

WORKSHOP SUMMARY

Communities and Sandy Hook: Partnering to Build Resilience to Climate Change

Cover: Sandy Hook Unit, Gateway National Recreation Area ©Michael J. Treola

















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I. Climate Change Adaptation as a Learning Opportunity



n October 2012, Hurricane Sandy came ashore in the Mid-Atlantic, obliterating millions of dollars' worth of property and underscoring the power exerted by our changing climate. One of the hardesthit regions included Gateway National Recreation Area, which spans three New York City boroughs and communities in northern New Jersey. Gateway's beaches, boat docks, and 26,607 acres of coastal scenery are an integral part of the social, recreational, and economic fabric of adjacent communities, which together comprise one of the largest urban populations in America. The disaster crystallized the importance

of preparing for future weather events, and provided new impetus for communities and parks to work together as they confront climate change.

When confronting the enormous challenge of climate change, parks and their communities each bring unique and valuable assets to the table. National parks like Gateway conduct and apply research, manage public lands and waters in the face of climate change, and offer opportunities for place-based learning. Community partners bring expertise in public health, planning, business needs, government, and other areas.

Combining their skills makes for a powerful collaborative approach to climate change adaptation. Parks must also understand the populations they serve, which is why it's so valuable for park leaders to engage with local leaders. By getting involved in local hands-on adaptation projects, people move beyond abstract science towards increased climate-science education. Co-beneficial climate adaptation projects that engage a diverse population offer a powerful vehicle for improved learning and application of sciencebased knowledge about climate adaptation and how to address both community and park vulnerabilities.



I. Climate Change Adaptation as a Learning Opportunity



In an effort to promote cross discipline collaboration, incorporate community perspective, and use the "power of place" and a hands-on approach to climate change, the project partners held a workshop October, 2014 in New Jersey at the Sandy Hook Unit of Gateway NRA. Funded by a grant from the National Science Foundation, the one-day workshop assembled nearly 70 participants including experts from various fields along with diverse community members to educate one another and share strategies for readying their park and towns for future changes. Land managers, elected officials, government leaders, scientists, and community members shared perspectives and proposed projects to improve the region's resilience to a changing climate. By leveraging the unique qualities of the national parks, the workshop and subsequent adaptation projects helped stakeholders advance climate science learning within the community.

The hope is that the dialogue initiated at Sandy Hook will serve as a model for other urban areas and adjacent parks that are striving for a collaborative approach to confronting climate change. The envisioned climate adaptation projects and the working groups designed to move them towards implementation have the potential to make Sandy Hook and the surrounding communities more resilient, and may inspire adaptation projects elsewhere.

Goals for the Day

- Communicate what science reveals about how climate change is affecting the environment and communities in the Sandy Hook region.
- Discuss a possible vision for the future of the Sandy Hook Unit of Gateway National Recreation Area and the surrounding region.
- Identify potential projects where people are excited to work together to better understand climate science, and use this collaboration to anticipate and adapt to potential impacts.
- Form working groups to advance climate adaptation project planning, funding, and implementation.

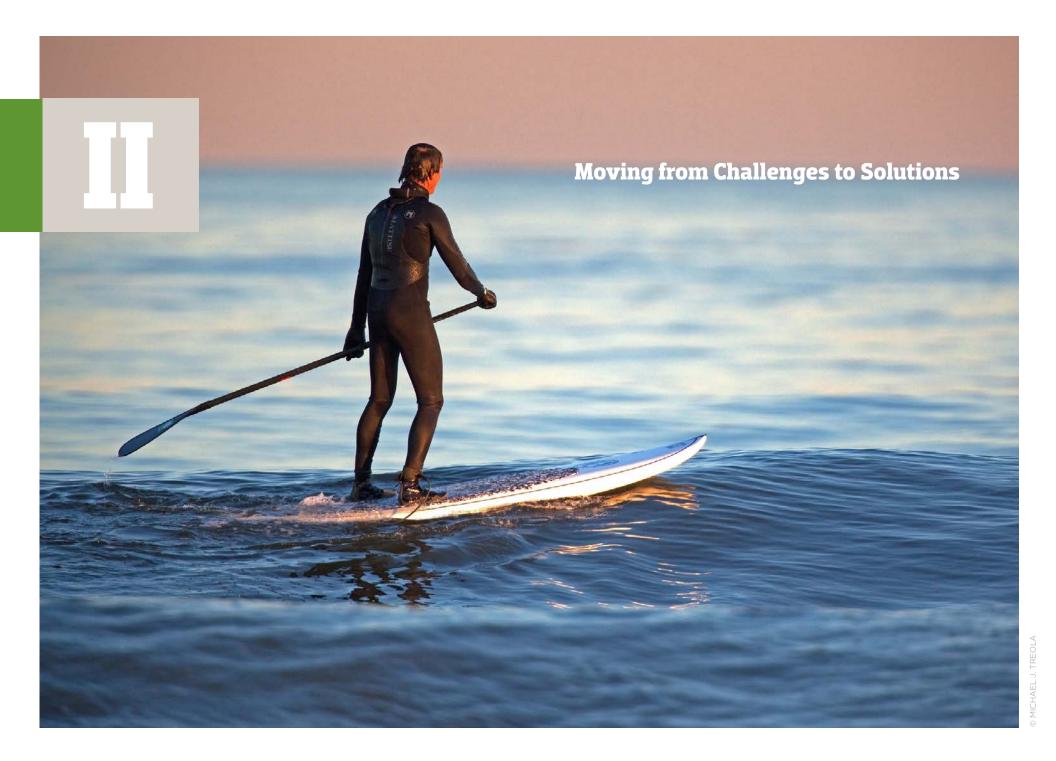
Collaboration and Diversity

In the spirit of collaboration, no single expert led the workshop. Instead, a democratic, discussion-based forum allowed a wide array of stakeholders to offer their expertise and learn from others. Groups that don't normally interact engaged in collegial debate and imagined a stronger, more resilient future for their region. Thus, discussions included both technical expertise and citizens' local knowledge.

Assembling such diverse voices required thoughtful outreach. The workshop's facilitators looked beyond the "usual suspects" to include representatives from often-overlooked groups. Project team members

identified an initial list of potential participants, and from there, they branched off into new and diverse professional communities such as faith leaders and after-school educators.

After initial e-mails to potential attendees, phone calls were made to reiterate the vision for the workshop. The personal approach was critical to helping invitees understand the value of their input. Some stakeholders who'd assumed that the workshop wasn't relevant to them ended up participating. Including such diverse viewpoints was precisely what made the workshop such a resounding success.





panel discussion included Dr. Norb Psuty (a Rutgers University professor specializing in coastal issues including sea level rise), Jennifer Nersesian (Superintendent of Gateway National Recreation Area), Joe Reynolds (who promotes the development of sustainable communities as part of the Bayshore Watershed Association), and Kate Andrews (a hazards planner with the Monmouth County Health Department). They provided context and background information for the day's work, focusing on climate change science and issues, and perspectives on building resilience at Sandy Hook and surrounding communities. As the speakers shared their perspectives, it became clear that despite their diverse backgrounds, they have similar concerns. As panelists responded to questions from the facilitators and participants, they identified these factors as having the greatest influence on their region's future efforts.

The challenge of sea-level rise

At Sandy Hook, not far from the building where workshop participants convened, sits a nondescript tide gauge. Since 1933, the year it was installed, this gauge has quietly recorded the sea's height—which appears to be rising some 1.6 inches per decade, on average. Most startling, though, is the sudden spike that indicates the ocean's biggest advances have taken place in recent decades.

This gauge echoes readings found elsewhere on the New Jersey coast, indicating that in the future, modest storms will produce bigger storm surges and more flooding than comparable storms 40 years ago. Even now, storm flooding is happening more frequently than it once did; in some locations, ordinary high tides inundate the streets.

As flooding becomes more severe, it poses additional threats to public health. The encroaching water may promote more vector-borne illnesses. Disease-spreading insects thrive in the warmer temperatures. Flooding also stresses the public's water supply and sanitary sewer systems.

From property damage to public sanitation, sea-level rise presents communities with a host of challenges. Simply building walls or sand dunes doesn't protect roads and buildings. To the contrary, accommodating sea-level rise defies easy solutions.

Coastal communities such as Sandy Hook need to account for sea-level rise as they plan for future storms. But even inland, where the ocean exerts less influence, intense storms seem to be occurring with greater frequency. What was common 60 years ago can't guide us today. Communities across the country must consider climate change as they plan their future readiness.

"We should not be scurrying to replace damaged infrastructure after the storm, but planning to survive the storm."

- Superintendent Jennifer Nersesian, Gateway N.R.A.

"It all comes down to money: How do we pay? By forming partnerships among homeowner associations, community groups, public support, and non-government organizations."

- Joe Reynolds, Bayshore Watershed Association



Sandy's Wake-Up Call

Superstorm Sandy became a pivotal moment for Gateway and its surrounding communities. The devastation heightened locals' awareness of climate change and strengthened their commitment to addressing it.

Local and county governments launched planning efforts that could help protect communities from future storms. The Mid-Atlantic region isn't immune to the funding shortages currently affecting communities across the nation, and budget cuts have forced some municipalities in New York and New Jersey to eliminate staff. Limited manpower presents a challenge for communities that are striving to improve storm-readiness. And it definitely presents a problem in times of crisis, as part-time staff can't be expected to show up full-time for emergencies.

The National Park Service also suffers from limited funding. Gateway received \$168 million for Sandy recovery, but it is not nearly enough to rebuild lost structures and public amenities. That shortage has forced the Park Service to devote funds to the soundest long-term investments rather than rebuilding everything that once stood before the storm.

Yet the challenge of rebuilding also presents opportunities for parks and surrounding communities, which can now choose to construct smarter infrastructure that is more sustainable in the face of climate change. Hurricane Sandy has forced park managers to adjust

expectations and goals for ecological restoration. Aiming to maintain a pristine ecosystem or even some species survival may no longer be practical, given changing climactic conditions. Fostering self-sustaining ecosystems is the park's new goal.

"Making changes to former building codes and local zoning plans will be both an opportunity and a challenge."

- Joe Reynolds, Bayshore Watershed Association









The Value of Education

Education precedes adaptation. If area residents don't understand climate impacts in their region—or if climate change seems like a foreign issue that doesn't pose local repercussions—then people won't commit to change. Developing the public's climate literacy can create citizens who feel dedicated to climate adaptation and can vocalize that priority to elected officials.



Parks and municipalities must look beyond the schools when developing educational outreach. Reaching young audiences is important, but the schools themselves are struggling to meet new expectations for standardized testing and address social issues such as bullying. Because teachers have little free time to develop climate change programming, after-school

programs may offer a better target for educational outreach.

National parks hold great reserves of knowledge about climate change. Interpreters at Gateway and at parks across the nation bear witness to its effects and are working on adaptation strategies for parks' natural

"We should also look to social media as an opportunity to reach the younger generation."

- Kate Andrews, Monmouth County Health Department

In Diversity, Commonality

The Sandy Hook workshop included people from a wide variety of backgrounds. Yet when it comes to climate change, these individuals have a lot in common—as a survey conducted by Dr. Marc Stern revealed. In his work at Virginia Tech University, Dr. Stern studies environmental organizations and analyzes why their initiatives succeed or fail. He asked participants in the Sandy Hook workshop to complete a survey prior to participating in the day's discussions. Some striking commonalities emerged:

- Respondents' top concerns were flooding, sea-level rise, and severe storm events
- Two-thirds felt optimistic that their community could respond to climate change
- Two-thirds felt that their community had the power to do something about climate change
- 84 percent of respondents expressed a desire to get directly involved in working on solutions to climate-related challenges in their communities.

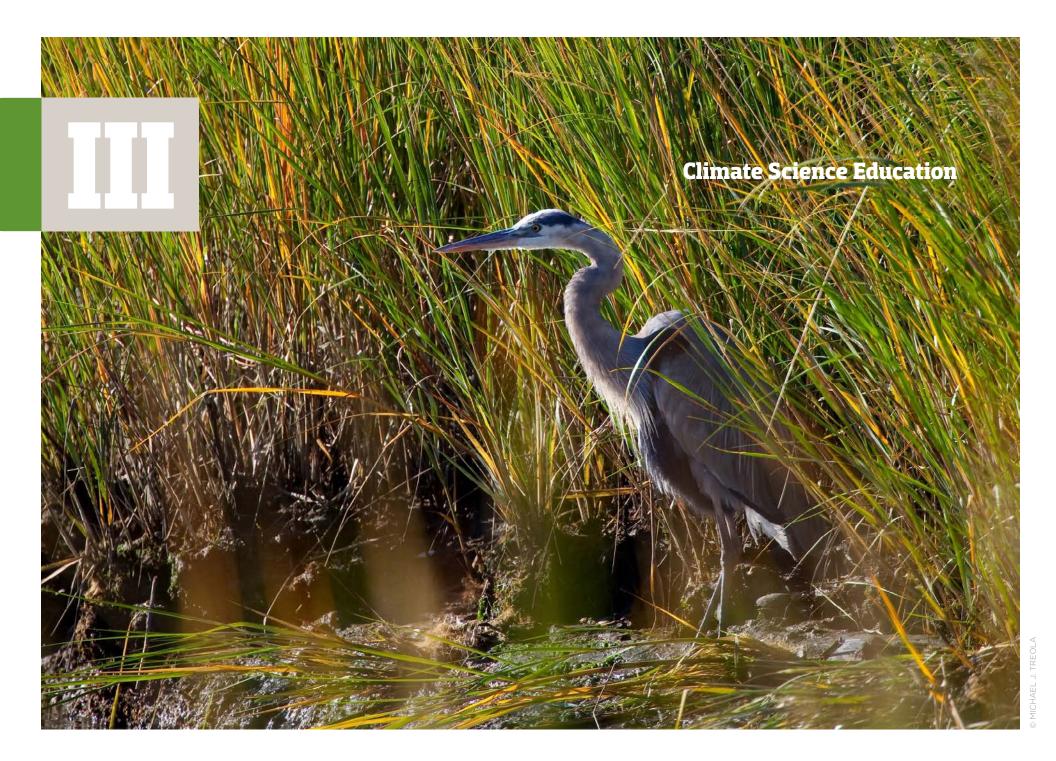




and historic resources. Budget and staffing constraints, however, haven't always allowed parks to share that knowledge with the surrounding communities and the general public.

Like many of our national parks, Gateway has long offered educational programs for K-12 school children, but sometimes struggles to reach adult audiences. Therefore, it's trying to develop strategies for communicating climate change impacts (such as sea-level rise) to area anglers and other adult populations. Such outreach efforts should include tangible, local evidence of climate change. For example, citizens of the Sandy Hook region should know what their tide gauge reveals. Efforts to educate the public should also address people's day-to-day concerns: Can home-buyers get a mortgage if they can no longer afford flood insurance?

Workshop Agenda		
8:30	Registration and photographic history of adaptation	
9:00	Welcoming remarks	
9:20	Panel discussion: What lies ahead?	
10:10	Tabletop session: Participants brainstorm Sandy Hook's past value and future resiliency	
10:45	Break	
11:00	Reports from tabletop sessions and full-group discussion	
11:45	Presentation on climate science education	
12:00	Lunch (with photo gallery presentation on successful climate adaptation projects)	
12:45	Project planning: What could promote resiliency within the Park and surrounding communities?	
2:00	Reports from project-planning groups and full-group discussion	
3:00	Networking break	
3:20	Project ranking and discussion	
3:45	Work planning: participants form work groups and establish action plans	
4:20	Next steps and closing remarks	
4:30	Adjourn	



III. Climate Science Education

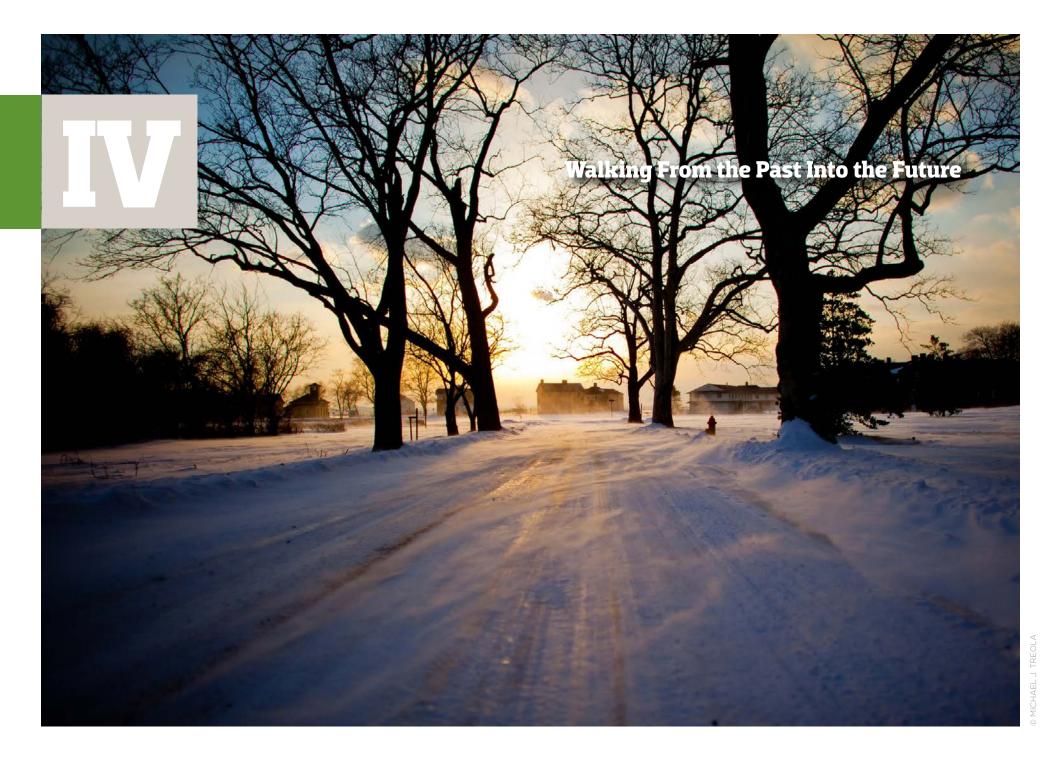


uring the lunch break, Dr. Gilly Puttick with the Technical Education Research Centers (TERC), a non-governmental organization focused on science and math education, discussed her organization's experience with successful climate-science education. Her advice:

Be inclusive. Community groups, municipal agencies, public media, and professional and craft associations all have their networks and characteristic ways of educating. Consider those habits when you bring such educators together into common adaptation projects.



- Aim for understanding. Education for information is not as effective at prompting action as education for understanding.
- Start with what you know. You don't need to make polar bears your focus when addressing communities in coastal New Jersey. Hurricane Sandy provides a better starting point.
- Address a relevant problem. Adults want to know how climate change affects their day-to-day concerns. But even children need to feel like they're learning something relevant. Build your outreach around a driving question that feeds learners' motivation and persistence.
- **Keep it local.** Place-based education builds on people's psychological connections, situates problems in a familiar context of things people can see and touch, and fosters commitment to projects for change.



IV. Walking From the Past Into the Future



ommunities are rooted in their past. Longstanding habits and expectations shape local culture and give each place unique flavor. Yet given the climate changes now underway, past practices aren't always helpful in readying communities for future circumstances. Parks and the people who live near them need to adapt.

Of course, change is always difficult, and people are even less inclined to embrace change that doesn't seem rooted in their community's core identity and values. That's why it's so important that adaptation projects involve community members and earn their buy-in. Changes that seem irrelevant to local residents or that disregard local values are seldom successful.

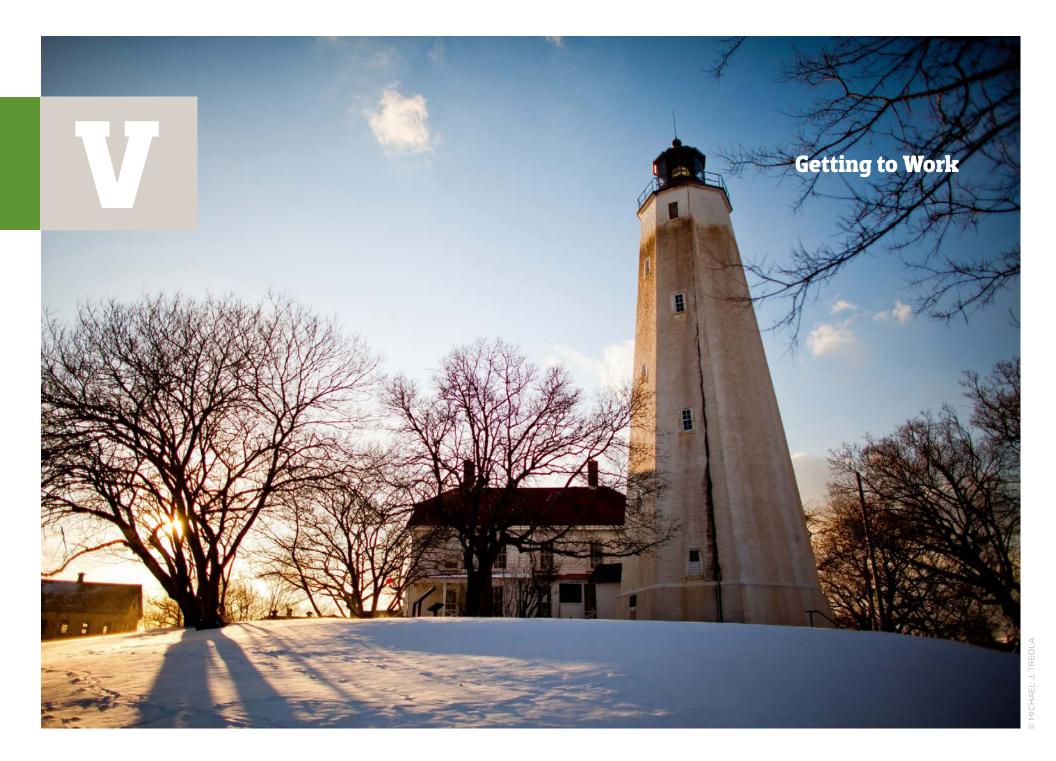
During the workshop, two questions helped participants set the context for future local responses to climate change:

- 1. When you look at photos of the past and think back to the panel discussion, what do you value most about the Sandy Hook region?
- If you think about our region being resilient to climate change, what would our communities and landscape look like?

Groups mulled diverse topics such as whether stormdamaged park resources should be rebuilt and what it would take to preserve Sandy Hook's bird habitat. But several common threads developed from the smallgroup brainstorming sessions and set the stage for actionable projects that fit Sandy Hook's unique needs.

Adaptation efforts should create self-sustaining systems. Even when participants weren't clear on exactly what "self-sustaining" might look like, they believed strongly in the value of building structures and systems capable of sustaining themselves through future changes in climate.

- Climate change education should include school children, their parents, elected officials and community organizations. Developing Sandy Hook's climate literacy is a key factor in developing the community's resiliency.
- Successful adaptation requires funding from a variety of sources.
- Adaptation may mean letting go of places that have become too vulnerable to merit sound investment. Participants admitted that plans might need to involve "strategic retreat" and phased withdrawal from vulnerable areas.
- Communities encouraged more leadership and support from the state of New Jersey.
- Hurricane Sandy forced the region's communities to confront climate adaptation sooner than many other American towns. Therefore, their efforts might serve as a model for other regions seeking to become more resilient.





t the beginning of the day, workshop attendees were given workbooks containing information on the day's process, climate adaptation examples and other background materials. A slideshow provided visuals of adaptation project ideas, helping to prime the table discussions. Using a small group, World Café style format (see box, page TK), participants addressed the same question: What project would help the park and surrounding communities be more resilient to climate change?

The ten groups generated numerous ideas, ranging from partnering with sister cities overseas, to staging town hall meetings, to regenerating Sandy Hook's holly forest. From that sea of possibilities, facilitators synthesized emerging themes and participants then ranked projects according to their potential to achieve resiliency to climate change. Then, participants relocated to join their preferred project's working groups to map out near-term actions. To do so, they considered these five questions:

- 1. What are the immediate next steps to plan for, implement, and/or otherwise contribute to the project?
- **2.** What opportunities should be taken advantage of?

- What barriers should we anticipate?
- What expertise or resources can I contribute?
- What are the key messages and methods for communication?

These seven project proposals earned participants' backing:

Regional Resilience & Municipal Coordination Plan

Using the existing Monmouth County Master Plan and others as a starting point, this initiative would develop a regional resilience and municipal coordination plan, guiding long-term, local decision-making (2050 and beyond). The comprehensive plan would include





emergency response, public health, transportation, energy, long-term changes to land use, and housing. Such a plan would provide a framework for integrating other plans within the watershed and would coordinate local and regional investment.

Developing a regional plan is a massive project, one complicated by various private property issues and limited funding. Yet grants (such as those offered by the Department of Defense Readiness and Environmental Protection Integration Challenge) could defray costs. And Sandy Hook wouldn't have to re-invent the wheel. It could piggy-back off of plans developed by the Department of Defense, Federal Emergency Management Agency (FEMA), the National Park Service, and the US Navy.

Leveraging the lingering impacts of Hurricane Sandy could help motivate stakeholders and win local buy-in. Citing the region's urgent need for resiliency, project backers planned to identify a sponsor, target funding sources, and schedule stakeholder meetings to map out elements of the plan.

Fort Hancock Model House

Fort Hancock is one of Sandy Hook's most valuable cultural resources. Decommissioned in 1974, the nineteenth-century Army artillery base once defended New York Harbor. Now, its buildings could be refurbished using storm-ready designs and green technologies that could model adaptive design. By employing one-way storm drainage vents, elevated utilities, native plantings, secure power supplies, and carbon-mitigation techniques, Fort Hancock could demonstrate how parks and area residents can adapt their structures to changing conditions. Not only would Fort Hancock exemplify how to live with the water (rather than fight its impacts), it would serve as a venue for climate change education programs.

Installing such features could be too costly for the Park Service to perform by itself. But grants supporting green infrastructure could meet some of the project's funding needs, and local groups such as garden clubs, solar-panel specialists, scouts and Rutgers' extension office could contribute their labor to the project and subsequent educational outreach. In the short term, project backers proposed researching rain gardens, flood vents, solar panels, and other adaptive building technologies.

Political Network for Advocacy and Fundraising

Community decision-makers aren't always wellinformed about climate change and its future impacts. But an adaptation advocacy group could spread the climate-change message to agency executives and help them to consider climate's effects when making policy. The advocacy group would also stimulate experiential learning opportunities for political stakeholders and initiate dialogues about re-zoning and reconfiguring property tax structure. Finally, it would solicit funds to support projects associated with planned retreat, restoration, and infrastructure hardening.

Compelling climate-change data and information already exists. Using that information, the advocacy group could design hands-on events that get stakeholders learning about climate change through participation. The park's nonprofit "friends" group could also help spread the word about individual projects.

Of course, some stakeholders may be skeptical of the network's climate change messages. But by persuading decision-makers about the big-picture benefits for themselves and their constituents, the advocacy network could convince local agencies that the cost of inaction is greater than the cost of action.



Future Footprint Plan

Along the coast of New York and New Jersey, sea-level rise poses a major threat to existing infrastructure. It also influences the viability of future development. That's why a computerized risk-assessment tool could be useful to local planners. By using mapping and geodatabase overlays, this program could compare current conditions against expected sea-level rise, which would be invaluable in proposing "future footprints" (such as property relocation and raised roads). The tool could help parks and municipalities identify areas suitable for planned retreat, and determine which zones would benefit from infrastructure hardening – strengthening against climate related threats like storm surge. It could also serve as a component of a broader regional resilience plan. Unlike that broader plan, this future footprint tool would emphasize spatial planning, technical risk assessment, and long-term (20 years or more) strategies for land acquisition following future storm events.

There's widespread demand for such a tool in the Sandy Hook region, where land managers and homeowners don't generally know how sea-level rise is likely to affect their particular resources and structures. However, a lack of funding, traditional land uses, and political inaction threaten to stymy

efforts to build such a tool. Once built, some of its findings may also prove unpopular. No one likes the term "retreat," and flagging zones as vulnerable to storm damage could result in costly consequences for property owners (who might face higher insurance premiums, etc.).

Still, such a tool could yield big-picture savings, should it help steer future construction into sustainable locations. Thus, project backers proposed to inventory existing sea-level conditions, create a geo database, develop a "what do maps tell us" narrative, and overlay their data with regional elevations to help planners conceptualize and plan for the impact of climate change.

Building a Living Laboratory and Community Center

Using current infrastructure and leveraging existing partners that operate related programs (such as the one administered by the National Oceanic and Atmospheric Administration), this project would design a hands-on "living laboratory" and all-ages community center. The center would be dedicated to various forms of science education—geomorphological, biological, ecological, meteorological-and could include dormitories for prolonged educational

immersion. The facility would operate terrestrial as well as marine components, such as an aquarium or undersea exhibit allowing visitors to see oyster beds and reefs that are hard to visualize. It would also serve as a demonstration site where new and emerging resilience strategies can be piloted and monitored for performance.

Many existing resources could bolster the project. The US Department of Housing and Urban Development (HUD) offers suitable funding. Additional funding sources might include the National Science Foundation, Army Corps of Engineers, private philanthropists, and FEMA.

Local educators could offer advice about developing educational programming, and the National Park Service could contribute lessons learned through its network of 18 research-learning centers. The working group could also mobilize the end users of any research generated at the center.

To make the center a reality, backers determined that they'd need to identify key partners among the scientific community who had experience in running a laboratory and conducting climate research. The working group also planned to study existing models



that could serve as examples for Sandy Hook's living laboratory and community center; seek a suitable technology partner (perhaps one that could demonstrate solar-power capability); and approach potential funding sources.

Education and Climate Literacy, K-12

This project proposes the development of a climate change curriculum suitable for all Monmouth County K-12 schools. The curriculum would include model lesson plans, semester-long lessons, afterschool programs, student projects, and field trips. The project would yield a common message for K-12 education and (unlike one-time lessons) would offer integrated learning that starts in kindergarten and progresses through the primary and secondary grades. Such a curriculum could develop the next generation's climate change leaders and establish Sandy Hook as a pioneer in climate adaptation.

First steps would include talking to schools that have already instituted climate change curricula to profit from lessons learned. Then, drawing from existing educational materials (such as ones developed by SeaGrant and Rutgers University), the project would coordinate with partners to develop a common message for the K-12 progression. Organizers could

also apply for funding from TERC and other resources.

Using related projects as stepping-stones, Sandy Hook's K-12 climate change curriculum could harness established educational resources to help serve local children.

Education and Climate Literacy in the Broader Adult Population

This initiative focuses on the education of teachers and other adults. It would document the community's baseline knowledge and build its understanding of climate change and adaptation. In addition to training teachers to teach climate change topics, this project



would develop computer applications and gaming tools to engage older populations and get them to consider risk assessment (see "Future Footprint Plan," page 17).

The value of an adaptation app is that it turns abstract concepts (such as sea-level rise) into tangible, relevant topics that can even be entertaining. Players could compete to propose mitigation strategies to a specific climate-related problem.

App developers could use existing GIS and flood data to create a program that would be educatational. To design something that would appeal to users, project backers proposed to analyze their target audience





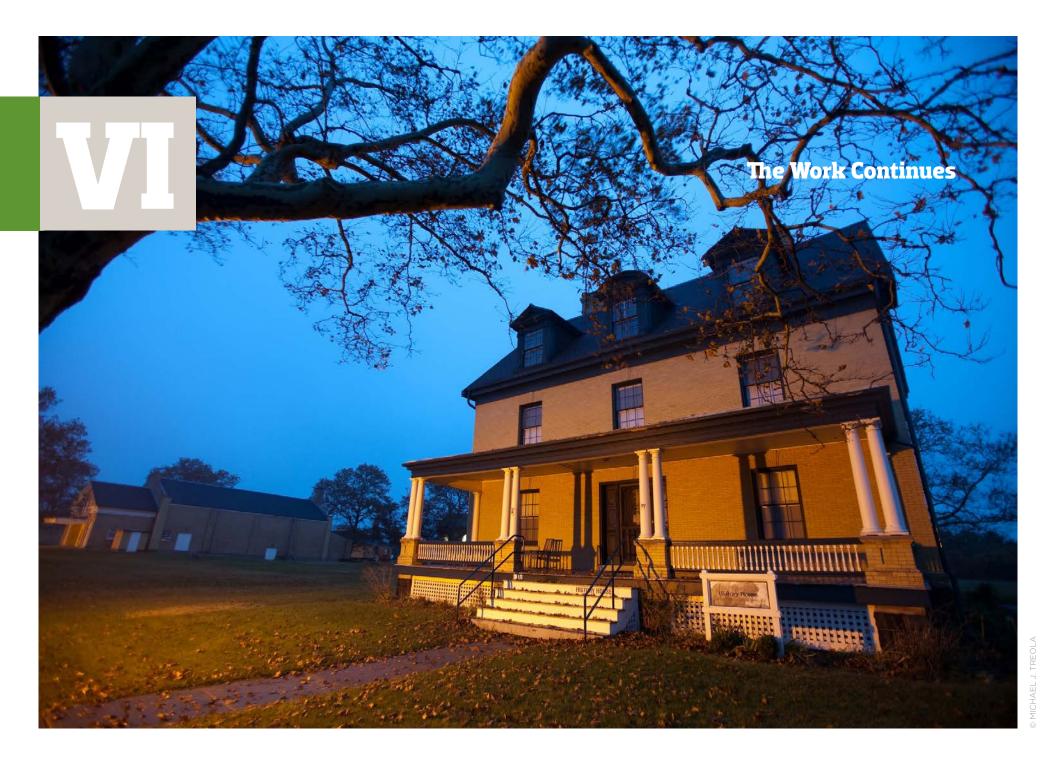
(so that the product could be audience-driven); define the app's educational goals; incorporate augmented reality (so that players could look through their phones to view flood levels at specific locations); and create a game that would invite players to propose adaptations.

Given funding limitations, the working group proposed building a pilot app that could test out users' interests before developing costly add-ons. Be it simple or elaborate, savvy programming for portable technology could go a long way toward developing climate literacy among adult audiences.

What makes a project a "climate adaptation" project?

- 1. The project considers the best available climate science and anticipates likely future scenarios, including the resources (natural and cultural), habitats, structures, communities, and values that are most vulnerable.
- 2. The project thinks at multiple time scales the near-term as well as 20-plus years into the future—and how to transition between the two.
- **3.** The project recognizes and respects uncertainty, but does not let this stall planning or action. In this regard, it may make use of technical decisionsupport tools to narrow and manage uncertainty.
- The project promotes resilience. It increases the capacity of community-environmental systems to minimize damage from and respond to trends in long-term drivers of change (e.g., temperature, precipitation) and acute stressors (e.g., winter and summer storms).

- **5.** The project is visionary. It goes beyond what we consider common sense today, and provides a compelling foundation for acting and leading in new ways.
- **6.** The project institutionalizes regular monitoring, synthesis of monitoring data, and corresponding adjustment of management (a process often called "adaptive management").
- **7.** For natural resources, it considers (a) refugia (habitats that persist as climate changes), (b) corridors and connectivity that allow plants and animals to move to more suitable locations, (c) healthy populations with sufficient genetic diversity to adapt, (d) landscape planning as well as project planning, to accommodate large-scale disturbances and long-term changes, and (e) reduces or removes additional threats and stressors (e.g., pollution).



VI. The Work Continues



t is our hope that the Sandy Hook workshop will inspire adaptation efforts in other communities and serve as a model for how to engage diverse community members in collaborative action. After all, meetings may spark ideas and fuel attendees' enthusiasm for change but it's the follow-up that truly matters.

That's why the Sandy Hook workshop emphasized continuing action and community collaboration. At the end of the meeting, participants had the opportunity to sign up for working groups that interested them. By committing to one or more community adaptation projects, participants proved they weren't just theorizing about climate adaptation-they took one step closer to making it a reality.

Two to three weeks after the workshop, participants received another nudge to "get their hands dirty" when team members followed up and issued another call to serve on working groups. Their participation is just a start. If the projects are to truly gain momentum, they must attract an even broader network of community members. Thus, Sandy Hook attendees were encouraged to draw their colleagues into the working groups as well.

The workshop website (at https://sites.google.com/ site/resilientparksandcommunities/home) provides an opportunity for continued dialogue and includes materials from the workshop, information on process, as well as the full summary of the day. Here, working groups can retrieve workshop documents and post updates on their progress.

The website can also serve as a resource for other parks and urban communities, who needn't re-invent the wheel in their efforts to address climate change. They can reach out to the workshop's core partners for advice, and can use Sandy Hook resources as a roadmap for sparking community collaboration wherever they may live.

We hope that the emphasis on action is Sandy Hook's enduring legacy, because just talking about climate change isn't enough: Engaging in hands-on efforts to help parks and communities adapt to changing climate is the ultimate objective.

Core Partners

The workshop was organized and supported by the following partners:

The National Parks Conservation Association

The National Park Service

The Sandy Hook Foundation

Virginia Polytechnic Institute and State University

Rutgers University

James J. Howard Marine Sciences Laboratory, NOAA













