

Preparing for Climate Impacts



Lessons from the Front Lines

A Synthesis Report to
The Kresge Foundation

GEORGETOWN CLIMATE CENTER
A Leading Resource for State and Federal Policy

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July 2014

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Introduction and Summary

Adaptation Is Evolving

Climate change is happening. Regardless of today's mitigation efforts, past emissions levels have committed us to decades of rising temperatures and seas. From Hurricane Sandy to record heat, extreme weather events associated with climate change are already devastating communities – and the threat is growing. Scientists project that sea levels in the U.S. could rise more than 6 feet and temperatures could increase by between 3 to 10 degrees Fahrenheit over the next 100 years.¹ Communities are beginning to recognize that they must adapt to this “new normal” of more-frequent hot days, more flooding, and more impacts to people and property. Adaptation refers to the activities taken to prepare for, reduce, or avoid the potential impacts from a changing climate.

The good news is that communities are beginning to take action to build resilience. They are planning for climate-change impacts, rebuilding stronger after natural disasters, and proactively implementing policies that will help lessen or avoid future impacts.

Most state and local governments are at the early phases of adapting. The dominant focus has been on “soft” activities like planning, vulnerability assessments, and capacity building. While planning is occurring at all levels of government and plans are becoming more sophisticated in their analysis of potential impacts and consideration of policy responses, planning is occurring in an ad hoc manner. This is primarily because there are no incentives, mandates or dedicated sources of funding for adaptation. As a result, adaptation planning is taking many makeshift forms that reflect different local champions (for example, senior policymakers, agency staff, or community activists), threats (such as sea-level rise and urban heat-island effect)², and vulnerable sectors (such as transportation and ecosystems).

As the level of scientific understanding and technical capacity increases, more and more jurisdictions are planning to meet unique local needs. Fourteen states have completed comprehensive, state-led adaptation plans (AK, CA, CO, CT, FL, ME, MD, MA, NH, NY, OR, PA, VA, and WA); an additional eight states (DE, HI, MI, MN, NJ, RI, VT, WI) are undertaking some form of adaptation planning that is either in progress, academically driven, or sector-specific; and roughly 50 local jurisdictions have adaptation plans that take a variety of forms. Few states and communities are implementing their plans by making “hard” changes in law or policy that alter regulatory and management decisions in light of projected climate change.

Purpose and Organization

The Georgetown Climate Center provides direct services to state and local jurisdictions to help them adapt to the impacts of climate change and to integrate adaptation into all levels of government decision-making. The Center works on adaptation policy generally and helps state and local governments answer legal and policy questions about how to adapt to specific climate change impacts – for example, sea-level rise and increased urban heat islands. The goal of our work is to help communities avoid losses by implementing adaptive measures before impacts occur. States we have served include Maryland, Connecticut, New York and Vermont; local jurisdictions we have worked with include Washington, DC, Milwaukee and New York City; regional efforts our work has informed include the West Coast Governors’ Alliance Climate Action Team and the Western Governors’ Association.

The purpose of this report is to summarize the lessons Georgetown Climate Center staff has learned through our work with state and local partners. This work was made possible by the generous support of The Kresge Foundation, the initial audience for this report. The Center and Kresge hope these lessons will help the wider funding community and other practitioners inform strategies for moving adaptation policy beyond planning and into action.

The Center’s work has focused on the challenges to and opportunities for integrating adaptation between vertical levels of government (federal, state, local) and across horizontal silos within one level of government (agencies and departments within a city, for example). This report begins with a discussion of the general roles that each level of government needs to play to facilitate and implement responses to climate change. Next, the report provides a brief synopsis of Georgetown Climate Center’s approach to integrating adaptation at each level of government, from planning to implementation. Finally, the report synthesizes the lessons the Center learned as it worked with states and communities. Brief case studies are provided throughout to draw out lessons from some of the projects on which the Center has worked. These case studies provide examples from leading communities to highlight the real-world experiences of our government partners as they try to plan and implement adaptive solutions.

Adaptation Actors

No single entity or level of government can respond to the challenge of climate change alone –all levels need to collaborate to ensure a viable response. Thus, an important part of devising an effective adaptation strategy is understanding the opportunities and barriers at all levels of government.

- **Local governments** are on the front lines of climate-change impacts. They make the land-use and public investment decisions that are often at the core of any adaptation strategy. The primacy of the local role, however, makes adaptation challenging. There is little opportunity for a top-down mandate from state or federal entities. States are hesitant to usurp local authority or impose new obligations on local governments that already shoulder multiple competing responsibilities with limited funding. In the absence of state-level coordination across local jurisdictions, one community’s adaptation can be maladaptive for neighboring communities. For example, if one community responds to flooding by erecting a sea wall, the natural flood protections provided by neighboring wetlands and beaches might be diminished. It is important to recognize the primacy of the local role in making zoning and land-use decisions while simultaneously working to build effective regional collaborations.
- **State agencies** have led adaptation efforts in 14 states by developing statewide adaptation plans. Goals articulated in these plans, however, are not always adopted and acted upon by state and local decision-makers. Recommendations for changes at the state level are successful when there is support from the governor and/or buy-in from the relevant agencies and resources and personnel are available to insure adoption of recommendations.

Recommendations that involve municipalities are successfully translated to localities when state agencies provide the technical assistance, guidance, funding, and scientific data that are critical to local decision-making. State investment decisions can also dramatically spur local action.

- The **federal government** sends billions of dollars every year to state and local governments. Federal agencies also provide the science, modeling, and technical support that are critical to state and local adaptation planning. There is no comprehensive federal legislation that requires states and localities to consider their long-term risks of climate impacts. This is a major gap because federal incentives historically have been a significant driver of state and local regulation, particularly in the context of land use and environmental regulation. The National Flood Insurance Act, for example, inspired regulation of development in flood-prone areas through the “carrot” of federal funding and insurance. No similar “top down” law requires communities to plan for and implement adaptations to climate change. As a result, adaptation is often near the bottom of the long list of priorities for state and local governments. In the absence of clear mandates, federal agencies could play a critical role in encouraging adaptation by aligning federal incentives – by including adaptation as a funding criterion or by giving priority to adaptive projects. Federal agencies should direct funding in ways that reinforce the efforts of the leading communities, while nudging laggard communities to adapt.
- **Professional associations** can also greatly influence state and local decision-making. Nongovernmental associations, such as the American Association of State Highway and Transportation Officials, the International Code Council, and the U.S. Green Building Council, develop model codes and standards that are adopted, by reference, by many states and localities. For example, roads and bridges are designed to meet AASHTO Green Book standards, and residential and commercial buildings are often designed to conform to ICC’s model building codes. A shortcut to resilience is to get these influential entities – whose membership often consists of government officials in the relevant sectors – to incorporate climate change in the development of their model codes. State agencies and localities can then adopt these model codes instead of developing their own, saving time and money.

Phases of Adaptation Decision-Making

Devising a viable adaptation strategy also requires consideration of the phases of adaptation decision-making: planning, implementation, post-implementation monitoring and then refining and updating plans based upon their efficacy. We are all learning by doing, with new information about changes coming in over time. Adaptation is in essence an iterative process.

- **Planning:** Adaptation planning can occur through a stand-alone process. Planning begins with identifying the climate-change impacts anticipated for the region and assessing vulnerabilities. Once those are identified, actions are recommended to prepare for and respond to projected impacts. Adaptation planning can also be “mainstreamed” – rather than adding a new task or responsibility, communities can incorporate consideration of climate-change impacts into how they make regulatory and fiscal decisions through planning documents required by other laws or regulations (e.g., hazard mitigation or comprehensive plans). In both formats, to ensure that planning leads to a more resilient community, plans must be translated into action by anticipating and responding to challenges that may be encountered during implementation.
- **Implementation:** Implementing the recommendations in adaptation plans often requires changes to existing laws and policies. The Center helps communities consider the legal feasibility of different responses to climate change and integrate selected policies into their existing legal frameworks (e.g., land-use laws, building codes). Existing laws and policies can be a barrier to adaptation because they were not designed to account for a changing climate.

Some federal laws or regulations prevent devastated infrastructure from being rebuilt stronger after a disaster, and some states limit the ability of municipalities to set standards beyond state building codes. We cannot remake our legal system overnight. Policymakers sometimes hesitate to even propose amendments to environmental laws out of fear that special interests will use such openings to gut protections that are already in place. As a result, adaptation often has to occur opportunistically, through a mix of short-term workarounds and longer-term reforms.

- **Non-legal barriers** (technical, administrative and funding) can also inhibit implementation. Actionable plans require decision-makers to understand: (1) what data and technical information they need to make decisions, (2) which agencies will be charged with implementing each recommendation, and (3) how the implementation of the strategies recommended in the plans will be funded. Many plans neglect to describe these aspects of implementation, leaving decision-makers without a clear path. Actionable plans should include a discussion of the agency or agencies charged with implementing each recommendation and mechanisms to find technical information and funding to support implementation.
- **Post-Implementation monitoring and revisions:** Adaptation planning is only useful to the extent that the activities implemented help communities become more resilient to impacts from climate change and extreme weather. To be truly effective, adaptation must be an iterative process – communities must monitor the efficacy of implemented activities and then refine plans, laws, and policies based upon the best scientific information about climate change and the effectiveness of different measures. Doing so will require policymakers to develop metrics for assessing the effectiveness of adaptation measures while providing funds and instituting requirements for monitoring their implementation. Regulators and managers must be given sufficient flexibility to adjust how they make decisions based upon the efficacy of measures and updated science. Such flexibility may, in many cases, require amending laws and regulations that often rely on historical baselines. Floodplain regulations, for example, are established by reference to the 100-year floodplain, which is defined by reference to historical flood data. Because the National Flood Insurance Program (described in Case Study 3) uses the 100-year floodplain as its regulatory baseline, regulators are inhibited from taking into account increased flood risks caused by climate change. Monitoring the efficacy of measures can also help build the case for adaptation. Once the benefits of measures can be quantified, practitioners will be better able to justify and build political support for adaptation. This is especially important given the contrast between the short-term political cycle and the long-term changes in store.

Take-Home Lessons

Decide Where to Focus

There is no single path to adaptation. A strategic approach requires consideration of the forums where adaptation can gain the most political traction, where law and policy can promote resilience, and where tools and policy models can be tested for replication on a larger scale. It is difficult for a foundation or a government entity to decide where to focus limited resources. By assisting adaptation leaders, the Georgetown Climate Center has learned the following lessons regarding where to focus resources.

1. **State and local governments are on the front lines of climate change in terms of both impact and action.** Impacts are experienced within local communities, and the strongest impulse will be to respond to impacts at a local level. Any viable response to climate change must recognize the primacy of local governments and work within jurisdictional divisions (states, counties, municipalities, regional planning organizations) and their limitations. In our work, the Georgetown Climate Center helps localities integrate adaptation into existing laws and policies and identify how federal and state agencies can remove barriers to better support state and local action.
2. **Natural leaders are the vanguard of change.** Strong leaders will be needed to overcome the many challenges presented by adaptation. Implementing adaptive measures will require a significant investment of time, staff, and resources. To devise workable solutions, we must provide support to those actors who show the political will to be bold and experimental, to commit resources, and to build the capacity to implement measures on the ground.
3. **Adaptation planning must connect to action.** Entities at all levels of government have competing priorities and a multitude of responsibilities. Successful adaptation aligns with, rather than competes with, existing priorities. For example, adaptation can be incorporated into existing comprehensive or hazard-mitigation planning, rather than codified in a stand-alone plan. For those with stand-alone plans, communities must connect the dots between “soft” plans and “hard” laws and policies that drive decision-making, such as land-use regulation.
4. **Disasters can be the drivers of adaptation.** Ideally, adaptation should be proactive – anticipating and preparing for risks. In reality, it is often reactive – considering changes in the wake of a catastrophic event or near miss. It is generally much easier to help communities make better choices when they are reacting to a disaster and when they understand the importance of rebuilding smarter and directing investments out of harm’s way. Experiences by communities affected by Hurricanes Sandy, Irene, and Katrina, however, show that planners are better prepared to seize the opportunity to rebuild resiliently after a disaster when they have well-developed plans and laws on the books in advance of the disaster. Otherwise, opportunities for improvement are often missed in the rush to restore normalcy. Federal agencies can play a vital role by providing communities with flexibility to rebuild resiliently using disaster-relief funds; without this flexibility, there is risk of wasting significant financial resources. (See Case Study 1 below.)

CASE STUDY 1: Sandy, Irene, and Katrina – Building Resilience After Disaster

With the global financial center submerged under several feet of water, Hurricane Sandy was a wake-up call to the nation. In the hurricane’s aftermath, New York Gov. Andrew Cuomo and New York City Mayor Michael Bloomberg announced plans not just to build back, but also to build back stronger – to increase the state’s and city’s long-term resilience to impacts from climate change.

Disaster-relief funding provides a critical window of opportunity for building resilience. Public facilities such as roads and bridges must be rebuilt and significant federal funding becomes available to assist communities with the process. Historically, however, communities have faced significant legal and practical barriers to improving facilities during rebuilding.

Lessons on how to streamline procedures and promote adaptation in disaster-relief efforts were learned through case studies of responses to Hurricanes Katrina and Irene. Working with agency staff in Louisiana and Vermont, the Georgetown Climate Center identified key barriers to resilient rebuilding in federal disaster-relief laws. New Orleans, for example, faced difficulty using disaster-relief funds in rebuilding its school system to accommodate demographic changes following Katrina. After Hurricane Irene, Vermont had problems getting reimbursed when state and local entities replaced blown out “pipe culverts” with larger, bottomless “box culverts” that accommodate greater amounts of stream flow and promote fish passage.

Both states reported difficulty navigating federal disaster relief, which is administered through more than 20 programs, each with its own rules and limitations. Federal agencies administering these funds do not coordinate the approval process and paperwork needed to reimburse state and local governments. This can create unnecessary complications, particularly for innovative projects, and can discourage communities from implementing adaptive measures during rebuilding. New York’s efforts to build back stronger with federal support have been informed by lessons learned in communities affected by Katrina and Irene. Leaders from Louisiana and Vermont laid the groundwork for key reforms to federal disaster-relief programs that were enacted in the Sandy Supplemental Appropriation.

The Sandy appropriation fails, however, to address one major structural deficiency of federal disaster-relief programs: These programs do not assist communities that receive the people who have lost their homes in extreme weather events or to encroaching seas. In Louisiana, for example, Baton Rouge and Lafayette saw overnight population explosions after Hurricanes Katrina and Rita. Their populations continue to be much higher nine years later and will likely continue to grow given combined pressures of sea-level rise, wetlands loss and the greater frequency of intense storms. Yet these and many other affected areas are ineligible for disaster-relief funds to help plan and provide services for swelling populations.

Understanding the Adaptation Provisions of the Sandy Disaster Relief Appropriation:

www.georgetownclimate.org/sandy-disaster-relief-act

Lessons Learned from Irene:

www.georgetownclimate.org/irene-lessons-learned

5. **Vulnerable communities set the benchmark for progress.** The drive to work with vanguard communities can compete with the need to support communities with fewer technical and financial resources and less political clout. These communities may be the most vulnerable to climate impacts and have the most vulnerable populations. Success or failure in adapting to climate change will be measured by how well we protect our most vulnerable. Adaptation practitioners must balance the drive to support vanguard communities in identifying successful pathways and models for others with the need to help the most vulnerable communities and populations.

CASE STUDY 2: Washington, DC – Coordinating Agency Action to Protect Vulnerable Communities

In the fall of 2011, District of Columbia Mayor Vincent Gray initiated a community-based comprehensive planning process for the city called Sustainable DC. This process provided a platform for conversations about climate change and environmental justice, which can now be leveraged to support adaptation planning and implementation. In our work with the District of Columbia, the Georgetown Climate Center evaluated the authority of 11 government entities, including the Council of the District of Columbia, to coordinate agency work across different sectors.

The Center worked with District officials to ensure that the citywide sustainability plan laid the groundwork for their forthcoming adaptation plan. The Center completed a legal analysis of the different policy responses to increased urban temperatures (including use of green roofs, cool roofs, permeable pavements, and urban forestry) and the powers of different city agencies to determine: (1) what measures agencies were already taking, (2) what they could do with existing authority, and (3) what responses would require additional authority from the council.

Additionally, the Georgetown Climate Center helped the District government evaluate how to focus its adaptation efforts on its most vulnerable citizens, including low-income residents, the elderly, and the homeless. Researchers from the University of Michigan are also working to create a heat-vulnerability map of the district, incorporating physical information about the built environment as well as socioeconomic and demographic data about the people who are most vulnerable to heat. Using this map and the Center's analytic work, the District Department of the Environment plans to target its heat-emergency response and adaptation efforts first to areas of the District that are most at risk.

Respond to Horizontal Diversity Across Communities

A viable strategy for promoting adaptation must recognize the natural diversity among communities. Every community has unique vulnerabilities, politics, and legal frameworks. These variables make it difficult to develop policies in one jurisdiction that can be directly replicated in others. For example, the adaptation options for densely populated urban areas differ greatly from those available to rural coastlines. Cool roofs are a good option in southern climates, but they increase winter heating costs in northern climates, potentially offsetting benefits during summer heat waves. While no single approach accommodates this diversity among communities, policymakers can share models and best practices when their needs align.

1. **One size does not fit all, but patterns allow communities to tailor their responses.** To respond to the challenge of diverse settings and priorities, Georgetown Climate Center products – such as our “tool kits” – and reports present communities with menus of options for responding to climate impacts. By presenting policymakers with a variety of options, the Center empowers communities to tailor their responses to their unique political, regulatory, and geographical needs.
2. **Resist approaching adaptation as a stand-alone silo of policies and programs.** Adaptation is evolving as a field with its own vernacular – one that does not always mesh with, and sometimes ignores, more traditional methods of thinking about problems such as hazard mitigation and sustainability. Because of this evolution as a distinct field of policy, adaptation often excludes relevant and politically influential stakeholders who are key to successful preparedness and response – officials such as emergency managers and floodplain managers. As a result, adaptation strategies may not be fully informed by, or informing of, existing policies and practices.

Integrate Vertical Power Across Levels of Government

Adapting to climate change will require increasingly greater resources and intergovernmental coordination. In our federal system, it is rare for any single level or agency of government to possess sufficient authority and capacity to adapt on its own. Relevant responsibilities are often divided among a number of agencies, jurisdictions, and laws. President Obama’s Climate Action Plan³ reinforces the importance of vertical coordination across levels of government, encouraging federal agencies to use existing authority to support and remove barriers to state and local adaptation efforts.

1. **Identify and remove regulatory barriers at all levels.** Local, state, and federal regulators have overlapping and sometimes conflicting authority over threatened resources. This makes adaptation challenging because it must be integrated into several regulatory frameworks, each administered at a different level of government. Regulatory barriers tend to be most pervasive in the coastal zone, because coasts are governed by laws and regulations at all three levels of government.
2. **Use the tools of cooperative federalism.** Legal barriers presented by federal programs may, in many cases, be more perceived than actual. In our work in several jurisdictions, we have found that often adaptation does not require new legislation or amendments to existing laws; many federal programs often provide enough flexibility to allow for adaptation. In fact, this flexibility does not always depend on additional federal agency action. Federal statutes often recognize state and local governments as co-regulators and contain provisions that allow for “cooperative federalism.” These can be cited to prompt federal agencies to be more flexible. Doing so, however, requires cooperation of state or local policymakers who are willing to put the time and effort into changing the status quo.
3. **Understand the inputs that drive state and local decision-making.** Some federal programs could allow shortcuts to promoting adaptation because they drive the bulk of local decision-making. For example, the floodplain maps developed by the Federal Emergency Management Agency to implement the National Flood Insurance Program drive local regulation of floodplains. By incorporating consideration of sea-level rise and changes in precipitation, FEMA could provide a critical tool to allow local governments to regulate development in vulnerable areas.

CASE STUDY 3: Maryland Model Sea-Level-Rise Ordinance – Develop a Pattern

With more than 3,000 miles of coastline, Maryland is one of the states most vulnerable to a rise in sea levels. Working with Maryland’s Department of Natural Resources and Emergency Management Agency, the Georgetown Climate Center developed a model sea-level-rise ordinance for Maryland localities, incorporated adaptation policies into the state’s model floodplain ordinance, and prepared a case study analyzing potential barriers in federal and state law that could limit the ability of localities to adapt.

We developed the model ordinance as a “choose your own adventure” tool for local governments because Maryland localities have diverse landscapes and varying risks of climate-change impacts. As a result, the state needed a regulatory model that could be tailored to local needs and customized to implement adaptation goals for different regions. This model provides them with a variety of land-use tools. One land-use zone accommodates new development in vulnerable areas (requiring that the development be sited and designed to be more resilient to impacts by elevating structures or setting them back from the coast, for example). A second zone encourages the relocation of development by limiting new development or redevelopment in highly vulnerable parts of the coast.

The model ordinance also provides strategies to help localities overcome legal obstacles. The National Flood Insurance Program governs the minimum requirements for local regulation of floodplains. To participate in the program, localities must impose minimum regulations in areas designated as the 100-year floodplain (areas that have a 1-percent chance of flooding in any given year based upon historical flood data) on floodplain maps. Because the maps use historical flood data to determine an area’s flood risk, localities will not be regulating development for the increasing risks posed by sea-level rise and more extreme storms. The model sea-level-rise ordinance proposes that localities use areas designated as the 500-year floodplain. This provides a short-term approach to protect against increased inland flooding while communities wait for sea-level-rise maps that they can use for regulatory purposes.

Adaptation will also require decision-makers to take advantage of opportunities presented in existing laws. As a companion to the model sea-level-rise ordinance, the Center analyzed the benefits to communities that participate in the Community Rating System and score points by implementing the tools detailed in the ordinance. The CRS is a voluntary, incentive-based program that rewards communities with lower insurance premiums if they adopt more restrictive floodplain regulations. We determined that a community that adopts most of the provisions in the Center’s model ordinance could receive a Class 2 ranking, qualifying landowners in that community for a 40 percent discount on insurance premiums. This analysis will be particularly useful following passage of the federal Biggert-Waters Act, which increases insurance rates for many homeowners. The Center also analyzed how the Biggert-Waters reforms will affect adaptation efforts.

Executive Summary of Our Sea-Level-Rise Ordinance:

bit.ly/sea-level-rise-ordinance

Analysis of the Biggert-Waters Reforms to the National Flood Insurance Program:

www.georgetownclimate.org/bigbert-waters-analysis

4. **Use funding as the carrot to promote adaptation at the state and local level.** Federal programs often present an untapped opportunity to promote adaptation. It is difficult to foster adaptation while budgets are being cut at all levels of government and maintaining existing infrastructure and operations is a challenge. Coastal and floodplain management has historically been driven by the “carrot and stick” of significant federal support: Local communities were inspired to enact regulations – the stick – by the promise of federal funding – the carrot. Federal agencies have a significant opportunity to promote adaptation through use of funding criteria and establishment of priorities.
5. **Align funding to help communities move from planning to implementation.** Most funding sources do not carry a community through the entirety of a project timeline. Some programs fund research, some fund planning; a smaller number fund implementation. Communities must therefore pull together funding from a variety of streams to implement their plans. Better sharing of information can smooth the path from planning to implementation. One such resource is the Center’s compendium on government opportunities to fund measures related to urban heat-island impacts (discussed in Case Study 4). The Federal Highway Administration smoothed the path for transportation planners by issuing a [memorandum](#)⁴ on how federal transportation funds can be used to support adaptation.

CASE STUDY 4: Funding and Financing Adaptation

Local governments need ways to pay for the adaptation activities detailed in their plans. Federal agencies provide funding for a variety of activities and, although there are few programs that explicitly fund adaptation, many programs could in fact support state and local adaptation activities. The Center mapped nearly 50 federal funding streams that can be used to fund urban heat adaptation and produced a compendium of federal programs to help local governments identify potential sources of funding for this work. Funds from the Community Development Block Grant and Weatherization Assistance programs and several types of transportation funding, for example, have enormous potential to promote adaptation if state and local governments can be made aware of that potential and federal agencies can be encouraged to fund adaptation activities.

Federal programs alone, however, will never provide all of the funding needed to adapt to climate change. Local governments, therefore, are seeking to leverage their funds through public-private financing mechanisms to maximize the benefits of their investments. In order to promote more bang for the adaptation buck, the Georgetown Climate Center analyzed financing options that would allow local governments to either lend money directly to developers and property owners – through a revolving loan fund, for example, or to support private lending, such as through a loan guarantee program. Working from financing models developed to promote energy efficiency, clean energy, and green infrastructure, the Center provided recommendations for applying similar financing models to support adaptation projects such as green and cool roofs. By enabling local governments to use their funds more than once by loaning the funds out or by supporting private lending, the adaptation opportunities across a community can be maximized.

Compendium of Federal Programs to Support Urban Heat Island Adaptations:

www.georgetownclimate.org/urban-heat-funding

6. **Develop creative mechanisms to leverage diminishing funding sources.** Dedicated funding for adaptation (e.g., Federal Highway Administration [pilot projects](#)⁵ in 22 communities) is limited, so federal agencies must leverage existing programs to encourage state and local governments to plan for and adapt to climate change. Otherwise, different priorities prevail: The threats of global warming are often seen as long-term and less pressing than other fiscal needs. The Center has begun to examine innovative ways to fund adaptation by leveraging federal resources through creative financing models. These include methods for state and local governments to leverage scarce funds to maximize adaptation financing (described in Case Study 4).

CASE STUDY 5: Living Shorelines – The Challenges of Vertical Integration

Living shorelines can help reduce flooding and erosion by recreating or restoring natural shoreline features such as wetlands and beaches. Many communities are considering living shorelines as a better option for protecting coastal development than more traditional methods such as hard armoring or constructing sea walls, which can have adverse impacts. However, living-shoreline projects are more difficult and costly to implement than hard armoring because they trigger regulatory review at all levels of government. For living shorelines to be a viable response to sea-level rise, regulators need to streamline the permitting process. Working with the West Coast Governors Alliance, the Georgetown Climate Center developed a report identifying a variety of mechanisms under the Clean Water Act that can be used to streamline permitting for living-shoreline approaches at both the state and federal levels.

The report includes two case studies of jurisdictions that have coordinated permitting between federal and state regulators. The state of Maryland has assumed authority to issue most permits for coastal protection projects through a Programmatic General Permit from the Army Corps of Engineers. Maryland lawmakers also passed the Living Shoreline Protection Act, which favors living shorelines over hard armoring to control flooding and erosion. In Alabama, the Corps developed a Regional General Permit that simplifies the process for obtaining a federal permit for a living-shoreline project.

These case studies demonstrate the opportunities presented by statutes (such as the Clean Water Act) that follow a cooperative-federalism model, by which federal agencies set minimum standards but do not usurp state and local authority to cooperatively regulate. A cooperative-federalism model can sometimes be challenging from an integration standpoint; because all three levels of government regulate activities, adaptation must be incorporated into local, state and federal regulatory schemes. However, laws that promote cooperative federalism also allow states and localities to impose more protective regulations that foster adaptation, as was done in Maryland.

Legal Barriers and Opportunities for Promoting Living Shorelines:

www.georgetownclimate.org/living-shorelines-barriers-and-opportunities

Help Decision-Makers Find a Path Forward

Adaptation is challenging for many reasons: While global warming is unequivocal, the timing and extent of impacts are uncertain. Even less clear is how communities should respond to these impacts and how to choose among a range of responses when the costs and benefits of different approaches are unclear. In addition, while the effects of climate change are already being felt, the most serious consequences will occur over time – beyond the term of those currently holding elective office. Without a groundswell of calls for action and dedication of new resources, it is all too easy to delay making investment decisions with climate change in mind – especially when such changes will be met with resistance by some constituents, such as landowners and developers, who are invested in the status quo. To foster adaptation in an era of competing priorities and limited funding, we must empower decision-makers with a clear path forward: with actionable science, clear options, and tools for choosing among options. We must also make the case that inaction is also a costly – and even dangerous – proposition given what we already know.

1. **Decisions are easier with clear options and criteria.** Adaptation planners face information overload: There are numerous reports, tools, and data on climate change and adaptation. However, this information is often not organized in an actionable manner. In order to develop a plan for adapting, decision-makers need to be able to quickly and easily determine the risks to their communities, the range of options for responding to those risks, the costs and benefits of each approach, and the means for implementing different policies on the ground.
2. **The costs of not adapting will often outweigh the cost of adapting.** One of the primary barriers to implementation is cost; even the most willing jurisdictions are having difficulty getting their communities to bear large up-front costs to protect against uncertain long-term risks. While the costs of adapting are immediate and known, the costs of not adapting are unquantified and impacts are often perceived as being far in the future and therefore beyond the political life cycle for most elected officials. While many adaptive measures can have significant long-term benefits and co-benefits, those benefits are also unquantified. For example, some measures can have multiple environmental benefits: Green roofs that reduce urban heat islands, for example, also filter polluted runoff, reduce energy consumption and improve public health, thus reducing water pollution, greenhouse gas emissions and health spending. The Center’s work helps policymakers “sell” adaptation by highlighting the variety of co-benefits from adaptive activities. More work can be done, however, to quantify both the potential economic and environmental benefits of adaptation and compare these to the costs of inaction.
3. **Science needs to support decisions.** Scientists need to develop mapping and modeling tools that support state and local decision-making. For example, most states assess their vulnerability to sea-level rise based upon bathtub models (i.e., models that simply reflect an area’s vulnerability to inundation based upon its topographical elevation); they do not account for storm-driven flooding from surge and waves. The flood-insurance maps used to drive regulatory decisions reflect only historical flood risks; they do not account for how flood risks will change as sea levels rise and precipitation increases, though both are already occurring. Thus, the tools currently used to make land-use decisions do not integrate with the tools being developed to assess climate risks. The Center helps communities address these technical barriers to adaptation by examining the legal authority of agencies to develop “actionable science” and the potential liability of relying on that science for decision-making.

4. Many decisions require present threats, not future certainty. The Center also helps communities identify adaptation strategies that do not require scientific certainty. Most communities are not prepared for the threats they face under existing climate conditions, let alone a radically different future. As a result, there are opportunities to build resilience to existing threats in a way that does not require communities to engage in the political debate of climate change or address uncertainties in the science regarding the timing and extent of impacts. One example of this work is our model sea-level-rise ordinance (Case Study 3), which identifies opportunities for communities to take a precautionary approach to regulating development in floodplains even without sophisticated sea-level-rise maps.

CASE STUDY 6: Getting the Word Out – Distilling Options and Sharing Lessons

The Center has developed a layered approach, through our Adaptation Clearinghouse, tool kits, reports, and webinars, that allows us to broaden our reach to a variety of audiences. Each layer is designed to move from a high-level overview, or “macro” approach, to a specific “micro” example in a way that leads to the implementation of adaptive responses on the ground.

At a macro level, the Georgetown Climate Center hosts the Adaptation Clearinghouse to identify and summarize the key resources that are most relevant to the wide array of state and local policymakers working on climate-change adaptation. The clearinghouse provides synopses and links to more than 1,000 resources and has in-depth tagging to help adaptation practitioners find the most relevant resources.

To bridge the macro and micro, the Georgetown Climate Center distills the menu of options for responding to particular climate-change impacts in tool kits such as our Sea-Level-Rise Tool Kit and Urban Heat Tool Kit. These identify the best practices for and the most salient criteria for choosing among policy options with the goal of helping policymakers devise actionable plans. The menu approach identifies the range of powers that can be used to respond to a problem and helps communities anticipate legal or administrative barriers to implementation, thereby allowing them to select options that best respond to local needs. In some communities, for example, a purely regulatory response to sea-level rise may be politically untenable, but the same communities may be able to encourage private actions through tax incentives. Incentive-based approaches can be coupled with regulatory approaches to minimize political opposition and avoid costs. At the micro level the Center tests selected tools on the ground with client jurisdictions, developing model laws and case studies to analyze the legal issues that may hinder implementation of particular policies.

The Center spreads the lessons we are learning from our direct services work through webinars (on floodplain regulations and living shorelines) and other methods. Our webinar series was particularly popular – both installments were completely booked, demonstrating the appetite among practitioners for in-depth discussion of adaptation options. We also post our reports from our work in communities on our website and Adaptation Clearinghouse – completing the circle by sharing the micro-level examples with a much broader audience.

Using this multilayered, multiple-format model, the Center has assisted leading communities in implementing measures on the ground, while also sharing lessons learned to ensure that the models developed by these communities can be replicated by other jurisdictions. Through this model, the Georgetown Climate Center has also begun to break down the “adaptation silo” by bringing diverse voices into our peer-to-peer exchanges. The Center partners with a variety of networks to vet and disseminate our work, and our clearinghouse resources and participation in our webinars reflect broad engagement. Recent webinars have featured states as diverse as Maryland, Alabama, Iowa, New Hampshire and Mississippi – with audience members from a much broader list of jurisdictions.

Georgetown Climate Center's Adaptation Clearinghouse:

www.adaptationclearinghouse.com

Adaptation Tool Kits:

Sea-Level Rise: www.georgetownclimate.org/slr-toolkit

Urban Heat: www.georgetownclimate.org/adaptation-tool-kit-urban-heat

Connecticut Case Study of Sea-Level Rise Adaptation Strategies:

nsglc.olemiss.edu/SGLPJ/vol5No1/Grannis.pdf

Conclusion

Real challenges exist to preparing for and responding to climate change. Adaptation will in most cases require local action, but local governments often have the least capacity to act and must balance multiple competing priorities under increasing budget constraints. Adaptation will also require that, rather than rely on historical norms, we revise laws, policies and procedures at all levels of government to incorporate consideration of future changes. Barriers at the federal level may hinder the ability of state and local governments to reduce the risks to their communities.

In spite of these challenges, many government agencies are forging ahead with planning and implementation, particularly in the aftermath of Hurricane Sandy. Local governments across the country are developing innovative responses to climate change, and other communities are adopting and adapting these models. Several governors, including those of Delaware and Maryland, have issued executive orders requiring state agencies to consider climate-change impacts in the design and construction of state facilities. In learning by doing, state agencies will be able to provide better guidance to local constituencies. Finally, driven by a mandate from President Obama in his 2013 Climate Action Plan, federal agencies are beginning to examine and realign federal programs to better support state and local adaptation. Opportunities exist to leverage existing laws and programs to support state and local adaptation. The Center hopes to further these efforts at all levels of government by sharing the lessons learned from its work with leading communities and by helping others replicate the models that are being developed across the nation.

With this intent in mind, some final recommendations:

- **Decide where to focus:** There is no blueprint for how to adapt to climate-change impacts. We are all learning by doing. However, some communities have more political support and financial and technical resources that allow them to be bold and experimental. To conserve scarce resources, a strategic approach will require supporting communities that can demonstrate the successful implementation of adaptation policies. The lessons from these leaders must be shared so that the models they develop can be replicated in and tailored to other areas. This approach must also be balanced with providing support to our most vulnerable communities and populations
- **Respond to the diversity among communities:** There is no one-size-fits-all approach to adaptation. Communities across the country have unique vulnerabilities and are politically and geographically diverse. To respond to this diversity, adaptation tools must present communities with a variety of options that can be tailored to local needs.
- **Integrate vertical power:** No one level of government can adapt alone. State and federal agencies can use existing authority to promote local efforts by integrating adaptation into funding and regulatory programs. Where legal barriers arise, workarounds to reduce them must be quickly implemented while longer-term strategies for instituting legislative or regulatory reforms are devised.
- **Support “actionable” decisions:** Adaptation practitioners across all disciplines must learn to provide actionable tools and resources that can quickly and easily be applied by decision-makers and used to justify state and local decisions.

Through these efforts, the Georgetown Climate Center hopes to align efforts at all levels of government to turn adaptation plans into implemented actions that will build the nation’s resilience to climate change.

End Notes

- 1 Jerry M. Melillo et al, U.S. Global Change Research Program, *Highlights of Climate Change Impacts in the United States: The Third National Climate Assessment* at 5-7 (2014); available at: <http://ncadac.globalchange.gov/>.
- 2 An urban heat island is a metropolitan area that is significantly hotter than surrounding rural areas because pavement, buildings and other infrastructure remove sources of shade and retain heat during that day releasing that heat overnight. Sara Hoverter, *Adaptation Tool Kit: Urban Heat* (2012), available at <http://www.georgetownclimate.org/adaptation-tool-kit-urban-heat>.
- 3 Executive Office of the President, *The President's Climate Action Plan* (Jun. 2013), <http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>; see also <http://www.georgetownclimate.org/resources/president-obamas-climate-action-plan>.
- 4 U.S. Department of Transportation Federal Highway Administration (FHWA), *Eligibility of Activities to Adapt to Climate Change and Extreme Weather Events Under the Federal-Aid and Federal Lands Highway Program* (Sep. 24, 2012), <http://www.fhwa.dot.gov/federalaid/120924.cfm>.
- 5 FHWA, *Climate Change Resilience Pilots, 2013-2014 Pilot Program*, http://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/vulnerability_assessment_pilots/.

The nonpartisan Georgetown Climate Center seeks to advance effective climate, energy, and transportation policies in the United States—policies that reduce greenhouse gas emissions, save energy, and help communities adapt to climate change.

For additional information, please visit www.GeorgetownClimate.org.

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