas."); Andy Olin, *Study Reveals Effects of White Privilege in FEMA Flood Buyout Program*, Rice: Kinder Inst. of Urb. Rsch. (Feb. 18, 2020), https://kinder.rice.edu/urbanedge/2020/02/18/study-reveals-effects-white-privilege-fema-flood-buyout-program-Houston-hurricane-harvey [https://perma.cc/NJ2M-GLK2].

[564] *See, e.g.*, Lord & Norquist, *supra* note 557, at 558 ("Nothing in the zoning code or the decisional records illustrated overt racism in the land-use process in Baltimore over the period from 1940 to 2000."); SHEILA R. FOSTER, ANA BAPTISTA, KHAI HOAN NGUYEN, JACK TCHEN, MARCO TEDESCO & ROBIN LEICHENKO, NPCC4: ADVANCING CLIMATE JUSTICE IN CLIMATE ADAPTATION STRATEGIES IN NEW YORK CITY 17–23 (2024).

[565] *See* FOSTER ET AL., *supra* note 564, at 5–12 (reporting on New York City's institutional reforms and community-led action to advance climate justice).

[566] Mach & Siders, *supra* note 458, at 1297.

[567] *Id.*

[568] *Id.*

affordable housing that complies with the codes exceeds the insurance payouts that residents of more modest housing receive when their homes are damaged or destroyed.[569] The siloed approach to assessing managed retreat strategies ultimately belies the reality that climate change itself, and adaptation responses to climate change, alter peoples' relationships with a place and involve difficult tradeoffs between essential needs and desires, and untenable tradeoffs between various essential needs.[570] Consequently, Mach and Siders urge researchers, policymakers and communities to analyze the potential inequities of managed retreat in comparison to a community's other feasible adaptation strategies.[571]

2. Money

Hazard area avoidance and managed retreat strategies from downzoning to relocation entail significant costs that are often cited as a barrier to local adoption of regulatory retreat strategies.[572] For retreat from developed areas of the floodplain, these costs can include the cost to acquire developed properties, relocation costs, loss of some of the local property tax revenue from the downzoned or vacant parcel, and loss of income tax revenues if the relocated occupants move out of the jurisdiction, among others.[573]

But just as assessments of the equity-related benefits and burdens of managed retreat that fail to consider the benefits and burdens of other feasible adaptation strategies can distort the findings, care must be taken not to minimize the valuable information that emerges from considerations of the economic costs and savings of adaptation strategies that center avoidance and retreat *as compared to other available adaptation strategies*.[574] The costs attributable to the current protection and accommodation policies that typify flood adaptation throughout the United States are massive and precipitously rising as climate change increases the hazard and as those policies facilitate greater exposure of people, structures, and infrastructure to that hazard.[575] The federal government spends billions of dollars to build and maintain flood control infrastructure even in light of evidence that flood control infrastructure tends to induce development that it cannot adequately protect.[576] It also expends substantial sums on so-called beach renourishment to protect coastal developments from encroaching seas and related flood, erosion, and

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[569] Pawson & Blakie, *supra* note 105, at 3.

[570] Mach & Siders, *supra* note 458, at 1297.

[571] *Id.* at 1297–98.

[572] *Id.* at 1298.

[573] Andrea McArdle, *Managing "Retreat": The Challenges of Adapting Land Use to Climate Change*, 40 U. ARK. LITTLE ROCK L. REV. 605, 623 (2018) (identifying these costs plus lost tax revenue resulting from the depression of surrounding property values and infrastructure adjustments).

[574] Mach & Siders, *supra* note 458, at 1297.

[575] *See supra* notes 408–99 and accompanying text (regarding current and future costs of accommodating development in flood hazard areas).

[576] *Id.*

subsidence risks—most often spending these funds to protect wealthier, whiter coastal developments.[577] When these protections fail, the federal government goes further in debt to pay flood insurance claims on high-risk, often repeat-loss properties in flood hazard areas.[578]

Although it is well beyond the scope of this paper to demonstrate that avoidance and managed retreat generate more cost savings than other adaptation measures, suffice it to say that the savings of the various available adaptation strategies also must be considered as part of the calculus of adaptation policymaking.[579] On the avoidance and managed retreat side of the ledger, savings include not only flood damage avoidance from limiting the exposure of people, structures, and infrastructure to flood hazards but also the savings attributable to protecting and preserving the natural functions of riverine and coastal floodplains. The economic value of these ecosystem services can be substantial. For example, some studies show that coastal wetlands provide more cost-effective flood protection than flood control structures.[580] One study found that coastal wetlands reduced flood damages from Tropical Storm Sandy by 20% to 30% in the states with the most extensive wetland coverage and projected that the coastal wetlands in a single New Jersey county would reduce future flood losses by an average of 16% annually.[581]

Notwithstanding the significance of these data points, however, a more meaningful point of comparison—at least in terms of local capacity to adopt hazard avoidance and managed retreat strategies—is the comparative *local* costs and benefits of various adaptation strategies. Absent reform that includes substantial financial assistance to state and local governments, centering avoidance and retreat will have the effect of shifting flood adaptation costs from the federal government to state and local governments. On the one hand, the federal government foots most of the bill under the current protection- and accommodation-focused flood policy. The federal government pays most of the costs of hard and soft armoring, props up the insolvent flood insurance program, and—after a federal disaster declaration—provides federal disaster assistance to individuals and businesses, and reimburses seventy-five percent or more of the costs local governments pay to rebuild public infrastructure.[582] FEMA's building-scale criteria also increase the cost to construct

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[577] Lisa Song & Al Shaw, *"A Never-Ending Commitment": The High Cost of Preserving Vulnerable Beaches*, PROPUBLICA (Sept. 27, 2018, 5:00 AM), https://www.propublica.org/article/the-high-cost-of-preserving-vulnerable-beaches [https://perma.cc/EL3P-4DFC] ("ProPublica analysis of 16 North Carolina communities directly behind beaches that have received federal funds shows they're 94 percent white on average . . . [and] a quarter of owner-occupied housing in these areas is worth more than $500,000."); *see also id*. ("The Corps generally funds projects only when the expected benefit is 2.5 times as high as the project's cost. Poor communities can't meet that criteria . . . .").

[578] Pappas & Flatt, *supra* note 121, at 382.

[579] Mach & Siders, *supra* note 458, at 1297.

[580] McArdle, *supra* note 573, at 623–24.

[581] *Id.* at 624.

[582] Justin Pidot, *Deconstructing Disaster*, BYU L. REV. 213, 246 (2013).

compliant structures, contributing to higher prices and more state and local property tax revenue.[583]

On the other hand, hazard area avoidance and proactive retreat threaten a primary source of local government revenue: local property taxes.[584] When properties that currently have development potential are rezoned for open space or less economically lucrative development, or existing development is relocated or destroyed and not rebuilt, the properties' market values decrease and, consequently, the contribution of the property to the local tax base also decreases.[585] The movement of residents and businesses out of a municipality also decreases the municipality's property tax revenue and local revenue derived from state or local income taxes.[586] Reductions in local revenue decrease the ability of the local government to maintain and improve infrastructure or provide essential services and amenities, like parks and open space, which can lead to further reductions in the value of property and out-migration of residents with the means and desire to move to a more affluent area. This downward spiral "can negatively impact these communities' credit ratings, which in turn can make it harder for them to access the capital necessary to finance the infrastructure projects needed to address . . . [sea level rise and flooding] impacts."[587] All these outcomes tend to disparately burden less affluent communities, rural communities, and low-income and historically marginalized community members.[588]

Without diminishing the criticality of these considerations, it is nevertheless worth reiterating that assessments of the inequities that are likely to follow adoption of hazard avoidance or managed retreat criteria provide information that, while important, is of limited policymaking relevance absent consideration of the economic and equity burdens of other feasible alternatives. Key among these alternatives is the status quo of nearly unfettered development of flood hazard areas,

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[583] FEMA's building-scale criteria increase the cost to construct compliant structures, contributing to higher prices and higher property taxes. Compliance with heightened building code standards can also exclude and squeeze less affluent residents out by making it cost-prohibitive to develop or rebuild more moderate housing. Stefanos Chen, *New Buildings Rise in Flood Zones*, N.Y. TIMES (July 6, 2018), https://www.nytimes.com/2018/07/06/realestate/luxury/new-buildings-rise-in-flood-zones.html [https://perma.cc/PB48-8Q6B]. *But see* Pappas & Flatt, *supra* note 121, at 379 (noting that where flood risk is reflected in the real estate market some owners of vulnerable properties that have become effectively unsellable cannot afford to relocate).

[584] *See* Pappas & Flatt, *supra* note 121, at 378 (positing that municipal officials are incentivized to "encourage continued habitation and growth despite disaster risks" because "municipalities typically derive their tax bases . . . from local residency and investment")

[585] Elizabeth A. Andrews & Jesse Reiblich, *Reflections on Rural Resilience: As the Climate Changes, Will Rural Areas Become the Urban Backyard?*, 44 WM. & MARY ENV'T. L. & POL'Y REV. 745, 752 (2020).

[586] *Id.*

[587] *Id.* (citation omitted); *see also* Donald T. Hornstein, *Public Investment in Climate Resiliency: Lessons from the Law and Economics of Natural Disasters*, 49 ECOLOGY L.Q. 137, 183 (2022) ("[A] community's ability to finance proactive resiliency measures is directly tied to the strength of its tax base and indirectly to the administrative capabilities that a greater tax base can support.").

[588] Andrews & Reiblich, *supra* note 585, at 752.

which is driving the ever-widening flood hazard preparedness gap. This preparedness gap disparately burdens communities and those within communities that are disproportionately vulnerable to flood hazards, and these disparities will grow as the hazards increase and hazard areas are further developed.[589]

In summary, regardless of whether the NFIP eligibility criteria center hazard avoidance and managed retreat, the large role local property taxes play as a source of local revenue will continue to disincentivize the adoption of local laws that limit land development and especially those that limit the development of high-value areas like some waterfronts.[590] Making NFIP eligibility contingent on the adoption of land use laws that decrease local sources of revenue, without providing other sources of revenue, is also likely to have the perverse effect of decreasing locally funded services—including services that increase the community's ability to effectively respond to flood hazards, such as the maintenance of transportation routes and other essential infrastructure. And yet, the status quo is also untenable.

3. Regulatory Takings

Although a robust takings analysis is beyond the scope of this Article, this section briefly analyzes the current state of regulatory takings doctrine and discusses ways in which land use regulations implementing hazard avoidance and managed retreat strategies can be fortified against takings challenges.

As *Lucas* illustrates, laws that prohibit all development in a flood (or erosion) hazard area are vulnerable to challenges that the regulation deprives property owners of their property without just compensation in violation of the Fifth Amendment to the U.S. Constitution[591] and similar state constitutional prohibitions of uncompensated regulatory takings.[592] Hazard avoidance and managed retreat

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[589] Wing et al., *Patterns of Flood Risk*, *supra* note 59, at 157; *see also* Pappas & Flatt, *supra* note 121, at 378–79 (describing "concentrat[ion of] burdens on those least suited to bear them and magnifying the costs[]" of cycles of building, destruction and rebuilding, and inevitable unmanaged retreat).

[590] *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, 312 (2019) ("Local governments can be reluctant to regulate floodplain development. Many are concerned about maintaining a healthy tax base."); Michael B. Gerrard, *Urban Flooding: Legal Tools to Address a Growing Crisis*, 39 J. LAND USE & ENV'T. L. 139, 180 (2024) ("[Retreat's] actual application has been limited. Local politicians almost always resist the idea; it would reduce their electorate and their tax base, and their constituents seldom want to move.").

[591] Lucas v. South Carolina Coastal Council, 505 U.S. 1003 (1992). Presumably because the *Lucas* lots were zoned solely for residential use, the Court characterized the Beachfront Management Act as prohibiting all economic use of the lots even though the Act only prohibited habitable structures. *See id.* at 1009. *Lucas* did not, however, seek a variance under the local zoning law to allow commercial or other uses of the property nor did he seek a hardship exemption, which the state law provided for by the time the case reached the Supreme Court. *Id.* at 1043 (Blackmun, J., dissenting).

[592] *See* Gerald S. Dickinson, *Federalism, Convergence, and Divergence in Constitutional Property*, 73 U. MIA. L. REV. 139, 142 (2018) (analyzing state constitutional takings jurisprudence).

regulatory strategies that allow property owners to recoup some of their economic investment in the property are less vulnerable to successful regulatory takings claims than the nearly complete development restriction at issue in *Lucas*. For example, combining an ambulatory setback (like the erosion control line in *Lucas*) with TDRs or using a flood hazard control line to designate land uses in hazard areas as non-conforming, as opposed to outright prohibiting them, *should* subject any takings claims to review under the *Penn Central* test—a test the Supreme Court has described as weighing heavily against the challenger when the regulation being challenged is a health or safety regulation.[593] By allowing property owners to recoup some of their investment through the use of TDRs or through non-conforming use regulations that allow existing uses to continue for a limited time (subject either to an amortization period or prohibition of expansion and termination of non-conforming use status if the use is abandoned or the structure is substantially destroyed),[594] the regulations would allow property owners to retain more than a "mere token" of the economic value of their property and avoid application of the *per se Lucas* test—at least according to the Court in *Palazzolo v. Rhode Island*.[595] Regulatory restrictions on development rights have also been more likely to withstand a takings challenge when they were supported by legislative findings that the development would create a nuisance presently or within the lifespan of the development,[596] or that the restriction is reasonably necessary to avoid health or safety risks to the property, nearby properties, or the community generally.[597]

Recent Supreme Court decisions cast doubt, however, on whether approaches such as these will be enough to avoid takings liability and, relatedly, shore up the constitutionality of land use laws against challenges based on the unconstitutional conditions doctrine.[598] For example, in 2021, the Court held that a

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[593] Penn Cent. Transp. Co. v. City of New York, 438 U.S. 104, 124 (1978). My use of the word "should" reflects mounting uncertainty about the longevity of the *Penn Central* test in light of the Court's continual erosion of judicial deference to police power regulations and expansion of the categories of *per se* regulatory takings. *See, e.g.*, Sheetz v. County of El Dorado, 601 U.S. 267 (2024).

[594] SALKIN, *supra* note 125, at §§ 12:1, 12:18–12.23 (5th ed., May 2024 update).

[595] Palazzolo v. Rhode Island, 533 U.S. 606 (2001) (holding that the property's at least $200,000 in development potential was more than a mere "token interest" and therefore the *Penn Central* test, rather than the *Lucas* test, is applicable). The other per se test for regulatory takings came from *Loretto v. Teleprompter Manhattan CATV Corp.*, which held that a regulation that requires a property owner to allow a third party to permanently occupy part of the property is a per se taking. Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 419, 435 (1982).

[596] *See, e.g.*, Hadacheck v. Sebastian, 239 U.S. 394 (1915); Miller v. Schoene, 276 U.S. 272 (1928).

[597] *See Penn Central*, 438 U.S. at 125–27 (cataloguing cases that held land use restrictions were not takings).

[598] *See, e.g.*, Cedar Point Nursery v. Hassid, 594 U.S. 139 (2021); Sheetz v. Cnty. of El Dorado, 601 U.S. 267, 279–80 (2024) (holding that a legislatively imposed traffic impact fee was subject to the unconstitutional conditions tests announced in *Nollan v. California Coastal Comm'n*, 483 U.S. 825 (1987), and *Dolan v. City of Tigard*, 512 U.S. 374 (1994), for unconstitutional land use exactions).

California regulation imposing a temporary easement on an agricultural employer's property was a per se taking, despite the temporary nature of the easement and the property's retention of its value. The Court rejected the applicability of the *Penn Central* balancing test, reasoning instead that, by granting labor organizers a time-limited right to engage in union activities on nursery's property, the regulation physically "appropriate[d] for the enjoyment of third parties the owners' right to exclude."[599]

Three years later, in *Sheetz v. County of El Dorado*, the Court extended the test for the "special class" of *adjudicatory* land use exactions to the non-discretionary application of a *legislatively* imposed traffic impact fee on a building permit.[600] Unlike the regulatory takings tests, which place the burden of proof on the challenger, the *Nollan Dolan* test for unconstitutional exactions puts the burden on the government.[601] Consequently, *Sheetz* raises at least the possibility that a court, when faced with a land use law that imposes conditions on the development of property in flood hazard areas, may require the government to prove the constitutionality of the law and thereby further erode the generally applicable presumption that legislative acts are valid and constitutional.[602]

Because *Sheetz* did not address how the *Nollan Dolan* test should be applied to legislative acts, it remains to be seen whether the test's presumption of unconstitutionality will apply in the legislative context or whether the Court will extend *Nollan Dolan* beyond legislatively imposed development fees. If this happens, the legislative record for hazard avoidance- and retreat-oriented flood adaptation regulations that include development conditions or criteria may need to include findings that align with the substantial nexus and rough proportionality test.[603] Because this test requires individualized assessments of whether the development condition is proportional to the risk attributable to the specific proposed development,[604] it may be that no amount of detail in the legislative findings of a generally applicable law will suffice to overcome the presumption against the legislation's constitutionality. That said, state and local legislatures enacting avoidance- and retreat-centered regulations—whether pursuant to NFIP

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[599] *Cedar Point Nursery*, 594 U.S. at 149; *see also* Horne v. Dep't of Agric., 576 U.S. 350 (2015) (applying the *Loretto* per se test and holding that agricultural crop reserve requirement was a per se taking notwithstanding the plaintiffs' retention of some of the value of the reserve crop). *But see Cedar Point Nursery*, 594 U.S. at 149 (stating that the reserve requirement in *Horne* "constituted a physical rather than a regulatory taking").

[600] 601 U.S. at 272, 279–80 (holding that legislatively imposed traffic impact fee was subject to the *Nollan Dolan* test).

[601] Lingle v. Chevron U.S.A., 544 U.S. 528, 538–39 (2005) (summarizing the two per se and one multi-factor balancing test applicable to regulatory takings challenges and the unconstitutional conditions test applicable to adjudicatory land use exactions).

[602] *See generally* SALKIN, *supra* note 125, at § 15:8 (5th ed., Nov. 2024 update) (discussing and citing cases regarding presumption of validity and constitutionality).

[603] *Lingle*, 544 U.S. at 538–39.

[604] *See* Nollan v. California Coastal Comm'n, 483 U.S. 825 (1987) (using essential nexus test to analyze whether an adjudicatory land use exaction constitutes an unconstitutional condition); Dolan v. City of Tigard, 512 U.S. 374 (1994) (adding the rough proportionality requirement to the test).

minimum criteria or otherwise—would be wise to include particularized findings regarding the harms avoided by the development limitations and the proportionality of those harms to the burdens imposed by the regulations.

Given the uncertainties about the constitutional validity and the susceptibility of regulations that limit development to traditional regulatory takings challenges, NFIP reform efforts should prioritize research that identifies hazard avoidance and managed retreat regulations that are less likely to trigger regulatory takings challenges or challenges based on the unconstitutional conditions doctrine. These include:

- Requiring assessment as part of the floodplain development permitting process of (1) the likelihood the development will flood under various climate scenarios and, (2) if flooded, the short and long term and concentrated and dispersed impacts of such flooding, including risk to lives, property, infrastructure, and floodplain ecosystem services.[605]
- Requiring communities to identify and justify the continuation or adoption of floodplain land use management strategies that contributes to local inequities and vulnerabilities.[606]
- Prohibiting the construction of vulnerable infrastructure and assets in the 100- or 500-year floodplain if it can be avoided.[607]
- Providing sufficiently strong incentives for owners of property in flood hazard areas to transfer their development rights to properties outside flood hazard areas or coupling development restrictions with TDRs.[608]
- Amending the approval criteria for subdivisions and planned unit developments (PUDs) to prioritize hazard area avoidance while also including in the legislative record particularized findings akin to those required by *Nollan Dolan*.[609]

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[605] *See* Nolon, *supra* note 82, at 551 (discussing same).

[606] *See supra* Section IV.C (discussing adoption of community resilience element that would include this requirement).

[607] *See* McArdle, *supra* note 573, at 619 (discussing and providing examples of "land-use restrictions on the timing, extent, and density of building").

[608] Per *Penn Central*, a case-by-case context dependent analysis is required to determine whether TDRs coupled with a development limitation effect a taking. Penn Cent. Transp. Co. v. City of New York, 438 U.S. 104, 124 (1978). The issue came before the Court again in Suitum v. Tahoe Reg'l Plan. Agency, 520 U.S. 725 (1997), but the Court skirted it on ripeness grounds. *But see id.* at 747 (Scalia, J., concurring in part) (arguing that the existence of TDRs was relevant to the determination of just compensation and not the determination of whether the regulation effected a taking); *see also* Julian Conrad Juergensmeyer, James C. Nicholas & Brian D. Leebrick, *Transferable Development Rights and Alternatives After* Suitum, 30 URB. LAW. 441, 475 (1998) (analyzing inverse condemnation implications of TDRs, identifying successful TDR programs, and distilling guidelines from those programs); Trevor D. Vincent, *Exploiting Ambiguity in the Supreme Court: Cutting Through the Fifth Amendment with Transferable Development Rights*, 58 WM. & MARY L. REV. 285, 318 (2016) (analyzing susceptibility of development restrictions coupled with TDRs to inverse condemnation liability).

[609] *See supra* notes 600–604 (discussing extension of *Nollan Dolan* test to legislatively required criteria or conditions on new development).

- Rezoning to allow less intensive land uses that nevertheless allow for some economic use of the properties, make existing higher intensity land uses non-conforming, and provide a hardship exception.[610]

Many other examples of regulatory strategies that would probably not trigger takings liability can be found in NFIP regulations that encourage—but do not require as a condition of program eligibility—floodplain land use regulations that facilitate hazard area avoidance, managed retreat, and the preservation of floodplain ecosystem services. These include:

- Prohibiting development that increases the danger to human life.[611]
- Prohibiting the manufacturing or storage of hazardous substances in floodways and coastal high hazard zones.[612]
- Acquiring frequently damaged properties.[613]
- Coupling property buy-outs with rezoning the property for open space use or other low-intensity, non-residential land uses that minimize harm to the natural flood-mitigating functions of the floodplain.[614]
- Avoiding or minimizing direct or indirect support of new development in flood hazard areas, including extension of roads, bridges, sewage and electric utilities, and other municipal services.[615]

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[610] *See supra* notes 125–130 (discussing how non-conforming use status allows owners to temporarily, and potentially indefinitely, continue recouping investment in property).

[611] *See* 44 C.F.R. § 60.22(a)(1) (suggesting but not requiring that communities prohibit floodplain development that would increase danger to human life).

[612] *Id.* § 60.22(c)(18).

[613] *Id.* § 60.22(b)(4) (referring to acquisition of "frequently flood-damaged structures").

[614] This is similar to an action that is creditable under the CRS program but not reflected in the NFIP eligibility criteria. *See* FEMA, 2017 CRS COORDINATOR'S MANUAL, *supra* note 510, at 110–12 (conditioning credit for property acquisition on documentation that the property will remain vacant). *See also* Thomas Ruppert, John Fergus & Enio Russe-Garcia, *Managing Property Buyouts at the Local Level: Seeking Benefits and Limiting Harms*, 48 ENV'T. L. REP. 10520, 10521 (2018) (recognizing many benefits of buyouts and analyzing unintended consequences at the local level).

[615] *See* 44 C.F.R. § 60.22(a)(2) (suggesting prohibition of nonessential public utilities); John Lovett, *Moving to Higher Ground: Protecting and Relocating Communities in Response to Climate Change*, 42 VT. L. REV. 25, 30–31 (2017) ("[A] landowner does not have a takings claim when the government elects *not* to protect land from the threat of natural hazards, or elects not to build infrastructure that would make the land developable."). *But see* Christopher Serkin, *Passive Takings: The State's Affirmative Duty to Protect Property*, 113 MICH. L. REV. 345, 346 (2014) (asserting that government inaction could effect a taking); David Dana, *Incentivizing Municipalities to Adapt to Climate Change: Takings Liability and FEMA Reform as Possible Solutions*, 43 B.C. ENV'T. AFF. L. REV. 281, 296 (2016) (asserting that even though courts have not embraced the passive takings theory the mere threat of liability from passive takings may disincentivize governments from withdrawing essential services).); Lovett, *supra*, at 51–58 (citing and analyzing cases that recognized potential inverse condemnation when local governments stop maintaining roads when they have an affirmative duty to act).

- Prohibiting or limiting the use of fill or hard armoring.[616]
- Requiring flood- and flood-insurance related disclosures "to all prospective and interested parties (including but not limited to purchasers and renters)."[617]

NFIP regulations also encourage participating communities to enact coastal setbacks that prohibit new construction in coastal high hazard zones.[618] FEMA and participating communities can support setbacks like these—as well as other strict limits on new construction—with a substantial factual record of the public health and safety risks the regulations prevent or reduce.[619]

While no strategy can ensure state and local governments will avoid regulatory takings liability, the variety and evolving nature of adaptation strategies, including hazard avoidance and managed retreat strategies, and the mounting evidence of harm attributable to development in flood hazard areas demands serious consideration of the wide range of existing strategies and support for climate adaptation and legal research focused on identifying regulatory strategies that can withstand scrutiny under the Fifth Amendment.

The realities of land law racism, tax base constraints, and the specter of liability or invalidity under the Fifth Amendment should not, however, counsel against strengthening federal incentives for state and local governments to use their police powers to facilitate hazard avoidance and managed retreat. Rather, they should inform the implementation of the current NFIP, critical assessment of the NFIP, and the design and implementation of any NFIP reform. At a minimum, annual assessments of the NFIP by the GAO and FEMA's periodic analysis of the effectiveness of the federal floodplain management criteria should consistently include evaluation of the extent to which the criteria fail to implement the primary operative feature of the NFIA and thereby contribute to the increasingly untenable economic, social, and environmental costs of flood disasters, and related inequities and vulnerabilities. Reform of the criteria can further prioritize equity and the reduction of community-scale vulnerability. FEMA and participating communities can and should track the demographics of the areas that bear the greatest burdens of adaptation strategies. As part of any required comprehensive planning, including consideration of a "community resilience element" and selection of hazard avoidance and managed retreat strategies, the federal criteria can require

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[616] *See* 44 C.F.R. § 60.22 (suggesting enactment of regulations requiring alternatives to fill "to maintain the storage capacity of the flood plain and to minimize the potential for negative impacts to sensitive ecological areas").

[617] *Id.* § 60.22(c)(3).

[618] *See, e.g.*, *id.* § 60.22(c)(14).

[619] *See* 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 N.Y.U. ENV'T. L.J. 84, 114–115 (2014) (arguing that in the context of takings challenges, courts are likely to be more receptive to measures addressing flood risks that are framed as exercises of the public health police power and supported by a substantial factual record supporting that framing than measures framed as exercises of the zoning power).

communities to identify and justify the continuation or adoption of strategies that contribute to local inequities and vulnerabilities. Although the "devil is in the details," so to speak, elucidation of the details of such requirements is beyond the scope of this analysis. Nevertheless, the robust evidence of the myriad ways in which the current NFIP criteria and local land use laws exacerbate exposure to flood hazards, inequities, and vulnerabilities should trigger the careful incorporation of these factors into future program reforms and ongoing assessments of the program.

CONCLUSION

Notwithstanding the NFIA's objective of constricting development in and shifting development away from flood hazard areas, the NFIP's primary flood management tools continue to be levees and other flood control infrastructure and building-scale criteria coupled with federal flood insurance. The unsurprising result has been precisely the moral hazard Congress structured the NFIA to avoid: a federal flood program that facilitates widespread development of the nation's riverine and coastal floodplains and, consequently, increases the pace of floodplain development and the social, environmental, and economic costs of flood disasters.

Amendment of the NFIP regulations that establish the minimum floodplain management eligibility criteria provides an opportunity to significantly increase the resilience of coastal communities and communities within the riverine floodplain while decreasing the cost of the NFIP overall. By reorienting the local floodplain management regulatory regime toward hazard avoidance, retreat, and restoration and preservation of natural areas within the floodplain, FEMA can finally align the flood program with its statutory mandate and, in so doing, increase the institutional capacity of local governments to effectively, equitably, and robustly guide development away from flood hazards.

The alternative is the continuation of a federal flood policy that encourages widespread maladaptive development, contributes to the degradation of the flood mitigating capacity of functioning floodplain ecosystems, and undermines local governmental capacity to adaptively manage floodplain land uses—ultimately resulting in more unmanaged retreat with high costs for everyone and even higher costs for vulnerable populations and historically marginalized people.