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## **Taming the Super-Wicked Problem of Waterfront Hazard Mitigation Planning: The Role of Municipal Communication Strategies**

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# **Chapter 6**

## **Taming the Super-Wicked Problem of Waterfront Hazard Mitigation Planning: The Role of Municipal Communication Strategies**

*Sarah J. Adams-Schoen*

[T]he policy process, and government in general, is rife with information, and this provides a critical but often overlooked dynamic in politics.<sup>1</sup>

In the Adaptation Report of the Fifth Assessment Report (AR5), the Intergovernmental Panel on Climate Change (IPCC) identifies floods in urban riverine and coastal areas as among the key climate-related risks for North America.<sup>2</sup> Not surprisingly for residents of coastal and riverine communities devastated by recent extreme weather events, the Adaptation Report acknowledges that risks related to sea-level rise, increased frequency and duration of extreme precipitation events, and increasingly intense coastal storms are not only future risks, but are current risks that are already manifesting in property and infrastructure damage, ecosystem and social system disruption, public health impacts, and water quality impairment.<sup>3</sup> The Adaptation Report identifies the current risk level for North American coastal cities as “medium” and projects that, with a 2° Centigrade (C) increase in global average temperatures over pre-industrial levels, coastal urban areas will have to implement “high adaptation” just to maintain the current risk level of

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*Author's Note: The author would like to thank Brian Walsh (Touro Law 2016) for his assistance with this chapter.*

1. BRYAN D. JONES & FRANK R. BAUMGARTNER, *THE POLITICS OF ATTENTION: HOW GOVERNMENT PRIORITIZES PROBLEMS* 2 (2005).
2. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY* 23 (2014) [hereinafter 2014 IPCC ADAPTATION REPORT].
3. *Id.* at 6.

medium.<sup>4</sup> With a 4°C increase, even high adaptation is projected to have little efficacy—indeed, the IPCC reports that under a 4°C pathway North American coastal cities will face high risk levels even if they implement high adaptation.<sup>5</sup> Given that staying within a 2°C pathway appears unlikely,<sup>6</sup> policymakers should heed the IPCC's projections by implementing waterfront development policies consistent with increasingly severe flood risks in both current and expanded flood zones.<sup>7</sup>

Notwithstanding the magnitude of present and future risks to coastal and riverine communities, however, waterfront development policies have shifted only incrementally. The result has been the continued siting of residential communities and critical infrastructure in vulnerable waterfront areas and the expansion and entrenchment of policies, behaviors, and preferences that, at best, fail to mitigate risk and, at worst, heighten risk. Even communities that have otherwise undertaken robust climate change mitigation and adaptation planning continue to base waterfront development policies on irrationally discounted risk projections and embrace communication strategies that obfuscate the risk and ultimately undermine the communities' ability to adequately respond to the risks. The literature on “wicked” and “super-wicked” policy problems suggests that, in the current context of heightened risk aversion following a major disaster like Hurricanes Sandy<sup>8</sup> or Katrina, municipal governments in the affected areas have an opportunity to transform waterfront development policies consistent with scientific evidence on climate related risks. Shifting waterfront development policies toward resilience likely begins with official communications that accurately portray risk, including waterfront and hazard mitigation plans, flood risk maps, and comprehensive planning processes, which can facilitate changes in zoning and building codes and private market behavior consistent with near- and long-term risks.

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4. *Id.* at 23.

5. The 2014 IPCC Adaptation Report characterizes the projected risk under a 4°C increase, even with high adaptation, to be approximately halfway between “medium” and “very high.” *Id.*

6. See Veerabhadran Ramanathan & Yan Feng, *On Avoiding Dangerous Anthropogenic Interference With the Climate System: Formidable Challenges Ahead*, 105 PROC. NAT'L ACAD. SCI. 14245, 14245 (2008) (estimating global warming of 2.4°C even if greenhouse gas concentrations held to 2005 levels).

7. Throughout this chapter, the word “policy” denotes governmental strategies in response to a problem, including communications, plans, and rules, both informal and formal.

8. This chapter refers to Sandy as a “hurricane” because, “although Sandy made landfall [near Brigantine, New Jersey] as an extratropical low, its strong winds, heavy rains and storm surge had been felt onshore for many hours while Sandy was still a hurricane.” ERIC S. BLAKE ET AL., TROPICAL CYCLONE REPORT: HURRICANE SANDY (AL182012) 22-29 OCTOBER 2012 4 n.6 (National Hurricane Center Feb. 12, 2013).

## I. Using the Construct of “Wicked” Policy Problems to Shift Waterfront Development Policy to a New Equilibrium

Framing waterfront development in the context of climate change as a “wicked” or “super-wicked” problem may help guide municipalities toward policy strategies that account for risk on a timeframe commensurate with the life of new developments and infrastructure. Since 1973, public policy scholars and others have been using the term “wicked” to describe and analyze strategies for addressing social planning problems that cannot be successfully resolved with traditional linear, analytical approaches.<sup>9</sup> Characteristics of wicked problems include, among other things, that the problems are difficult to define, not entirely solvable, socially complex, and characterized by interdependencies that can result in conflicting goals for the various stakeholders. Wicked policy problems also tend to exist in complex systems such that attempts to address the problems lead to unforeseen or undesirable consequences and responses to wicked problems typically involve changing behavior.<sup>10</sup> When Horst Rittel and Melvin Webber introduced the concept of wicked problems, they argued that current modes of policy analysis promoted rather than solved these complex problems. However, as Kelly Levin et al. later observe, “[w]hile Rittel and Webber usefully highlight features of problems that decision makers ought to consider when determining which decision tool to apply, wicked problems arguably describe most policy problems.”<sup>11</sup> Thus Levin et al. introduced the term “super-wicked” to describe anthropogenic climate change and other intractable problems that are characterized by the key features of wicked problems as well as four additional features: (1) time is running out, (2) those who cause the problem also seek to provide a solution, (3) the central authority needed to address the problem is weak or nonexistent, and (4) irrational discounting occurs that pushes responses into the future.<sup>12</sup> These features in concert “create a tragedy because our governance institutions, and the policies they generate (or fail to generate), largely respond to short-term time horizons even when the cata-

9. Horst W.J. Rittel & Melvin M. Webber, *Dilemmas in a General Theory of Planning*, 4 *POL’Y SCI.* 155, 160-69 (1973).

10. *See id.* at 161-64 (identifying 10 characteristics of wicked problems).

11. Kelly Levin et al., *Overcoming the Tragedy of Super Wicked Problems: Constraining Our Future Selves to Ameliorate Global Climate Change*, 45 *POLICY SCI.* 123, 127 (2012).

12. Levin et al. first identified climate change as a super-wicked problem in a conference paper in 2007. *See* Kelly Levin et al., *Playing It Forward: Path Dependency, Progressive Incrementalism, and the “Super Wicked” Problem of Global Climate Change*, presented at International Studies Association Convention, Chicago, Ill., Feb. 28-Mar. 3, 2007.

strophic implications of doing so are far greater than any real or perceived benefits of inaction.”<sup>13</sup>

While anthropogenic climate change is the prototypical example of a “super-wicked” problem, waterfront hazard mitigation planning and related lawmaking also embody the attributes of a super-wicked policy problem.<sup>14</sup> As with national and international climate issues, climate-related waterfront risks embody the characteristics of wicked problems. Climate-related waterfront risks have multiple causal factors, including coastal erosion and storms, dam failure, disease outbreak, floods, landslides, land subsidence, building collapse, infrastructure failure, and utility disruptions.<sup>15</sup> High levels of disagreement exist about the nature of the risks and their potential solutions.<sup>16</sup> And, the motivation and behavior of individuals is a key part of any solution. Indeed, a range of cognitive processes affect assessment of redevelopment in the wake of disaster and often “militate in favor of development even where such development is ‘irrational’ in the market sense that risks outweigh benefits.”<sup>17</sup> Climate-related waterfront risks are also characterized by the four additional “super-wicked” attributes.

### A. *Time Is Running Out*

Infrastructure lock-in and increasing flood and storm surge risk levels over time mean that time is not costless. The U.S. population is expected to grow to 420 million by 2050, resulting in the projected construction between 2007 and 2050 of 89 million new or replaced homes and 190 billion square feet of new offices, institutions, stores, and other nonresidential buildings.<sup>18</sup> Based on these projections, two-thirds of homes and buildings in existence in 2050 will be built between 2007 and then.<sup>19</sup> Given that more than one-half the U.S. population lives in coastal watershed counties and population den-

13. Levin et al., *supra* note 11, at 124.

14. This is not to say that waterfront hazard mitigation in the context of a changing climate embodies all the characteristics that make anthropogenic climate change a super-wicked problem. See Richard J. Lazarus, *Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future*, 94 CORNELL L. REV. 1153, 1161-87 (2009) (asserting that national climate change legislation presents a super-wicked problem as a result of the nature of climate change itself, human nature, and the nature of U.S. lawmaking institutions).

15. See, e.g., CITY OF NEW YORK, 2014 NEW YORK CITY HAZARD MITIGATION PLAN 47-48 (2014).

16. See, e.g., Niki L. Pace, *Wetlands or Seawalls? Adapting Shoreline Regulation to Address Sea Level Rise and Wetland Preservation in the Gulf of Mexico*, 26 J. LAND USE & ENVTL. L. 327, 329 (2011); see also National Oceanic and Atmospheric Administration (NOAA), STATE OF THE COAST: SHORELINE ARMORING: THE PROS AND CONS, [http://stateofthecoast.noaa.gov/shoreline/shoreline\\_armoring.html](http://stateofthecoast.noaa.gov/shoreline/shoreline_armoring.html).

17. See generally Justin Pidot, *Deconstructing Disaster*, 2013 B.Y.U. L. REV. 213, 242-43 (2013).

18. REID EWING ET AL., GROWING COOLER: EVIDENCE ON URBAN DEVELOPMENT AND CLIMATE CHANGE 8 (2008).

19. *Id.*

sity continues to grow in these counties,<sup>20</sup> it seems likely that, absent policies that limit waterfront development, a large portion of new homes and buildings, as well as related infrastructure, will be constructed in waterfront areas.

On a personal scale, time is not costless for those who are rebuilding in, relocating to, and choosing to remain in hazardous areas where future property damage and public health problems including loss of life are foreseeable results of new and continued waterfront development. Thus, not surprisingly, the IPCC highlights the importance of “city and municipal governments acting *now* to incorporate climate change adaptation into their development plans and policies and infrastructure investments.”<sup>21</sup>

### B. *The Same Actors Both Cause and Seek to Solve the Problem*

Those who contribute to the problem of increased waterfront risks also seek to end the problem. For example, many waterfront property owners use shoreline armoring<sup>22</sup> in an attempt to protect their property from erosion and flood risks, while this same armoring often leads to the “unintended . . . consequences [of] vertical erosion, loss of downdrift sediment, and erosion of flanking shores.”<sup>23</sup> Likewise, following Sandy, many waterfront municipalities amended their zoning and building codes to facilitate and encourage development and redevelopment in floodplains, notwithstanding the heightened risks that would occur as a result of increasing impermeable surface areas, which tends to increase flood risk, and attracting greater numbers of people into vulnerable areas.<sup>24</sup>

Indeed, even a report on achieving hazard-resilient coastal communities published by the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA) encourages

20. NAT'L OCEANIC & ATMOSPHERIC AGENCY, NATIONAL COASTAL POPULATION REPORT: POPULATION TRENDS FROM 1970 TO 2020 11 (2013).

21. 2014 IPCC ADAPTATION REPORT, *supra* note 2, at 541 (emphasis added).

22. “Armoring” refers to the use of hard structures to protect shoreline properties from flooding and erosion, including, for example, bulkheads, seawalls, groins, and revetments. Pace, *supra* note 16, at 338.

23. *Id.* (citing Scott L. Douglass & Bradley H. Pickel, *The Tide Doesn't Go Out Anymore: The Effect of Bulkheads on Urban Bay Shorelines*, 67 SHORE & BEACH 19, 19 (1999)).

24. See, e.g., NEW YORK CITY BUILDING CODE (NYCBC), app. G, §304.1.1 (2014) (requiring one- to two-family residences be flood-proofed to two feet above Base Flood Elevation); *id.* at §302.1.1 (requiring 30 feet of ramp for a 30-inch rise). Depending on the amount of stairs or ramping required to access the elevated structure, the structure may need to be shifted back from the street, thereby occupying space that had previously been the backyard, and addition of lengthy switchback ramps and stairs needed to access an elevated first floor may increase the impermeable area of the structure. See CITY OF NEW YORK, COASTAL CLIMATE RESILIENCY: RETROFITTING BUILDINGS FOR FLUID RISK 42-43 (2014); see also OREGON DEPT' OF LAND CONSERVATION, WATER QUALITY MODEL CODE AND GUIDE BOOK 4.44 (2000) (discussing disruptions caused by building impervious surfaces in floodplains).

rebuilding in coastal areas, albeit with design and siting decisions based on smart growth principles.<sup>25</sup> The report's 10 "smart growth and hazard mitigation strategies specifically for coastal and waterfront communities" do not include any suggestion that waterfront development be restricted or limited and only one strategy that would have this effect,<sup>26</sup> despite recognition that "[i]nfill development may increase risk if existing development is in a hazard-prone location" and "[k]eeping development out of flood-prone areas protects lives and property and allows alternative uses of the land, such as public waterfront parks and recreation areas."<sup>27</sup> Conflicting messages like these from stakeholders committed to increasing resilience reflect economic and political realities, to be sure, but they also illustrate the super-wicked nature of the problem presented by waterfront development in the context of a changing climate.

### C. *Weak or Nonexistent Central Authority to Address the Problem*

Authority over waterfront hazard mitigation is fragmented and diffuse. Although federal and state law delegates much of the authority relevant to climate change adaptation to municipal governments, municipal governments' ability to adequately respond to climate-related hazards is often constrained by unmet needs for funding and technical support and a lack of complementary state and federal laws and policies.<sup>28</sup> In 2011, approximately 90% of all U.S. cities surveyed by the Massachusetts Institute of Technology in a joint project with ICLEI-Local Governments for Sustainability reported that they face challenges securing funding for adaptation, and only 6% reported that the federal government understood the realities they face with respect to adaptation.<sup>29</sup> Likewise, the U.S. Government Accountability Office (GAO) concluded in a 2013 report that, although the federal government plays a

25. ACHIEVING HAZARD-RESILIENT COASTAL & WATERFRONT SMART GROWTH: COASTAL AND WATERFRONT SMART GROWTH AND HAZARD MITIGATION ROUNDTABLE REPORT 6 (2013). Strategy three is to "[p]rovide a range of housing opportunities and choices to meet the needs of both seasonal and permanent residents" and strategy seven is to "[s]trengthen and direct development toward existing communities, and encourage waterfront revitalization." *Id.*

26. Strategy 6 is to "[p]reserve open space, farmland, natural beauty, and the critical environmental areas that characterize and support coastal and waterfront communities." *Id.* at 6.

27. *Id.* at 8.

28. See generally John R. Nolon, *Climate Change and Sustainable Development: The Quest for Green Communities, Part II*, PLAN. & ENVTL. L., Nov. 2009, at 3, 5. But see Community Risk and Resiliency Act, 2014 N.Y. Laws 355 (directing state agencies to prepare model municipal laws taking into consideration sea-level rise and other climate-related events and "develop additional guidance on the use of resiliency measures that utilize natural resources and natural processes to reduce risk").

29. JOANN CARMIN ET AL., PROGRESS AND CHALLENGES IN URBAN CLIMATE ADAPTATION PLANNING: RESULTS OF A GLOBAL SURVEY 22-24 (2012). ICLEI-Local Governments for Sustainability is an association of more than 1,000 cities, towns, and metropolises committed to sustainability. See ICLEI-

critical role in producing the information needed to facilitate informed local infrastructure adaptation decisions, this information is not easily accessible to local decisionmakers.<sup>30</sup> The governors, mayors, and other local leaders on the President's Task Force on Climate Preparedness and Resilience also concluded in their report to the President in November 2014 that "projects and investments are being advanced without adequate and coordinated consideration of the project design or alternatives relative to climate impacts . . . , a direction that generates unacceptable public health, safety, and financial risks for communities."<sup>31</sup> Similarly, a 2014 Georgetown Climate Center report on how to improve federal programs to support local climate change preparedness found that many local governments "have been looking to the federal government for help and guidance, only to run into challenges tapping into federal programs and resources."<sup>32</sup>

Additionally, with respect to waterfront hazard mitigation in particular, a complex web of more than a dozen local, state, and federal laws implemented by an even greater number of agencies, departments, commissions, and task forces create a policy regime characterized by fragmentation and diffuse authority.<sup>33</sup> Waterfront policies and projects also often implicate state common law and statutory public trust doctrine<sup>34</sup> as well as federal takings jurisprudence.<sup>35</sup> Furthermore, even at the sub-state levels waterfront policies tend to be scattered throughout numerous

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LOCAL GOVERNMENTS FOR SUSTAINABILITY, WHO WE ARE, ICLEI.ORG, <http://www.iclei.org/about/who-is-iclei.html> (last visited Jan. 18, 2016).

30. U.S. GOV'T ACCOUNTABILITY OFFICE (GAO), GAO REPORT: FUTURE FEDERAL ADAPTATION EFFORTS COULD BETTER SUPPORT LOCAL INFRASTRUCTURE DECISION MAKERS 80 (Apr. 12, 2012).
31. *See* THE WHITE HOUSE, PRESIDENT'S STATE, LOCAL, AND TRIBAL LEADERS TASK FORCE ON CLIMATE PREPAREDNESS AND RESILIENCE: RECOMMENDATIONS TO THE PRESIDENT 20 (Nov. 2014).
32. GEORGETOWN CLIMATE CTR., PREPARING OUR COMMUNITIES FOR CLIMATE IMPACTS: RECOMMENDATIONS FOR FEDERAL ACTION 5 (2014).
33. *See, e.g.*, The Coastal Zone Management Act, 16 U.S.C. §1454 (2012); Submerged Lands Act of 1953, 43 U.S.C. §1312 (2006); Coastal Barrier Resources Act, 16 U.S.C. §1452(2)(K) (2006); New York State Waterfront Revitalization of Coastal Areas and Inland Waterways Act, N.Y. COMP. CODES R. & REGS. tit. 19, §600.1(c) (2012); Tidal Wetlands Act (TWA), N.Y. COMP. CODES R. & REGS. tit. 6, §661.1 (2012); New York Coastal Erosion Hazard Area Act (CEHA), N.Y. ENVTL. CONSERV. LAW §34-0102(5) (McKinney 2012); New York City DEPARTMENT OF CITY PLANNING, THE NEW WATERFRONT REVITALIZATION PROGRAM 3 (2002); *Zoning Resolution Text*, N.Y.C. DEP'T OF CITY PLAN'G (Apr. 28, 2015); *see also* N.Y. Exec. Law §§910-923 (authorizing local waterfront revitalization plans); N.Y. COMP. CODES R. & REGS. tit. 19, §601 (2012) (implementing optional LWRP provisions); *see generally* Sarah J. Adams-Schoen, *Sink or Swim: In Search of a Model for Coastal City Climate Resilience*, 40 COL. J. ENVTL. L. 433, 473-79 (2015) (discussing web of federal, state, and local laws applicable to New York City waterfront).
34. *See* The Underwater Lands Bill, Act of Aug. 7, ch. 791, §3, 1992 N.Y. Laws 4028, 4029 (codified as amended at N.Y. PUB. LANDS LAW §75 (McKinney 2014)).
35. *See, e.g.*, New Creek Bluebelt, Phase 4 v. City of New York, No. D42904 (N.Y. App. Div. Nov. 19, 2014) (finding reasonable probability that city wetlands designation is a regulatory taking under federal Constitution).

plans including local comprehensive plans, waterfront revitalization plans, and hazard mitigation plans.<sup>36</sup> Although in most jurisdictions zoning laws must be consistent with a municipality's comprehensive plan,<sup>37</sup> which may be interpreted to include all relevant planning activities,<sup>38</sup> and local, state, and federal actions must be consistent with any local waterfront revitalization plan,<sup>39</sup> often the numerous plans setting forth waterfront policies in a municipality fail to cross-reference one another, are developed by various planning authorities that may not collaborate with one another, and ultimately may contain conflicts.<sup>40</sup> With respect to this fragmentation at the planning level, a roundtable of experts from the fields of smart growth, hazard mitigation, climate change adaptation, and coastal management recognized the need to link hazard mitigation and land use planning processes, further research the potential for one plan to serve multiple planning requirements, and provide tools and technical assistance to better integrate plans at the local level.<sup>41</sup> In the meanwhile, however, the existing fragmentation means that central authority over waterfront hazard mitigation remains weak or nonexistent.

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36. See, e.g., CITY OF NEW YORK, PLANYC: A STRONGER, MORE RESILIENT NEW YORK 57-65 (June 2013) [hereinafter STRONGER, MORE RESILIENT] (setting forth 37 initiatives to increase resilience of city's waterfront); N.Y.C. DEP'T OF CITY PLANNING, VISION 2020: NEW YORK CITY COMPREHENSIVE WATERFRONT PLAN (March 2011) [hereinafter VISION 2020]; N.Y.C. DEP'T OF CITY PLANNING, THE NEW WATERFRONT REVITALIZATION PROGRAM 3 (2002); N.Y.C. DEP'T OF CITY PLANNING, THE NEW YORK CITY WATERFRONT REVITALIZATION PROGRAM: NEW YORK CITY APPROVED REVISIONS PURSUANT TO SECTION 197-A OF THE CITY CHARTER (2013); CITY OF NEW YORK, 2014 NEW YORK CITY HAZARD MITIGATION PLAN (2014).
  37. See PATRICIA E. SALKIN, 1 N.Y. ZONING LAW & PRAC. §4:03 (reporting that enabling statutes in most states require zoning to be in accordance with the comprehensive plan); Edward J. Sullivan & Jennifer Bragar, *Recent Developments in Comprehensive Planning*, 46 URB. LAW. 685, 689-90 (2014) (reporting trend in case law toward view that comprehensive plan is at least a factor in judicial analysis of zoning law).
  38. See, e.g., N.Y. Town Law §272-a(2)(a) (defining comprehensive plan as "the materials, written and/or graphic, including but not limited to maps, charts, studies, resolutions, reports and other descriptive material that identify the goals, objectives, principles, guidelines, policies, standards, devices and instruments for the immediate and long-range protection, enhancement, growth and development of the" municipality).
  39. See 16 U.S.C. §§1456(c)(1)-(2) & (d) (2015); 15 C.F.R. pt. 930 (2015); see, e.g., 42 N.Y. EXEC. LAW §916 (McKinney 2014) (requiring "state agency program actions be undertaken in a manner which is consistent to the maximum extent practicable with the approved [local] waterfront revitalization program [LWRP]," including reviews conducted under the state environmental quality review act"); N.Y. COMP. CODES R. & REGS. tit. 10, §97.12(d)(13) (2015) (providing for state environmental impact review based on effects of proposed action on applicable policies of LWRP as opposed to state WRP when municipality has an approved LWRP).
  40. See STRONGER, MORE RESILIENT, *supra* note 36, at 40 (concluding that "[e]fforts by [the multiple] agencies [with regulatory authority in the coastal zones] are not completely aligned" and "[t]his lack of unified and coordinated regulatory oversight can lead to delayed and unpredictable waterfront activity, complicating the achievement of important public goals, including coastal resiliency").
  41. NOAA, ACHIEVING HAZARD-RESILIENT COASTAL & WATERFRONT SMART GROWTH: COASTAL AND WATERFRONT SMART GROWTH AND HAZARD MITIGATION ROUNDTABLE REPORT 11 (2013).

### D. *Irrational Discounting of Climate-Related Waterfront Risks Pushes Responses Into the Future*

Examples of local government plans, reports, executive orders, and other communications that irrationally discount climate related waterfront risks abound—even in jurisdictions that are otherwise undertaking robust climate adaptation initiatives. For example, following Hurricane Sandy, state and local governments along the East Coast of the United States characterized the storm as “unthinkable,” “unique,” and the “perfect storm.”<sup>42</sup> Implicit (and sometimes explicit) in these communications was the message that the magnitude of and devastation from Sandy were unforeseeable and that Sandy was a “worst case scenario” that resulted from the confluence of highly improbable factors. Although containing some elements of truth, each of these characterizations is potentially misleading.

Rather than being “unthinkable,” the magnitude and devastation of the storm was foreseeable. Prior to the storm, numerous sources including state and local government agencies had projected extreme flooding and significant property damage for vulnerable coastal areas along the east coast of the United States. New York and New Jersey had both adopted master plans and issued reports predicting the growing dangers from continued waterfront development.<sup>43</sup> More than eight years before Sandy, Princeton University reported that the rapid population growth in New Jersey’s “coastal counties was setting the scene for monumental environmental damage and property loss.”<sup>44</sup>

Notwithstanding the foreseeability of rising sea levels and storm surges, however, heavy development of vulnerable flood prone areas continued. On Staten Island, “developers built more than 2,700 mostly residential structures in coastal areas at extreme risk of storm surge flooding between 1980 and 2008, with the approval of city planning and zoning authorities. . . .”<sup>45</sup> The devastation of these areas during Sandy and other extreme weather events

42. Cavan Sieczkowski, *Hurricane Sandy Damage Photos: Superstorm’s “Unthinkable” Aftermath Revealed (PICTURES)*, HUFFINGTON POST (Oct. 30, 2012), [http://www.huffingtonpost.com/2012/10/30/hurricane-sandy-damage-photos-superstorm-unthinkable-aftermath\\_n\\_2044099.html](http://www.huffingtonpost.com/2012/10/30/hurricane-sandy-damage-photos-superstorm-unthinkable-aftermath_n_2044099.html) (“Chris Christie said the wreckage is ‘beyond anything I thought I’d ever see.’ Adding, ‘The level of devastation at the Jersey Shore is unthinkable,’ according to CNN.”).

43. See Maxine Burkett, *Duty and Breach in an Era of Uncertainty: Local Government Liability for Failure to Adapt to Climate Change*, 20 GEO. MASON L. REV. 775, 782 n.46 (2013) (citing New York and New Jersey master plans and reports predicting the growing dangers from continued development).

44. John Rudolf et al., *Hurricane Sandy Damage Amplified by Breakneck Development of Coast*, HUFFINGTON POST (Nov. 12, 2012, 12:15 PM), [http://www.huffingtonpost.com/2012/11/12/hurricane-sandy-damage\\_n\\_2114525.html](http://www.huffingtonpost.com/2012/11/12/hurricane-sandy-damage_n_2114525.html).

45. See John Rudolf et al., *Hurricane Sandy Damage Amplified by Breakneck Development of Coast*, HUFFINGTON POST (Nov. 12, 2012, 12:15 PM), [http://www.huffingtonpost.com/2012/11/12/hurricane-sandy-damage\\_n\\_2114525.html](http://www.huffingtonpost.com/2012/11/12/hurricane-sandy-damage_n_2114525.html).

included loss of lives, displacement of thousands of residents and businesses, and massive property and infrastructure losses.<sup>46</sup> Ultimately, New Jersey suffered economic losses from Hurricane Sandy of \$9 to \$15 billion<sup>47</sup> and New York suffered economic losses of \$19 billion.<sup>48</sup>

Since Sandy, by repeatedly employing language like “unique” and “worst case scenario” to describe Sandy,<sup>49</sup> local governments continue to give the impression that the storm was an anomaly that is unlikely to recur. Although Sandy was indeed unprecedented in some respects (for example, it had the lowest recorded sea-level pressure of a storm making landfall north of North Carolina in the United States<sup>50</sup>), a storm of Sandy’s magnitude is not unprecedented in the region, and a different set of circumstances could have made Sandy even more devastating than it was. Since 1900, the New York City region has experienced storms with higher wind speeds,<sup>51</sup> more rain,<sup>52</sup> and peak surges 10 feet or higher above mean low tide.<sup>53</sup> Moreover, although a number of idiosyncratic factors combined to increase Sandy’s devastation, Sandy itself was not a worst-case scenario. Had Sandy struck at high tide in Western Long Island Sound, as opposed to near high tide in New York Harbor and along the Atlantic Ocean, modeling by the storm surge research team at the Stevens Institute of Technology projects that Sandy’s peak surge would have been four feet higher than it was.<sup>54</sup> The city of New York provides most of this information in publicly accessible reports; however, these reports tend to highlight—through themes, headers, and executive summaries—characterizations of the storm as an anomaly unlikely to occur again.<sup>55</sup>

46. See Burkett, *supra* note 43, at 782 (“At least two fatalities in Staten Island occurred in developments completed as recently as the 1990s in coastal areas at extreme risk of storm surge flooding.” (citations omitted)).

47. *Id.*

48. *Id.*

49. See, e.g., Michael R. Bloomberg, *Foreword*, in STRONGER, MORE RESILIENT, *supra* note 36 (referring to Sandy as “the worst natural disaster ever to hit New York City”).

50. BLAKE ET AL., *supra* note 8, at 6.

51. STRONGER, MORE RESILIENT, *supra* note 36, at 21 (“[Sandy’s] 80-mile-per-hour (mph) peak wind gusts fell well short of other storms that have hit New York City, including Hurricane Carol in 1954 (up to 125-mph gusts) and Hurricane Belle in 1976 (up to 95-mph gusts).”).

52. *Id.* (“Previous storms also brought much more rain with them. Sandy dropped a scant inch in some parts of New York, far less than the 5 inches of rain dropped on the city during Hurricane Donna in 1960 or the 7.5 inches during the April 2007 nor’easter.”).

53. See *id.* at 21 (discussing 1821 hurricane (13-foot storm surge) and Hurricane Donna in 1960 (10-foot storm surge)); BEN STRAUSS ET AL., NEW YORK AND THE SURGING SEA: A VULNERABILITY ASSESSMENT WITH PROJECTIONS FOR SEA LEVEL RISE AND COASTAL FLOOD RISK, CLIMATE CENTRAL RESEARCH REPORT 11, 16 (2014) (noting that storms today are intensified in terms of surge height and other variables as a result of higher sea levels and arguing that Sandy’s surge height has been misreported as 14 feet at the Battery and that Sandy’s peak storm surge was actually nine feet).

54. See STRONGER, MORE RESILIENT, *supra* note 36, at 21 (describing projected impacts under a western Long Island Sound high-tide scenario).

55. See, e.g., STRONGER, MORE RESILIENT, *supra* note 36.

Exacerbating the discounting effect of this messaging, a theme that New York City and New Yorkers are tougher than climate change is woven throughout the city's voluminous climate resilience reports. For example, the June 2013 post-Sandy report, *Stronger, More Resilient New York*, tells a persuasive story of toughness and machismo:

The underlying goal of this report is resiliency. That is, to adapt our city to the impacts of climate change and to seek to ensure that, when nature overwhelms our defenses from time to time, we are able to recover more quickly.

In short, we have to be tough.

And toughness, as we all know, is one of the defining traits of New Yorkers.

In just the first few years of this century, we have been through the September 11, 2001 terrorist attacks, financial crises and blackouts, and now, Sandy. With each challenge, we have become more united as a city.

We must come together again with an even stronger commitment to slow the progress of climate change while simultaneously preparing for the changes already evident around us—and those yet to come.

.....

The time has come to make our city even tougher.<sup>56</sup>

Newer reports issued under the de Blasio administration carry the toughness theme forward with, among other things, use of the tag line “One City, Built to Last,” reminiscent of Ford Truck’s 1990s ad campaigns (“Built to Last” and “Built Ford Tough”).<sup>57</sup> The underlying message appears to be that New York City and its residents are tougher than climate change. Illustrative of this, the inside cover of *A Stronger, More Resilient New York* provides the following definition of “resilient”:

res•il•ient [ri-zil-yuhnt] adj.

1. Able to bounce back after change or adversity. 2. Capable of preparing for, responding to, and recovering from difficult conditions.

Syn.: TOUGH

See also: New York City<sup>58</sup>

56. *Id.* at 6 (emphasis in original). The “toughness” theme is also reinforced through images. *See, e.g., id.* at 6.

57. *See* CITY OF NEW YORK, ONE CITY, BUILT TO LAST 20 (Revision 1.1 2014); Tanya Gazdik, *Ford Boosts Ad Spending Behind Jwts’ “Built to Last” Campaign*, ADWEEK (Feb. 9, 1998, 12:00 AM), <http://www.adweek.com/news/advertising/ford-boosts-ad-spending-behind-jwts-built-last-campaign-23668>.

58. STRONGER, MORE RESILIENT, *supra* note 36, at 2.

Consistent with a theme that suggests New Yorkers are tougher than climate change, the city's plans eschew retreat strategies and instead boast about continued development of waterfront areas. For example, the city reported in its Clean Waterfront Plan that "New Yorkers are taking advantage of the waterfront for recreation, housing, and new business opportunities in record numbers,"<sup>59</sup> and in its coastal management plan that "[n]ew housing on waterfront property has helped the city accommodate the influx of nearly one million new residents. Since 1992, [when the city adopted its first waterfront plan,] more than 20,000 new residential units have been built on waterfront blocks, with nearly 6,000 additional new units in the development pipeline."<sup>60</sup> By touting waterfront development, New York City and other municipalities discount waterfront hazards, promote building in—and attract populations to—vulnerable areas, and irrationally delay appropriate responses to known risks.

## **II. Coastal Cities' Commitment to Rebuild Can Reinforce Maladaptive Path-Dependent Processes and Fail to Take Advantage of a Window of Opportunity to Entrench Support for More Resilient Waterfront Policies**

The local government toolbox contains a variety of tools that can be used to create more resilient waterfronts, including various planning processes, zoning code amendments, building code amendments, moratoria, conservation easements, transferable development credits, tax incentives, exactions and condemnation, buyouts, public education and private information disclosure requirements, and risk mapping tools.<sup>61</sup> The nature of the super-wicked class of problems, however, makes taking advantage of the tools in the local government toolkit difficult. The reward of risk mitigation tends to be ephemeral—either the absence of harm or, even worse from a political perspective, the reduction but not elimination of harm. Moreover, when the harm is something that would not occur (or is not perceived to be likely to occur) within the lifespan of a government or even within the lifespan of the voting public, the impetus to

59. N.Y.C. LOCAL LAW 55 OF 2011: CLEAN WATERFRONT PLAN 4 (2014).

60. VISION 2020, *supra* note 36, at 13.

61. See ANNE SIDERS, MANAGEMENT COASTAL RETREAT: A LEGAL HANDBOOK ON SHIFTING DEVELOPMENT AWAY FROM VULNERABLE AREAS 5-7 (Columbia Law School Center for Climate Change Law, 2013); see generally J. GRANNIS, ADAPTATION TOOL KIT: SEA LEVEL RISE AND COASTAL LAND USE (Georgetown Climate Center, 2011); John R. Nolon, *Disaster Mitigation Through Land Use Strategies*, 23 PACE ENVTL. L. REV. 959, 976-77 (2006); J. Peter Byrne & J. Grannis, *Coastal Retreat Measures*, in THE LAW OF ADAPTATION TO CLIMATE CHANGE 267-306 (M. Gerrard & K. Kuh eds., 2012).

educate the public to the risk in order to garner support for spending political capital on mitigation is further reduced. Instead, given the lifespan of political power,<sup>62</sup> rather than educating constituents about medium- and long-term risks, elected officials may prefer to increase public support for actions that have immediate, visible effects—like increasing the tax base through development of high-value coastal properties<sup>63</sup>—by utilizing messaging and other strategies that actually increase the short-sightedness of the public. In this way, communications that irrationally discount waterfront development risks are both the cause and effect of the wicked nature of the problem.

Indeed, municipal plans that utilize themes of toughness and resistance may promote a cultural narrative of climate change that further entrenches status quo waterfront policies. Robin Kundis Craig has characterized coastal communities' preference for resistance over retreat strategies as a manifestation of a "technology will save us" cultural narrative that underlies many U.S. environmental laws and policies. Consistent with a technology will save us narrative, waterfront adaptation strategies focus on human control, minimize disruption and displacement of human activities, and ignore the potential for sea-level rise to overwhelm coastal technologies.<sup>64</sup>

Notwithstanding entrenched resistance to restrictions on waterfront development, disasters like Hurricane Sandy can create a window of opportunity to shift waterfront development policy to a new, more resilient policy equilibrium. For many residents of the northeastern United States who are still displaced and rebuilding more than three years after Hurricane Sandy, maintaining the current risk level of medium is not acceptable and a future with even greater risk levels is unthinkable.<sup>65</sup> In the wake of Sandy, 14 counties were declared federal disaster areas, 117 lives were lost, approximately 300,000 housing units were damaged or destroyed, 2,000 miles of roads were affected or closed, subways and tunnels were flooded, major power transmission and communication systems were damaged, and, more than three years after the storm, many residents remain displaced.<sup>66</sup> These experi-

62. See COLIN PRICE, *TIME, DISCOUNTING, AND VALUE* 125 (Blackwell, London 1993) ("although society may be regarded as immortal, a government achieving several terms in office still has a life-span shorter than that of an average human").

63. See JOHN R. LOGAN & HARVEY L. MOLOTOCH, *URBAN FORTUNES: THE POLITICAL ECONOMY OF PLACE* 57-63 (Berkeley, CA: Univ. of California Press, 1987) (describing municipal narratives of cost- and value-free growth and local political pressure for economic growth).

64. Robin Kundis Craig, *Learning to Live With the Trickster: Narrating Climate Change and the Value of Resilience Thinking*, PACE ENVTL. L. REV. (forthcoming 2016).

65. See, e.g., Justin Gillis & Felicity Barringer, *As Coasts Rebuild and U.S. Pays, Repeatedly, the Critics Ask Why*, N.Y. TIMES, Nov. 18, 2012, <http://www.nytimes.com/2012/11/19/science/earth/as-coasts-rebuild-and-us-pays-again-critics-stop-to-ask-why.html?pagewanted=all>.

66. N.Y. STATE DEPT OF STATE OFFICE OF PLANNING AND DEVELOPMENT, RFP 15-OPD-7 FOR GENERIC ENVIRONMENTAL IMPACT STATEMENT FOR LONG ISLAND TRANSFER OF DEVELOPMENT RIGHTS PROGRAM

ences have resulted in heightened climate risk aversion, which is reflected in many local government hazard mitigation plans.<sup>67</sup>

The heightened risk aversion that follows a major disaster creates an opportunity to shift waterfront development policy to a new equilibrium. Bryan Jones and Frank Baumgartner's ambitious empirical study of shifts in American policy from the end of the Second World War to the end of the 20th century suggests that a shift in focus, like the one following Sandy, provides a "window" during which policymakers may punctuate an otherwise stable policy.<sup>68</sup> Using pre- and post-9/11 terrorism policies as an illustration, Jones and Baumgartner assert that

Shifting [policy] attention requires a major impetus, and some general intelligence about possible threats would not be enough. The natural tendency is to under-emphasize new threats, new ways of thinking of things, new ways to organize public bureaucracies, until and unless some significant threshold of urgency is crossed. At that point, major changes can occur. . . . Crises seem necessary to drive change.<sup>69</sup>

In the case of climate change generally and waterfront development policies specifically, identifying and taking advantage of this window is particularly important in light of the "time is running out" nature of the policy problem.

However, notwithstanding the magnitude of the devastation caused by Sandy, waterfront development policies have shifted only incrementally and for the most part have failed to shift toward resilient path-dependent processes, with the result being the continued siting of residential communities and critical infrastructure in flood zones. Illustrating this cycle of development, devastation, and redevelopment that is characteristic of many coastal communities,<sup>70</sup> New York City and State shifted course away from a state property acquisition program that would have permanently preserved properties as open space<sup>71</sup> and instead entered into a Memorandum of Understanding under which the city could purchase vulnerable waterfront properties

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4 (released July 20, 2015).

67. See, e.g., TOWN OF SOUTHDOLD, NATURAL HAZARDS CHAPTER, in SOUTHDOLD 2020: THE NEW COMPREHENSIVE PLAN FOR THE TOWN OF SOUTHDOLD (final draft Sept. 16, 2013) (recognizing various risks from sea-level rise).

68. JONES & BAUMGARTNER, *supra* note 1, at 49-50 (discussing windows in which policy equilibria may be punctuated); *id.* at 21 (discussing data set and methodology).

69. JONES & BAUMGARTNER, *supra* note 1, at 51.

70. See SIDERS, *supra* note 61, at 1 (observing that Dauphin Island, Alabama, has been substantially destroyed and rebuilt 10 times in the past 40 years).

71. See Christine A. Fazio & Ethan I. Strell, *Government Property Acquisition in Floodplains After Hurricane Sandy*, Feb. 28, 2013, N.Y. LAW J.; 42 U.S.C. §5107c(b)(2)(B)(ii); FEMA, HAZARD MITIGATION ASSISTANCE UNIFIED GUIDANCE: HAZARD MITIGATION GRANT PROGRAM, PRE-DISASTER MITIGATION

for redevelopment and resale.<sup>72</sup> Along the same vein, the city's comprehensive coastal management plan identifies as an achievement the rezoning of approximately 3,000 acres of shorefront land to enable redevelopment, about one-half of which was rezoned from non-residential to mixed-use and from lower to higher-density.<sup>73</sup>

These redevelopment policies and zoning code amendments are touted as resilience oriented, notwithstanding the fact that more than eight million New Yorkers live in areas vulnerable to flooding, storm surges, and other natural disaster-related risks,<sup>74</sup> and nearly one-half million of these residents live on 120 square miles of land that is less than six feet above the high-tide line.<sup>75</sup> Moreover, as a result of climate-related factors and land subsidence, sea level in New York City has risen 1.1 feet since 1900, approximately 1.2 inches per decade, a rate nearly two times the global average.<sup>76</sup> As Strauss et al. of Climate Central observe, "Looking forward under a fast sea-level rise scenario, [Climate Central] compute[s] a 3-in-4 chance of historically unprecedented coastal flooding in New York City by 2100—or a 1-in-10 chance under a slow rise scenario."<sup>77</sup> According to NPCC2, an ongoing body established by New York City law to regularly update and report on region-specific climate data and projections, sea-level rise is projected to accelerate as the century progresses, rising in New York City 11 to 21 inches by the 2050s, 18 to 39 inches by the 2080s, and as much as six feet by 2100 (over average 2000-2005 levels).<sup>78</sup>

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PROGRAM, FLOOD MITIGATION ASSISTANCE PROGRAM, REPETITIVE FLOOD CLAIMS PROGRAM, SEVERE REPETITIVE LOSS PROGRAM 75, 94-97 (2010).

72. Memorandum of Understanding Between the State of New York and the City of New York Concerning the Purchase of Properties Affected by Superstorm Sandy (Dec. 16, 2013).

73. VISION 2020, *supra* note 36, at 13.

74. *Id.* at 207.

75. STRAUSS ET AL., *supra* note 53, at 8. This vulnerable land is also home to more than 1,500 miles of road, 1,200 EPA-listed sites, and 100 public schools. *Id.*

76. NEW YORK CITY PANEL ON CLIMATE CHANGE, CLIMATE RISK INFORMATION 2013: OBSERVATIONS, CLIMATE CHANGE PROJECTIONS, AND MAPS 8 (Cynthia Rosenzweig & William Solecki eds., 2013) (finding that approximately 45% of the observed sea-level rise of 1.2 inches per decade since 1900 is due to land subsidence, with the remaining sea-level rise driven by climate-related factors).

77. STRAUSS ET AL., *supra* note 53, at 11.

78. Cynthia Rosenzweig et al., *Building the Knowledge Base for Climate Resiliency: New York City Panel on Climate Change 2015 Report*, 1336 ANNALS N.Y. ACAD. SCI. 1, 11 (2015). See also *infra* Part III (discussing the city's robust, transparent, and science-based data collection, analysis, and benchmarking initiatives).

### III. Utilizing Transparent Risk Projections and Land Use Planning Processes to Expand and Entrench Support for Resilient Waterfront Policies

We know intuitively that climate change poses intractable obstacles and waterfront development restrictions are politically unpopular. So, why bother identifying these policy problems as wicked or super-wicked? The point certainly is not to sit around and lament the problems,<sup>79</sup> but rather to “tame” them.<sup>80</sup> The wicked and super-wicked constructs prove useful only insofar as they help inform responses to the problems. By identifying a problem as wicked or super-wicked, lawmakers and analysts can recognize from the outset that the problem is “highly resistant to resolution,”<sup>81</sup> avoid strategies that are known not to work with such problems, and utilize “policy analysis techniques that are consistent with, rather than ignore, the key features of this class of problems.”<sup>82</sup>

Climate change generally and waterfront hazard mitigation specifically have temporal free rider challenges such that strategies to counteract these problems must overcome the tendency to give greater weight to immediate interests, discount future threats, and delay behavioral changes, even when doing so is contrary to medium- and long-term interests.<sup>83</sup> To overcome this, Levin et al. assert that policymakers need to address three diagnostic questions when addressing super-wicked problems: (DQ1) “What can be done to create stickiness making reversibility immediately difficult?”; (DQ2) “What can be done to entrench support over time?”; and (DQ3) “What can be done to expand the population that supports the policy?”<sup>84</sup> They posit that DQ2 and DQ3 are “prerequisites” because they must occur to develop path dependency to address super-wicked problems, while DQ1 is “useful” because it “[b]uys time,” but is not a prerequisite “as long as increasing support over time kicks in quite quickly.”<sup>85</sup>

79. Chris Riedy, *Climate Change Is a Super Wicked Problem*, PLANETCENTRIC (May 29, 2013), <http://chrisriedy.me/2013/05/29/climate-change-is-a-super-wicked-problem/>.

80. Rittel & Webber, *supra* note 9 (contrasting wicked and tame problems); John C. Camillus, *Strategy as a Wicked Problem*, HARV. BUS. REV. ONLINE (May 2008), <https://hbr.org/2008/05/strategy-as-a-wicked-problem> (arguing that wicked problems cannot be solved, but can be tamed).

81. AUSTRALIAN PUBLIC SERV. COMM’N, TACKLING WICKED PROBLEMS: A PUBLIC POLICY PERSPECTIVE iii (2007).

82. Levin et al., *supra* note 11, at 129.

83. See Lazarus, *supra* note 14, at 1183 (discussing “free riders,” who exploit the ecosystem commons to maximize their gains or minimize their losses by relying on others to make the necessary sacrifices”).

84. Levin et al., *supra* note 11, at 129.

85. *Id.* at 130; see also JONES & BAUMGARTNER, *supra* note 1, at 49 (“The general phenomenon of policies reproducing themselves through time is known as path dependency. Once a path is chosen, it tends to be followed. Moving off the path can be difficult.” (citation omitted)). For example, rather than

Thus, focusing more on entrenchment and expansion, Levin et al. argue that small policy changes can trigger path-dependent processes that can gain durability and expand over time.<sup>86</sup> This approach has at least two benefits over one-shot approaches that focus on creating immediate stickiness. First, to create immediate stickiness, a policy would have to include features that make it difficult to undo and would as a result be subject to attack as anti-democratic.<sup>87</sup> Second, such a policy would likely entail a large shift from the status quo, an approach that tends to be met with resistance.<sup>88</sup> Ultimately, rather than focusing on one-shot policy changes (whether they create stickiness or not), Levin et al. suggest that focusing on norms, values, and coalition-building can “unleash[ ] path-dependent trajectories.”<sup>89</sup> An approach to shifting policy equilibria by changing norms and values also finds support in a growing body of research that suggests that emotional responses to risk are an important component of rational risk regulation.<sup>90</sup> However, given the time-is-running-out nature of super-wicked problems, approaches that expand and entrench support incrementally must nevertheless be capable of changing behavior quickly.

Land use planning processes offer an opportunity to build coalitions and shift norms and values toward resilience. Participants in interactive planning processes not only influence the norms and values underlying the plan, but likely also experience shifts in their own values as a result of their participation. Many land use planning processes—for example, community engagement initiatives, visioning, and charrettes<sup>91</sup>—facilitate collaborative decisionmaking through intensive, personal engagement in project planning. These processes often engage participants in self-advocacy, public com-

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developing skills related to relocation, students, developers, builders, and others respond to policies that promote rebuilding by developing skills related to armoring shores, buildings, and infrastructure against flood risks.

86. Levin et al., *supra* note 11, at 125.

87. *But see* Lazarus, *supra* note 14, at 1195-1204 (discussing and rejecting anti-democratic critique of policies that create stickiness).

88. Levin et al., *supra* note 11, at 125 (“one-shot ‘big bang’ policies for super wicked problems, which require behavioral change by all relevant populations immediately, either fail to garner adequate support or, in those rare cases where such policies are adopted, are likely to produce societal ‘shocks’ that hamper implementation and compliance, derailing a policy no matter how well designed”).

89. *Id.*

90. Dan M. Kahan, *Two Conceptions of Emotion in Risk Regulation*, 156 U. PA. L. REV. 741, 744 (2008).

91. A charrette is a collaborative brainstorming session “intended to build consensus among participants, develop specific design goals and solutions for a project, and motivate participants and stakeholders to be committed to reaching those goals.” GAIL LINDSEY ET AL., A HANDBOOK FOR PLANNING AND CONDUCTING CHARRETTES FOR HIGH PERFORMANCE PROJECTS 1 (Nat’l Renewable Energy Lab., 2d ed. 2012), available at [http://www.nrel.gov/sustainable\\_nrel/pdfs/44051.pdf](http://www.nrel.gov/sustainable_nrel/pdfs/44051.pdf). See also Danielle Bergstrom et al., *The Sustainable Communities Initiative: The Community Engagement Guide for Sustainable Communities*, J. AFFORDABLE HOUSING & COMMUNITY DEV. L., 2014, at 191, 194-95 (discussing strategies for engaging marginalized communities in traditional planning processes).

mitment to a vision, and validation of the vision through shared personal experiences. Research on changing deeply held beliefs suggests that these attributes—self-advocacy, public commitment, and validation through personal experience—can effect lasting, cognitively accessible changes in participants' deeply held beliefs.<sup>92</sup>

However, without transparent communication regarding waterfront risks, participants in land use planning processes are hobbled in their ability to engage with the issues. Analogizing to research on complex adaptive systems, John Nolon observes that effective communication of information is a key component in successful adaptation to stressful events.

In nature and in human organizations, the systems that thrive are those that have established effective mechanisms for exchanging, evaluating, and reacting to information among their component parts. As stress occurs, information is gathered at the lowest level of the system and relayed to higher levels that digest and synthesize that information. Then, through continued communication, system behaviors are reordered to react and adapt to change. . . . Through continued and effective communication . . . the system adapts in unpredictable but generally successful ways as it deals with external events.<sup>93</sup>

By accurately communicating about risks, local governments can also increase the diversity of participants in the planning process, thereby involving actors who may be more amenable to punctuating policy equilibria. As Jones and Baumgartner observe,

[An] oft-noted reason for the difficulty in shifting policy direction stems from continuity of participation in key governmental positions. . . . [E]nacting change often requires the involvement of a diverse range of policymakers. Many of these, including those in important gate-keeping positions, typically were involved in creating the earlier policy or at least in administering it.<sup>94</sup>

Failing to communicate accurately about waterfront risks limits those who understand the risks to insiders and experts, thereby exacerbating a lack

92. See, e.g., Joshua Aronson et al., *Reducing the Effects of Stereotype Threat on African American College Students by Shaping Theories of Intelligence*, 38 J. EXPERIMENTAL SOC. PSYCHOL. 113, 116-23 (2002) (empirical study identifying conditions for influencing persistent, cognitively accessible changes in attitudes including advocacy in a person's own words, public commitment, and validation by personal experience); see generally Sarah J. Adams-Schoen, *Of Old Dogs and New Tricks: Can Law Schools Really Fix Students' Fixed Mindsets*, 19 LEGAL WRITING: J. LEGAL WRITING INST. 3, 23-31 (2014) (discussing and citing research on facilitating long-lasting, cognitively accessible changes in deeply held beliefs); John R. Nolon, *Champions of Change: Reinventing Democracy Through Land Law Reform*, 23 PACE ENVTL. L. REV. 905, 915 (2006) (analyzing changes within and among communities observed in author's experience working with local governments).

93. Nolon, *supra* note 92, at 916.

94. JONES & BAUMGARTNER, *supra* note 1, at 49-50.

of diversity in the planning process that, as Jones and Baumgartner assert, makes change difficult.

#### **IV. Conclusion**

In summary, discounting of risk in local government communications about climate change and waterfront development likely reinforces existing maladaptive path-dependent processes. By adopting toughness narratives, rejecting retreat strategies outright, or otherwise discounting risks following a major storm like Hurricanes Katrina or Sandy, municipalities fail to take advantage of a window of opportunity in which public support likely exists for a shift to more resilient, albeit restrictive, waterfront development policies. By recognizing waterfront hazard mitigation as a super-wicked problem, which is characterized by time-is-running-out features and which requires entrenchment and expansion of support for resilience in order to break the cycle of development, destruction, and redevelopment, local governments, with the support of federal and state governments, can and should begin to evaluate and seize upon opportunities to shift policies toward resilience. Such opportunities likely begin with official communications that accurately portray risk, including waterfront and hazard mitigation plans and flood risk maps, which can then lead to planning processes and changes in zoning and building codes and private market behavior consistent with near- and long-term risks.

