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Building Resilient Communities in the Wake of Climate Change While Keeping Affordable Housing Safe From Sea Changes in Nature and Policy

Shelby D. Green*

I. INTRODUCTION

Seas are rising. The scientists have confirmed it.¹ The causes are many, but the consensus is that this phenomenon is largely attributable to global climate change.² Climate change portends many effects, most of them harmful and frightening—from severe storms, to excessive heat, to drought.³ In fact, “[s]cientists believe that climate change will increase the duration and frequency of extreme weather events, such as hurricanes, tropical cyclones, and storm surges.”⁴ Most of the world is responding to these threats. The two well-identified paths are mitigation and adaptation. In mitigation, governmental institutions and industry seek to reduce future carbon dioxide (“CO₂”) emissions by studying and implementing energy saving technologies and practices, including energy efficient lighting, geothermal heating, and using renewable energy sources.⁵ The aim is to slow the demand for energy, particularly that derived from fossil fuels, which in turn will reduce the output of carbon, said to be the main culprit in climate change.⁶

Adaptation, on the other hand, focuses on protecting society from the current—as well as future—risks posed by the adverse effects of climate change.⁷ To some, adaptation sounds like “uncle,” or “I give up.” But it need

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1. See generally John A. Church, et al., *Climate Change 2013: The Physical Science Basis*, INTERNATIONAL GOVERNMENTAL PANEL ON CLIMATE CHANGE, (Ch. 13, Sea Level Change) (2014), available at http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter13_FINAL.pdf (last visited Apr. 6, 2015).

2. *Id.* at 1137. Glacial melting and ocean thermal expansion resulting from global climate change have caused increasingly high rates of sea level rise over the past century. *Id.*

3. See Christopher B. Field, et al., *Climate Change 2014: Impacts, Adaptation, and Vulnerability*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, (Summary for Policymakers)(2014), available at http://www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf. (last visited Apr. 6, 2015) [hereinafter “Summary for Policymakers”].

4. Robin Bronen, *Climate-Induced Community Relocations: Creating An Adaptive Governance Framework Based In Human Rights Doctrine*, 35 N.Y.U. REV. L. & SOC. CHANGE 357, 359 (2011) (citing Charles J. Hanley, *Long, Hot Summer of Fire, Floods Fits Predictions*, USA TODAY, Aug. 12, 2010, http://www.usatoday.com/weather/climate/2010-08-12-predictions-weather_N.htm).

5. U.S. GLOBAL CHANGE RESEARCH PROGRAM, CLIMATE CHANGE IMPACTS IN THE UNITED STATES 653-54, 657, 671 (2014) [hereinafter “Climate Change Impacts in the U.S.”].

6. *Id.* at 649, 657.

7. *Id.* at 671.

not be taken this way. Instead, it is in recognition of the fact that much of the CO₂ emissions causing climate change occurred over the course of centuries, and may be irreversible, at least in the short term.⁸ Thus, there is a need to adapt to ever-present threats from a much more malevolent world. Adaptation may take many forms, including building up beaches,⁹ constructing breakwaters,¹⁰ and installing gates, such as in the Venice Lagoon.¹¹ Significantly, it may mean removing vulnerable populations from exposed areas in order to protect them and reduce the losses and the costs of rescuing them, but also to allow the areas to return to their natural form and purposes, perhaps to head off or channel storms or surges.¹² Other adaptation measures include elevation of sites, the wholesale demolition of buildings and stringent standards and codes for the construction and rehabilitation of buildings that require resiliency features.¹³ The object is to design and construct buildings and infrastructure that might withstand the ravages of a Superstorm Sandy, much as the Statue of Liberty did—that is, to create communities that are low-energy consuming and that are resilient.

Both of these responses, mitigation and adaptation, despite being well-meaning, portend hardship for the already cost-burdened poor—those who live in vulnerable areas, in aging, not so well-crafted structures. The most immediate effect is, of course, dislocation and displacement.¹⁴ In the creation of new resilient communities, the planning focus may be on infrastructure and not affordable places to live. The second effect is that stringent building standards will make new construction and rehabilitation (retrofitting) more costly and hence less likely. The related effects on the availability of housing will be felt in increasing costs for casualty and flood insurance, greater difficulty obtaining mortgage loans for properties located in flood-prone areas because appraisals will discount the value of properties on account of threats from climate and, as prices decline, so does the strength and efficiency of the secondary mortgage market.

No one can question the wisdom of mitigation and adaptation measures, only that they be taken with regard to those hapless families who unwittingly have made their homes in nature's way. The movement to construct new resilient communities must be evaluated in the larger context of other such programs in our society—from urban renewal in the 1950s and 1960s, to

8. See Summary for Policymakers, *supra* note 3 at 14.

9. Office of the Mayor, *A Stronger, More Resilient New York*, PLANYC 46-49 (2013), available at http://s-media.nyc.gov/agencies/sirr/SIRR_singles_Lo_res.pdf.

10. *Id.*

11. *Integrated System for the Safeguard of Venice and its Lagoon Against Flooding*, CLIMATE-ADAPT, available at http://climate-adapt.eea.europa.eu/viewmeasure?ace_measure_id=3334 (last visited Apr. 6, 2015).

12. N.Y. GOVERNOR'S OFFICE OF STORM RECOVERY, *NY Rising Buyout and Acquisition Programs*, <http://stormrecovery.ny.gov/ny-rising-buyout-and-acquisition-programs> (last visited Apr. 6, 2015).

13. URB. GREEN COUNCIL, *Building Resiliency Task Force*, 14 (2013), http://issuu.com/urbangreen/docs/brtf_executive_summary.

14. See discussion of displacement *infra* note 42.

wholesale razing of homes in “legacy cities” in 2014—to learn from their successes and failures. Prominent in any such plans must be regard for the communities of people whose political and economic stature is marginal.

This Article will explore the twin interests of responding to climate change and preserving accessible and affordable housing. Part II will give a broad overview of the scientists’ climate change predictions. Part III will discuss what these predictions portend for populations, housing, and communities. Part IV will describe the broad responses that the federal, state, and local governments are making to climate change to create communities that are thriving and resilient. Part V discusses the efficacy of these responses and their potential impact on the poor, housing, and communities. Part VI looks for parallels between the resilient cities movement and the urban revitalization programs of the past to see if there are lessons that should be heeded and discusses ways to mediate the intersection of what should be parallel interests—resiliency and community. In Part VII, I suggest that climate change will force new conceptions of what it means to own property and what it means to govern democratically. In conclusion, this Article offers some prescriptions for going forward.

II. CLIMATE CHANGE: EFFECTS ON POPULATIONS AND LIVABILITY OF CITIES

Climate change is rapidly transforming our natural and built environments with disastrous consequences for the human existence—health, communities, ecosystems, economic markets, and legal systems. The severe weather events emanating from climate change not only destroy the physical environment, but also cause the deaths of hundreds, if not thousands.¹⁵ Millions of people are displaced.¹⁶ Global climate is projected to continue to change over this century and beyond, largely the result of the proliferation of heat-trapping gases emitted globally, known as greenhouse gases (“GHGs”).¹⁷ No aspect of the natural or built environment will be untouched.

A. Air

The United States average temperature has increased by 1.3°F to 1.9°F since 1895, with the greatest increases occurring since 1970. The most recent decade was the nation’s warmest on record, with temperatures expected to

15. In Russia, recent wildfires have killed fifty-two people and destroyed the homes of more than 300 people. Tom Parfitt, *Moscow Death Rate Doubles as Smoke from Wildfires Shrouds Capital*, GUARDIAN (U.K.), (Aug. 9, 2010, 15:43 EDT) available at <http://www.guardian.co.uk/world/2010/aug/09/moscow-death-rate-russia-wildfires>. While in Pakistan, flooding has affected 14 million people, with 1,600 killed by the rising waters and 113 dying from mudslides. *Pakistan Floods ‘Hit 14m People,’* BBC NEWS (Aug. 6, 2010), <http://www.bbc.co.uk/news/world-south-asia-10896849>.

16. See Summary for Policymakers, *supra* note 3, at 20.

17. Climate Change Impacts in the United States, *supra* note 5, at 20.

continue rising.¹⁸

B. Energy

Warming will lead to decreased demands for heating energy, but increased demand for cooling energy.¹⁹ Because nearly half of the nation's electricity comes from coal-fired plants, increased demands for electricity will lead to increased total national CO₂ emissions.²⁰

C. Ecosystems

Climate change will affect ecosystems and agriculture, particularly by causing changes during the frost-free seasons. Across the United States, the growing season is projected to continue to lengthen.²¹ The consequences of a longer growing season can include forest fires as well as increases in invasive plant species, insect pests, and disease pathogens.²²

D. Water

Climate change portends both too much and too little precipitation. There will be more rain, snow, and heavy downpours in the northern United States, but less for the Southwest.²³ Over this century, the greatest increases have occurred in the Midwest and Northeast, but scientists predict that future increases of "extreme weather events" will occur across the entire United States.²⁴ Paradoxically, the increased precipitation in the northern parts of the country will occur at the same time as heat waves leading to droughts in the Southwest.²⁵ Higher energy costs will also ensue from increased evaporation, which will lead to greater water demand for irrigation and power-generating stations.²⁶

E. Wind

Strong wind events are expected to become more severe; since the 1980s, the frequencies of the strongest (Category 4 and 5) hurricanes have increased.²⁷

18. *Id.* "Because human-induced warming is superimposed on a naturally varying climate, the temperature rise has not been, and will not be, uniform or smooth across the country or over time." *Id.*

19. *Id.* at 116.

20. *See id.* at 115.

21. *Id.* at 20, 31.

22. *See id.* at 82.

23. *Id.* at 20, 33, 40.

24. *Id.* at 20.

25. *See id.*

26. Thomas R. Carl, et al., *Global Climate Change Impacts In The United States*, U.S. GLOBAL CHANGE RESEARCH PROGRAM, 49 (2009) available at <http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf> [hereinafter "Climate Change Impacts in the U.S. 2009"].

27. Climate Change Impacts in the United States, *supra* note 5, at 20. The intensity and frequency of tornadoes, hail, and damaging thunderstorm winds are uncertain and are being studied intensively. *See also Extreme Events*, U.S. GLOBAL CHANGE RESEARCH PROGRAM, available at

Warmer air holds more water vapor evaporating from the oceans and land surface.²⁸ Increased damage is a direct function of stronger storm systems; “an 11% increase in wind speed translates to roughly a 60% increase in damage.”²⁹ Strong winds will lead to storm surges, which in turn will lead to more frequent and extreme tidal events.³⁰

F. Sea Level Rise

On top of the terrestrial changes is the phenomenon of sea level rise, which has crept up by an average of about eight inches since 1880.³¹ Scientists project that the average sea level will rise an additional one to four feet by the year 2100.³² The melting of glaciers and arctic ice has accelerated; alarmingly, “[t]he Arctic Ocean is expected to become essentially ice free in summer before mid-century.”³³ While the oceans are working tirelessly to absorb roughly a quarter of annual global CO₂ emissions, they are becoming more acidic as a result, which may have severe long-term impacts on marine ecosystems.³⁴ The most significant consequence of sea level rise is flooding—coastal, riverine, and urban. As sea levels rise higher over the next fifteen to thirty years, tidal flooding is expected to occur more often and cause more disruption, even rendering some areas unusable at all within the time frame of a typical home mortgage.³⁵ Sea level rise will render land worthless, literally underwater.³⁶ The number and severity of tidal flooding events over the coming decades portends significant impacts on property infrastructure and on the daily lives of affected populations.³⁷ More flooding means increased saltwater intrusion in drinking water supplies.³⁸ Urbanization typically results in impervious

<http://www.globalchange.gov/explore/extreme-events> (last visited Apr. 6, 2015).

28. Climate Change Impacts in the United States, *supra* note 5, at 37.

29. Emily Eisenhaur, *Socio-ecological Vulnerability to Climate Change in South Florida*, FLA. INT’L UNIV., 7 (Mar. 2014) available at <http://digitalcommons.fiu.edu/etd/1269>.

30. *Id.*

31. Climate Change Impacts in the United States 2014, *supra* note 5, at 21.

32. *Id.*

33. *Id.*

34. *Id.* at 21, 48–49.

35. Erika Spanger-Siegfried, et al., *Encroaching Tides: How Sea Level Rise and Tidal Flooding Threaten U.S. East and Gulf Coast Communities over the Next 30 Years*, UNION OF CONCERNED SCIENTISTS, (Oct. 2014), available at <http://www.ucsusa.org/sites/default/files/attach/2014/10/encroaching-tides-full-report.pdf>. From 1880 to 2009, overall sea level rise has exceeded eight inches. *Id.* at 1. Since 1856, New York City has experienced sea level rise of more than seventeen inches; Baltimore more than thirteen inches since 1902; and Boston, more than ten inches since 1921. *Id.* at 11.

36. See, e.g. Okmyung Bin, *Measuring the Impacts of Sea Level Rise on Coastal Real Estate in North Carolina*, CTR. FOR NATURAL HAZARDS RESEARCH, 3 (2008), <http://www.ecu.edu/cs-cas/hazards/upload/Bin.pdf>. “The result of this study demonstrates that as sea level rise contributes to increased inundation and shoreline erosion, coastal economies may experience significant economic losses in the absence of mitigation and local adaptation.” *Id.*

37. Union of Concerned Scientists, *Causes of Sea Level Rise*, 1 (2013), http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/Causes-of-Sea-Level-Rise.pdf.

38. Eisenhaur, *supra* note 29, at 6–7. South Florida is an area particularly at risk inasmuch as it draws most of its water supply from groundwater aquifers. *Id.* Rising sea levels will drive the salt water further inland into drinking water and wells. *Id.* at 7. This phenomenon was observed as far back as the early 1900s

surfaces and consequently more stormwater runoff.³⁹ Stormwater drainage may become impaired and be unable to handle heavy downpours,⁴⁰ causing contamination of drinking water.⁴¹

III. WHAT THE CLIMATE PREDICTIONS PORTEND FOR POPULATIONS, THE ECONOMY, HOUSING, AND COMMUNITIES

The effects of climate change are myriad and will affect every aspect of society: from communities to the economy.

A. Human Populations

The Intergovernmental Panel on Climate Change ("IPCC") has warned that the effects of climate change, including rising sea levels, heavier floods, more frequent and severe storms, and paradoxically drought, will cause large-scale human displacement.⁴² Extreme weather events will damage homes, communities, water supplies, land resources, transportation, and urban infrastructure.⁴³ By some estimates, by the year 2050, as many as 200 million people, worldwide, will be displaced.⁴⁴ Researchers have identified at least three groups of people likely to be displaced as the consequence of climate change: (1) those in areas prone to sudden-onset natural disasters which are increasing in severity and intensity; (2) those who must be relocated because their livelihoods are threatened by slow-onset effects of climate change (e.g., increasing drought frequency, salinization of water, etc.); and (3) those who must be relocated because their country or parts of their country face destruction from the effects of climate change (e.g., small island states facing sea level rise).⁴⁵

In many instances, it is low-income communities, those populated by the elderly, and minorities that are most affected by adverse impacts.⁴⁶ When

when canals were beginning to drain into inland areas. *Id.* The saline levels became so high in the 1970s that well fields in the east had to be closed. *Id.*

39. E.P.A., *Urban Nonpoint Source Fact Sheet*, (Feb. 2013), http://water.epa.gov/polwaste/nps/urban_facts.cfm.

40. *Id.*

41. *Id.*

42. Summary for Policymakers, *supra* note 3; see also Climate Change Impacts in the United States, *supra* note 5, at 20.

43. Climate Change Impacts in the United States, *supra* note 5, at 20.

44. David Hodgkinson & Lucy Young, "In the Face of Looming Catastrophe": A Convention for Climate Displaced Persons, A Convention For Persons Displaced By Climate Change 2 (2012), available at <http://www.ccdpconvention.com/documents/Climate%20change%20displacement%20treaty%20proposal.pdf>. It is believed that South and East Asia, because of its large coastal populations in low-lying areas, will be hit hard. *Id.* at 3. Millions in Africa and the Caribbean Islands are also threatened. *Id.* The authors are calling for an international convention for the protection of persons who would be displaced. The convention would establish an international regime for the status and treatment of climate change displaced persons. *Id.* at 7. Convention parties would provide for resettlement and assistance to such persons. A fund would be set up to provide, inter alia, assistance for resettlement, enable responses to specific climate change events, and assist adaptation and mitigation by affected parties. *Id.* at 8.

45. International and national responses to displacement is discussed *infra* at notes 140, 320.

46. Megan M. Herzog & Sean B. Hecht, *Combating Sea Level Rise In Southern California: How Local*

Hurricane Katrina struck New Orleans, it was those homeowners in the Lower Ninth Ward, an economically-depressed area, that felt the deluge. This area of the city was particularly vulnerable because the natural depression, or “dip” pattern, in which it is geographically located, made it a ready receptacle for waters from Lake Pontchartrain when the levees gave way.⁴⁷ Scores of people died and tens of thousands of historic homes throughout the city were destroyed.⁴⁸ But, the phenomenon of poor people being relegated to flood prone areas occurs all across the country. During the Colorado flooding in September 2013, Lyons, a town of about two thousand, lost about 20 percent of its housing stock, along with two trailer parks, which held about fifty homes.⁴⁹ A significant number of vulnerable residents in Superstorm Sandy’s path were low-income, in public housing projects, as well as elderly and disabled.⁵⁰

Governments Can Seize Adaptation Opportunities While Minimizing Legal Risk, 19 HASTINGS W. NW. J. ENV’T L. & POL’Y 463, 490 (2013) (citing Matthew Heberger et al., *The Impacts of Sea Level Rise On The Cal. Coast*, CAL. CLIMATE CHANGE CTR. 21–22, 49–51, Tbl. 8 (2009), http://www.pacinst.org/reports/sea_level_rise/report.pdf; Danielle Hirschfeld & Brian Holland, *Sea Level Rise Adaptation Strategy For San Diego Bay*, ICLEI LOCAL GOVERNMENTS FOR SUSTAINABILITY (2012), available at <http://www.icleiusa.org/action-center/planning/san-diego-bay-sea-level-rise-adaptation-strategy> (“projecting that low-income residents, the homeless, elderly, and minorities in San Diego Bay disproportionately will suffer sea level rise impacts”)).

47. Juliette Landphair, “*The Forgotten People of New Orleans*”: Community, Vulnerability, and the Lower Ninth Ward, 94 J. OF AM. HIST., 837–45 (Dec. 2007). “This ‘dip’ pattern—a below-sea-level depression between two swaths of higher ground—distinguishes many New Orleans neighborhoods and explains why floodwaters, trapped in such imperfect bowls, remained stagnant for weeks after Hurricane Katrina.” *Id.* at 838.. See also FEMA, MITIGATION ASSESSMENT TEAM REPORT: HURRICANE KATRINA IN THE GULF COAST, 8-1 to 8-40 (2006), available at http://www.fema.gov/media-library-data/20130726-1520-20490-4521/549_ch8.pdf. It was “the failure of the Industrial Canal . . . and coastal levees [that] produced intense flooding in eastern New Orleans and St. Bernard Parish, resulting in severe structural damage in the Lower Ninth Ward of New Orleans and Chalmette in St. Bernard Parish.” *Id.* at 8-7. “In all areas affected by flooding resulting from Hurricane Katrina, property elevation was the key difference in the magnitude of damage. The higher the property grade elevation, the lower the flood damage.” *Id.* at 8-4. “[R]esidential buildings sited immediately behind failed sections of levees or other flood control structures” were the most vulnerable. *Id.* at 8-8.

48. See Kimberly A. Geaghan, *Forced to Move: An Analysis of Hurricane Katrina Movers 2009 American Housing Survey: New Orleans*, SEHSD WORKING PAPER NUMBER 2011- 17 4 (2011), https://www.census.gov/hhes/www/hlthins/publications/HK_Movers-FINAL.pdf. At least 82 percent of households “who were living in the New Orleans metro area at the time of Hurricane Katrina[,] moved away from their homes,” and the vast majority evacuated to an area located outside metro New Orleans. *Id.* At least, 77 percent of those who moved reported that they lived in a shared residence, the most common type being a “[h]ouse or apartment” (59 percent), and the second most common type being a “[h]otel, motel, or cruise ship” (22 percent). *Id.* at 9. Higher income (more than \$120,000) householders were more likely to have stayed “in a house or apartment[,] compared to those making less than \$80,000.” *Id.*

49. Grace Hood, *Add Housing Shortage To A List Of Challenges In Post-Flood Lyons*, CMTY RADIO FOR N. COLO. (Sept. 9, 2014), available at <http://www.kunc.org/post/add-housing-shortage-list-challenges-post-flood-lyons>. In the Big Thompson Canyon, in Larimer County Colorado, more than 338 homes suffered significant damage. FEMA doled out more than \$61 million to the state, and the Small Business Administration provided more than \$80 million in low interest loans to homeowners. Grace Hood, *After the Colorado Flood, Some Rebuild and Others Start Over*, CMTY RADIO FOR N. COLO. (Sept. 5, 2014), <http://www.kunc.org/post/after-colorado-flood-some-rebuild-and-others-start-over>. Statewide, more than 16,000 homes were damaged by the flood and another 1,900 destroyed. Brian Larson & Grace Hood, *Boulder County Still Assessing Flood Damage*, CMTY RADIO FOR N. COLO., (Sept. 26, 2013) <http://www.kunc.org/post/boulder-county-still-assessing-flood-damage>. It was estimated that more than 200 miles of roads and fifty bridges were damaged or destroyed by the flooding, which resulted from torrential rain that caused flash flooding of the St. Vrain River and the canyon. *Id.*

50. Hurricane Sandy Rebuilding Taskforce, *Hurricane Sandy Rebuilding Strategy: Stronger*

Poorer populations are more likely to be impacted by climate change in the form of disruptions in commercial activity, transportation, community amenities,⁵¹ and health care facilities because of their inability to escape on their own.⁵² This demographic will suffer most heavily from heat-related deaths, as well as deaths from disease-causing agents transmitted through food, water, or animals as they more often labor outdoors and are more likely served by aging and overburdened urban infrastructure, water supply, and sewer systems.⁵³

B. Economic Effects

The effects of climate change will extend to the metaphysical world of economic markets. Recently, the United States Secretary of the Treasury, Jacob Lew, commented on the predictions of the Council of Economic Advisers on the effects of global warming on global output.⁵⁴ The Council warned that if warming above pre-industrial levels increases to three degrees Celsius, a one percent decrease in global output annually could result.⁵⁵ Secretary Lew pointed out that the economic cost of climate change is not limited to the product-manufacturing sector of our economy, but additionally threatens agricultural productivity, transportation infrastructure, power grids, and the healthcare sector.⁵⁶ He stated further that the economic cost of climate change is clearest in the area of infrastructure, which is “fundamental to our economy’s productivity and competitiveness,”⁵⁷ pointing specifically to our roads, bridges

Communities, A Resilient Region, U.S. DEP’T OF HOUSING & URBAN DEV.89 (2013), <http://portal.hud.gov/hudportal/documents/huddoc?id=hsrebuildingstrategy.pdf> [hereinafter “HUD Hurricane Sandy Rebuilding Strategy”] (citing The Furman Center and the Moelis Institute for Affordable Housing Policy, *Sandy’s Effects on Housing in New York City* (2013), <http://www.furmancenter.org/files/publications/SandysEffectsOnHousingInNYC.pdf>; Enterprise, *Measuring the Response to Hurricane Sandy*, <http://www.practitionerresources.org/showdoc.html?id=67899>. “A significant number of low-income households were impacted by the storm. Reports released in March 2013 by New York University’s Furman Center for Real Estate and Urban Policy and by Enterprise Community Partners, Inc. indicate that 43% of those who registered for FEMA assistance were renters. Of all renter registrants, 64% in New York City and 67% in New Jersey are low-income and less likely to have insurance.” *Id.*

51. See U.S. DEP’T OF TREAS., *Climate Change Adaptation Plan*, 31 (June 2014), <http://www.treasury.gov/about/organizational-structure/offices/Documents/2014%20Treasury%20Climate%20Change%20Adaptation%20Plan%20-%20Final%206%2030%202014.pdf>.

52. See Herzog & Hecht, *supra* note 46, at 46768 (citing NAT’L RESEARCH COUNCIL COMM. ON SEA LEVEL RISE IN CAL., ORE., & WASH., SEA-LEVEL RISE FOR THE COASTS OF CAL., ORE., AND WASH.: PAST, PRESENT, AND FUTURE 9 (2012), available at http://www.nap.edu/catalog.php?record_id=13389; CAL. NAT’L RES. AGENCY, 2009 CAL. CLIMATE ADAPTATION STRATEGY 68–69, 127 (2009), http://resources.ca.gov/climate_adaptation/docs/Statewide_Adaptation_Strategy.pdf).

53. Herzog & Hecht, *supra* note 46, at 490.

54. Jacob J. Lew, Remarks of Secretary Jacob J. Lew on the Economics of Climate Change Hosted by the Hamilton Project at Brookings, (Sept. 22, 2014) http://www.hamiltonproject.org/files/downloads_and_links/Remarks_Secretary_Lew_Economics_Climate_Change_Hosted_by_Hamilton_Project.pdf.

55. *Id.* at 2.

56. *Id.*

57. *Id.*

and sewers, explaining that they were not constructed to anticipate the threats of climate change.⁵⁸ This was evident from the fact that “Superstorm Sandy in 2012 closed every tunnel and most bridges leading into New York City, while a large part of the subway system below 34th Street—including all seven tunnels under the East River—was flooded by storm surges.”⁵⁹

Other related effects on the economic world are remarkable.⁶⁰ Increased healthcare costs associated with these effects have been well documented as rising heat levels and diminishing air quality threaten the health and safety of outdoor laborers, such as farmers and construction workers.⁶¹ The nation’s fiscal status is burdened when the federal government has to provide disaster relief, crop and flood insurance, and protection from wildfires.⁶² These efforts will cause “budgetary pressures that will force hard tradeoffs, larger deficits or higher taxes,” making it “more challenging to invest in growth, meet the needs of an aging population, and provide for our national defense.”⁶³ Secretary Lew concluded that, “[W]hatever your public policy views, whether you care about our national debt and deficits, our tax rates, or government investing in everything from national security to job creation, you should care about the costs of coping with climate-related damage.”⁶⁴

Secretary Lew is not the only one raising the hue and cry about the effects of climate change on economic activity. Business leaders, past and present, have joined in the racket. In the Risky Business Project,⁶⁵ they paint a most horrifying state of the economic world if we do not act now to decisively arrest climate change. Sea level rise will produce losses to coastal property and infrastructure that could reach \$3.5 billion in the next fifteen years; adding hurricane activity will drive that figure up to \$35 billion.⁶⁶ Without adaptation by certain farms in specific Midwestern areas (valued at \$135.6 billion annually) crop yields (of corn, wheat, soy, and cotton) will decline by as much as 20 percent by mid-century and in some cases by as much as 90 percent by the end of the century.⁶⁷ As greenhouse gases drive up air temperatures,

58. *Id.*

59. *Id.*

60. *Id.*

61. *Id.*

62. *Id.* In fact, in the last nine years, the National Flood Insurance Program has had to borrow \$24 billion from the Treasury Department because of payouts resulting from Hurricanes Katrina, Rita, Wilma, and Sandy. *Id.*

63. *Id.*

64. *Id.* at 3. See generally *Climate Change In the U.S.*, *supra* note 5, at 671, citing G. Garfin, et al., *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment*, ISLAND PRESS, 528 (2013), <http://swccar.org/sites/all/themes/files/SW-NCA-color-FINALweb.pdf>; J. Winkler, et al., *Midwest Technical Input Report: Prepared for the US National Climate Assessment* 236 (2012).

65. THE RISKY BUS. PROJECT, *RISKY BUSINESS: THE ECONOMIC RISKS OF CLIMATE CHANGE IN THE UNITED STATES* (2014), <http://riskybusiness.org/reports/national-report/executive-summary> [hereinafter *Risky Business: U.S.*].

66. *Id.* at 3.

67. *Id.*; see also THE RISKY BUS. PROJECT, *RISKY BUSINESS: HEAT IN THE HEARTLAND: CLIMATE CHANGE AND ECONOMIC RISK IN THE MIDWEST*, 17 (2015), <http://riskybusiness.org/uploads/files/RBP->

requiring more energy for cooling, there will be a need to construct more power generating facilities—the equivalent of 200 average coal or natural gas-fired power plants—costing residential and commercial ratepayers up to \$12 billion per year.⁶⁸ The Risky Business Project predicts that by 2050 there will be a loss of coastal property valued between \$66 billion and \$106 billion.⁶⁹ Moreover, the risks of developing melanoma will rise significantly, the humid heat stroke index will claim many lives, and labor productivity nationwide will drop by as much as three percent.⁷⁰

1. Mortgage Markets: Primary and Secondary Effects

The secondary mortgage market, in which loan originators pool and sell mortgages to purchasers, who in turn sell interests in those mortgages to investors as mortgage-backed securities, will also suffer.⁷¹ The Federal National Mortgage Association (“FNMA”) and the Federal Home Loan Mortgage Corporation (“Freddie Mac”) buy the lion’s share of new mortgages. These government-sponsored enterprises (“GSEs”) aim to facilitate home ownership by providing liquidity to banks to make more home loans. Climate disasters destroy homes and livelihoods and lead to high rates of mortgage defaults.⁷² Catastrophic losses to the collateral underlying the mortgage-backed securities impact borrowers’ ability to pay, which in turn puts the GSEs’ reserves and operations in jeopardy.⁷³ The volume of potential losses is a key determinant for the volume of mortgages that the GSEs can safely purchase.⁷⁴

Midwest-Report-WEB-1-26-15.pdf.

68. Risky Business: U.S., *supra* note 65, at 3.

69. *Id.* at 4.

70. *Id.* The economic impacts will radiate outside of the immediately impacted markets, since as supply chains are interrupted, industrial activity in other parts of the country will be hurt. *Id.* at 7.

71. *Id.*

72. After Hurricane Sandy, the owners of damaged homes fell behind on their mortgage payments and faced foreclosure, but the Federal Housing Finance Authority, the conservator of the Federal National Mortgage Association (“FNMA”) and Federal Home Loan Mortgage Corporation (“Freddie Mac”), intervened to stay foreclosure by allowing a twelve-month mortgage forbearance period and, often, the opportunity to obtain streamlined mortgage refinancing through the Federal Housing Administration’s Streamline Refinance program. Hurricane Sandy Rebuilding Strategy, *supra* note 50, at 85, 90–91; Kimberly Amadeo, *Secondary Mortgage Market*, ABOUTNEWS, available at http://useconomy.about.com/od/glossary/g/secondary_marke.htm (last visited Apr. 13, 2015); see also Shelby D. Green, *Disquiet on the Homefront: Disturbing Crises in the Nation’s Markets and Institutions*, 30 PACE L. REV. 7, 10–11 (2009).

73. U.S. Dep’t of Hous. & Urban Dev., *Climate Change Adaptation Plan*, 12 (Oct. 2014), <http://portal.hud.gov/hudportal/documents/huddoc?id=HUD2014CCAdaptPlan.pdf>. 12 [hereinafter “HUD Adaptation Plan”].

74. *Id.* at 47. For the other large player in the secondary market, the Government National Mortgage Association (“Ginnie Mae”), operating within HUD, to invest, mortgage loans must be federally insured by the Federal Housing Administration (“FHA”) or guaranteed by Veterans’ Affairs. FHA underwriting assesses whether properties are located in flood plains to ensure that applicable homes have flood insurance in place as a condition of providing FHA mortgage insurance. “While Ginnie Mae has a more indirect role in addressing most climate-related vulnerabilities, the agency insurance and guaranty requirements in form and drive many of Ginnie Mae’s program policies and procedures for the secondary mortgage market.” *Id.* at 48. On top of the concerns about Ginnie Mae’s ability to operate soundly in the market, its physical ability to continue in the physical world is also threatened by climate change; with only one centralized location in Washington, D.C., the “continuity of operations are also at a risk from a hazard that affects the area and building where Ginnie

Climate change will affect the mortgage markets in the first instance to the extent that it affects the appraised value of the mortgage collateral. Appraisers are now recalibrating their measuring tools to account for loss of value from climate change.⁷⁵ Historically, the market value of property has not reflected either environmental risk or sustainability,⁷⁶ except that property situated on a body of water (i.e., “waterfront property”) was assigned a higher value than comparable property not so situated. But, the emerging view is that environmental changes affect asset risk, such that market value must reflect value impacts from storm, flood, and fire.⁷⁷ The insurance industry also has recognized that environmental risk is rising and should be appropriately reflected in valuations.⁷⁸ The new conception is that environmental impacts are two sides of the same coin—affecting investment decisions both as to whether risks of damage are high, thus reducing value,⁷⁹ as well as to whether sustainability features add value.⁸⁰

The new appraisal standards will make risk spreading through insurance more difficult and costly. Casualty insurance premiums have risen precipitously in some parts of the country, while some insurers have stopped writing policies in others.⁸¹ While insurance rates rise, they yet fall short of

Mae is located.” *Id.* at 47.

75. New Uniform Standards of Professional Appraisal Practice (“USPAP”) standards require a consideration of the effects of climate change on the value of real property, either to discount the value where the threat from damage from a weather event or phenomenon is great or to increase the value where resilience and energy efficiency technologies are incorporated. APPRAISAL INST., *Residential Green and Energy Efficiency Addendum*, (Jan. 2013), http://www.appraisalinstitute.org/assets/1/7/AI_820_04-Residential_Green_Energy_Efficient_Addendum.pdf.

76. Chris Corps, *Toward Sustainable Financing and Strong Markets for Green Building: Valuing Sustainability*, GREEN BUILDING IN NORTH AMERICA, 2 (2008), available at <http://www3.cec.org/islandora/en/item/2329-paper-2c-toward-sustainable-financing-and-strong-markets-green-buildingvaluing-en.pdf>.

77. See John R. Nolon, *Land Use and Climate Change Bubbles: Resilience, Retreat, and Due Diligence*, 39 WM. & MARY ENVTL. L. & POL’Y REV. 321, 322 (2014); see also Kelly Coplin, *How Climate Change Will Affect Home Value: Essential Answer*, STAN. MAG. (Sept./Oct. 2009), available at https://alumni.stanford.edu/get/page/magazine/article/?article_id=30265. “Low-lying coastal areas, such as along the Gulf Coast, are particularly vulnerable to sea-level rise and stronger storms—and those risks are reflected in rising insurance rates and premiums.” *Id.*

78. Corps, *supra* note 76, at 4; see also Timothy P. Runde & Stacey Thoyre, *Integrating Sustainability and Green Building Into the Appraisal Process*, 221 (2010), www.josre.org_wp-content/uploads_2012_09_Sustainability.pdf.

79. Corps, *supra* note 76 (citing U.N. ENVTL. PROGRAM FINANCE INITIATIVE, *Work Streams*, available at http://www.unepfi.org/work_streams/investment/amwg/ (last visited Apr. 13, 2015)). “The impact is not limited to the real estate sector as businesses whose valuations appear on a corporate account will also be affected.” *Id.*; see also Bjorn Urdal, et. al., *Carbonizing Valuation: Assessing Corporate Value at Risk from Carbonization* (2006), http://assets.wwf.org.uk/downloads/carbonizing_valuation.pdf. The carbon impact of energy generation systems will become a legacy issue unless more sustainable approaches are adopted. Corps, *supra* note 67. They dub this “corporate value at risk” from carbon impact, which means valuing the carbon impact of the energy generation plant (and by extension, other enterprises, including buildings). *Id.* This will become especially relevant if governments impose carbon taxation, which is increasingly being signaled in North America. *Id.*

80. Corps, *supra* note 76, at 2, 5.

81. See Nolon, *supra* note 77, at 336–37. “California alone has ‘\$2.5 trillion in real estate assets at risk for climate change damage. . . approximately 135 percent of the state’s annual gross domestic product! Insurers have already begun canceling homeowners’ policies in high-risk areas and raising insurance costs in potentially impacted locations.” *Id.* New York Senator Charles Schumer stated, “after Sandy, home insurance companies are increasingly abandoning Long Islanders—even those unaffected by the storm—forcing them

coverage. In the best case, property insurance pays for destruction because of disasters, but it does not pay for loss of value over time, whether rapidly or gradually. Even as land values are assessed downward, replacement costs for destroyed properties will need an upward adjustment to account for new building standards, such as structural fortifications, flood-proofing, and elevations.⁸² The cost of casualty insurance will rise in tandem with flood insurance.⁸³ When appraised values decline as flood insurance premiums rise, fewer homeowners and buyers will be able to satisfy the terms for obtaining and servicing mortgage loans. At first, ripples, then waves of impact on the viability of the secondary mortgage markets.

C. Housing Supply: Shortages by Nature and Society

Climate change will radically alter the social phenomena of housing and communities, away from their traditional foundations and purposes. Areas may become unlivable because of heat, ocean surges, and drought. Construction will become more expensive as a result of increased costs for transportation, declining supplies of forest materials, and greater burdens for supplying water.⁸⁴ What seemed like eternal monuments to history and faith may be overwhelmed. The tornado that hit Joplin, Missouri in 2011; the mudslides that swept through Oso, Washington in 2014; and the flooding near Boulder, Colorado in 2013 not only destroyed buildings and lives, but also communities—and with them, social, economic, and family connections and

into far higher-priced, lower-coverage plan; [that he] will call for FEMA to bring serious penalties against companies if they continue to leave the market.” CERES, *Insurer Climate Risk Disclosure Survey Report & Scorecard: 2014 Findings & Recommendations*, 7 n.6 (2014), http://www.munichre.com/site/mram/get/documents_E172407602/mram/assetpool.mr_america/PDFs/5_Press_News/News/Ceres_InsRiskDisclosureSurvey_102014.pdf; Skip Stiles & Shannon Hulst, *Homeowners Insurance Changes in Coastal Virginia: Causes and Consequences for Shoreline Communities*, WETLANDS WATCH, (July 2013), http://www.floods.org/acefiles/documentlibrary/committees/Insurance/WetlandsWatch_Insurance-study.pdf; M. Patricia Titus, *Insurers Abandon Coastal Market*, COASTAL POINT, (Apr. 19, 2008), available at http://bethanybeachnews.com/content/insurers_abandon_coastal_market.

82. *Id.* at 35 (citing FREDDIE MAC, REVIEWING APPRAISALS IN TODAY’S MORTGAGE MARKET (2011), http://www.freddiemac.com/singlefamily/uw/docs/PLNAQ_series_Reviewing_Appraisals_in_Todays_Mtg_Mkt_Fact_Sheet_838.pdf).

83. Under the Biggert-Waters Flood Insurance Reform Act of 2012 Act, Pub. L. No. 112-141, tit. II, subtit. A, §§ 100201–100253, 126 Stat. 405 (codified as amended at 42 U.S.C. §§ 4001–4129 (2006)), the National Flood Insurance Program was extended for five years, but premiums were revised up to reflect risk and certain subsidies would be phased out. Those rises, however, were moderated somewhat under the Homeowner Flood Insurance Affordability Act of 2014 (Pub. L. No. 113-89, 128 Stat. 1020 (2014)). See generally Sarah Fox, *This is Adaptation: The Elimination of Subsidies Under the National Flood Insurance Program*, 39 COLUM. J. ENVTL. L. 205 (2014).

84. Some hurricane prone areas, such as Miami, Florida, continue to erect condominiums that may be uninhabitable in a few decades. See Danielle Paquette, *Miami’s Climate Catch-22: Building Waterfront Condos to Pay for Protection Against the Rising Sea*, WASHINGTON POST (Dec. 22, 2014), available at <http://www.washingtonpost.com/news/storyline/wp/2014/12/22/miamis-climate-catch-22-building-luxury-condos-to-pay-for-protection-against-the-rising-sea/>. In Miami-Dade County, only three percent of buildings are greater than twelve feet above sea level at normal high tide and only nine percent are more than ten feet above sea level. Chris Wodskou, *Rising Sea Levels Could Make Florida Residents ‘Climate Refugees’*, CBC NEWS (Dec. 14, 2014), available at <http://www.cbc.ca/news/technology/rising-sea-levels-could-make-florida-residents-climate-refugees-1.2871710>.

sources of support.⁸⁵ The recent hurricane events of Katrina, Sandy, and Rita took a severe toll on the housing stock. Sandy destroyed whole neighborhoods, heavily damaging hundreds of multi-family buildings, and where the buildings were left standing, their mechanical systems, historically located in the basements of buildings, were irretrievably corrupted.⁸⁶ In New York City, “60,000 buildings with over 250,000 residential [housing] units are located in the 100-year floodplain,” and 35,000 buildings with 145,000 units in the 500-year floodplain.⁸⁷ One-third of these buildings are detached one- to four-family homes; 41 percent are attached or semi-attached one- to four-family homes; 26 percent are condos, co-ops, or multi-family apartments; of that 26 percent, 17 percent are mixed-use and non-residential.⁸⁸ These buildings, particularly those owned by the New York City Housing Authority represent a significant portion of the city’s low-income housing inventory.⁸⁹ Most of the structures are rent regulated or rent subsidized through state programs,⁹⁰ HUD Section 8, or tax credits (Low Income Housing Tax Credits).⁹¹ Most renters have modest income, the average being \$36,000 and are rent cost-burdened—paying more than thirty percent of income on housing.⁹²

In New Orleans, over 300,000 homes were damaged or destroyed by

85. See Katie Wheatley, *The May 22, 2011 Joplin, Missouri EF5 tornado*, U.S. TORNADOES (May 22, 2013), <http://www.ustornadoes.com/2013/05/22/joplin-missouri-ef5-tornado-may-22-2011/>; Warren Cornwall, *Causes of Deadly Washington Mudslide Revealed in Scientific Report*, NAT’L GEOGRAPHIC NEWS (July 24, 2014), <http://news.nationalgeographic.com/news/2014/07/140722-oso-washington-mudslide-science-logging/>; City of Boulder, CO, *September 2013 Flood*, <https://bouldercolorado.gov/flood/september-2013-flood> (last visited Jan. 30, 2015).

86. Kevin Findlan, et al., *The Price of Resilience: Can Multifamily Housing Afford to Adapt?* N.Y. UNIV. FURMAN CTR., 4 (2014) [hereinafter “The Price of Resilience”], http://furmancenter.org/files/NYUFurmanCenter_ThePriceofResilience_July2014.pdf.

87. *Id.*

88. *Id.* at 5. Although multi-family buildings are a small share of the buildings in the floodplain, more than two-thirds of the housing units in buildings at risk of flooding are located in multi-family buildings. *Id.* The types of buildings are quite diverse, from small walk-ups, with five to nine units (40 percent) to larger structures, with more than 100 units (23 percent). *Id.* Most (55 percent) are low-rise, that is, four or fewer stories. *Id.*

89. POST-SANDY INITIATIVE, *Building Better, Building Smarter: Opportunities for Design and Development* 20 (2013), http://postsandyinitiative.org/wp-content/uploads/2013/05/Post-Sandy-Report_Full.pdf. The Post-Sandy Housing Working Group was formed in New York City, and is a partnership of six professional organizations, including the American Institute of Architects New York, American Society of Landscape Architects New York Chapter, American Planning Association New York Chapter, New York City Bar Association, Committee on Land-Use & Zoning, Structural Engineers Association of New York, and the American Council of Engineering Companies of New York. These organizations were joined by four housing policy organizations: Citizens Housing and Planning Council, New York University Furman Center for Real Estate & Urban Policy, New York State Association for Affordable Housing, and Regional Plan Association. *Id.* at 19.

90. The Price of Resilience, *supra* note 86, at 10. “Created in 1955, the Mitchell-Lama program provides affordable rental and cooperative housing to moderate- and middle-income families. There are 132 city-sponsored, moderate- and middle-income rental and limited-equity cooperative developments in New York City, which contain approximately 54,000 units.” NYC Affordable Housing Resource Center, *Mitchell-Lama Apartments*, http://www.nyc.gov/html/housinginfo/html/apartments/apt_rental_mitchell-lama.shtml (last visited Apr. 19, 2015).

91. The Price of Resilience, *supra* note 86, at 7.

92. *Id.* at 10.

Hurricane Katrina,⁹³ and thousands of people were displaced.⁹⁴ A full 80 percent of the city was flooded, damaging 90,000 square miles of land and causing a total of \$81 billion in property damage.⁹⁵ It is estimated that the total cost of the damages caused by Hurricane Katrina is \$108 billion.⁹⁶ The population of New Orleans decreased by 29 percent,⁹⁷ and the city's Lower Ninth Ward, one of the areas hardest hit by the flooding, lost a full 80 percent of its population, which has still not returned.⁹⁸ The number of black renters decreased by 44 percent.⁹⁹

In many cases, those communities in harm's way were vulnerable populations who either made miscalculations in choosing to build communities in storm-prone areas—ignoring the risks from climate change, with the misapprehension that the land and its current uses would exist forever—or were directed to those areas on the basis of historical, social, and political forces, such as classism and racism.¹⁰⁰ Studies of the aftermath of Hurricane Andrew, which struck Miami in 1992, revealed that the groups most affected were those most marginalized, with less political power and economic resources, making them most vulnerable to harm from “natural” hazards.¹⁰¹ Moreover, the demographic characteristics such as gender, class, race, and immigrant status largely determined individuals' abilities to manage environmental hazards.¹⁰² In New Orleans, it was lower-income, black families who were steered into living in fragile areas reclaimed from the delta through the levee system.¹⁰³

93. Karl Tate, *Hurricane Katrina History and Numbers (Infographic)*, LIVESCIENCE (Jan. 27, 2011), <http://www.livescience.com/11235-hurricane-katrina-history-numbers.html>.

94. *Id.* The population of New Orleans decreased from 1.034 million in 2004 to just 581,417 in 2006.

95. *Id.*

96. STATE OF LA. DISASTER RECOVERY UNIT, *Katrina and Rita Recovery and Rebuilding*, available at http://www.doa.louisiana.gov/cdbg/dr/KatrinaRita_MainPage.htm (last visited Apr. 19, 2015).

97. Campbell Robertson, *Smaller New Orleans After Katrina, Census Shows*, N.Y. TIMES (Feb. 3, 2011), <http://www.nytimes.com/2011/02/04/us/04census.html?pagewanted=all>.

98. Allison Plyer, *Population Loss and Vacant Housing in New Orleans Neighborhoods*, THE DATA CTR. (Feb. 5, 2011), available at http://www.datacenterresearch.org/reports_analysis/population-loss-and-vacant-housing/.

99. *Id.* at 8. Before Hurricane Katrina, Louisiana had already been experiencing land loss, losing more than 1,800 square miles since the 1930s. See COASTAL PROT. & RESTORATION AUTH., LOUISIANA'S COMPREHENSIVE MASTER PLAN FOR A SUSTAINABLE COAST, 29 (2012), http://issuu.com/coastalmasterplan/docs/coastal_master_plan-v2?e=3722998/2447530. In fact, according to the U.S. Geological Survey, Louisiana currently loses over sixteen square miles of land per year. *Id.* Scientists estimate that the rate of subsidence of Southern Louisiana is as much as three feet every 100 years, or a little less than one-half inch per year. See National Geographic News, *New Orleans—A Man Made Disaster?*, NATIONAL GEOGRAPHIC SOCIETY, (Oct. 28, 2010), available at http://news.nationalgeographic.com/news/2005/09/0921_050921_New_Orleans.html.

100. See Eisenhaur, *supra* note 29, at 16.

101. *Id.*

102. PETER FEIDEN, INT'L HOUS. COALITION, ADAPTING TO CLIMATE CHANGE: CITIES AND THE URBAN POOR 1, 7 (2011) [hereinafter “Adapting to Climate Change: Cities and the Urban Poor”], at <http://intlhc.org/wp-content/uploads/2011/09/Climate-Change-and-the-Urban-Poor.pdf>.

103. Eisenhaur, *supra* note 29, at 16–17.

1. Persistent Housing Shortages

The loss of housing from recent climate events only exacerbated housing shortages that have persisted over the ages. The most recent survey of housing reveals that there is available housing for only one-third of those needing it.¹⁰⁴ Working in tandem with shortages is the rising level of inadequate housing—characterized by deficiencies in plumbing, electrical, and physical integrity, e.g., leaks, peeling plaster, and rats.¹⁰⁵ And, as the typical unit completed in 2012 rented for \$1,041 per month, new housing development alone will not be sufficient to alleviate the affordability gap,¹⁰⁶ since even when housing is available, it is not always within the means of most low-income households. Most, as many as three-fourths of all extremely low-income (“ELI”) households, are cost-burdened, that is, the household spends over 30 percent of its income on housing.¹⁰⁷ A severe housing cost burden exists when the household spends more than 50 percent of its income on housing costs.¹⁰⁸ This circumstance is more common for renters than owners, and it is more likely for lower-income renters.¹⁰⁹ In 2012, “seventy-five percent of ELI renter households and 90% of deeply low-income (“DLI”) renters spent more than half of their income on rent and utilities.”¹¹⁰ In total, three-fourths of all ELI households experience a severe housing cost burden.¹¹¹

Paradoxically, housing supply is a significant issue confronting our legacy cities, whose most defining characteristic is severe population decline—as much as 50 percent in some cities.¹¹² A “legacy city” has come into common parlance when discussing the plight of forty-eight United States cities, which were once robust and thriving economic powerhouses but over the past century have fallen into decline.¹¹³ Among these are cities such as Philadelphia,

104. NAT’L LOW INCOME HOUSING COALITION, *The Affordable Rental Housing Gap Persists*, 1 (Aug. 2014) [hereinafter “2014 Housing Spotlight”], http://nlihc.org/sites/default/files/HS_4-1.pdf. Now, low-income households make 80 percent or more of area median income (“AMI”); low-income (“LI”) households make between 50 and 80 percent of AMI; very low-income (“VLI”) households make between 30 and 50 percent of AMI; extremely low-income (“ELI”) households make 30 percent or less of the AMI; and deeply low-income (“DLI”) households make below 15 percent of AMI. *Id.* at 2. The demographics of the population affected by these housing shortages is predictable: a high percentage of ELI households are headed by persons with a disability (30 percent), the elderly (20 percent), blacks (26 percent), or females (28 percent). *Id.* at 2–3. From 2009–2012, the number of ELI households has risen from 9.6 million to 10.3 million. *Id.* at 1. DLI renter households experienced a shortage of 3.4 million rental units in 2012. *Id.* All told, in the United States in 2012, there were only fifty-eight affordable units per 100 VLI households; thirty-one per 100 ELI households; and just sixteen affordable housing units per 100 DLI households. *Id.* at 9.

105. NAT’L LOW INCOME HOUS. COAL., *40 Years Ago: The Housing Survey*, (Apr. 25, 2014), <http://nlihc.org/article/40-years-ago-annual-housing-survey>.

106. JOINT CTR. FOR HOUS. STUDIES, HARVARD UNIV., *THE STATE OF THE NATION’S HOUSING 2014 30* (2014), <http://www.jchs.harvard.edu/sites/jchs.harvard.edu/files/sonhr14-color-ch6.pdf>.

107. *Id.* at 2.

108. *Id.*

109. NAT’L LOW INCOME HOUS. COAL., *America’s Affordable Housing Shortage, and How to End it*, 2 (Feb. 2013), http://nlihc.org/sites/default/files/HS_3-1.pdf. Fifty percent of all renters live in unaffordable housing, compared to 28 percent of homeowners. *Id.*

110. 2014 Housing Spotlight, *supra* note 104.

111. *Id.* at 4, 9.

112. *Id.* at 5.

113. Allan Malach & Lavea Brachman, *Regenerating America’s Legacy Cities*, LINCOLN INST. OF LAND

Baltimore, Detroit, Cleveland, Buffalo, Cincinnati, and Pittsburgh.¹¹⁴ Some cities, like Philadelphia and Baltimore, are experiencing somewhat of a resurgence, while others, like Detroit and Cleveland, seem stalled.¹¹⁵ In the latter group, disinvestment and abandonment have led to a general lack of confidence in the viability of the city.¹¹⁶

A multitude of factors have been identified as driving cities down, including deindustrialization, changes in consumer demands, increasing suburbanization and sprawl, and failed public policy initiatives.¹¹⁷ Economic activity in legacy cities is generally unsteady and precarious. Consequently, in addition to substantial declines in population, legacy cities are defined by high levels of poverty and crime, huge amounts of vacant and abandoned houses in neighborhoods and the resulting excess infrastructure, a poorly functioning educational system, and prolonged, high rates of unemployment.¹¹⁸ In some cities, these conditions have proven to be largely intractable and cyclical. Prolonged periods of unemployment lead to protracted homelessness and increasing rates of foreclosures.¹¹⁹ These phenomena, in turn, lead to a diminution of the tax base and a concomitant increased reliance on federal, state, and local programs to support the financially challenged residents who remain.¹²⁰ To be sure, even thriving cities have their burdens with intractable poverty and housing shortages, but the effects are more acutely revealed in the struggles of legacy cities to meet even the most basic needs of their citizens.¹²¹

With both people and industry leaving the communities, the number of vacant dwellings and other structures rose in tandem. But, those abandoned structures were not suitable for living. As economic forces waned, so too did the resources of families and other property owners to keep housing habitable.¹²² The inevitable consequence of this trend is declining quality and

POL'Y (2013), https://www.lincolnst.edu/pubs/dl/2215_1582_Regenerating_Americas_Legacy_Cities.pdf. These forty-eight cities are those "with over 50,000 residents that have lost greater than 20% of their population since peak population. THE BERNARD AND ANNE SPITZER SCH. OF ARCHITECTURE, *Legacy City Design Initiative*, available at <http://ssa1.cuny.cuny.edu/programs/jmb-legacy-city-design.html> (last visited May 2, 2015).

114. Malach & Brachman, *supra* note 113, at 20.

115. *Id.* at 10.

116. *Id.*

117. *Id.* at 56.

118. *Id.* at 78.

119. *Id.* at 16.

120. *Id.* at 15.

121. See Mike Shedlock, *Detroit Is Halting Garbage Pickup, Police Patrols In 20% Of City: Expect Bankruptcy*, in 2011, BUSINESS INSIDER, (Dec. 13, 2010), available at <http://www.businessinsider.com/detroit-garbage-pickup-bankruptcy-2010-12>. Before it decided to enter bankruptcy, the city of Detroit explored the idea of drawing a ring around the central city beyond which city services would not be provided. *Id.*

122. The 2008 housing crisis threw millions who thought they had obtained the security of homeownership into the brutal process of mortgage foreclosure. Millions defaulted on their home loans, issuers of mortgage-backed securities could not make the promised returns, and hundreds of banks failed. The pace of new loans dropped to a trickle, with the secondary effect of near collapse of the secondary market, as there were fewer loans for sale. Green, *supra* note 72, at 10. Many causes have been identified as the impetus for the crisis, not the least of which was the explosion in risky subprime lending and securitization and the failure of the Federal Reserve to set prudent mortgage-lending standards. U.S. FIN. CRISIS INQUIRY COMM'N, *The Inquiry Report: Final Report of the Nat'l Comm'n on the Causes of the Financial and Economic Crisis in the*

availability of affordable housing.

IV. MITIGATION AND ADAPTATION FOR RESILIENCY

Much is happening to confront the impacts of climate change—the two schemes have come to be expressed as mitigation and adaptation. Mitigation is determined to stop the world from turning by the development and application of technologies, changes in living and work habits, and substitutions of raw materials that reduce resource inputs and emissions,¹²³ essentially, implementing actions to reduce greenhouse gas emissions or increase the amount of CO₂ absorbed and stored by natural and man-made carbon sinks.¹²⁴ Adaptation recognizes the limits, if not the impossibility, of restoring us to our

U.S. xvii (2011), http://fcic-static.law.stanford.edu/cdn_media/fcic-reports/fcic_final_report_full.pdf [hereinafter “Final Report of the Nat’l Comm’n on the Causes of the Financial and Economic Crisis in the U.S.”]. Financial institutions dealt in mortgage securities without scrutinizing them for safety, and some even knew they were defective. *Id.* at xvi. In the six years from 2001 to 2007, national mortgage debt nearly doubled. Financial regulation and supervision were absent. Thirty years of deregulation and reliance on self-regulation by financial institutions erased important safeguards, leaving openings for abuse. The rate of borrowers who defaulted on their mortgages within months after closing nearly doubled from the summer of 2006 to late 2007, which meant that they likely took out loans that they neither could, nor intended to repay; mortgage brokers were paid “yield spread premiums” by creditors as rewards for putting borrowers into higher-cost loans; mortgage fraud thrived in the absence of sound lending standards and on the platform of lax regulation; creditors made improvident loans that they knew borrowers could not afford and that could cause massive losses to investors in mortgage securities, all the while selling securities based on these loans. *Id.* at xxii. Nearly one-quarter of all mortgages made in the first half of 2005 were interest-only loans. *Id.* at xxiii. During the same year, 68 percent of “option ARM” loans originated by the two biggest players in this story—Countrywide and Washington Mutual—had low- or no-documentation requirements. In response to the crisis, FNMA and Freddie Mac were put under conservatorship. *Id.* at 464. Congress appropriated massive amounts of money for capital infusion into banks for loan modifications. 12 U.S.C. § 5301 (2010). Along with rescue appropriations, Congress enacted new legislation, putting into place controls on lending practices. The Wall Street Reform and Consumer Protection Act (“Dodd-Frank”) was enacted in July 2010 in response to the crisis of 2008. Joseph Cafariello, *The Great Bank Regulation Debate: How Much Is Too Much?*, WEALTHDAILY (July 21, 2014), available at <http://www.wealthdaily.com/articles/the-great-bank-regulation-debate/5260>; see also SENATE COMM. ON BANKING, HOUS., & URB. AFFAIRS, *Summary: Restoring American Financial Stability* 1 (2010), http://www.banking.senate.gov/public/_files/FinancialReformSummaryAsFiled.pdf. Constraints and oversight of banking activities were imposed. The Consumer Financial Protection Bureau (“CFPB”) was charged with adopting regulations to protect consumers from predatory and unfair lending practices. The Act also imposed fiduciary duties to investors on brokers in offering investment advice, to act in the best interests of individual consumers, rather than in their own financial interests—just as investment advisers must today. See generally U.S. DEPT. TREASURY, *Wall Street Reform*, <http://www.treasury.gov/wallstreetreform>, (last visited Apr. 19, 2015). Significantly, Dodd-Frank eliminated many unsafe loan origination practices and products; prohibited brokers and bankers from being paid more for “steering” borrowers into higher cost loans than they otherwise qualify for; prohibited “no doc” loans; required mortgage creditors to document and verify a borrower’s income or assets before making a loan to ensure that the borrower can afford to repay it; banned prepayment penalties that locked families into loans and often prevented refinancing into lower rate loans (for certain types of complex mortgages); and required firms that buy mortgages and package them into securities to retain a portion of those loans in their own portfolios, thereby providing an incentive to buy loans that borrowers can afford to repay because they will have to keep skin in the game. *Id.*; see also, CONSUMER FIN. PROTECTION BUREAU, *Integrated Mortgage Disclosures under the Real Estate Settlement Procedures Act (Regulation X) and the Truth In Lending Act (Regulation Z)*, available at <http://www.consumerfinance.gov/regulations/integrated-mortgage-disclosures-under-the-real-estate-settlement-procedures-act-regulation-x-and-the-truth-in-lending-act-regulation-z/>, (last visited Apr. 19, 2015). 12 C.F.R. § 1026.43 (requiring evidence of creditworthiness and ability to repay) and § 1026.35(c)(3) (requiring appraisers to adhere to standards of the Uniform Standards of Professional Appraisal Practice rules (USPAP) and criteria; see also THE APPRAISAL FOUND., *Uniform Standards of Professional Appraisal Practice: 2014-2015 Edition* U-7 (2014), available at <http://www.uspap.org/#/24>.

123. NATIONAL CLIMATE ASSESSMENT, *supra* note 64, at 672.

124. *Id.*

original state, instead focusing on making adjustments in natural or human systems to a new or changing environment.¹²⁵ Both schemes promise constraints on individual freedoms to maneuver in their economic and personal worlds: residential and commercial properties must employ efficient technologies for energy use and conservation and use alternative, renewable energy sources to contain the CO₂ emissions, thereby, slowing the pernicious effects of climate change;¹²⁶ all new and existing edifices must have regard for place and integrity to withstand fierce weather events. Both schemes are political as they portend new levels of regulation of industry and private conduct, requiring radical changes in the way the world operates, its productivity goals and industrial investments.¹²⁷ Unfortunately, because they are political, involving issues of jurisdiction, sovereignty, and global eminence, the world's leading nations have been addressing these points for decades, but still seem light years apart.¹²⁸

Nevertheless, the two schemes converge on the point of achieving resiliency, that is, the "capability to anticipate and recover from climate impacts that affect society, the economy, and the environment."¹²⁹

A. The Practices of Adaptation

The emerging conception of adaptation measures is one that embraces the components of protection, accommodation, and retreat.¹³⁰ These components contemplate redesigning structures and changing habits. They also mean reconfiguring community, moving people and their institutional icons. While they are openly infused with technological inventions, what is often overlooked is that they are and should be informed by social policy. This means that as with any socio-economic policy or program, adaptation has uneven consequences, with the potential for greater impacts on those who are already disadvantaged.

Protection strategies contemplate the defense of the physical area from climate change. Against coastal flooding from sea level rise, the typical measures include hard armoring the shorelines with hard structures like sea walls,¹³¹ while soft armoring, means protecting the shore through natural

125. *Id.*

126. *Id.*

127. Fiona Harvey, *Everything You Always Wanted to Know About the UN Climate Talks but Were Afraid to Ask* (Mar. 4, 2015), <http://ensia.com/features/everything-you-always-wanted-to-know-about-the-un-climate-talks-but-were-afraid-to-ask/>.

128. *Id.*

129. *Id.* But, how much reduction in energy usage we should aim to achieve, at least from fossil fuels, is the subject of much debate and negotiations, within the country and among the world's nations.

130. Herzog & Hecht, *supra* note 47, at 8.

131. Other forms of hard armoring include riprap ("large, one- to six-ton rocks or pieces of concrete rubble that are deposited directly on a beach or cliff slope for coastal protection") and revetments (a deliberately engineered "version of riprap involving carefully stacked layers of rocks of different sizes"). Herzog & Hecht, *supra* note 47, at 8, citing Rebecca Stamski, *The Impacts of Coastal Protection Structures in California's Monterey Bay National Marine Sanctuary*, Marine Sanctuaries Conserv. Series MSD-05-3 3, 6-7, 14-15.

systems, like sand or vegetation.¹³² Accommodation measures are wide-ranging, from financial regulations to technological inventions, to life-style changes.¹³³ They involve the retooling of traditional zoning and land use regulations for increased resilience to sea level rise,¹³⁴ such as rebuilding restrictions, assessments of impact fees, requirements for the removal of structures, density restrictions, and setback buffers.¹³⁵ At the core are measures that regulate what and how we build—requiring fortified infrastructure and buildings to improve housing quality for resiliency to extreme weather; land filling to raise elevations for new development to protect against flooding; cooling technologies to help thwart urban heat island effects; and planning to ensure more effective evacuation in storm events. They also embrace energy efficiency measures—renewable energy sources and fluorescent lighting.¹³⁶

As the term implies, retreat strategies mean constraining new development in vulnerable areas while relocating, demolishing existing development, or simply allowing it to be taken by the sea.¹³⁷ Tools used in this strategy include rolling development restrictions, land use regulations that make certain areas undevelopable, permit conditions that prevent interference with the natural landward migration of the shoreline as sea levels rise, that is, synchronizing use restrictions with the mean high tide line—as the line migrates inward, so do development restrictions.¹³⁸ As an adaptation measure, retreat may mean the removal not only of structures from shorelines, out of the path of floods and deciding not to rebuild roads or bridges for access to property, but also the involuntary removal of populations. Displacement by planned relocations was identified as an important form of adaptation by the Conference of Parties to the UN Framework Convention on Climate Change in 2010, and is believed to play an important role in future strategies to adapt to the effects of climate

(2005), available at <http://aquaticcommons.org/2325/1/stamski.pdf>; and GARY B. GRIGGS, KIKI PATSCH, & LAURET E. SAVOY, *LIVING WITH THE CHANGING CALIFORNIA COAST* 117 (2005). Despite its promises, hard armoring, because it “prevents landward migration of beaches and deflects wave energy,” may lead to beach and wetland erosion, which in turn harms ecosystem functions. *Id.* at 9. Hard armoring may also limit the ability of coastal ecosystems to filter water and support fisheries, among other things. *Id.* Another consideration is the blunt visual impact of concrete barriers lining the coast. *Id.* Lower property values are another consequence of hard armoring. *Id.*

132. Soft armoring, which uses natural infrastructure such as sand, gravel, dune grass, or wetlands to strengthen coastlines, is a less burdensome option. It is more aesthetically pleasing and serves to “enhance coastal ecosystem services in protecting recreational resources.” *Id.* at 9–10. The two predominant forms are “living shorelines,” involving natural habitat restoration or conservation (including restoring marsh habitats), and beach nourishment, involving the introduction of new sediment to an eroded beach, “placed in a dune system above the shoreline, on the dry or wet sand area of the beach or offshore in a sandbar.” *Id.* at 10. “Local governments should be aware that soft armoring is not wholly without negative environmental impacts, however; beach nourishment, for example, can disrupt sand habitats or introduce foreign species to beach environments.” *Id.* In addition, the benefits may be overwhelmed by the considerable costs required for soft armoring. *Id.*

133. *Id.* at 10.

134. *Id.*

135. *Id.* at 10–11.

136. *ADAPTING TO CLIMATE CHANGE: CITIES AND THE URBAN POOR*, *supra* note 147, at 1.

137. Herzog & Hecht, *supra* note 46, at 35, citing J. Peter Byrne, *The Cathedral Engulfed: Sea-Level Rise, Property Rights, and Time*, 73 LA. L. REV. 69, 85 (2012).

138. *Id.* at 11.

change.¹³⁹

B. Specific Measures and Initiatives: in Sync and at Cross-Purposes

Mitigation and adaptation responses to climate change are coming from all directions—the White House, environmental advocates, local governmental leaders, and the private sector. But, it does not appear to be a well-coordinated response. In fact, this seems impossible, given the multiple layers of government—federal, state and local—as well as sometimes conflicting interests of those involved or impacted by the initiatives, i.e., environmentalists, developers, private landowners.¹⁴⁰

The Obama administration has taken a fairly aggressive approach to addressing climate change—from pressing for mitigation measures by the world's biggest polluters,¹⁴¹ to agenda-setting messages to the Environmental Protection Agency to regulate polluters at home.¹⁴² The White House has adopted a series of broad policy directives and convened task forces on the subject of climate change that require agencies to see and assess the changing winds.¹⁴³

139. 2010 UN CLIMATE CHANGE CONFERENCE IN CANCUN, MEXICO, 29 NOVEMBER – 10 DECEMBER 2010, REPORT OF THE CONFERENCE OF THE PARTIES ON ITS SIXTEENTH SESSION, ADDENDUM – PART TWO: ACTION TAKEN BY THE CONFERENCE OF THE PARTIES AT ITS SIXTEENTH SESSION, available at <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>; UNHCR, LEGAL AND PROTECTION POLICY RESEARCH SERIES, PROTECTION AND PLANNED RELOCATIONS IN THE CONTEXT OF CLIMATE CHANGE, ELIZABETH FERRIS, BROOKINGS-LSE PROJECT ON INTERNAL DISPLACEMENT, DIVISION OF INTERNATIONAL PROTECTION 7 (Aug. 2012), available at <http://www.unhcr.org/53c4d6f99.pdf>.

140. See Alice Kaswan, *Climate Adaptation and Land Use Governance: The Vertical Axis*, 39 COLUM. J. ENVTL. L. 390, 450 (2014) (arguing that ensuring democratic and inclusive decision-making requires a tiered governance system, with stages set aside for federal, state, and local control).

141. *Obama: U.S.-China climate change accord "historic,"* CBS NEWS (Nov. 11, 2014), <http://www.cbsnews.com/news/u-s-china-announce-climate-change-agreement/>.

142. Presidential Memorandum, *Power Sector Carbon Pollution Standards*, WHITE HOUSE OFFICE OF THE PRESS SEC'Y, June 25, 2013, available at <http://www.whitehouse.gov/the-press-office/2013/06/25/presidential-memorandum-power-sector-carbon-pollution-standards>.

143. The most recent White House measures include instructions from the Council on Environmental Quality to federal agencies to institute climate change adaptation policies, assess the impact of climate change on the agencies' missions and operations; and develop a prioritized plan of action. *Instructions for Implementing Climate Change Adaptation Planning in Accordance with Executive Order 13514*, COUNCIL ON ENVTL. QUALITY, INSTRUCTIONS FOR IMPLEMENTING CLIMATE CHANGE ADAPTATION PLANNING IN ACCORDANCE WITH EXECUTIVE ORDER 13514 (2011), available at www.whitehouse.gov/sites/default/files/microsites/ceq/adaptation_final_implementing_instructions_3_3.pdf. In 2013, the President issued his *Climate Action Plan*, EXEC. OFFICE OF THE PRESIDENT, THE PRESIDENT'S CLIMATE ACTION PLAN 2–3, 12 (2013) [hereinafter PRESIDENT'S CLIMATE ACTION PLAN], available at <http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>. (laying out contours for national action on climate change that embraces both mitigation and adaptation strategies). After Hurricane Sandy, President Obama set up a rebuilding task force on Climate Preparedness and Resilience ("Task Force"), consisting of state, local, and tribal leaders. PRESIDENT'S STATE, LOCAL, AND TRIBAL LEADERS TASK FORCE ON CLIMATE PREPAREDNESS AND RESILIENCE, *Recommendations To The President*, 19 (Nov. 2014), available at http://www.whitehouse.gov/sites/default/files/docs/task_force_report_0.pdf. The Task Force largely echoed the ideas in the Climate Action Plan, calling for among other things, FEMA to consider tying flood insurance premiums to mitigation measures and directing HUD to use Community Development Block Grant ("CDBG") Disaster Recovery funds to help assist low and moderate income populations. *Id.* The Task Force's recommendations aimed to cause federal agencies to "identify and seek to remove or reform barriers" to making climate-resilient investments, to identify and remove counterproductive policies that increase vulnerabilities to climate change impacts, and to utilize grants and technical assistance to encourage and support increased resiliency. *Id.* at 13. Federal agencies were directed to continue providing targeted support and assistance to

1. Reshaping Missions Toward Resiliency

Many federal agencies have recalibrated their missions in light of climate change and have adopted various programs aimed at building resilient communities. HUD, the Department of Transportation and the EPA, each as well as jointly with one another, offer “sustainable communities” programs, with funding opportunities¹⁴⁴ to help “communities realize their own visions for building more livable, walkable, and environmentally sustainable regions” and to “improve the quality of development and protect human health and the environment.”¹⁴⁵ HUD requires that Community Development Block Grant-Disaster Recovery grantees “adopt green building standards for replacement and new construction of residential housing.”¹⁴⁶ Compact development of housing leads to water conservation and the expenditure of fewer resources associated with stormwater management and water treatment facilities.¹⁴⁷ FNMA recently partnered with the EPA to adopt the ENERGY STAR Portfolio Manager tool that contains metrics for assessing energy efficiency of buildings for purposes of improving energy efficiency and for comparison to other buildings nationwide.¹⁴⁸ FNMA’s Multifamily Green Initiative provides financial assistance to owners to enable them to make energy efficiency improvements in multifamily buildings under two Green Financing Options: Green Preservation Plus and Multifamily Property Improvements to Reduce Energy (M-PIRE).¹⁴⁹ Green Preservation Plus operates in partnership with HUD and is targeted toward owners of affordable rental housing who desire to refinance expiring mortgages, reduce energy consumption, and lower annual

help vulnerable communities. *Id.* at 13–14.

144. *Partnership Grants, Assistance, and Programs*, THE P'SHIP FOR SUSTAINABLE CMTYS., <http://www.sustainablecommunities.gov/partnership-resources> (last visited Feb. 6, 2015).

145. *Id.* “The Partnership agencies manage a variety of on-going programs . . . that provide funding and technical assistance to support communities creating vibrant, healthy neighborhoods that provide more housing options, economic opportunities, and efficient transportation while reinforcing existing investments.” *Id.* These funding and technical assistance programs, such as the CDBG program and the Congestion Mitigation and Air Quality (“CMAQ”) program can provide another means of federal resources for states, regions, and local governments. *Id.* The U.S. Department of Agriculture (“USDA”) provides similar programs to rural communities, aimed at promoting economic competitiveness while also protecting healthy environments for an improved quality of life. Partnership for Sustainable Communities, *supra* note 194; see also Partnership for Sustainable Communities, Federal Resources for Sustainable Rural Communities (2014), available at http://www.sustainablecommunities.gov/sites/sustainablecommunities.gov/files/docs/federal_resources_rural.pdf.

146. HUD Hurricane Sandy Rebuilding Strategy, *supra* note 50, at 87. HUD published “a menu of standards that could be applied uniformly across each jurisdiction.” *Id.* The standards reveal both mitigation and adaptation ends—promoting greater efficiency by reducing utility costs, which also promises long-term reduction in housing costs. *Id.*

147. LYNN RICHARDS, GEOFFREY ANDERSON, & MARY KAY SANTORE, PROTECTING WATER RESOURCES WITHIN HIGHER DENSITY DEVELOPMENTS, U.S. ENVIRONMENTAL PROTECTION AGENCY 1, available at http://owpubauthor.epa.gov/polwaste/nps/stormwater/upload/2003_03_26_NPS_natlstormwater03_30Richards.pdf.

148. See *Learn how Portfolio Manager helps you save*, ENERGYSTAR, <http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/learn-how-portfolio-manager> (last visited Feb. 15, 2015). The tool operates by a point system.

149. See *Green Initiative*, FANNIE MAE, <https://www.fanniemae.com/multifamily/green-initiative> (last visited Feb. 15, 2015).

operating costs.¹⁵⁰ M-PIRE, on the other hand, was adopted in partnership with the New York City Energy Efficiency Corporation and serves as a financing tool for owners of New York City co-ops and rentals to improve property performance and conditions.¹⁵¹

The Department of Energy (“DOE”) has been facilitating the nationwide adoption of a Building Energy Code.¹⁵² Buildings that consume less energy and that emit fewer byproducts are an important mitigation and adaption strategy. Energy efficient homes that use compact fluorescent or LED lighting that regulate and minimize use result in savings in heating and lighting and also decrease greenhouse gas emissions.¹⁵³ But, not all states and municipalities have incorporated energy efficiency standards in their building codes and the standards in those that do vary wildly.¹⁵⁴ DOE predicts substantial combined savings in costs (\$261.5 billion), emissions output (55 million metric tons of CO₂), and energy savings (67 quads), by 2040 if the standard code were immediately adopted.¹⁵⁵

HUD, the Department of Homeland Security (“DHS”), and FEMA have adopted new standards for fortified buildings.¹⁵⁶ In September 2014, DHS awarded the “Resilience Star” under the Home Pilot Project.¹⁵⁷ The DHS promotes home design features, specifically, the IBHS FORTIFIED Home, that it represents as both affordable and proven to enhance resilience to disasters such as hurricanes.¹⁵⁸ Homes were built or retrofitted to meet the Institute for Business and Home Safety (“IBHS”) standards for structural resilience.¹⁵⁹ Alongside the IBHS standards, FEMA has adopted its own retrofitting guide, the Wind Retrofit Guide for Residential Buildings,¹⁶⁰ to provide guidance on

150. See *Green Financing Loans*, FANNIE MAE, <https://www.fanniemae.com/multifamily/green-initiative-financing> (last visited Feb. 15, 2015).

151. *Id.* The loans are made more attractive as the program factors in energy and water cost savings to support a larger loan. *Id.*

152. U.S. DEP’T OF ENERGY, BUILDING ENERGY CODES PROGRAM: NATIONAL BENEFITS ASSESSMENT 1992–2040 (2014), available at http://www.energycodes.gov/sites/default/files/documents/BenefitsReport_Final_March20142.pdf.

153. See *Energy Efficient Lighting*, EARTHEASY: SOLUTIONS FOR SUSTAINABLE LIVING, http://eartheasy.com/live_energyeff_lighting.htm (last visited Mar. 9, 2015).

154. *Status of State Energy Code Adoption*, U.S. DEP’T OF ENERGY, <http://www.energycodes.gov/adoption/states> (last visited Mar. 5, 2015). California perhaps has the most aggressive energy standards, the 2013 Building Energy Efficiency Standards Act (CAL. CODE REGS. tit. 24, parts 1 and 6) enables local governments to put into place strict energy efficiency standards for buildings. In contrast, Arizona, Wyoming, South Dakota, Kansas, and Maine all lack any form of a statewide code. U.S. DEP’T OF ENERGY, *Building Energy Codes Program*, available at <http://www.energycodes.gov/adoption/states> (last visited June 3, 2015).

155. *Id.* at A.4.

156. Discussed further *infra*.

157. Mike Kangior, *DHS Issues First-Ever Resilience Star™ Designations to Homeowners* (Sept. 23, 2014), <http://www.dhs.gov/blog/2014/09/23/dhs-issues-first-ever-resilience-startm-designations-homeowners> (last visited Feb. 7, 2015).

158. FORTIFIED FOR SAFER LIVING STANDARDS, INSTITUTE FOR BUSINESS & HOME SAFETY 5 (2008) [hereinafter FORTIFIED FOR SAFER LIVING STANDARDS], available at http://www.disastersafety.org/wp-content/uploads/fortified-safer-living-standards_IBHS.pdf.

159. *Id.*

160. FEMA, WIND RETROFIT GUIDE FOR EXISTING BUILDINGS (2010), available at http://www.fema.gov/media-library-data/20130726-1753-25045-2304/508versioncombined_804.pdf

improving the wind resistance of existing residential structures in coastal regions at risk for high wind events.¹⁶¹

2. State and Local Initiatives on the Ground and in Planning

The initiatives adopted by the various states and local governments have been wide-ranging; some inventive, some very aggressive, some sanguine—from stringent building regulations to barriers against the pressures of the sea.

a. Fortified and Green Building and Rehabilitation

Most cities have long adopted building codes pursuant to their police power that regulate structural integrity, safety, interior environments, plumbing, mechanical, and electrical systems.¹⁶² Building codes not only address the safety of residents and first responders, they also lead to economies of scale in the production of building materials and construction.¹⁶³ Yet, the National Trust for Historic Preservation estimates that nearly one-quarter of all existing buildings in the United States will be replaced between 2005 and 2030.¹⁶⁴ This is largely because they were not built to last.¹⁶⁵

The early modern municipal codes were preceded by codes adopted by various industries—insurance (concerned with containing risk); tenement buildings (aimed at addressing unhealthy conditions); civil and structural engineers (intended to ensure safety and soundness of construction); the federal government (through the establishment of National Institute of Standards and Technology, which led to consistent measurements); and HUD's mortgage insurance programs (as a measure of the value of the collateral).¹⁶⁶

161. *Id.* at 1-1. The guide was designed to provide additional technical guidance to states affected by Hurricane Katrina, to facilitate the Hazard Mitigation Grant Program in Mississippi, which “fund[s] up to 75 percent of eligible costs of retrofits, such as adding roof deck attachments, roof-to-wall connections, and opening protection as well as additional fasteners, secondary water barriers, flashing, underlayment of concrete and clay tile roofs, strengthened vents and soffits, shutters, stud connections, and anchored chimneys.” *Id.* at 1-1; see also *id.* at 4-2 to 4-26 and 5-13 to 5-15. The guide recognizes that not all structures can and should be retrofitted, and specifies factors for determination including: 1) “[w]hether the house is a good candidate for wind retrofit project[.]” 2) whether the retrofit is “cost-effective for the house’s desired level of protection;” and 3) “[h]ow much risk of wind-related damage is acceptable to the homeowner.” *Id.* at 2-5. The guidance addresses all aspects of the physical character and integrity of the structure, and is intended to protect against hazards including tornadoes, storm surges, erosion, flooding, earthquakes, and other related effects.

162. See generally David Listokin & David B. Hattis, *Building Codes and Housing*, 8 CITYSCAPE: A J. OF POL’Y DEV. & RES. 21, 23 (2005), available at <http://www.huduser.org/periodicals/cityscape/vol8num1/ch2.pdf>.

163. *Id.* at 31.

164. PRESERVATION GREENLAB, THE NATIONAL TRUST FOR HISTORIC PRESERVATION, THE GREENEST BUILDING: QUANTIFYING THE ENVIRONMENTAL VALUE OF BUILDING REUSE, ix (2012), citing ARTHUR C. NELSON, TOWARD A NEW METROPOLIS: THE OPPORTUNITY TO REBUILD AMERICA (2004), available at http://www.preservationnation.org/information-center/sustainable-communities/green-lab/lca/The_Greenest_Building_lowres.pdf.

165. *Id.*

166. *Id.* at 24–27. For more than fifty years, many municipalities have adopted, to varying degrees, model building codes adopted by the International Code Council (“ICC”). *Id.* at 31–32. Cities adopted model codes as construction and technology became more complex. See NAT’L COUNCIL OF GOV’TS ON BUILDING CODES & STANDARDS, *Codes and Standards Development*, Apr. 10, 2015, available at

Model codes have evolved over time in reaction to catastrophes—those caused by human actions, such as the Chicago Fire and the Great Fire of Boston, and those occurring naturally, such as earthquakes and superstorms.¹⁶⁷ Now codes are evolving to reduce the risk of damage and injury from flooding and severe weather events, through stringent standards for new construction and for retrofitting existing buildings.¹⁶⁸ Local governments are adopting either new private sector standards or using home-grown resilience standards. These new standards feature fortification and building green.¹⁶⁹

The new construction standards were developed by the private industry, acting out of self-interest, as well as to serve the common cause.¹⁷⁰ One of the loudest voices to emerge in support of the movement toward fortified codes is the IBHS,¹⁷¹ which is pushing “The Fortified for Safer Living Standards.”¹⁷² These standards purport to set baselines that “promote[] [the] best available practices for disaster resistance, and also require compliance with accepted designation standards regarding residential construction, plumbing,

www.wbdg.org/resources/codedevelopment.php.

167. See FEDERAL ALLIANCE FOR SAFE HOMES, BUILDING CODES: THE FOUNDATIONS FOR RELIANCE 2 (2014) <http://www.flash.org/building-codes.pdf> (describing the evolution of codes out of the self-interest of the various industries affected by disasters) [hereinafter FLASH]. From 1935, until 1982, the federal government was in the forefront in the movement to adopt standards for safe construction, through HUD’s Minimum Property Standards (“MPS”) which were required to be met in order to be entitled to HUD financial assistance. But, at the urging of the private sector, the National Association of Home Builders, in particular, HUD withdrew the MPS, deferring to local building codes. *Id.* at 2–3.

168. The Price of Resilience, *supra* note 86, at 17. Retrofitting measures include relocation of critical building systems (from basements to roofs or in the yard); dry floodproofing (meaning constructing barriers to water intrusion); adding non-residential uses to allow dry floodproofing of cellars; and using demountable flood barriers. *Id.* at 21, 22, 30. In New York City, after Superstorm Sandy, the city amended its codes to require compliance with the FEMA flood insurance program and to incorporate FEMA guidelines into buildings and codes, imposing stricter requirements for increased elevation. *Id.* at 14–15. The four main components of the stricter building codes pertain to the lowest floor, enclosures, materials, utilities, and equipment. *Id.*

169. Edward Teyber, *Incorporating Third Party Green Building Rating Systems Into Municipal Building And Zoning Codes*, 31 PACE ENVIR. L. REV. 832 (2014).

170. The private sector has rallied to offer a variety of defensive strategies. Some come as a response to new regulations, leading to products and practices calculated to reduce our collective carbon footprint. Clean technologies for coal fired plants, fuel-efficient automobiles, and biodegradable packaging are all instances of industry rising to meet a need. As it pertains to housing, private industry has developed vegetable dyes for carpeting in new construction, composite materials for walls and flooring, long-lasting fluorescent lighting, recirculating water systems, and smart homes. See, e.g., SIEMENS, HOW CAN WE MEET THE WORLD’S ENVIRONMENTAL CHALLENGES AND ENSURE ECONOMIC PROSPERITY? (2009), available at http://www.usa.siemens.com/pool/about_us/ec/siemens_ebrochure09.pdf.

171. See *supra* note 160. IBHS Urges New York To Adopt 2015 Model Building Codes, INS. J. (Oct. 20, 2014), available at <http://www.insurancejournal.com/news/east/2014/10/20/344089.htm>. The Institute for Business and Home Safety (“IBHS”) describes itself as “an independent, nonprofit, scientific research and communications organization supported by the property insurance industry that it conducts research to identify and promote effective actions that strengthen homes, businesses, and communities against natural disasters and other causes of loss.” *Id.* The IBHS influences the actions of local governments by its direct comments on proposed amendments to codes, but also by its *Rating the States* initiatives, which purports to offer an assessment of residential building code and enforcement systems. The reports have the potential of embarrassing states into taking action or else be viewed as irresponsibly leaving their citizens exposed to the threats of catastrophes. But the National Association of Home Builders is speaking against across-the-board adoption of a national fortified building code. It opposes across-the-board increases in code stringency that make housing less affordable, burden code officials with enforcing unclear, infeasible, or onerous requirements that fail to properly target actual issues while ignoring where structures have performed well. See NAT’L ASS’N OF HOMEBUILDERS, OVERVIEW ON CLIMATE CHANGE AND RESILIENCY 2 (2013).

172. FORTIFIED FOR SAFER LIVING STANDARDS, *supra* note 158, at 5.

mechanical, electrical fuel-gas and energy conservation.”¹⁷³ Some organizations, including non-profit consumer advocacy groups, are calling for a federal role in the adoption of a national building code.¹⁷⁴ They believe that the federal government is in a unique position to get to this point, through smart policy (offering enhanced disaster relief dollars and empowering swift spending or relief funds), financial incentives to states that adopt fortified building codes, and accountability requirements.¹⁷⁵

Prayers and incantations for rain and cool winds, proving unsuccessful, regulators have turned to living “green,” that is, requiring green building and green infrastructure and green outdoors.¹⁷⁶ Some require adherence to the standards of the United States Green Building Council.¹⁷⁷ Others have adopted

173. *Id.* at 5. The process:

is governed by local and municipal policy concerning where it is deemed safe to build residential structures. Fortified structures cannot be designated in the following areas: low-lying barrier islands and coastal regions, close proximity to known seismic fault lines, close proximity to major levees, and steep slopes potentially subject to either erosion or wildfire.

The process starts with the design of the home to meet Fortified requirements for a specific location. A registered designer creates a suitable design, and completes a Fortified Design Checklist. Next, a Fortified design reviewer checks the design, completes a Fortified Design Review Checklist, and develops a suitable field inspection plan.

Id. (emphasis omitted). The manual describes the various perils by region, including hurricane-prone areas, tornado and hail regions, high wind regions, earthquake regions, wildfires, flood zones, and severe winter weather. *Id.* at 7–8. Building standards are prescribed to address each of the types of perils. A few examples of the building standards specified include the placement of nails, screws and other fasteners; load bearing capacity of framing; secondary water resistance capacity for roofs; high-impact resistance doors, windows, and outward opening doors; elevated structures; noncombustible eaves; wide driveways and separation of firewood storage. *Id.* at 7–8, 13, 17–18, 20–21, 26, 28. Twelve states have adopted Fortified standards. *Id.* at 72–73. Existing houses cannot be retrofitted to Fortified Standards, but they can be strengthened, during a reroofing, including adding positive connections, moisture barriers, and roof materials rated for high winds, wildfire and hail impact. See “Fortified” homes protect against natural disasters, INSURE.COM (Sept. 24, 2007), www.insure.com/home-insurance/fortified-homes.html (last visited Feb. 7, 2015).

174. FLASH *supra* note 167, at 9. It points out that while the movement for fortified homes is progressing, the objectives are sometimes frustrated by the lack of enforcement resources (Alabama and Mississippi) or by provisions allowing local governments to opt out (Texas and Mississippi). *Id.*; see also FEMA, WIND RETROFIT GUIDE FOR EXISTING BUILDINGS 5–7, A-1 (2010), available at http://www.fema.gov/media-library-data/20130726-1753-25045-2304/508versioncombined_804.pdf (illustrating the relationship between FEMA and IBHS—elements of IBHS’s Fortified program are based on FEMA recommendations, and FEMA in turn promotes the Fortified program as an example of a means by which homeowners can reduce their insurance premiums).

175. *Id.* at 10. Two pieces of proposed federal legislation are worth noting: the Safe Building Code Incentives Act of 2013, S. 924, rewarding communities that enact strong building codes with increased payment of disaster relief, and the Disaster Savings Act of 2014, S. 1991, adding an amendment to the Internal Revenue Code to provide a deduction of up to \$5,000 set aside in a tax-preferred account for use in mitigating disaster expenses.

176. California and Texas are suffering from severe drought and have adopted either state plans for living with the conditions or have joined regional alliances for managing water shortages. NATIONAL CLIMATE ASSESSMENT, *supra* note 64, at 267. In April 2014, Governor Jerry Brown of California declared a drought emergency for the state, calling for, among other things, a twenty-five percent statewide reduction in water consumption. Exec. Order No. B-29-51, Apr. 1, 2015, available at http://gov.ca.gov/docs/4.1.15_Executive_Order.pdf. “Texas . . . has called for a coordinated response through the National Integrated Drought Information System (NIDIS); Regional Integrated Sciences and Assessments (RISAs) program; (Southern Climate Impacts Planning Program [SCIPP] Climate Assessment for the Southwest [CLIMAS]); and state and private sector partners through anticipatory planning and preparedness (for example, implemented in 2011 drought).” *Id.*

177. U.S. GREEN BLDG. COUNCIL, A LOCAL GOVERNMENT GUIDE TO LEED FOR NEIGHBORHOOD DEVELOPMENT 6 (2012). As of March 2012, over 440 U.S. localities have implemented LEED ordinances, policies, or incentives.

independent standards.¹⁷⁸ Among other things, cities are requiring all new construction to have cool roofs, and to install green infrastructure for stormwater retention and filtration.¹⁷⁹

Zoning ordinances are being amended to keep land green by rendering it undevelopable.¹⁸⁰ Some cities are employing eminent domain powers or otherwise acquiring land, then preserving it as parkland land.¹⁸¹ After recent weather events in New York and Colorado, many local governments determined to demolish housing that was either already severely damaged by the storm, or that was at a high risk of being damaged by climate change-related events in the future.¹⁸² In the aftermath of the Colorado flood, the Town of Lyons has been buying back property using CDBG-DR housing acquisition funding and HMGP 404 funds, and anticipates a net gain of approximately fifteen acres of open space, which will offset the five-to-seven acres being used for active rebuilding.¹⁸³ The buyout land will be returned to a “state of nature” and ensure its permanent park space status.¹⁸⁴

b. Holding Back the Sea

Rejecting the impossible notion of walling off the city, the post-Superstorm Sandy plan describes a resilient city—not one that is “shielded from

178. U.S. ENVTL. PROT. AGENCY, *Green Building Standards*, <http://www.epa.gov/greenbuilding/standards/index.html> (last visited Mar. 8, 2015). Local governments have a variety of model green building codes to choose from, and may choose to adopt standards that match their needs. *Id.*

179. See generally LOCAL GOV'TS FOR SUSTAINABILITY USA, LOCAL GOVERNMENTS, EXTREME WEATHER AND CLIMATE CHANGE 2012 5 (2012), available at http://www.resilientamerica.org/wp-content/uploads/2013/06/ICLEI_extreme_weather_cities_fact_sheet_2012.pdf. Cities pursuing either or both of these initiatives include Los Angeles, Washington, D.C., Chicago, Atlanta, and New York City. *Id.* at 1.

180. See generally Randall Arendt, “Open Space” Zoning: *What It Is & Why It Works*, 5 PLAN. COMM’RS J., PLANNERS WEB (July/Aug. 1992), available at <http://www.franklin-gov.com/home/showdocument?id=2593>.

181. See Alec Torres, *Colorado Couple May Lose Home In ‘Open Space’ Eminent Domain Seizure*, NAT’L REVIEW (Feb. 19, 2014), available at <http://www.nationalreview.com/article/371489/colorado-couple-may-lose-home-open-space-eminent-domain-seizure-alec-torres>. See LOCAL GOV'TS FOR SUSTAINABILITY USA, LOCAL GOVERNMENTS, EXTREME WEATHER AND CLIMATE CHANGE 2012 5 (2012), available at http://www.resilientamerica.org/wp-content/uploads/2013/06/ICLEI_extreme_weather_cities_fact_sheet_2012.pdf.

182. King County, Washington has adopted a plan to demolish chronically flooded homes. ICLEI at 5. The city of Lyons, Colorado experienced a massive flooding event in 2013, which altered the banks of the St. Vrain River and caused millions of dollars in property damage. “The . . . flood event—across a total of 24 counties—took nine lives, damaged 26,000 homes, destroyed more than 1,800 homes, damaged 765 businesses, destroyed 203 businesses, damaged or destroyed almost 500 miles of road, triggered inspections of 207 dams, caused nine small dams to fail, damaged or destroyed more than 160 water-diversion structures, damaged a roughly estimated 32,000 acres of croplands and swept away \$350,000 in stream-gauge equipment.” Electa Draper, *Colorado flood recovery process is a lesson in who owns the river*, DENVER POST (Nov. 3, 2013), available at http://www.denverpost.com/news/ci_24443335/colorado-flood-recovery-process-is-lesson-who-owns. But, it will never return to what it was. “Unlike after Hurricane Katrina, the Army Corps of Engineers will not reconstruct Colorado’s unique patchwork of now-fractured water infrastructure. The system was mostly built by private landowners, farmers, ditch companies, water districts, towns, and cities. And they will be the ones to rebuild it.” *Id.*

183. LYONS HOUS. COLLABORATIVE, FREQUENTLY ASKED QUESTIONS 19 (Feb. 2015), available at <http://www.townoflyons.com/component/jdownloads/finish/5-request-forms-and-applications/1748-lyons-housing-collab-faqs?Itemid=218>.

184. *Id.* at 20.

climate change all of the time,” but one “that is: first, protected by effective defenses and adapted to mitigate most climate impacts” and “second, able to bounce back more quickly when those defenses are breached from time to time.”¹⁸⁵ The plan calls for installing removable floodwalls in Lower Manhattan¹⁸⁶ and restoring marshes in Jamaica Bay in Queens.¹⁸⁷ In Lower Manhattan, a removable system of posts and slats is contemplated to be deployed to form temporary floodwalls.¹⁸⁸ Projects also include revetments to guard parts of Staten Island,¹⁸⁹ building dunes in the Rockaways,¹⁹⁰ building a barrier system of levees and gates to bar the Coney Island Creek from carrying floodwaters inland,¹⁹¹ and possibly creating a levee in Lower Manhattan.¹⁹² The Resiliency Plan also contemplates increasing coastal edge elevation, installing structures to minimize upland wave zones and protect against storm surges, and improving coastal design and governance.¹⁹³

Under its Sand Dune Rules, Maine requires a setback from the shoreline based on the future shoreline position and considering two feet of sea level rise over the next 100 years.¹⁹⁴ Rhode Island requires public agencies to consider land-use applications to plan for a three- to five-foot rise in sea level.¹⁹⁵

V. WHAT THESE RESPONSES PORTEND FOR THE POOR, HOUSING, AND COMMUNITIES

While the private and public benefits of resilience measures are evident, on the other side of resilience is its burden on the availability and affordability of housing and communities. These externalities are both policy-based—a shift in focus of efforts toward infrastructure and away from housing—and practical—increased costs of complying with stringent building and green codes and higher insurance premiums.

185. A Stronger, More Resilient N.Y., *supra* note 9, at 7.

186. *Id.* at 51, 55.

187. *Id.* at 50, 51.

188. *Id.* at 224.

189. *Id.* at 58.

190. *Id.* at 53.

191. *Id.* at 58.

192. N.Y.C. DEP'T OF ENVTL. CONSERV., SOUTHERN MANHATTAN COASTAL PROTECTION STUDY 6 (May 2014), available at http://www.nycedc.com/sites/default/files/filemanager/Projects/Seaport_City/Southern_Manhattan_Coastal_Protection_Study_-_Evaluating_the_Feasibility_of_a_Multi-Purpose_Levee.pdf.

193. *Id.* at 5.

194. See 20 GOOD IDEAS FOR PROMOTING CLIMATE RESILIENCE: OPPORTUNITIES FOR STATE AND LOCAL GOVERNMENTS, GEORGETOWN CLIMATE CTR. 8 (2014) [hereinafter 20 GOOD IDEAS FOR PROMOTING CLIMATE RESILIENCE], available at <http://www.georgetownclimate.org/20-good-ideas-for-promoting-climate-resilience>. Maine's *Sand Dune Rules* are applicable to structures greater than 2,500 square feet. *Id.*

195. See Allie Goldstein and Kirsten Howard, *The Great American Adaptation Road Trip: Lessons learned about how hometowns across the United States are building their resilience to climate change*, GEORGETOWN CLIMATE CTR. (2015), available at <http://www.georgetownclimate.org/sites/www.georgetownclimate.org/files/GCC-Great%20American%20Adaptation%20Road%20Trip-Jan%202015.pdf>. This includes North Carolina and Rhode Island. *Id.*

A. Focus on Infrastructure

Announced federal mitigation policy orients planning and investments toward building resilient infrastructure and less toward housing. Building community resilience on regional and national scales will require significant investment in the retrofitting of public and private infrastructure. Capital improvements such as seawalls and bridges, porous pavements, improved wastewater treatment systems, levees, cisterns, and rain barrels are costly.¹⁹⁶ Defraying the costs will mean fewer resources for housing subsidies and construction. Green infrastructure, creating tree canopies, cultivating urban forests, tunnels, and designing rain gardens, also will be costly, in money and land. No doubt all benefit from a sturdy bridge, but a bridge is no place to live.

B. Reduction in Housing Supply

The effects on the ground are even more concerning as they necessarily impact housing supply in several ways. Land use regulations that require the incorporation of fortification devices and green features,¹⁹⁷ repurposing areas,¹⁹⁸ that prohibit construction in areas formerly available for housing, will increase construction costs and consequently housing demand and supply. Rising casualty and flood insurance premiums may make housing unaffordable.¹⁹⁹

1. Costs of Building Strong and Green

While serving the public interest in ensuring the safety and habitability of structures, compliance with building codes nevertheless drives up the costs of

196. After Superstorm Sandy, several subway lines were flooded and remained inoperable for weeks. After the storm, New York State proposed to spend \$2.4 billion restoring the shore, wetlands, and fortifying the coast. These projected expenditures do not compare favorably with the expenditures, already incurred and planned, for housing and building communities. After the flooding in Colorado washed out narrow, but essential roads through the canyon, the Colorado Department of Transportation was able to repair all damaged roads for usability within three months of the floods, although permanent repairs will take more time, using \$450 million in federal disaster funding. See Stephanie Paige Ogburn, *Years Of Work Still To Come For Flood-Damaged Colorado Roads*, CMT'Y RADIO FOR N. COLO., <http://www.kunc.org/post/years-work-still-come-flood-damaged-colorado-roads> (last visited Feb. 17, 2015). Many bridges succumbed to the forces of the weather in New England after storm Irene. See discussion of damage caused by Superstorm Sandy, *supra* Part III(C). The costs for the required retooling of infrastructure seem prohibitive, at least for single towns alone. A study for one municipality "estimated that constructing protection measures for the next seventy to one hundred years, including draining, water supply, and raising roads would cost \$500 million to \$1 billion." Eisenhaur, *supra* note 29, at 8. A recent regional planning effort undertaken in Florida to respond to sea level rise included "a variety of strategies including retreat from some areas and fortifying coastline in others both with natural buffers such as mangroves and sand dunes, and with engineered solutions such as water controls structures, raising land, levees." *Id.* Though the plan did not give a cost estimate, it did acknowledge that high cost is a serious challenge. *Id.* at 9.

197. Discussed *infra*.

198. Discussed *infra*.

199. See BUILD BACK SAFER & STRONGER: WHAT YOU NEED TO KNOW, FEMA (Feb. 2013), available at http://www.fema.gov/media-library-data/20130726-1858-25045-7797/build_back_stronger02_2013.pdf [hereinafter BUILD BACK SAFER & STRONGER]; see also THE PRICE OF RESILIENCE, *supra* note 97, at 2.

construction.²⁰⁰ The increased costs are both substantive and administrative.²⁰¹ Substantive costs include requiring improvements (irrespective of their efficacy), restricting cost-saving materials and technologies, and impeding scale and efficient production.²⁰² Administrative costs are those that come from the inadequate supply of trained inspectors (leading to scheduling delays and questionable inspections), conflicts between administrative agencies with overlapping jurisdictions, and fees.²⁰³

The prescribed construction and fortification techniques range from the relatively simple—such as adding storm windows and shutters, and creating water barriers and seals to stop flooding—to the intense and complex—which may include strengthening roof attachments, bolting houses to their foundations, reinforcing walls and floors, building safe rooms, and elevating electrical systems.²⁰⁴ The estimates of the increased costs from fortification range wildly from one percent to as much as 200 percent,²⁰⁵ although the most common estimate is three to five percent.²⁰⁶

Recently, the Furman Center at New York University completed a comprehensive study of the costs of retrofitting existing multi-unit buildings for resilience. While it concluded that retrofitting could be done, the obstacles loom large. The costs could be in the millions depending on the design, size, age, and condition of the structure.²⁰⁷ These costs might be prohibitive for some owners whose buildings lack sufficient equity for borrowing.²⁰⁸ As some new land use regulations may require tearing down all the units below the predicted flood level, there could result the loss of thousands of indispensable housing units. Even if units are not lost to demolition, owners will try to pass on the costs of retrofitting buildings to residents through a rent increase, further reducing the supply of affordable housing.²⁰⁹ But, if the building is rent-regulated, the owner is forced into an impossible conundrum: rent stabilization

200. Listokin & Hattis, *supra* note 162, at 21.

201. *Id.* at 33.

202. *Id.*

203. *Id.* at 33–34.

204. HOUSINGPOLICY.ORG, *Promote “Smarter and Safer” Building & Rehabilitation Practices*, , HousingPolicy.org/toolbox/strategy/policies/rehab_practices.html (last visited Apr. 12, 2015).

205. See *The Impact of FORTIFIED Building Standards*, MERLINO & ASSOCIATES, (May 14, 2012), <http://merlinosinc.com/fortified-building-standards>. It is currently estimated that building to FORTIFIED specifications adds five-to-ten percent to construction costs. *Id.*

206. See INSURE.COM, “*Fortified*” Homes Protect Against Natural Disasters, (Sept. 24, 2007), <http://www.insure.com/home-insurance/fortified-homes.html>. Estimates for retrofitting have varied widely. *Id.* For example, a house without fortification costing \$200,000 would, once fortified, cost from \$206,000 to \$210,000—a relatively modest increase. See *id.* At the same time, the long-term savings (in energy costs and lower casualty insurance premiums) to the homeowner will exceed these costs. *Id.* FLASH states that building a home that incorporates the *Dual-Objective-Based Tornado Design Philosophy* (that requires homes to be built to withstand winds of up to 135 mph), would add only \$0.50 per square foot or \$1,000 in metal connectors installed in an average 2,000 square foot home. FED. ALLIANCE FOR SAFE HOMES, *Building Codes: The Foundation for Resilience*, 6, (May 1, 2014), <http://www.flash.org/building-codes.pdf>. FLASH maintains that this new design has been proven (if only in a lab) to be successful in reducing losses for tornadoes. *Id.*

207. *The Price of Resilience*, *supra* note 86, at 2.

208. *Id.*

209. *Id.*

regulations prohibit the removal of a unit on the one hand, and the recovery of the costs through higher rents on the other.²¹⁰ These owners, unable to raise funds for improvements by raising rents, finding the financial burden of the costly retrofits overwhelming, will consider converting their buildings to market rate cooperatives or condominiums.²¹¹ Otherwise, many buildings will be left exposed and unprepared for future weather events.²¹² Ironically, retrofitting in the least costly manner, such as by installing mechanical systems in the yard, may even be prohibited by local land use regulations.²¹³

With housing costs rising, tenants and building owners strapped financially, and government at all levels fiscally limited, “there really isn’t the money to do what’s necessary to protect the buildings even within the 100-year zone.”²¹⁴ On the other hand, the cost of not retrofitting could be punishing as well; without retrofitting, “building owners may face skyrocketing flood insurance premiums.”²¹⁵ Even if an owner is able to borrow money to attempt to retrofit to meet new building standards or for flood insurance, the availability of loans will be limited not only by the existence of equity in the building, but also by the availability of funds from banks, because mortgages used for home improvement are not capable of being securitized.²¹⁶

While building green will increase initial costs, by some 15 percent,²¹⁷ the consensus is that these costs will be recouped in energy cost savings over the life of the property,²¹⁸ as well as in increased sales prices.²¹⁹

a. Inadequate and Restricted Government Financial Assistance

That the added costs are inevitable seems to have eluded the thinking of

210. *Id.* at 34.

211. *Id.* at 2.

212. *Id.*

213. *Id.* at 16, 22.

214. Peter Slavin, *The Cost of Retrofitting Multifamily for Resilience*, URBANLAND (July 31, 2014), <http://urbanland.uli.org/sustainability/resilience-efforts-hurt-affordability-multifamily/> (quoting ULI senior housing fellow John McIlwain).

215. *The Price of Resilience*, *supra* note 86, at 2.

216. PRESIDENT’S STATE, LOCAL, AND TRIBAL LEADERS TASK FORCE ON CLIMATE PREPAREDNESS AND RESILIENCE, *Recommendations To The President*, 19 (Nov. 2014), available at http://www.whitehouse.gov/sites/default/files/docs/task_force_report_0.pdf.

Barriers to wide-scale retrofit of existing private properties include limited access to and incentives for long-term financing to cover project costs. Property Assessed Clean Energy (PACE) provides a means of financing energy efficiency upgrades, renewable energy installations, and weatherization improvements on residential and commercial properties through a voluntary property assessment. PACE also offers co-benefits such as spurring local investment and expanding economic opportunities in the green energy sector.

Id. See BUILD BACK SAFER & STRONGER, *supra* note 199; see also *The Price of Resilience*, *supra* note 86, at 2.

217. Robert Miller Stephenson, *Quantifying The Effect of Green Building Certification on Housing Prices in Metropolitan Atlanta* 2 (Dec. 2012) (unpublished M.S. thesis, GA Inst. of Tech.), https://smartech.gatech.edu/bitstream/handle/1853/50137/stephenson_robert_m_201212_mast.pdf.

218. See CTR. FOR CLEAN AIR POLICY, *THE VALUE OF GREEN INFRASTRUCTURE FOR URBAN CLIMATE ADAPTATION* 8–10 (2011).

219. Stephenson, *supra* note 217, at 58.

the planners. Yet, the cost of fortification measures would not be as concerning if there were sufficient funding available to operate alongside the new demands for fortifying and retrofitting. Neither private sector nor governmental financial sources are adequate to meet the demands of adapted living. While the Pre-Disaster Mitigation Program provides funding to municipalities for hazard mitigation planning and projects, as well as for retrofitting structures and voluntarily acquiring property in hazard-prone areas for conversion to open space,²²⁰ there are no standard allocations of funds for this program, but awards are made on a competitive basis.²²¹ The Hazard Mitigation Grant Program ("HMGP") provides funding to affected jurisdictions for implementing mitigation measures,²²² but only those jurisdictions that have received recovery funds for officially declared disasters are eligible for HMGP funds.²²³

The Disaster Recovery Enhancement Fund, established by HUD, aimed "to encourage states to undertake long-term disaster" projects to minimize the extent of damage from future natural disasters.²²⁴ These projects may include buyouts of homeowners in high-risk areas, relocation payments to encourage residents to move to safer locations, and home improvement grants for, among other things, property elevation and reinforced garage doors and windows.²²⁵ A significant limitation on these funds is that they can only be used in counties officially covered by a disaster declaration in 2008.²²⁶ While FEMA provides assistance to grantees receiving funds under the Pre-Disaster Mitigation Program, HMGP, and Hazard Mitigation Assistance for Wind Retrofit Projects for Existing Residential Buildings (for wind retrofits of one- and two-family residential buildings), that assistance is only available to grantees that utilize building techniques that conform to the design criteria in the Wind Retrofit Guide for Residential Buildings.²²⁷ Eligibility requires a

220. CTR. FOR HOUS. POL'Y, *Issue Brief: Financing Efforts to Make Homes More Resistant to Natural Disasters*, 1 (2010), http://www.nhc.org/media/documents/disaster_resistant_finance.pdf [hereinafter Ctr. For Housing Pol'y Issue Brief].

221. *Id.*

222. *Id.*

223. *Id.* "FEMA can award jurisdictions HMGP funds for up to 15 percent of the amount they received in total disaster recovery funds. FEMA can fund up to 75 percent of the eligible costs of each mitigation project with states or local grantees providing a 25 percent match." *Id.* The Flood Mitigation Assistance Program seems to be the answer, as it "provides funds for projects that reduce or eliminate the long-term risk of flood damage to buildings, homes and other structures that are insured under the National Flood Insurance Program (NFIP)." *Id.*

224. *Id.* at 2.

225. *Id.* The funds can also be used for "improving and enforcing building codes" and "developing forward-thinking land use plans that reduce development in high-risk areas." *Id.*

226. *Id.*

227. FEMA Mitigation Policy 104-008-01, <http://www.nfipiservice.com/pdf/Storm%20Sandy/Wind%20Retrofit%20Projects%20Guidance.pdf>. The policy was enacted pursuant to the Stafford Act, under which Congress provides funding for the purpose of reducing or eliminating risks to life and property from hazards and their effects. The Wind Retrofit program targets the existing homes in hurricane-prone regions and aims to protect existing homes from hurricane-force winds. *Id.* FEMA P-804 provides:

(1) technical assistance and public education on building techniques for the rebuilding and recovery process to reduce the potential for future losses from wind-related damage; (2) promotion of the most appropriate and cost-effective building materials and practices to encourage future construction

home evaluation to determine whether the home is a viable candidate for retrofit.²²⁸

Our nation's attitude toward housing may provide some perspective here. Housing shortages have persisted in the nation, not because of a lack of raw materials to build or the availability of structures, but because of the absence of political will to fund housing for all.²²⁹ The cost of complying with a rule or regulation is surely a measure of its efficacy.

2. Repurposing Funds and Areas

In the last decade, \$11.5 billion were appropriated for post-hurricane recovery efforts in Alabama, Florida, Mississippi, Texas, and Louisiana.²³⁰ Although the various disaster mitigation programs offered through FEMA can and have benefited lower income households and vulnerable populations, they were not specifically targeted to these populations. These households have fewer resources and are less likely to upgrade homes to make them more resistant to natural disasters.²³¹ Indeed, under the terms of the disaster recovery amendments, grants are to be used primarily for low-income residents in and around the communities that have experienced the disaster; grantees are required to use only half the grant for activities that principally benefit low- and moderate-income persons, either through activities in which all or the majority of people who benefit have low or moderate incomes or activities that benefit an area or service group in which at least 51 percent of the population are of low- and moderate-income.²³² Prior to these amendments, at least 75 percent

of disaster-resistant buildings; and, (3) programmatic guidance on developing and implementing residential wind retrofit projects that can be used when applying for funding through PDM and HMGP.

Id. at 2.

228. *Id.* at 4.

229. See Shelby D. Green, *The Public Housing Tenancy: Variations on the Common Law that Give Security and Control*, 43 CATH. U. L. REV. 681 (1994) (discussing how over the decades, some administrations reduced spending on housing, despite shortages, and others asked Congress for no appropriations at all).

230. Allocations and Common Applications and Reporting Waivers Granted to and Alternative Requirements for CDBG Disaster Recovery Grantees Under the Dep't of Defense Appropriations Act, 2006, 71 Fed. Reg. 7666 (Feb. 13, 2006). The legislation originally granted Louisiana \$6.2 billion in homeowner assistance. *Id.* Louisiana additionally requested—and received—an additional \$4.2 billion for its housing assistance fund. *Id.*; see also Emergency Supplemental Appropriations Act for Defense, The Global War on Terror, and Hurricane Recovery, 2006, Pub. L. No. 109-234, 120 Stat. 418.

231. In the aftermath of Hurricanes Katrina, Rita, and Wilma in 2005, Congress authorized Disaster Recovery Grants under Title I of the Housing and Community Development Act of 1974, 42 U.S.C. § 5301, the legislation that created the CDBG. See Disaster Relief and Emergency Assistance Amendments of 1988, Pub. L. No. 100-707, § 105(e), 102 Stat. 4689, 4691. The CDBG Disaster Recovery funds can be used for “recovery efforts involving housing, economic development, infrastructure and prevention of further damage to affected areas.” HUD EXCHANGE, *CDBG-DR Eligibility Requirements*, available at <https://www.hudexchange.info/cdbg-dr/cdbg-dr-eligibility-requirements/> (last visited Apr. 12, 2015).

232. 24 C.F.R. § 570.208(a) (2015); 42 U.S.C. §§ 5301(c), 5304(b)(3)(A) (2012); *Allocations and Common Application and Reporting Waivers Granted to and Alternative Requirements for CDBG Disaster Recovery Grantees Under the Department of Defense Appropriations Act, 2006*, 71 Fed. Reg. 7666-67 (Feb. 13, 2006). Those concerns that were raised when government funding shifted from project based grants to block grants, but put aside, arose once more in the aftermath of Katrina, where issues of equity and competence came to the fore. See David Finger, *Stranded and Squandered: Lost on the Road Home*, 7 SEATTLE J. FOR SOC.

of CDBG grants was required to be used for the benefit of low- and moderate-income persons.

Legal challenges to states' use of disaster relief funds have been unsuccessful. In *Mississippi State Conference NAACP v. U.S. Department of Housing and Urban Development*,²³³ plaintiffs challenged HUD's approval of Mississippi's plan to divert \$570 million of Hurricane Katrina federal relief funds away from the construction of low-income housing, toward plans to expand a high-end port.²³⁴ They asserted that HUD has a non-waivable statutory duty to make a substantive assessment of the proposal, but that review instead was arbitrary, capricious, and contrary to law inasmuch as no housing or benefit to low and moderate-income persons was contemplated.²³⁵ The state's plan was not a wholesale abandonment of the purposes of the relief funds, but a redirection of excess funds from the Homeowners Assistance Program ("HAP"). Under HAP, the state made one-time grant payments of up to \$150,000 to eligible homeowners who suffered flood damage (but not wind damage) to their homes. The program was expanded to give \$100,000 grants "to other low-and-moderate income homeowners who suffered flood damage but were not eligible in the first phase."²³⁶ It turned out that the state had overestimated the number of homeowners who would be eligible for HAP, leaving \$570 million in "excess funds," which it then proposed to divert to the Port of Gulfport Restoration Project.²³⁷ While aiming to restore public infrastructure destroyed by Hurricane Katrina and to help protect against future damage, the state also claimed that the project would also serve the Housing and Community Development Act of 1974 ("HCDA") requirement of aid to low-and-moderate income persons, by creating more than 5,000 new jobs that would be available first to applicants with low-to-moderate incomes.²³⁸ "HUD approved the diversion of funds on the conditioned certifications, with former HUD Secretary Alphonso Jackson noting that he had 'little discretion' in approving the project."²³⁹ The challenge was dismissed on standing grounds: the plaintiffs were not eligible for HAP, as "they: 1) were not homeowners (i.e., were renters); or 2) did not live in eligible counties; or 3) did not insure their residences pre-Katrina; or 4) had residences that suffered wind damage, instead of flood damage."²⁴⁰

JUSTICE 59 (2008) (discussing a failed \$900 million project to assist homeowners to rebuild after Katrina that was marred by conflicts of interest, dereliction, and prompted a congressional hearing).

233. 677 F. Supp. 2d 311 (D.D.C. 2010).

234. *Id.* at 312.

235. *Id.*

236. *Id.* at 312–13.

237. *Id.* at 313.

238. *Id.*

239. *Id.*

240. *Id.* So far, only two bills have been introduced with the aim of addressing this gap in policy. The Pre-Disaster Hazard Mitigation Enhancement Program Act of 2009 proposed funding for projects designed to protect against hurricane damage for lower income households, living in single-family and multi-family homes. Ctr. For Housing Pol'y Issue Brief, *supra* note 220, at 1. The Hazard Mitigation for All

3. Displacement and Destruction of Community: Focusing on the Trees, Not Seeing the People

The retreat strategy will have the greatest impact on vulnerable populations, to the extent that families and their communities may be relocated and prevented from returning to their original homes. In the legacy cities, the first task confronting planners being perhaps to stabilize, bodes ill for vulnerable populations. To be sure, poor schools, high crime, and crumbling infrastructure turn away many prospective purchasers. Although forgotten areas will continue to house some people, they do so at much lower densities than in the past. Lower densities do not promise better housing quality; in fact, the population in many rural areas is disproportionately low-income, creating a struggle to find affordable housing in a limited market.²⁴¹ To combat the negative social consequences of abandoned or dilapidated buildings in legacy cities, some cities are proposing wholesale demolition of wide areas.²⁴² Rather than rebuilding decent and affordable housing, in response to climate change, planners are arguing for open, green spaces within communities, meant to control stormwater runoff, provide public spaces, and decrease the urban heat island effect.²⁴³

Challenges to decisions to demolish structures face an uphill battle. In New Orleans, HUD announced in June 2006 that 5,100 apartments in four major public housing developments would be demolished.²⁴⁴ Private developers would do the rebuilding, but fewer apartments would be rebuilt there or elsewhere.²⁴⁵ The demolition and rebuilding was to be financed by a

Act of 2009 proposed grants for mitigation support for public housing and HUD-assisted private properties, such as those supported by Section 8 programs. *Id.* at 2. "Private properties that received grant funds would be required to give preference to public housing and Section 8 residents for a period of five years following receipt of the funds." *Id.* "[G]rants to local public housing authorities that would be used to finance disaster-resistant retrofits for public and private Section 8 properties, with a proposed 25-percent match required from the respective state." *Id.* However, neither of the two bills were ultimately enacted. *Id.* As it stands, there are no federal programs targeting specifically the concerns of low- or moderate-income households. *See id.* at 3. The few state programs in operation have expired because of lack of funding. *Id.* The MySafe Florida Home Program was created in 2006 through a \$250 million appropriation from the state and provided mitigation retrofit grants to households, specifically low- to moderate-income households—those with homes with insured values of under \$300,000. *Id.* But budget constraints led to the expiration of the program. *Id.* A similar program was also established in South Carolina, the South Carolina Hurricane Damage Mitigation Program. *Id.*

241. *See, e.g.,* Gillian B. White, *Rural America's Silent Housing Crisis*, THE ATLANTIC (Jan. 28, 2015), available at <http://www.theatlantic.com/business/archive/2015/01/rural-americas-silent-housing-crisis/384885/> (stating that even rural areas often struggle to provide enough affordable, safe housing to the most vulnerable segment of the population).

242. Alan Mallach & Lavea Brachman, *Regenerating America's Legacy Cities*, LINCOLN INST. OF LAND POL'Y, 55, (2013); *see also* Ben Austen, *The Post-Post-Apocalyptic Detroit*, N.Y. TIMES MAG. (July 11, 2014) (noting that 80,000 buildings are "likely in need of demolition.").

243. Mallach and Brachman, *supra* note 242.

244. Desiree Evans, *Is HUD locking the poor out of New Orleans?*, FACINGSOUTH, THE INST. FOR S. STUDIES (Dec. 10, 2008), <http://www.southernstudies.org/2008/12/is-hud-locking-the-poor-out-of-new-orleans.html>.

245. A class action suit sought to reopen the closed units. In *Anderson v. Jackson*, plaintiffs alleged violations of the Fair Housing Act as well as the U.S. Housing Act. No. 06-3298, 2007 WL 458232 (E.D. La. Feb. 6, 2007), *aff'd* 556 F.3d 351 (5th Cir. 2009). The court granted summary judgment on all claims for defendant. *Id.*

portion of the \$411 million in discretionary CDBG-DR funds awarded to New Orleans.²⁴⁶ That challenge was ultimately not successful.²⁴⁷

Where demolition cannot be justified based on nuisance, cities are pursuing clearance through eminent domain. The use of eminent domain powers post-*Kelo v. City of New London*²⁴⁸ has become a politically charged issue. Even though the Supreme Court has found that the taking of private property for the purpose of economic redevelopment is a public use under the Constitution, many states acted to amend their constitutions or statutes to prohibit the exercise of eminent domain in such circumstances.²⁴⁹ In one respect, clearing storm-prone areas could be viewed as a public use. On the other hand, because these are coastal areas, with beachfront land held in the public trust,²⁵⁰ coastal protection projects, such as dune building or restoration, have been held to not constitute a taking, as these projects are undertaken for the protection and benefit of the property owner, as well as the surrounding residents.²⁵¹

Where eminent domain is deliberately employed, one concern relates to the communities that are selected for acquisition. If one neighborhood comprised of persons of a certain ethnic group are selected for removal, while another is provided with fortification benefits, such as seawalls and elevations, then an equal protection claim might be stated.²⁵²

4. Higher Insurance Premiums

Some form of risk spreading, casualty insurance everywhere, and flood insurance in floodplains, is not only wise, but required for the purchase of a home and to comply with the terms of a mortgage. As the private sector entrepreneurs act to contain their exposure to claims by raising premiums and withdrawing from doing business in some areas, so also is the federal government in the case of flood insurance. Under the Biggert-Waters Flood Insurance Reform Act,²⁵³ some proposed rises would have been as much as

246. See Ariella Cohen, 'Reinventing' New Orleans? Landrieu Team Steers Dwindling Recovery Dollars to Humdrum Projects, THE LENS (Apr. 4, 2011), available at <http://thelensnola.org/2011/04/04/dcdbg-spending/>.

247. See generally *Anderson*, 556 F.3d 351.

248. 545 U.S. 469 (2005).

249. See Daniel Cole, *Why Kelo Is Not Good News for Local Planners and Developers*, 22 GA. STATE UNIV. L. REV. 803 (2006).

250. See *Stop The Beach Renourishment, Inc. v. Fla. Dep't of Env'tl. Prot.*, 557 U.S. 903 (2010).

251. *Borough of Harvey Cedars v. Karan*, 214 N.J. 384 (2013).

252. Carolyn Lochhead, *Lawmaker Cautions Against Eminent Domain in Rebuilding*, S.F. GATE CHRON., (Sept. 21, 2005), available at <http://www.sfgate.com/news/article/Lawmaker-cautions-against-eminent-domain-in-2568523.php>. One lawmaker has warned against the use of eminent domain to assemble land for new development in the low-lying and largely poor, minority neighborhoods of New Orleans. Congresswoman Maxine Waters stated: "We have to watch the redevelopment in New Orleans for a lot of reasons, and one of them is to make sure that the shadow government of the rich and the powerful does not end up abusing eminent domain to take property that belongs to poor people in order to get them out of the city." *Id.*

253. Pub. L. No. 112-141, §§ 100201-100253, 126 Stat. 405 (codified as amended at 42 U.S.C. §§ 4001-4129 (2012)).

1,000 percent.²⁵⁴ Mortgages on properties that are not protected by both kinds of insurance are unsellable on the secondary mortgage market, reducing overall liquidity and thereby causing higher mortgage interest rates. While the Homeowners Flood Insurance Affordability Act of 2014 has moderated those rises in premiums, it did not eliminate all of the inevitable increases, which may still be beyond the means of many homeowners.²⁵⁵ As eligibility for flood insurance now requires mitigation (such as elevation and floodproofing),²⁵⁶ the cost of homeownership may become prohibitive.

5. Charging for Water

A number of municipalities have developed adaptation plans that, by their terms, pass the cost of implementation to homeowners. Michigan assesses a fee on water bills.²⁵⁷ The District of Columbia imposes a charge for paper and plastic bags to defray the cost of green roofs.²⁵⁸ New York imposes a surcharge on energy bills for green energy.²⁵⁹ There are also indirect costs, such as the expenses passed on to purchasers from developers from complying with stringent permitting procedures.²⁶⁰

254. Laura Vecsey, *Coastal Area Residents Stunned by Flood Insurance Rate Hikes*, ZILLOW (Oct. 22, 2013, 6:05 P.M.), available at <http://www.forbes.com/sites/zillow/2013/10/22/coastal-area-residents-stunned-by-flood-insurance-rate-hikes/>. Biggert-Waters “extended the NFIP for five years and revised NFIP premiums to more accurately reflect risk and to put the program’s finances on surer footing.” Fox, *supra* note 83, at 227.

255. *Id.* at 231. Biggert-Waters planned rate rises led to considerable controversy because of the impacts of the increased premiums on property owners. The controversy eventually led to the repeal or alteration of many provisions of Biggert-Waters in the Homeowner Flood Insurance Affordability Act of 2014, Pub. L. No. 113-89, 128 Stat. 1020 (2014) (“the Affordability Act”). *Id.*

The Affordability Act amends numerous provisions of Biggert-Waters. First, it repeals rate increases for 1) Pre-FIRM properties not insured when Biggert Waters was enacted; 2) Pre-FIRM properties sold after Biggert Waters was enacted; and 3) policies for Pre-FIRM properties rated full-risk under Biggert Waters due to a lapse in coverage. The Affordability Act restores grandfathered rates for pre-FIRM properties, and it reduces the permissible annual premium rate increase for many properties.

Id. To help fund the cost of the subsidies, the Affordability Act imposes premium surcharges, due annually until premiums are restored to full-risk rates. The Affordability Act provides greater guidance on the desired affordability study and additional funding for its completion. It also requires the FEMA Administrator to designate a Flood Insurance Advocate “to advocate for the fair treatment of policy holders under the National Flood Insurance Program and property owners. These and other provisions reverse or delay many of the reforms planned in Biggert-Waters. Moreover, the successful opposition to Biggert-Waters demonstrates the challenges likely to face any proposal to adapt to climate change by eliminating subsidies.” *Id.* at 231-32 (internal quotations omitted); see also H.R. 3370, <https://www.govtrack.us/congress/bills/113/hr3370/text>; FEMA, HOMEOWNER FLOOD INSURANCE AFFORDABILITY ACT OVERVIEW (2014), http://www.fema.gov/media-library-data/1396551935597-4048b68f6d695a6eb6e7118d3ce464/HFAA_Overview_FINAL_03282014.pdf.

256. See generally Fox, *supra* note 83.

257. Goldstein & Howard, *supra* note 195, at 27.

258. 20 Good Ideas for Promoting Climate Resilience, *supra* note 194, at 6.

259. *Id.*

260. See *id.* at 9. One example is Boston, which requires that developers of large-scale projects complete a Climate Change Preparedness and Resiliency Checklist along with their initial filing. *Id.* The checklist requires a developer to assess likely climate change impacts, such as wind, flooding, and to offer a plan for mitigating them. *Id.*

VI. LESSONS FROM HISTORY AND MOVING FORWARD

The old aphorism about ignoring the past seems to be one that should be heeded here.²⁶¹ While the federal government's early policy to provide decent and safe housing was genuine, its competence in achieving that goal was anything but admirable. The list of governmental policies over the past century is too numerous to recount here; many achieved moderate success, many failed miserably, some were allowed to prove their efficacy, and some were cut short too soon.²⁶² There are many legacies, two of which are most enduring: public housing construction and urban renewal.

A. Public Housing Construction

The United States Housing Act²⁶³ was enacted in 1937, with the stated aim of ensuring a decent place to live for all needy Americans.²⁶⁴ Under the Act, Congress provided funding for the construction of public housing.²⁶⁵ But to avoid undue competition with the private sector, the law required that "no public housing units could be built without destroying an equal number of existing private sector units, incidentally achieving the end of slum clearance."²⁶⁶ Public housing was designed with minimum space and no frills because such amenities were reserved to those who could climb the social ladder on their own.²⁶⁷ Funding for public housing has had a tortuous history, moving from government construction of housing, to direct subsidies to low-income persons and rental assistance vouchers.²⁶⁸ The level of funding has varied depending upon the political winds. Currently, there are not nearly enough vouchers to meet existing housing needs. The legacy of public housing is monolithic, prison-like structures placed in the most undesirable parts of the communities.²⁶⁹

B. Urban Renewal

If urban renewal was the twin of public housing, it was indeed the evil one. The general consensus is that urban renewal was a social policy, and fiscal

261. "Those who cannot remember the past are condemned to repeat it." GEORGE SANTAYANA, REASONS IN COMMON SENSE: VOLUME ONE OF "THE LIFE OF REASON" (1980).

262. See generally JAMES KUSHNER & CHARLES E. DAYE, EDS., HOUSING AND COMMUNITY DEVELOPMENT: CASES AND MATERIALS 89-90, 157-249 (4 ed. 2012).

263. U.S. Housing Act of 1937, Pub. L. 93-383, 88 Stat. 653 (codified as amended at 42 U.S.C. § 1437).

264. Green, *supra* note 229.

265. *Id.* at 686.

266. *Id.* at 690-91.

267. See *id.* at 686-87.

268. *Id.* at 682; see generally, Kushner, *supra* note 262.

269. Indeed, that was the deliberate policy of some cities, which occurred with HUD's complicity. The saga of *Gautreaux v. Chicago Housing Authority*, 265 F. Supp. 582 (N.D. Ill. 1967), that exposed and ended this policy, is both saddening (because of the injustice) and heartening (because of the persistence of the residents and the court). See Alexander Polikoff, *Gautreaux and Institutional Litigation*, 64 CHI. KENT L. REV. 451 (1988).

failure.²⁷⁰ Although the declared goal of urban renewal was the improvement of housing quality for the poor, in the end, the poor lost more housing than they gained.²⁷¹ In fact, starting with the 1950s and the interstate highway program through 1967, more than 700,000 families, primarily low-income and minority, were displaced.²⁷²

Urban renewal was urged on by the effects of the Great Depression, which caused society to see and evaluate the plight of the poor. In 1941, the Federal Housing Administration adopted plans for slum clearance and urban redevelopment. The goal of building new housing went hand in hand with slum clearance. Slums were thought to be a national policy; that the externalities were contagions; that the transaction costs associated with the assembly and redevelopment of land in central cities by private enterprise was a large barrier to urban development; and that city governments had neither the legal nor the financial resources to undertake large-scale clearance and renewal efforts.²⁷³ As such, the original Act focused on clearance and redevelopment of a "predominantly residential character."²⁷⁴ Subsequent legislation embraced rehabilitation and conservation, carved out certain service projects that were not predominantly residential (such as hospital and university expansions), and encouraged citywide planning and code enforcement.²⁷⁵ The most direct impact of an urban renewal project fell on the areas targeted for clearance, redevelopment, or rehabilitation. The theory was that by knocking down relatively low-quality housing and commercial buildings, the overall building

270. Amy Lavine, *Urban Renewal and The Story of Berman v. Parker*, 42 URB. LAW. 423, 469 (2010); JOHN R. LOGAN & HARVEY L. MOLOTCH, URBAN FORTUNES: THE POLITICAL ECONOMY OF PLACE 167-69 (1987); William Alonso, *Cities, Planners, & Urban Renewal* in URBAN RENEWAL: THE RECORD AND THE CONTROVERSY 437, 442-43 (James Q. Wilson ed. 1966).

271. LOGAN & MOLOTCH, *supra* note 270.

272. BERNARD J. FRIEDEN & LYNN B. SAGALYN, DOWNTOWN, INC.: HOW AMERICA REBUILDS CITIES 29 (1989).

273. William J. Collins & Katharine L. Shester, *Slum Clearance And Urban Renewal In The United States: Working Paper 17458*, NATIONAL BUREAU OF ECONOMIC RESEARCH, 4-7 (Sept. 2011), available at <http://www.nber.org/papers/w17458>.

In 1949, Congress authorized the Housing and Home Finance Agency (HHFA) to assist locally planned urban renewal projects with grants of two-thirds (or in some cases three-fourths) of the net project cost to the city, where the net cost was defined as the difference between the total cost of acquiring and clearing properties and the income received from selling the cleared land.

Id. at 4; see Henry W. McGee, Jr. & Donald C. Bryant, Jr., *Gentrification and the Law: Combatting Urban Displacement*, 25 WASH. U. J. URB. & CONTEMP. L. 43 (1983) (citing D. MANDELKER, ET AL., HOUSING & COMMUNITY DEVELOPMENT 520 (1981)); see also Chester W. Hartman, *Relocation: Illusory Promises and No Relief*, 57 VA. L. REV. 745, 745 (1971) (offering similar assessments based on the data from the National Commission on Urban Problems and National Association of Home Builders).

274. Collins and Shester, *supra* note 273, at 4-5.

275. A project typically began with:

the creation of a Local Public Agency (LPA) that was 'enabled' under state legislation to undertake urban renewal activities and to exercise eminent domain powers. The LPA would identify an urban renewal area (typically characterized by 'blight' or signs of deterioration), hold public hearings, seek approval from the local government (e.g., city council), and then seek approval from [the federal agency] to proceed with specific project planning within that area. The project plans would include detailed information on current and proposed land use, changes in streets and utilities, aid for displaced residents and businesses, and estimates of the costs. Once approved, a combination of federal loans and grants would allow the project to proceed.

Id. at 5.

quality would appear to improve.²⁷⁶ Improving the physical condition of specific areas was believed to benefit the city “through a virtuous circle (e.g., less blight, less outmigration, and higher property values across the city), or at least by short-circuiting the process of deterioration.”²⁷⁷ In this context, recourse to eminent domain was important because assembling sizable areas of urban land through individual negotiations with multiple property owners was costly and subject to holdouts. Urban renewal attempted to make central-city locations more attractive to businesses as well as to residents; this was based on the premise that firms and workers were willing to pay more to locate there for higher levels of “productive amenities,” thus raising property values.²⁷⁸ The pace of completion of projects was slow, usually taking years.²⁷⁹ Though it began with fairly broad political support, urban renewal fell out of favor over the years and by 1974, the program had been abandoned, and the HCDA was enacted in its place.²⁸⁰ The HCDA substituted block grants to cities, giving them wide discretion as to how to build communities, other than by slum clearance.²⁸¹

1. Urban Relocation

What became of those families that were removed? Some studies showed that relocated households found only marginal improvement in housing conditions, but most experienced higher costs.²⁸² They tended to cluster in the immediate vicinity of the displacement project.²⁸³ The burdens of relocation fell most heavily upon blacks, as they represented a significant percentage of the urban areas undergoing renewal,²⁸⁴ and the patterns of racial segregation that existed after relocation was more pronounced.²⁸⁵ There was no decrease in overcrowding—to the contrary, there were indeed some increases²⁸⁶—and

276. *Id.* at 6.

277. *Id.*

278. *Id.* at 4–7. These amenities were found to have an “ambiguous effect on wages, however, because for any given rent level, workers are willing to accept lower wages to have access to the amenity, but firms are willing to pay higher wages.” *Id.* at 6–7.

279. *Id.* at 5. “As of June 30, 1966, the last date on which detailed data are available, approved projects had cleared (or intended to clear) over 400,000 housing units, forcing the relocation of over 300,000 families, just over half of whom were nonwhite.” *Id.* For perspective, the 1950 Census of Housing characterized approximately 1.3 million units in metropolitan areas as ‘dilapidated.’” *Id.* at n.7. “The proposed clearance areas included nearly 57,000 total acres (90 square miles), of which about 35 percent was proposed for residential redevelopment, 27 percent for streets and public rights-of-way, 15 percent for industrial use, 13 percent for commercial use, and 11 percent for public or ‘semi-public’ use.” *Id.* at 5.

280. Housing and Community Development Act of 1974, 12 U.S.C. § 1706e.

281. KUSHNER & DAYE, *supra* note 262.

282. KUSHNER & DAYE, *supra* note 262, at 556; see generally Hartman, *supra* note 273.

283. Hartman, *supra* note 273, at 746.

284. See generally Wendell Pritchett, *The “Public Menace” of Blight: Urban Renewal and the Private Uses of Eminent Domain*, 21 YALE L. & POL’Y REV. 1, 46 (2003); MARTIN ANDERSON, *THE FEDERAL BULLDOZER: A CRITICAL ANALYSIS OF URBAN RENEWAL, 1949-1962* (1964); Hartman, *supra* note 273, at 745 (providing a summary of studies of urban renewal projects).

285. Hartman, *supra* note 273, at 746.

286. *Id.*

there was severe social and personal disruption.²⁸⁷ Even though in the passage of the National Housing Act of 1949, Congress foresaw the displacement as revealed in the precatory language that displacements should only be temporary, it failed to include any measures or programs to mitigate this effect. Subsequent housing and community development legislation, in 1954 and 1964, did include directives under urban renewal plans to deal with relocation and provided financial assistance for this purpose.²⁸⁸ In 1970, the Uniform Relocation Assistance and Real Property Acquisition Policies Act²⁸⁹ provided financial assistance for moving expenses and for replacement housing for both homeowners and tenants.²⁹⁰ While displacement has declined since the abandonment of urban renewal programs, certain populations are still being forced out of their communities under both federally funded community development programs and housing rehabilitation projects and private development projects.²⁹¹

VII. NEW NOTIONS OF OWNERSHIP AND DEMOCRATIC GOVERNANCE

If nothing else, the recognition of the potential ravages of climate change presents the opportunity for some existential thinking, to identify common values and prioritize ends and strategies. One scholar recently remarked:

287. *Id.*

288. *Id.* at 749–50; Housing Act of 1949, § 105, 63 Stat. 416, (as amended 42 U.S.C. § 1455(c)(1) (Supp. V., 1970)); Housing Act of 1964, Pub. L. No. 88-560, § 305(a)(1). Few challenges to urban renewal projects have been successful, even after the issue of standing had been resolved in the displaced persons' favor. See *Norwalk CORE v. Norwalk Redevelopment Agency*, 395 F.2d 920 (2d Cir. 1968) (finding standing for citizens to challenge urban renewal projects on equal protection grounds); see also *Powelton Civic Homeowners Ass'n v. Dep't of Hous. & Urb. Dev.*, F. Supp. 809 (E.D. Pa. 1968).

289. 42 U.S.C. § 4601 (2012).

290. *Id.* The act has been criticized as being:

far less effective in replacing and increasing the stock of low- and moderate-income housing lost as a result of federal and federally assisted projects than it is in providing monetary payments to the displaced persons. The basic statutory mandate remains no more than a requirement that the taking agency assure that satisfactory relocation housing resources are available prior to displacement- the very same assurances that in the past have proved totally inadequate to maintain, let alone increase, the supply of decent low- and moderate-income housing and to protect the interests of both displacees and the low- and moderate-income housing groups in general. And the federal agency head only need receive "satisfactory assurance" from state and local agencies that rehousing resources are available, again raising the critical defect that federal agencies are not likely to halt major state and local projects which the supervising federal agency itself wishes to foster.

Hartman, *supra* note 273, at 780 (internal citations omitted). The Uniform Act was viewed as much weaker than the one-for-one replacement requirements under the NHA. *Id.* at 781. After Hurricane Katrina, in the CDBG-DR funds, HUD expressly waived the requirement of paying relocation expenses. *Allocations, Common Application, Waivers, and Alternative Requirements for Grantees Receiving Community Development Block Grant (CDBG) Disaster Recovery Funds in Response to Hurricane Sandy*, 78 Fed. Reg. 14,329 (Mar. 5, 2013).

291. See Henry W. McGee, Jr., *Seattle's Central District, 1990–2006: Integration or Displacement?*, 39 URB. LAW. 167 (2007).

Property law sets boundaries between the individual and society. Unprecedented changes in the natural world must change the calculation of what society can require of individual property owners. Sea-level rise changes the extent to which a private owner can develop land at the coast and armor the coastline. Such legal reforms will be made differently in different states and in communities with different property traditions, regulatory structures, and environmental conditions.²⁹²

We should heed his observations and rethink the obligations of land ownership.

A. *Ceding Autonomy and Sovereignty*

Landowners must come to recognize more and more the social obligations that inhere in their titles.²⁹³ This means that some property owners will necessarily suffer burdens for the greater good that others will not. But these unequal burdens cannot be taken to either justify limits on governmental power to regulate or to impose increased obligations on government to compensate the owner for those burdens. The unequal burdens only serve as a recognition that individual ownership must serve human values and are limited to that end.²⁹⁴ Indeed, ownership has long-since ceded authority to the state in order to protect against congestion and mixed uses,²⁹⁵ to limit excessive emission of GHGs,²⁹⁶ to address housing shortages,²⁹⁷ to further economic development,²⁹⁸ and even to assure the clarity of a lake.²⁹⁹ Protection from the impacts of climate change are no less imperative. In this regard, landowners might rightly be required to install technology that limits energy usage, to recycle packaging and containers, to elevate a structure, or to fortify a home. At the same time, not all fortification measures are reasonable or efficacious for all properties, such that evaluation must be done more discretely. The impacts of climate change, nonetheless, will shift the marker for determining whether government directives go too far.³⁰⁰

The impacts, moreover, will cause us to rethink our notions of democratic governance. Because the responses may do a great deal of harm to vulnerable persons, just as doing nothing, it is no answer for decision-makers simply to justify a plan by the fact that a majority of citizens or elected officials voted in its favor. New levels of accountability must be demanded. Efforts should be

292. Byrne, *supra* note 137, at 118.

293. See generally Gregory Alexander, *The Social-Obligation Norm in American Property Law*, 94 CORNELL L. REV. 745 (2009). Scholars are already discussing reshaping property in response to climate change. See John R. Nolon, *Land Use and Climate Change: Lawyers Negotiating Above Regulation*, 78 BROOKLYN L. REV. 521 (2013); Byrne, *supra* note 137.

294. *State v. Shack*, 277 A.2d 369, 372 (N.J. 1971); see also *Penn. Cent. Transp. v. New York City*, 438 U.S. 104 (1978).

295. See *Vill. of Euclid v. Ambler Realty Co.*, 272 U.S. 365 (1926).

296. See *Massachusetts v. EPA*, 549 U.S. 497 (2007).

297. See *Pennell v. City of San Jose*, 485 U.S. 1 (1988).

298. See, e.g., *Kelo v. City of New London*, 545 U.S. 469 (2005).

299. See *Tahoe-Sierra Pres. Council, Inc. v. Tahoe Reg'l Planning Agency*, 535 U.S. 302 (2002).

300. See *Pa. Coal, Co. v. Mahon*, 260 U.S. 393 (1922).

made to engage and include these historically excluded persons in the planning and decisions.³⁰¹ In this new, resilient planning, listening to the vulnerable populations has not been an imperative. Indeed, there has been a decided retrenchment from the affirmative and specific requirements for citizen participation under the early urban renewal programs. The current version of the HCDA speaks of citizen involvement in only general terms—providing information regarding proposed and possible activities, holding at least one public hearing, and giving notice of, with opportunity to respond to, any program change.³⁰² Remarkably, it does not mandate citizen input, much less consensus on the application of block grants. The better vision should direct designers, planners, and funders to embrace the views and plight of all who reside and work in the community.³⁰³

Going forward, for mitigation and adaptation strategies that promise safety and cooling even to the vulnerable, the following points should be embraced.

1. Regard for Costs

The efficacy of fortified structures must be evaluated in relation to costs. To be sure, merely because the upgraded standards are urged by the insurance sector, is not a sufficient reason for rejecting them. Upgraded standards must be done after careful analysis of their efficacy, with a regard for any burdens that might befall those whose means are limited.

2. Flood Insurance Premium Caps

While it could be argued that providing flood insurance creates a moral

301. See e.g., *Dowdell v. City of Apopka*, 698 F.2d 1181 (11th Cir. 1983) (describing that a history of exclusion from administrative and elective office is relevant in assessing fairness of municipalities' allocation of resources to minority communities).

302. 42 U.S.C. § 5301(a)(2) (2012)). Amendments made in 1987 strengthened the citizen participation requirements, by requiring a citizen participation plan. *Id.* at § 5301(a)(3); see generally Audrey MacFarlane, *When Inclusion Leads to Exclusion: The Uncharted Terrain of Community Participation in Economic Development*, 66 BROOK. L. REV. 861 (2001) (discussing the public participation requirements and practices under the various urban development programs).

303. This can be accomplished through conversations. One notable strategy is that being done in Boulder County, Colorado. "The Long-Term Flood Recovery Group (LTFRG) is partnering with the City of Boulder, Boulder County, Lyons, Jamestown, Longmont, nonprofits, the education and business community and faith-based groups to launch BoCo Strong – a series of community conversations to help Boulder County strengthen its resilience following last year's floods." LONG-TERM FLOOD RECOVERY GRP. OF BOULDER CNTY., *Conversations on 'Building Resilience into Our Communities' Scheduled Throughout Boulder County*, (July 11, 2014), <http://bocofloodrecovery.org/conversations-on-building-resilience-into-our-communities-scheduled-throughout-boulder-county>. The Boulder County plan called for a series of "informal, neighborhood-style meetings to take place throughout July and early August at multiple venues in an effort to capture important lessons learned from the 2013 Flood" and sought to learn "[w]hat worked for you during the flood? What didn't work for you? What preparations have you or your community made to prepare for other disasters such as wildfire or drought? What makes households, neighborhoods and communities resilient?" *Id.* The plan explained that "[c]ommunity input [would] be used to develop Resilience Best Practices that will be available to all residents of the county. In addition, the findings would be presented to community leaders from all sectors (government, business, nonprofit, faith, education, etc.) identifying what we should work on to enhance our resilience." *Id.*

hazard for owners choosing to live in harm's way, nevertheless, some homeowners live in storm prone areas, not out of choosing, and many others may lack the means to relocate. This in turn argues for continued moderation in rises in premiums that could be tied to income or wealth.

3. Government Support in the Secondary Market

The government must strengthen its programs that operate in the secondary mortgage market and that would be impacted by climate change. The HUD Climate Change Adaptation Plan is a good start. It calls for a review of Ginnie Mae's Targeted Lending Initiative and proposes expansion to encourage investment in properties with enhanced disaster resilience and sustainability features.³⁰⁴ HUD itself has called for changes in the law that will allow it to securitize property improvement loans in order to enable the agency to shore up the market for these loans.³⁰⁵ The policies that prevent Freddie Mac and Fannie Mae from purchasing mortgages for properties with Property Assessed Clean Energy ("PACE") loans should be abandoned. Importantly, PACE programs address locally relevant energy efficiency programs, renewable energy installations, and weatherization improvements.³⁰⁶

4. Environmental Impact Statements

The National Environmental Policy Act of 1970³⁰⁷ was passed to require agencies about to embark upon a major federal action to consider the impacts on the human environment.³⁰⁸ This consideration is usually made in an environmental impact statement ("EIS").³⁰⁹ The impacts the courts have recognized to be cognizable under the act are those affecting the physical

304. HUD Adaptation Plan, *supra* note 73. Among other things, the plan sees the need for updating Chapter 33 of the Ginnie Mae Mortgage-Backed Securities Guide, the Guaranty Agreement, or investor disclosure documents such as prospectuses and data disclosures. But these measures might require statutory or Mortgage-Backed Securities Guide-level regulatory changes and additional resources (staff and program funds) to accomplish. *Id.* at 12–13.

305. *Id.* at 13. While property improvement loans can be securitized in Ginnie Mae pools: the current Mortgage-Backed Securities Guide does not allow securitization of these loans, and there are substantial difficulties in pooling these small second lien loans. Ginnie Mae's existing pool types are based on and backed by first lien loans. In addition, there are significant economic obstacles to efficient securitization of small property improvement loans—primarily the relative cost of servicing and bond administration—and there is currently little investor and lender demand for this product. New security types would also need to be created because these loans cannot be commingled with currently eligible loans in existing security types. The overall cost of such engineering efforts in dollars, staff time, and contractor resources would be substantial. Allowing these loans to be securitized could provide additional capital and facilitate financing for property improvements, light or moderate rehabilitation, and repairs to enhance disaster resilience and hazard mitigation. This measure could also limit risk before disasters strike, particularly to improve the safety, quality, and sustainability of properties located in areas that are most vulnerable to these climate-related hazards.

Id. at 13–14.

306. PRESIDENT'S STATE, LOCAL, AND TRIBAL LEADERS: TASK FORCE ON CLIMATE PREPAREDNESS AND RESILIENCE, *supra* note 216, at 19.

307. 42 U.S.C. § 4321 (1970).

308. *Id.*

309. *See id.*

environment. However, where such impacts are found, courts have ruled that they must be addressed in the EIS.³¹⁰ Some state environmental laws, such as the New York State Environmental Quality Review Act,³¹¹ also include impacts on populations, such as displacement considerations.³¹² EPA should adopt regulations specifically embracing impacts on human populations as an impact needing evaluation.³¹³

5. Develop Uniform Building Appraisal Standards

While standard appraisals will need to incorporate those factors that should reduce the value of property as a consequence of climate change, a green real estate appraisal standard would operate in the opposite fashion, by measuring the efficiency and sustainability value of commercial properties, thereby attaching increased asset value to higher performing buildings.³¹⁴ Green building has become such a positive trend, it seems imperative to create comprehensive standards that will boost funding sources for efficiency projects and bolster green jobs.³¹⁵ A green appraisal has radiating benefits; banks will be encouraged to provide capital for more energy efficiency projects, as the appraisal enables assessment of property value based on money and energy savings.³¹⁶ An appraisal standard will assist in the creation of new sources of funding for efficiency upgrades and retrofits.³¹⁷ “A green appraisal standard will provide these stakeholders with a consistent methodology to assess properties’ energy efficient and sustainable features in determining market value.”³¹⁸

6. Protections for Displaced Persons

The adoption of resiliency measures must embrace the plight of persons whose vulnerability may be defined by limited economic means and lack of social and familial resources, not solely by those characteristics by which they already have protections against adverse actions—that is, race, color, sex,

310. *Olmstead Citizens for Better Cmty. v. United States*, 793 F.2d 201, 210 (8th Cir. 1986).

311. N.Y. ENVTL. CONSERV. LAW, art. 8 (2014); 6 N.Y.C.R.R. § 617 (1996).

312. Unlike the National Environmental Policy Act, New York State Environmental Quality Review Act imposes an obligation upon actors to choose the course that has the least effect upon the environment. 6 N.Y.C.R.R. § 617.11(d)(5).

313. The absence of specific language on this requirement should mean that any regulation would be entitled to *Chevron* deference. See *Chevron, U.S.A., Inc. v. Nat’l Res. Def. Council, Inc.*, 467 U.S. 837, 842–46 (1984).

314. See generally Corps, *supra* note 76. See also CAL. SUSTAINABILITY ALLIANCE, *Green Appraisal Standards*, http://sustainca.org/blog/built_environment/green_appraisal_standards.

315. Corps, *supra* note 76, at 2.

316. See Runde & Thoyre, *supra* note 78 (discussing the need for systematic methodology for assessing the value of sustainability derived from green building).

317. *Id.* There is currently a general lack of consistent data about the monetary and energy efficiency benefits of higher performing buildings on which stakeholders from energy, financing, appraisal, and real estate service industries can rely. The California Sustainability Alliance proposes a data tracking system that would give appraisers a resource for comparable projects. *Id.*

318. *Id.*

disability, religion, and national origin. Before adopting and implementing any kind of relocation program, planners and governmental authorities should embrace all persons having any of the above characteristics, who are likely to be negatively impacted. Together, a master relocation and resettlement plan should be developed that addresses issues critical to these populations, including the evidence that relocation is required and all alternatives (including adaptation and mitigation) to relocation have been considered—a delineation of the process of land acquisition, community preferences on how to reshape the environs, the provision of transitional shelter and permanent housing for the displaced, measures to preserve existing social and cultural institutions, an analysis of the suitability of the new site for living and thriving and receptiveness for the displaced, strategies for ensuring access to public services, social and financial support during the transitional period, and mechanisms for reporting concerns and for monitoring the implementation of the plan. Support should aim, at minimum, to restore the displaced to their prior station in life and ideally help elevate them to higher standards of living.³¹⁹

7. Targeted Funding for Affordable Housing

Congress should return to the original requirement that block grants be devoted primarily (at least 70 percent) to low- and moderate-income persons, but also go further in mandating that appropriated funds be used exclusively for these populations. Housing should have the highest priority for which such funds can be used. While recipients need some room to maneuver, Congress should consider adopting parameters on the kinds of community projects that qualify for the grants. New sidewalks at the pier will not provide shelter to the homeless families.

8. Rebuilding Neighborhoods

Flexibility in zoning regulations is needed to allow green uses to be interspersed with existing homes and neighborhoods in complex, interwoven patterns that will make for enticing, desirable neighborhoods. Older neighborhoods must be helped to retain or regain their desirability for various economic activities as the quality of life improves. There are sure to be varying desires of residents in neighborhoods whose populations have declined; some residents will want to remain, either because of ties to their homes or because they prize the “rural” quality of the area. Others may feel trapped in their homes and would prefer to move to more densely populated neighborhoods with better

319. See generally THE WORLD BANK OPERATIONAL MANUAL: OPERATIONAL POLICIES 4.12, INVOLUNTARY RESETTLEMENT, ANNEX A (2011), <http://siteresources.worldbank.org/INTFORESTS/Resources/OP412.pdf> (authorizing the concept and extent of a Resettlement Action Plan, and offering specific guidance for development of such a plan, including evaluating the need for relocation and providing economic, cultural, and social support for the relocated persons).

facilities and services. Cities should respect both desires, ensuring that residents who want to move have the opportunity to do so, while those who want to remain are given no reason to fear that they will be forced out of their homes and can continue to receive the benefits of the city's public services. Walkable urban texture and proximity to major institutions and employers will create opportunities for residential redevelopment, which is most likely to drive future core rebuilding.

Cities should rethink zoning restrictions that impede resiliency, such as those that prohibit mechanical and electrical systems normally located in the basement to be moved to a yard, as owners in the 100-year floodplain can more easily do now. If the goal of adaptation is to minimize the impacts of climate change on human societies, an understanding of the nature of vulnerability to climate change is required; it is necessary to be deliberate about protecting those most vulnerable. But planning processes have not yet fully accepted this responsibility. Instead, the adaptation plans created by cities and regions typically focus on infrastructure needs, and less so on the needs of vulnerable populations. "The widely used adaptation framework for sea level rise—protect, accommodate, retreat—is a physical-technical approach" that conceives climate change in the narrow scheme of physical threats, rather than in the context of human societies.³²⁰ Cities must devise carefully thought-out strategies and plans to protect neighborhoods and residents in the event of major storms. These plans need to be tailored for the neighborhoods, the buildings, and most significantly, for the residents.³²¹

VIII. CONCLUSION

Critics have labeled the urban renewal program of the 1950s and 1960s as a failure because it did not prevent or reverse urban economic decline. Some have pointed to the riots, rising crime rates, and municipal fiscal crises of the 1960s and 1970s, combined with concerns about the costs borne by the displaced and slow pace of redevelopment, as the primary culprits in the program's political demise. Some have opined that urban renewal failed, at least in part, "because large-scale slum clearance proved a crude and largely unworkable redevelopment method."³²² The fundamental policy issues and misguided tools used to renew and revitalize the urban landscape must be taken to heart as we implement measures to fortify and renew the urban environment in the wake and advent of climate change. The mitigation and adaptation measures discussed here seem to take a scattershot approach—hitting everything and then maybe nothing. Lost in the midst may be the essential things that land use and governmental measures should aim to accomplish, that

320. Eisenhauer, *supra* note 29, at 4.

321. *Id.*

322. Collins & Shester, *supra* note 273, at 27.

is, the creation and maintenance of safe and thriving communities for people, family, and human relationships.