

Urban Climate Adaptation and Resisting the Urge to Panic

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Through actions and words, the incoming Trump administration has adopted a hostile attitude toward climate change and other environmental issues, leading to a state of dread and panic among the nation's climate researchers. Indeed, the U.S. federal government has served a pivotal role in providing climate data and funding, as well as coordinating climate-related efforts on a grand scale. Losing this network of support represents a critical challenge in the years to come. Instead of paralysis, however, urban and regional planners need to respond to this challenge by promoting three fundamental societal shifts. First, planners should work to move beyond climate change mitigation strategies focused on the reduction of emissions, and integrate climate change adaptation strategies focused on helping the world to live with ongoing climate changes. Secondly, planners need to narrow their geographic focus from the national to the regional level, the scale at which the primary impacts of climate change occur and climate adaptation takes place. Finally, planners must take action to help individuals and communities shift from a feeling of powerlessness to empowerment, as climate change adaptation represents an opportunity to demonstrate to people that their actions matter.

In Douglas Adams' classic science fiction work *The Hitchhiker's Guide to the Galaxy*, everyman Arthur Dent survives the ultimate environmental catastrophe: the destruction of Earth, carried out by bureaucratic extraterrestrials in an act of intergalactic eminent domain. Dent's rescuer, Ford Prefect, hands him a copy of the titular Hitchhiker's Guide, an encyclopedia emblazoned with the words "Don't Panic!" As the universe forces him to confront a sudden, previously unimaginable level of absurdism, Dent remarks, "It's the first helpful or intelligible thing anybody's said to me all day."¹

Today, planners are coping with the smaller but significant looming environmental catastrophe of global climate change, combined with the sudden, absurdist reality of Donald Trump's election to the United States presidency. On the campaign trail, President Trump repeatedly referred to climate change as "a hoax perpetrated by the Chinese,"² engendering a state of fear and panic among environmentalists, and the first signs from the administration appear to confirm those fears. President Trump has appointed Scott Pruitt, a climate change denier with deep ties to the oil and gas industry, to head the Environmental Protection Agency.³ His transition team sent an ominous memo to the Department of Energy requesting names of employees and contractors who attended United Nations climate meetings,

as well as those who helped develop the Obama administration's social cost of carbon metrics.⁴ It also appears likely that the administration will attempt to pull the United States out of the 2015 Paris Agreement, a pact between 195 countries to take action toward climate change mitigation, adaptation, and finance.⁵ Even beyond the current actions of the incoming administration, the federal government funds and maintains a number of climate-related initiatives that climate change researchers and practitioners rely on for their daily work. This includes the U.S. Global Change Research Program's National Climate Assessment, the Department of Health and Human Services' Climate-Ready States and Cities Initiative, the Department of Agriculture's National Roadmap for Responding to Climate Change, the Department of the Interior's network of Climate Science Centers, climate models run by the National Aeronautics and Space Administration (NASA) to determine climate impacts and adaptation strategies, and a host of other initiatives too lengthy to list.⁶ These initiatives form an intricate web of support for climate strategies, and researchers are desperately scurrying to copy this information in case the federal sources suddenly go dark.⁷

This is a long list of dire premonitions, and given the sudden, drastic sea change in the attitude of the federal government toward climate change, it

is easy to succumb to fatalism. But climate change is going to advance whether the U.S. federal government takes action or not, and given the nation's increasingly urban population—roughly 80 percent of citizens as of the 2010 U.S. Census, expected to rise to 87 percent by 2050⁸—it is imperative that planners take action to prepare for the changing climate to come. This includes the risks of increased flooding, drought, extreme heat events, and more powerful extreme weather events such as snowstorms and hurricanes.⁹ In the face of substantial uncertainty, planners should resist the urge to panic and see 2017 as the moment to bring about three fundamental shifts in climate change planning: from mitigation to adaptation, from national to regional levels of government, and from individual powerlessness to individual empowerment.

From Mitigation to Adaptation

The first step in reframing the dialogue surrounding climate change is working to increase public awareness of climate change adaptation. Much of the conversation surrounding climate change has focused primarily on mitigation, which the Intergovernmental Panel on Climate Change (IPCC) defines as anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases, such as carbon dioxide, methane, and nitrous oxide.¹⁰ Adaptation is the other, less publicized side of climate change response, defined by the IPCC as the process of adjustment in natural or human systems in response to actual or expected climate and its effects.¹¹ Mitigation seeks to reduce the effects of climate change, while adaptation prepares for the changes that are expected to occur regardless of mitigation efforts. Both responses are necessary as components of a comprehensive response.¹²

It is important to note that adaptation and mitigation do not comprise separate, siloed strategies, but rather need to form two ingredients of an integrated strategy. This theoretical approach is known as the “mitigation-adaptation interface,” and acknowledges that each strategy has the potential to enhance or undercut the effects of the other.¹³ For example, installation of air conditioners can help urban residents adapt to extreme heat events, but these air conditioners also release greenhouse gases that aggravate the effects of climate change. Conversely, “green infrastructure,” such as living roofs, simultaneously exerts a cooling effect on the surrounding urban environment and captures greenhouse gases, simultaneously serving adaptation and mitigation goals. Environmental analyst Jeff Howard likens adaptation responses that do not serve mitigation goals to “learning that the house is on fire but, instead of fighting the fire, trying to devise methods to live in the flaming structure.”¹⁴

Climate adaptation is still a nascent field, with a variety of promising regional strategies but comparatively little in the way of on-the-ground implementation or centralized coordination. Until recently, adaptation was a taboo subject among planners, who saw it as an implicit admission of defeat in the face of impending disaster.¹⁵ Environmental planning has only recently experienced an adaptation “turn,”¹⁶ with extreme weather events such as New York City's Hurricane Sandy prompting decision makers and planners to realize the dangers that climate change poses, even in the near term.¹⁷ As a result, adaptation research and practice is currently scattered, with a number of competing typologies that present the same concepts using different frameworks.¹⁸

Communities throughout the world have devised a wide variety of adaptation strategies

targeted toward local and regional needs. For the challenge of sea level rise alone, options include building sea walls,¹⁹ acquiring land to relocate homes and infrastructure under threat,²⁰ and establishing “rolling easements,” in which coastal development is designed to gradually yield to wetlands, beaches, and barrier islands migrating inland.²¹ But physical strategies are just one component of a broad suite of systemic institutional responses. Among these, decision-makers and institutions are predominantly focusing on the preliminary step of capacity building, which the IPCC defines as the practice of enhancing the strengths and attributes of, and resources available to, an individual, community, society, or organization to respond to change.²² This is an important step, but because it tends to be the first step that communities take toward building climate resilience, it is a sign that there is significant work to be done. As of 2016, more than 40 U.S. communities had created standalone climate adaptation plans, with potentially hundreds more embedding climate considerations into other planning approaches. However, the thoroughness and consistency of these plans vary wildly.²³

So what can planners do? Planning theorist John Forester once wrote that planners’ true power lies in their facilitation of information and anticipation and deflection of misinformation, and this applies to an important but under-recognized field such as climate adaptation.²⁴ To wit, it is important that planners not only support and participate in adaptation efforts, but also increase public awareness of adaptation, which can in part be done by working to make adaptation a way of life. A critical component of the adaptation process is “mainstreaming,” the embedding of climate considerations into other dominant planning domains and decision-making processes.²⁵ This has the advantage of allowing planners to apply existing institutional tools toward adaptation-friendly goals.

For example, Boston is particularly vulnerable to sea level rise, containing four watersheds that all have the potential to overflow and flood sections of the city.²⁶ The City of Boston has incorporated adaptation into the wider planning process through their new comprehensive plan, *Imagine Boston 2030*. Scheduled for release in 2017, the plan incorporates a complete assessment and visioning of risks to the Boston waterfront, with climate change a central issue.²⁷ The City has also folded adaptation into its official hazard mitigation²⁸ and capital improvement plans,²⁹ and has made moves toward amending its zoning code to make climate preparedness a formal requirement for development review.³⁰ Boston’s example demonstrates that adaptation is fundamentally a process that takes place within the existing context of planning, and there are numerous opportunities for planners to apply their expertise.

From National to Regional

While working to make adaptation part of mainstream discourse, planners need to focus their energy at the local and regional level, the scale at which climate change adaptation actually takes place. In the wake of the 2016 election, former New York City Mayor Michael Bloomberg released an op-ed insisting that if the federal government backs away from climate change action, the cities and mayors of the U.S. would step in to fill the gap. Bloomberg cited the fact that the government has passed little in the way of direct climate change legislation, likely a result of the congressional gridlock characteristic of most of the Obama administration.³¹

Bloomberg is correct in that climate adaptation primarily takes place at scales beneath the national level. Though Earth’s average temperature is expected to warm overall

as the 21st century progresses, individual communities will experience a wide variation in temperature shifts, with the impacts varying based on geographic characteristics and broader climate patterns. Accordingly, there is no “one size fits all” approach to adaptation, and much innovation has taken place at the local level, with cities serving as “laboratories” for adaptation approaches.³² For example, cities in hot and humid regions will likely benefit from installation of reflective roofs to ameliorate the urban heat island effect, expected to increase as climate change advances.³³ However, cities that experience powerful winds benefit from compact development with medium-height buildings, in order to shield downwind buildings from damage.³⁴

What Bloomberg undersells, however, is the federal government’s significant capacity to coordinate climate action on an extremely broad scale. The federal government serves as a source of usable information and financial support for adaptation, fosters stewardship of public resources, anticipates impacts that cross political boundaries, establishes federal policies that allow for flexibility in adaptation efforts, disseminates best adaptation practices, and is unparalleled in its ability to build public awareness.³⁵ Cities may be the level of government that deals directly with the impacts of climate change, but should federal support dry up completely, it will take a massive, coordinated effort to make up for the robust network of federal support that has been an integral part of adaptation efforts for years.

So what can planners do? Regional adaptation efforts require coordination, or they run the risk of forming a patchwork of responses that could potentially undercut one another’s goals. A persistent, substantial gap also exists between climate adaptation research and practice, with one side often unaware of what the other

is doing. Planners taking a holistic view of climate adaptation need to do whatever they can to fill this gap, as well as the broader gap that a retreat in federal support would create. Along these lines, the Great Lakes Integrated Sciences + Assessments Center pioneered a “boundary chain” model, identifying “boundary organizations” that form links between the producers of climate knowledge and the local institutions capable of translating this knowledge into practice.³⁶

Several regional entities already exist that take a systems-based approach to adaptation, treating each municipality as a component in a broader network rather than an island. In 2010, the Florida counties of Broward, Miami-Dade, Monroe, and Palm Beach formed the Southeast Florida Regional Climate Change Compact to coordinate mitigation and adaptation activities across county lines.³⁷ California’s Alliance of Regional Collaboratives for Climate Adaptation adopts an even broader scope, providing support and guidance at the state level to individual regional actors, allowing regions to share resources and lessons learned across the entire state while still focusing on their own locally targeted needs.³⁸ Even without federal support, a broad range of local, regional, state, and non-governmental actors are doing substantial work in climate adaptation, and it is the job of planners to strengthen the links in this chain.

From Powerlessness to Empowerment

The third major shift for planners working in climate change adaptation is fostering greater individual empowerment among U.S. citizens—a sense that individuals and their actions matter. A side effect of the broader climate change narrative’s focus on mitigation is that it has

engendered a sense of powerlessness among average citizens. Individuals often feel that their own actions are just a drop in the bucket compared with the actions of corporations or the collective,³⁹ and eliminating or drastically reducing one's own contribution to the overall level of emissions can require significant effort or investments of time or money.⁴⁰ Cumulatively, the actions of individuals have a significant, quantifiable impact on climate change, but on a psychological level, it is a seemingly insurmountable barrier.

As Lorenzoni and Pidgeon write, “the widely observed public ambivalence towards climate change may well reflect an expression of frustration fueled by disempowerment.”⁴¹ The Yale Program on Climate Change Communication’s “Six Americas” tracking study, which surveys Americans’ beliefs, attitudes, policy preferences, and behaviors regarding climate change, has found that 23 percent of Americans are split roughly evenly between the two extremes of concern (“alarmed” and “dismissive”), while the remainder of Americans barely pay attention to the issue.⁴² Climate change discourse in the U.S. is characterized by a mixture of apathy and fatalism, citizens either convinced that the end is nigh, convinced that the status quo is acceptable, unable to bring themselves to care, or simply outright denying it.

Climate adaptation, in contrast, is experienced primarily at the individual level, and many limitations are endogenous, emerging from within society. Adger et al. write that the availability of scientific knowledge, the extent to which places and cultures are valued, and individuals’ ethical standpoint and attitudes toward risk can limit societies’ ability to adapt to climate change. While these factors are significant barriers, the authors write, they are liable to change.⁴³ The ability of a society to overcome these barriers is

determined by “the availability of technology and the capacity for learning, but fundamentally by the ethics of the treatment of vulnerable people and places within societal decision-making structures.”⁴⁴

So what can planners do? As adaptation has gained ground in theory and practice, it has become clear that many of the world’s most vulnerable populations do not have the resources to implement expensive, infrastructure-based solutions to climate change. A concept that has emerged in response to this challenge is community-based adaptation (CBA), based on the premise that local communities have the skills, knowledge, and connections to undertake climate adaptation.⁴⁵ This is no easy task, as local communities contain highly heterogeneous groups of stakeholders, differentiated by factors such as gender, class, ethnicity, and age.⁴⁶ Nonetheless, CBA represents an alternative to top-down, government-driven adaptation. It is an opportunity for planners to engage with communities directly, and increase community members’ sense of self-efficacy in the face of an environmental crisis.

Another key factor in helping adaptation gain ground is the presence of strong leadership. Shi et al. conducted a survey on local adaptation planning in 156 U.S. municipalities, 60 percent of which were actively planning for climate change. The authors found that existing state policy was not a significant predictor of climate adaptation action, but the presence of strong, charismatic political leadership was a major determinant.⁴⁷ In contrast with the fatalistic view that individual action is inherently fruitless, the actions of devoted individuals can and have made a difference in forwarding sustainable planning.

An inspiring example is the administration of

former Grand Rapids, Michigan Mayor George Heartwell, who, unsatisfied with federal and state leadership on environmental issues, opted to lead by example at the local level. The mayor guided Grand Rapids toward adopting a standalone *Sustainability Plan*, which serves as the City's overall strategic plan. The *Sustainability Plan* has spurred substantial economic growth⁴⁸ and improved Grand Rapids' environmental health, with the City drawing 20 percent of its municipal energy needs from renewable sources by 2013, with a goal of 100 percent by 2020.⁴⁹ It is true that no person acts in isolation, and Grand Rapids' successes are the work of hundreds of dedicated individuals. However, Heartwell's undeniable charisma, an outgrowth of his experience as an ordained minister, has served as a rallying source of energy for the city's rebirth, and serves as a sign to planners that the actions of individuals can have an immediate and lasting impact.

Uncertain Yet Familiar Times

Whether existing adaptation efforts will proceed if federal funding and coordination disappear, or whether non-federal actors will prove capable of filling the gap, is still very much up in the air. So amid this substantial uncertainty, how can planners reassure themselves? One answer is that uncertainty by its very nature is a component of climate adaptation planning, and plans that directly address uncertainty rather than cast rigid projections onto the future will remain relevant longer, allow for iterative course correction, and ultimately avoid maladaptive outcomes.⁵⁰

There is also a sense of "this has all happened before" concerning the Trump administration. Since the environmental revolution of the 1970s, the U.S. has experienced two presidential administrations that were extremely hostile toward environmental issues, prompting a

significant bottom-up response. In the 1980s, President Ronald Reagan appointed anti-environmentalist James Watt as Secretary of the Interior and gutted federal funding to environmental programs, catalyzing growth in the environmental movement.⁵¹ Similarly, in the 2000s, President George W. Bush's administration and the accompanying Republican Congressional majority vehemently opposed mandatory federal emissions standards. In their place, a wide range of states and municipalities adopted emissions standards of their own, and U.S.-based NGOs, firms, and universities launched their own emissions reduction programs.⁵² This demonstrates how in the absence of federal support, other actors have historically arrived to fill the vacuum.

Finally, there is an opportunity for growth in the urban planning profession, with the current crisis underscoring a need for climate education and preparedness to become a core part of the urban planning curriculum. Environmental planning is traditionally a niche subfield of urban planning, sitting alongside other areas of focus such as food systems, physical planning, transportation, and housing policy—and these subfields indeed all represent critical components of the planning profession. But urban environments are, themselves, human-centered ecosystems, and restricting environmental planning to a siloed area of study ignores the fact that as it advances, climate change is going to have a system-wide effect on every individual component of the urban environment.⁵³ No matter their chosen field of study, in the coming decades, a planner not well versed in climate change will be at an inherent disadvantage.

The recommendations in this piece do not comprise a comprehensive policy response, but rather general shifts in societal attitudes toward climate change, and suggestions for how planners

can work to effect this change holistically and smoothly. The bottom line is that climate change has advanced to a stage where it is more urgent than ever that networks of cities, regions, and organizations have the support and resources necessary to take action, and it is going to take genuine innovation, leadership, and collaboration

to make it through the uncertain years to come. But no matter how daunting, complex, and uncertain the challenge may seem, and no matter how absurd the surrounding political context grows, it is important to remember Adams' sage advice: Don't panic!

Endnotes

1. Douglas Adams. *The Ultimate Hitchhiker's Guide to the Galaxy*. New York: Ballantine Books (2002).
2. Edward Wong. "Trump Has Called Climate Change a Chinese Hoax. Beijing Says It Is Anything But." *The New York Times*, November 8, 2016, accessed February 17, 2017, https://www.nytimes.com/2016/11/19/world/asia/china-trump-climate-change.html?_r=0
3. Coral Davenport and Eric Lipton. "Trump Picks Scott Pruitt, Climate Change Denialist, to Lead E.P.A." *The New York Times*, December 7, 2016, accessed January 4, 2017, http://www.nytimes.com/2016/12/07/us/politics/scott-pruitt-epa-trump.html?_r=0
4. Steven Mufson and Juliet Eilperin. "Trump Transition Team for Energy Department Seeks Names of Employees Involved in Climate Meetings." *The Washington Post*, December 9, 2016, accessed January 4, 2017, https://www.washingtonpost.com/news/energy-environment/wp/2016/12/09/trump-transition-team-for-energy-department-seeks-names-of-employees-involved-in-climate-meetings/?utm_term=.44ef2dcd81f1
5. Brian Kahn. "Trump's Presidency Poses Serious Risks to the Climate." *Climate Central*, November 9, 2016. <http://www.climatecentral.org/news/trumps-presidency-climate-change-20858>
6. Rosina Bierbaum, Joel B. Smith, Arthur Lee, Maria Blair, Lynne Carter, F. Stuart Chapin III, Paul Fleming, Susan Ruffo, Missy Stults, Shannon McNeeley, Emily Wasley, and Laura Verduzco. "A Comprehensive Review of Climate Adaptation in the United States: More Than Before, But Less Than Needed." *Mitigation and Adaptation Strategies for Global Change* 18 no. 3 (2013): 361-406.
7. Brady Dennis. "Scientists Are Frantically Copying U.S. Climate Data, Fearing It Might Vanish Under Trump." *The Washington Post*, December 13, 2016, accessed February 15, 2017, https://www.washingtonpost.com/news/energy-environment/wp/2016/12/13/scientists-are-frantically-copying-u-s-climate-data-fearing-it-might-vanish-under-trump/?utm_term=.58c013884eed
8. United Nations, Department of Economic and Social Affairs, Population Division. "World Urbanization Prospects: The 2014 Revision: Highlights" (New York: United Nations, 2014).
9. Intergovernmental Panel on Climate Change. *Climate Change 2014: Synthesis Report* (Geneva, Switzerland: IPCC, 2014).
10. Ibid.
11. Ibid.
12. Jeff Howard. "Climate Change Mitigation and Adaptation in Developed Nations: A Critical Perspective on the Adaptation Turn in Urban Climate Planning." In *Planning for Climate Change: Strategies for Mitigation and Adaptation for Spatial Planners*, edited by Simin Davoudi, Jenny Crawford and Abid Mehmood. London; Sterling, VA: Earthscan, 2009.
13. Ibid.
14. Ibid.
15. Ron Brunner and John Nordgren. "Climate Adaptation as an Evolutionary Process: A White Paper." In *Living with Climate Change: How Communities are Surviving and Thriving in a Changing Climate*, edited by Bullock, Jane A., George D. Haddow, Kim S. Haddow, and Damon P. Coppola. CRC Press, 2015.
16. Howard, "Climate change mitigation.."
17. Cynthia Rosenzweig and William Solecki. "Hurricane Sandy and Adaptation Pathways in New York: Lessons from a First-Responder City." *Global Environmental Change* 28 (2014): 395-408.
18. Bonizella Biagini, Rosina Bierbaum, Missy Stults, Saliha Dobardzic, and Shannon M. McNeeley. "A Typology of Adaptation Actions: A Global Look at Climate Adaptation Actions Financed Through the Global Environment Facility." *Global Environmental Change* 25 (2014): 97-108.
19. Emily Boyd. "Climate Adaptation: Holistic Thinking Beyond Technology." *Nature Climate Change* 7 no. 2 (2017): 97-98.
20. Robin Bronen and F. Stuart Chapin. "Adaptive Governance and Institutional Strategies for Climate-Induced Community Relocations in Alaska." *Proceedings of the National Academy of Sciences* 110 no. 23 (2013): 9320-9325.
21. Erica Novack. "Resurrecting the Public Trust Doctrine: How Rolling Easements Can Adapt to Sea Level Rise and Preserve the United States Coastline." *Boston College Environmental Affairs Law Review* 43 (2016): 575.
22. Missy Stults and Sierra C. Woodruff. "Looking Under the Hood of Local Adaptation Plans: Shedding Light on the Actions Prioritized to Build Local Resilience to Climate Change." *Mitigation and Adaptation Strategies for Global Change* (2016): 1-31.

23. Ibid.
24. John Forester. "Planning in the Face of Power." *Journal of the American Planning Association* 48 no. 1 (1982): 67-80.
25. Stults and Woodruff, "Looking Under the Hood."
26. City of Boston. *Natural Hazard Mitigation Plan*. Boston, MA, 2015. https://www.cityofboston.gov/images_documents/Boston%20Revised%20Draft%20Hazard%20Mitigation%20Plan%202014%20Update%20%2003-31-15_tcm3-51167.pdf.
27. City of Boston. *Imagine Boston Waterfront: Assessment and Vision*. Boston, MA, 2016. http://20222-presscdn.pagely.netdna-cdn.com/wp-content/uploads/2017/01/IBW_Deliverable_2016-12-8-FINAL.pdf.
28. City of Boston. *Hazard Mitigation Plan*.
29. City of Boston. *Capital Planning*. Boston, MA, 2016. https://www.cityofboston.gov/images_documents/08%20Capital%20Planning_tcm3-53289.pdf.
30. City of Boston Climate Preparedness Task Force. *Climate Ready Boston*. Boston, MA, 2013. https://issuu.com/eecs_boston/docs/final_report_29oct13.
31. Michael Bloomberg. "Washington Won't Have Last Word on Climate Change." *Bloomberg View*, November 22, 2016. <https://www.bloomberg.com/view/articles/2016-11-22/washington-won-t-have-last-word-on-climate-change>
32. Bierbaum et al., "Comprehensive Review of Climate Adaptation."
33. M. Georgescu, W. T. Chow, Z. H. Wang, A. J. Brazel, B. Trapido-Lurie, M. Roth, and V. Benson-Lira. "Prioritizing Urban Sustainability Solutions: Coordinated Approaches Must Incorporate Scale-Dependent Built Environment Induced Effects." *Environmental Research Letters* 10 (2015): 1-5.
34. Rafael Pizarro. "Urban Form and Climate Change: Towards Appropriate Development Patterns to Mitigate and Adapt to Global Warming." In *Planning for Climate Change: Strategies for Mitigation and Adaptation for Spatial Planners*, edited by Simin Davoudi, Jenny Crawford and Abid Mehmood, 41. London; Sterling, VA: Earthscan, 2009.
35. Bierbaum et al., "Comprehensive review of climate adaptation."
36. Maria Carmen Lemos, Christine J. Kirchhoff, Scott E. Kalafatis, Donald Scavia, and Richard B. Rood. "Moving climate information off the shelf: boundary chains and the role of RISAs as adaptive organizations." *Weather, Climate, and Society* 6 no. 2 (2014): 273-285.
37. "Who we are." Southeast Florida Regional Compact, accessed February 15, 2017, <http://www.southeastfloridacclimatecompact.org/who-we-are/>.
38. Laura Hammett. "Thinking Beyond the City: Regional Climate Adaptation Planning and Habitat III." F&ES Blog, June 3, 2016. <https://environment.yale.edu/blog/2016/06/thinking-beyond-the-city-regional-climate-adaptation-planning-and-habitat-iii/>.
39. Jan C. Semenza, David E. Hall, Daniel J. Wilson, Brian D. Bontempo, David J. Sailor, and Linda A. George. "Public Perception of Climate Change: Voluntary Mitigation and Barriers to Behavior Change." *American Journal of Preventive Medicine* 35 no. 5 (2008): 479-487.
40. Chris J. Cuomo. "Climate Change, Vulnerability, and Responsibility." *Hypatia* 26 no. 4 (2011): 690-714.
41. Irene Lorenzoni and Nick F. Pidgeon. "Public Views on Climate Change: European and USA Perspectives." *Climatic Change* 77 no. 1 (2006): 73-95.
42. Anthony Leiserowitz, Edward Maibach, Connie Roser-Reinout, Geoff Feinberg, and Seth Rosenthal. "Global Warming's Six Americas, March 2015" (Haven, CT: Yale Program on Climate Change Communication, 2015).
43. W. Neil Adger, Suraje Dessai, Marisa Goulden, Mike Hulme, Irene Lorenzoni, Donald R. Nelson, Lars Otto Naess, Johanna Wolf and Anita Wreford. "Are There Social Limits to Adaptation to Climate Change?" *Climatic Change* 93 no. 3-4 (2009): 335-354.
44. Ibid.
45. David Dodman and Diana Mitlin. "Challenges for Community-Based Adaptation: Discovering the Potential for Transformation." *Journal of International Development* 25 no. 5 (July 2013): 640-659.
46. Thomas G. Measham, Benjamin L. Preston, Timothy F. Smith, Cassandra Brooke, Russell Gorddard, Geoff Withycombe, and Craig Morrison. "Adapting to Climate Change Through Local Municipal Planning: Barriers and Challenges." *Mitigation and Adaptation Strategies for Global Change* 16 no. 8 (December 2011): 889-909.
47. Linda Shi, Eric Chu, and Jessica Debats. "Explaining Progress in Climate Adaptation Planning Across 156 U.S. Municipalities." *Journal of the American Planning Association* 81 no. 3 (2015): 191-202.
48. Caitlin Geary. "Sustainable Connections: Linking Sustainability and Economic Development Strategies" (Washington, D.C.: National League of Cities, 2011).
49. George Heartwell. "Sustainable Practices in a Michigan City," presentation, Rackham Amphitheatre, Ann Arbor, MI, October 1, 2015.
50. Sierra C. Woodruff. "Planning for an Unknowable Future: Uncertainty in Climate Change Adaptation Planning." *Climatic Change* 139 no. 3 (2016): 445-459.
51. Laura A. Johnson. "An Open Field: Emerging Opportunities for a Global Private Land Conservation Movement" (Cambridge, MA: Lincoln Institute of Land Policy, 2014).
52. Henrik Selin, and Stacy D. VanDeveer. "Political Science and Prediction: What's Next for U.S. Climate Change Policy?," *Review of Policy Research* 24 no. 1 (2007): 1-27.
53. Nancy B. Grimm, J. Grove Grove, Steward TA Pickett, and Charles L. Redman. "Integrated Approaches to Long-Term Studies of Urban Ecological Systems." *BioScience* 50 no. 7 (2000): 571-584.