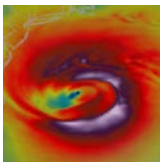
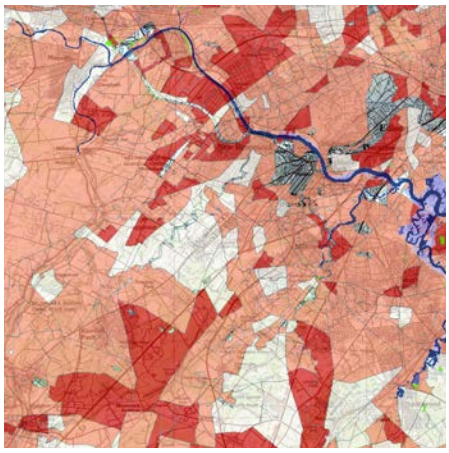


Resilience

Preparing New Jersey for Climate Change

Policy Considerations from the New Jersey Climate Adaptation Alliance



June 2014

New Jersey Climate Adaptation Alliance

The New Jersey Climate Adaptation Alliance ("the Alliance") is a network of policymakers, public and private sector practitioners, academics, and nongovernmental and business leaders organized to build climate change preparedness capacity in New Jersey. The mission of the Alliance is to identify, demonstrate, recommend, and communicate policies and cost-effective activities that can prepare New Jersey's vulnerable sectors to better meet the anticipated impacts of climate change. The Alliance is guided by an advisory committee and is facilitated by Rutgers University.

Members of the New Jersey Climate Advisory Alliance Committee who participated in the process leading to these recommendations include the following:

ACKNOWLEDGMENTS
Support for development of this report comes from the Kresge Foundation, the Fund for New Jersey, the Gallagher Family Fund, the Rockefeller Brothers Fund, the Dean of the Rutgers University Edward J. Bloustein School of Planning and Public Policy, and the Executive Dean of the School of Environmental and Biological Sciences. Support for the Alliance's outreach and education efforts comes from generous sponsors, a list of whom can be found at our website (njadapt.rutgers.edu). Special thanks for support of this effort go to the Rutgers Climate Institute and Professors Anthony Broccoli, Robin Leichenko, and Michael Greenberg of Rutgers University. Production assistance was provided by Gattuso Media Design.

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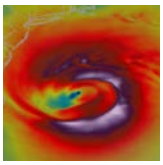


Resilience

Preparing New Jersey for Climate Change

Policy Considerations from the New Jersey Climate Adaptation Alliance

Executive Summary

Resilience: Preparing New Jersey for Climate Change: Policy Considerations from the New Jersey Climate Adaptation Alliance is the culmination of a deliberative research and stakeholder engagement process undertaken by the New Jersey Climate Adaptation Alliance ("the Alliance"), a network of policymakers, public and private sector practitioners, academics, nongovernmental organizations, and business leaders designed to build climate change preparedness capacity in New Jersey. The mission of the Alliance is to identify, demonstrate, recommend and communicate policies and activities that can prepare New Jersey's vulnerable sectors to better meet the anticipated impacts of climate change. The individuals and organizations that comprise the Alliance Advisory Committee agree that the recommendations in this report present the compelling issues to be addressed as part of a statewide climate change adaptation discussion. Rutgers University serves as the facilitator of the Alliance. In this defined role, staff at Rutgers, at the direction of the Committee, undertook the research and stakeholder engagement process that resulted in these recommendations and, as such, these recommendations do not represent the position of the University. While individual members of the Alliance Advisory Committee do not necessarily endorse each and every specific recommendation, the Committee has reached consensus that these recommendations accurately reflect and present the issues that emerged from the research and stakeholder engagement process, and require further consideration and discussion in New Jersey.

Floods in Sparta after days of heavy rains in August 2000 buckled roads and damaged bridges (Chris Hondros, iStock).

The Alliance recognizes that important climate change adaptation and preparedness efforts are already underway in New Jersey. The intent of these recommendations is to support and advance ongoing activities as well as to foster a statewide dialogue regarding consistent and long-term public policy action to enhance preparedness for a changing climate in New Jersey. Examples of some ongoing and important climate change adaptation and preparedness efforts already undertaken in New Jersey are noted in the Introduction of this report.

The approach followed to develop these recommendations was guided by the Alliance Advisory Committee and involved several tasks, including research on climate change impacts in New Jersey, analysis of leading policy practices and extensive stakeholder engagement. The Alliance focused on key sectors and cross-cutting issues: agriculture; built infrastructure (transportation, energy, and telecommunications); coastal communities; emergency management; environmental justice; natural resources; public health; social services; and water resources. Stakeholder engagement partners were commissioned to gather the views of sectoral experts through various methods (surveys, workshops, listening sessions, one-on-one interviews). In addition, information was synthesized from a statewide survey on public perception of climate change, a May 2013 Alliance sponsored conference on climate adaptation leading practices, and specific research reports on climate adaptation from the perspective of the media, the state's environmental community, policies related to building resilient structures, vulnerable

populations, and climate change adaptation funding and financing mechanisms. The outcomes of these efforts serve as basis and background to these recommendations and are available in a set of reports (also identified in the Introduction) that can be found on the Alliance's website. A companion document to these recommendations which provides an overview of actions that New Jerseyans can take now, at the individual, family, neighborhood and community level, to prepare themselves and their communities for a changing climate, can be found here: https://www.sas.rutgers.edu/cms/njadapt/component/docman/doc_download/117-what-you-can-do?Itemid=.

In December 2013, the Alliance issued the report, *Resilience: Preparing New Jersey for Climate Change: A Gap Analysis from the New Jersey Climate Adaptation Alliance,* which outlined gaps in public policy that had been identified via extensive stakeholder engagement as well as informed by the research that had been completed to date. The December 2013 report identified six general areas of policy gaps:

- Research, needs assessment and data development;
- Enhanced implementation of existing data, tools, and methods;
- Regulation, policy and governance support;
- Coordination of adaptation planning and preparedness actions;
- Ensure suitable funding;
- Education and outreach efforts.

This report builds upon the December 2013 report by identifying recommendations that correspond to the six major categories in the gap analysis. These recommendations incorporate iterative consideration by the Alliance Advisory Committee in consultation with stakeholder engagement partners and technical experts. The table below provides a brief summary of the recommendations organized by the six gap categories. For each recommendation, the sectors affected by the recommendation are identified and those recommendations that can be considered initial steps are also identified.

Above: Damaged homes in Mantoloking five months after Hurricane Sandy (Wendell A. Davis, Jr., FEMA).

Left: A Lambertville homeowner surveys her backyard after rains in June 2006 caused flooding along the Delaware River (Colin Archer, iStock).

Below: Extended periods of high temperatures pose a wide range of risks, including heat-related health issues, road and rail damage, spikes in energy and water use, and stressed crops and livestock (iStock).

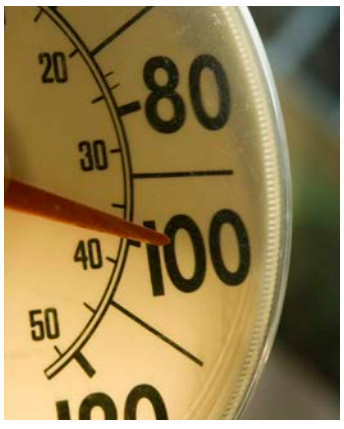
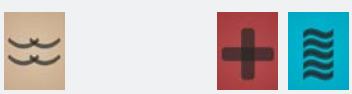


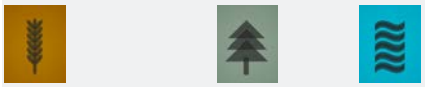
Table 1: Climate change policy recommendations

1.0 - Strengthen climate change preparedness and adaptation in New Jersey through the establishment of a statewide climate adaptation policy that is designed to significantly reduce New Jersey's vulnerabilities to a changing climate through actions that direct integration of science-based standards into state policies, programs and regulations and that direct actions consistent with the statewide policy be taken by State agencies, regional and local planning authorities and commissions, municipal and county government.

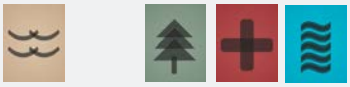
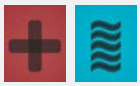
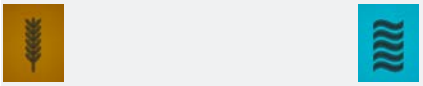
	RECOMMENDATIONS	SECTORS	INITIAL STEPS
1.1	Establish a statewide Climate Change Working Group through legislative or executive action to foster statewide preparedness planning, coordinate scientific and technical assessment of potential climate change impacts to the citizens and environs of New Jersey and to frame adaptation policy.		✓
1.2	Form a Science and Technical Advisory Panel (STAP) within the Climate Change Working Group to rapidly develop a climate impact assessment.		✓
1.3	Use the climate impact assessment to inform consistent development and adoption of statewide climate adaption policy.		
1.4	Incorporate consideration of a changing climate into long-term planning that governs regulations, program operations, and funding allocation decisions with discrete outcomes, necessary resources, staff development and schedules for implementation.		
1.5	Incorporate climate change policy into capital planning and decision making of state agencies, regional and local planning authorities and commissions, municipal and county governments.		
1.6	Conduct a comprehensive evaluation of policies and regulations governing New Jersey's coastal zone in light of identified risks to a changing climate.		
1.7	Convene a working group of experts to consider the outcomes of the statewide climate impact assessment on certain geographic areas of the state, including urban communities and the Delaware Bayshore, as well as on certain populations that are particularly vulnerable to a changing climate.		✓
1.8	Revise the Municipal Land Use Law to require a master plan element that addresses natural hazards such as climate change.		

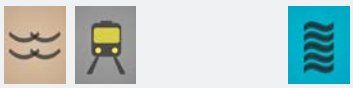
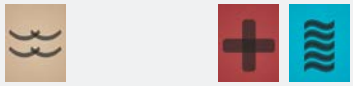
2.0 - Implement standards, regulations and policies that apply a risk management approach to identify people, places and assets (including natural capital) most at risk to climate stressors and direct investment to risk reduction efforts as well as uses that are compatible with a changing climate.

2.1	Develop and enhance tools to restrict or discourage future development and redevelopment in areas at high risk to the impacts of current and future storms, flooding and sea level rise.		

	RECOMMENDATIONS	SECTORS	INITIAL STEPS
2.2	Assess the vulnerability of New Jersey's agricultural lands to a changing climate, including activities on land as well as aquaculture in coastal waters.		✓
2.3	Assess the vulnerability of natural areas (i.e. tidal wetlands, forests, and other natural areas) and the value of these areas for reducing and/or adapting to climate change.		✓
2.4	Require that all public water supply and public wastewater utilities develop, implement and periodically update plans for the identification and mitigation of natural and other risks to facility operations in light of the statewide climate change impact assessment and as part of current compliance requirements.		✓
2.5	Assess the vulnerability of transportation infrastructure using the climate change impact assessment.		

3.0 - Rely on existing governance structures and programs, to the greatest extent possible, and build partnerships with community-based organizations, as a means to integrate climate change adaptation and preparedness rather than create new programs.

3.1	Assess the existing health and environmental burdens experienced by certain communities that may be exacerbated by a changing climate and enhance programmatic attention including climate change adaptation policy in these communities.		✓
3.2	Develop and sustain meaningful incentives at a statewide scale to encourage counties and municipalities to advance targeted and comprehensive buy-out programs for flood and storm prone areas.		
3.3	Encourage greater participation by a broader set of state and local agencies in state and local emergency management and hazard mitigation planning.		✓
3.4	Analyze and determine how to effectively plan for debris management during disasters and storms events.		
3.5	Enhance compliance inspections and pollution prevention assistance to facilities using petroleum or hazardous materials that exist in flood prone areas.		
3.6	Assess farmland preservation strategies and coordinated agricultural, floodplain and wetland easement purchases for agricultural locations that may be vulnerable to sea level rise or flooding from climate change to facilitate climate change adaptation preparedness.		✓
3.7	Examine regulation of agricultural conservation practices under federal and state authorities to best minimize barriers for farmers to apply conservation strategies that are beneficial for climate adaptation and consider health and sustainability of other ecosystems.		✓

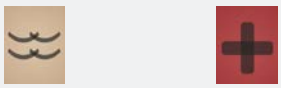
	RECOMMENDATIONS	SECTORS	INITIAL STEPS
3.8	Develop long-term resiliency plans for the electric distribution system and investigate the feasibility of alternative configurations including micro-grids or implementation of smart-grid technology to mitigate risk related to power outages.		
3.9	Develop and adopt a comprehensive climate adaptation public health strategy as guided by the federal Centers for Disease Control Building Resilience Against Climate Effects (BRACE) framework.		
3.10	Set a goal of 80% municipal participation in the FEMA Community Rating System program.		✓
3.11	Convene a team of experts to recommend climate resilient design and construction guidelines along with commensurate amendments to regulations, codes and standards to meet the new guidelines.		✓
3.12	Modify regulatory standards regarding stormwater runoff, stream flow and water quality based effluent limits in NJPDES permits and water allocations to incorporate implications of climate change.		✓
3.13	Require proposed shore erosion control projects to consist of nonstructural shoreline stabilization measures, such as living shorelines, as a default design standard.		✓
3.14	Consider the need for mold standards to protect worker health and safety.		✓
3.15	Enhance environmental surveillance during and after storms in communities that already experience other environmental burdens such as contaminated sites or industrial facilities with hazardous materials.		✓
3.16	Encourage efforts to foster collaborative partnerships between local neighborhood organizations and various governmental levels of emergency management.		

4.0 - Explore and implement creative strategies to generate stable funding for climate change adaptation and preparedness activities, favoring strategies that also result in reductions of emissions that cause climate change.

4.1	Convene a Blue Ribbon Panel to examine approaches to establish dedicated funds to support climate change preparedness in New Jersey and prepare a report to the Legislature with recommendations.		
4.2	Reflect the integration of the statewide climate change adaptation policy in the annual budget process of state agencies and authorities by including capital programming and operating and maintenance funds for enhancing resiliency and climate adaptation.		

	RECOMMENDATIONS	SECTORS	INITIAL STEPS
4.3	The State should pursue opportunities to participate in regional multi-state regulatory and non-regulatory initiatives that not only result in significant reductions in emissions through creation of markets for low-carbon energy, transportation and other sources of greenhouse gas emissions, but that also generate revenue which can be invested in strategies to address the impacts that result from these emissions by enhancing climate change preparedness and adaptation in New Jersey.		✓
4.4	Maximize efforts to secure federal funds for climate adaptation and preparedness efforts.		
4.5	Encourage the NJ Congressional Delegation to champion increased funding for existing flood mitigation programs managed by the Federal Emergency Management Agency.		✓

5.0 - Promote education, training, outreach and innovative partnerships to better inform the public, decision makers and practitioners about climate change impacts and adaptation strategies to foster adaptation and preparedness capacity.

5.1	Engage the New Jersey Climate Adaptation Alliance to lead a public education effort that effectively communicates climate change impacts and risks to New Jersey.		✓
5.2	Authorize enhanced state training and resources for local officials regarding climate adaptation and resiliency planning.		✓
5.3	Develop innovative approaches to implementing agricultural-sector climate change adaptation through public-private partnerships.		
5.4	Develop a long-term, sustained education and outreach curriculum for the agricultural community, farmers, commercial fishermen and shellfishermen on climate change impacts and recommended management practices.		
5.5	Develop a systematic and sustained training curriculum to teach transportation facility managers, infrastructure engineers and operators the basics of risk analysis and climate science.		
5.6	Educate health care providers and practitioners on climate change impacts; start an organized campaign to educate vulnerable populations about self-reliance in the case of extreme weather events, including high temperatures.		
5.7	Improve statewide and local emergency response communication protocols to ensure timely community communication about potential hazardous risks during extreme weather events.		✓

6.0 - Undertake analyses and research to inform climate adaptation and preparedness practices in New Jersey.

	RECOMMENDATIONS	SECTORS	INITIAL STEPS
6.1	Foster collaboration between state agencies, academic, federal and local governments as well as the NGO community with the goal of undertaking research and analyses on key issues to support climate change preparedness in New Jersey.		
6.2	Analyze New Jersey's current utility regulatory structure to determine the degree to which it provides disincentives for proactive climate adaptation implementation		✓
6.3	Analyze the extent to which all-hazards planning within healthcare organizations is incorporating consideration of climate change impacts.		
6.4	Foster collaboration between public, private and non-profit sectors to develop and propagate strategies that improve personal resiliency among New Jersey residents.		
6.5	Evaluate needs for creating a statewide system that could allow private health care practitioners and other health care providers to establish links in the event of emergency events to share and maintain refrigeration for critical medical needs.		
6.6	Enhance existing agricultural extension programs to better address climate change impacts to New Jersey agriculture.		
6.7	Analyze NJ's regulatory structure and policies for public investment to identify approaches to remove barriers to and provide incentives for use of green infrastructure, innovative design, and compatible uses that cost effectively promote climate adaptation while delivering additional ecosystem service or other benefits.		

Introduction

Resilience: Preparing New Jersey for Climate Change: Policy Considerations from the New Jersey Climate Adaptation Alliance is the culmination of a deliberative research and stakeholder engagement process undertaken by the New Jersey Climate Adaptation Alliance ("the Alliance"), a network of policymakers, public and private sector practitioners, academics, nongovernmental organizations, and business leaders designed to build climate change preparedness capacity in New Jersey. The mission of the Alliance is to identify, demonstrate, recommend and communicate policies and activities that can prepare New Jersey's vulnerable sectors to better meet the anticipated impacts of climate change.

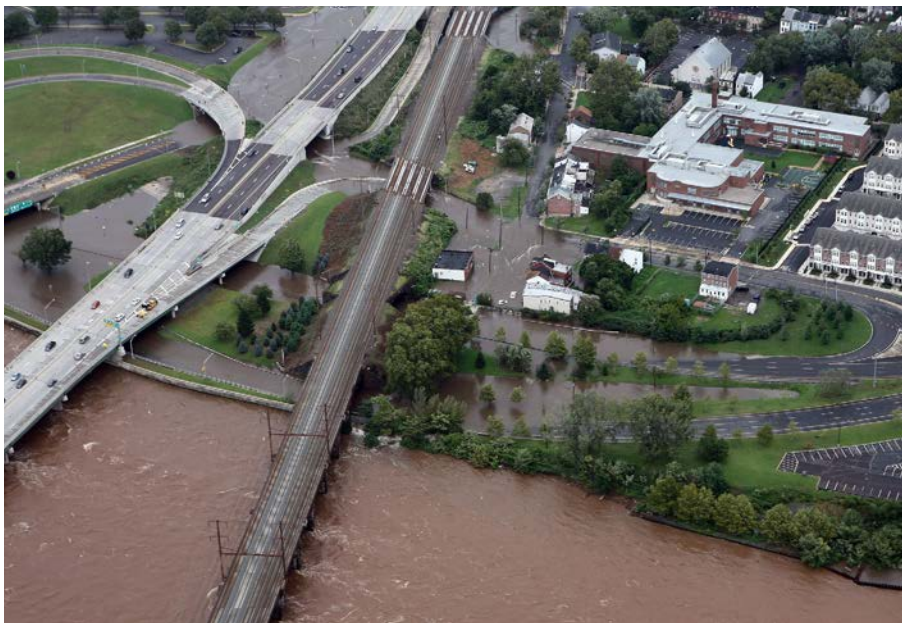
The individuals and organizations that comprise the Alliance Advisory Committee agree that the recommendations in this report speak to the compelling issues to be considered as part of a statewide climate change adaptation discussion. While individual members of the Alliance Advisory Committee do not necessarily endorse each and every specific recommendation, the Committee has reached consensus that these recommendations accurately present the issues that emerged from the research and stakeholder engagement process, and that warrant further discussion in New Jersey. Rutgers University serves in a defined role as the facilitator of the Alliance. In this role, staff at Rutgers, at the direction of the Committee, undertook the research and stakeholder engagement process that resulted in these recommendations and, as such, these recommendations do not represent the position of the University.

Supporting a Statewide Dialogue

This report is designed to support a statewide dialogue regarding the need for public policy action identified by the Alliance to enhance preparedness for a changing climate in New Jersey. It is structured to provide well-researched policy recommendations and supporting insights to inform deliberations among a variety of audiences, including state, county and local decision makers, legislators, leaders in the nonprofit and business sector, and the media. The recommendations herein build upon a body of work undertaken by the Alliance since it first convened in June 2012. Readers are strongly encouraged to review this report in conjunction with the other reports issued by the Alliance as those other reports serve as a "basis and background" for the recommendations contained in this report.

Since the purpose of these recommendations contained in this report are to support and inform a statewide dialogue regarding policies and strategies to enhance New Jersey's adaptation to and preparedness for a changing climate, those recommendations that appear to be especially timely to inform such a dialogue are identified in the Executive Summary table as initial actions.

Throughout the Alliance's stakeholder engagement process, community leaders, government officials, nonprofit organizers, residents and business managers expressed interest in understanding more about what actions they can undertake to prepare themselves and their communities for a changing climate. *Preparing for a Changing Climate in New Jersey: Actions for Individuals, Communities and Business Today* is an overview of actions that New Jerseyans can take now, at the individual, family, neighborhood



Route 29 in Trenton is closed to traffic due to flooding caused by Tropical Storm Irene (Tim Larsen, Governor's Office).

and community level, to prepare themselves and their communities for a changing climate and can be found here: https://www.sas.rutgers.edu/cms/njadapt/component/docman/doc_download/117-what-you-can-do?Itemid=.

Approach and Basis and Background for Recommendations

The approach undertaken to develop these recommendations was guided by the Alliance Advisory Committee and involved several tasks which resulted in a set of reports (see sidebar) available on the Alliance's website and which serve as basis and background to the development of these policy recommendations. These tasks included:

1. **Research climate change impacts and potential initiatives to address vulnerabilities** – Staff at Rutgers undertook research through a review of the scientific and grey literature, as well as relevant websites including those of research organizations, state and federal agencies, non-governmental organizations and others to identify climate change impacts, adaptation and preparedness practices, and potential initiatives to address vulnerabilities for each of the Alliance's targeted sectors. The research was summarized in a series of "working briefs" (njadapt.rutgers.edu/climate-impacts-in-new-jersey) that have been periodically updated to reflect new information.

2. **Engage stakeholders throughout New Jersey**. The Alliance Advisory Committee recommended integration of a robust stakeholder engagement process as part of the policy development process. Rutgers staff focused stakeholder engagement through three efforts:

Statewide survey. Rutgers undertook a statewide public perception survey through the Bloustein Center for Survey Research, led by Professor Michael Greenberg. The survey was designed to better understand perceptions of New Jerseyans with regard to climate change impacts in New Jersey as well as New Jersey's support for policy development to address climate impacts.[1]

Stakeholder engagement partnerships. Rutgers staff engaged a team of individuals with expertise in targeted sectors to engage stakeholders within those sectors to better understand perceptions of climate change impacts and policy needs to address those impacts. The stakeholder engagement partners used a variety of methods, (workshops, meetings, listening sessions, individual interviews, etc.) to gather the views of sectoral experts and practitioners with regard to climate change impacts and policy needs within the sectors. The outreach process was organized and documented in stakeholder reports for six sectors: agriculture; built infrastructure (transportation, energy, and telecommunications); coastal communities; natural resources; public health; and water resources. Additionally, three cross cutting stakeholder engagement reports were undertaken: social services; environmental justice; and emergency management.

Statewide conference. On May 22, 2013, the Alliance hosted a statewide conference attended by more than 275 participants.

[1] Greenberg, M. R., Weiner, M. D., Noland, R., Herb, J., Kaplan, M. and Broccoli, A. J. (2014), Public Support for Policies to Reduce Risk After Hurricane Sandy. Risk Analysis. doi: 10.1111/risa.12203.

KEY DOCUMENTATION

Supporting Documents

State of the Climate: New Jersey

Resilience. Preparing New Jersey for Climate Change: A Gap Analysis from the New Jersey Climate Adaptation Alliance

Surveys of Stakeholder Groups: Climate Change Preparedness in New Jersey

Public Support for Policies to Reduce Risk after Hurricane Sandy

Vulnerable Populations to Climate Change in New Jersey

The Role of Buildings in Climate Adaptation

Insights into Media Coverage of Climate Change and Severe Weather Events in New Jersey

Climate Change Preparedness and Resiliency: Funding and Financing Strategies for New Jersey

20 Good Ideas for Promoting Climate Resilience: Opportunities for States and Local Government

Working Briefs

Agriculture

Built Infrastructure: Transportation

Built Infrastructure: Utilities

Coastal Communities

Natural Resources

Public Health

Water Resources

Stakeholder Engagement Reports

Agriculture

Coastal Communities

Environmental Justice

Emergency Management

Environmental Organizations

Natural Resources

Public Health

Transportation

Social Services

Utilities

Water Resources

The first half of the conference focused on experts outside of New Jersey sharing experiences and insights of climate change adaptation efforts around the country. The second half of the conference focused on New Jersey led discussions designed to generate discussion on policy gaps in New Jersey. Conference materials can be found on the Alliance website.

Targeted online surveys. To complement the statewide public perception survey as well as to support the sector-based stakeholder engagement effort, Rutgers staff, in collaboration with stakeholder engagement partners, undertook a set of online surveys of targeted stakeholders. These surveys were designed to solicit broader feedback from stakeholders in a targeted sector group (e.g. water resource managers, public health officers). Results were provided to the stakeholder engagement partners and incorporated into their reports. Additionally, results from all of the online surveys are compiled in one report on the Alliance website.

3. **Commission reports on other compelling topics that emerged from the stakeholder process**. The Alliance commissioned three reports outlining public policy needs from the perspective of the media, the state's environmental community and policies related to building resilient structures. The Georgetown Climate Center authored a report on the media; the Executive Director of the NY/NJ Baykeeper authored a report on perspectives of the state's environmental community; and the Rutgers Center for Green Buildings authored a report on resilient structures. Additionally, two reports, *Vulnerable Populations to Climate Change* and *Climate Change Preparedness and Resiliency: Funding and Financing Strategies for New Jersey,* were also developed on these two important topics related to policy development. Research for these reports was led by two full-time graduate student fellows with direction from Rutgers staff and faculty. Finally, the Georgetown Climate Center, at the Alliance's request, compiled a brief outlining innovative climate adaptation policies in other states; thus providing New Jersey readers with insights on activities across the country.

4. **Report out on identified policy gaps.** In December 2013, the Alliance issued, *Resilience: Preparing New Jersey for Climate Change: A Gap Analysis from the New Jersey Climate Adaptation Alliance*. The gap analysis served to identify major needs in climate change adaptation and preparedness policy in New Jersey. The "gap analysis" provided the results of research conducted to date on climate change adaptation leading practices as well as the seven-months of stakeholder engagement that had been undertaken by Rutgers staff along with stakeholder engagement partners.

A Highlands resident marks his home on a map at the 2013 Highlands Long Term Community Recovery Strategy Workshop. The borough is collaborating with the Federal Emergency Management Agency (FEMA) and other organizations to develop a plan to recover from and mitigate future disasters like Hurricane Sandy (Rosanna Arias, FEMA).

5. **Develop a summary of policy recommendations based on research and stakeholder engagement and review with Advisory Committee**. Rutgers staff compiled the research, stakeholder results and the needs identified in the gap analysis into an initial synthesis of draft policy recommendations in consultation with the Alliance Advisory Committee ensuring the process acceded to the committee's expectations for a comprehensive method as well as their identification of additional gaps.

6. **Request technical input on summary recommendations from subject area experts**. Two technical work sessions were hosted by Rutgers staff which included participation by stakeholder engagement partners, Rutgers subject area experts, as well as a subset of Advisory Committee members who are subject area experts on topics covered in the policy recommendations. These work sessions were designed to ensure the technical accuracy of the drafted recommendations, and reconcile any further gaps.

7. **Revise recommendations for additional review by Advisory Committee and finalize**. The draft recommendations were subsequently revised based on the technical work sessions and presented again to the Alliance Advisory Committee prior to finalization of this report.

Building on Current Action

The Alliance recognizes that important climate change adaptation and preparedness efforts are already underway in New Jersey. The intent

Above: The restoration of Kimble's Beach in Cape May County is one of many coastal resilience projects funded by the U.S. Department of the Interior. The project is a partnership of the U.S. Fish & Wildlife Service, American Littoral Society, NJDEP, and Army Corps of Engineers. The beach plays a critical role in providing seasonal spawning ground for horseshoe crabs, whose eggs serve as a food source for migrating shore birds like the ruddy turnstone, the shortbilled dowitcher, and the red knot (Eric Schrading, USFWS).

Right: An image from NJ Flood Mapper.

of these recommendations is to support and advance ongoing activities as well as to use such activities as a foundation for development of more systematic and consistent long-term climate adaptation planning. Examples of some ongoing and important climate change adaptation and preparedness efforts already underway in New Jersey are included in the box at the end of this section.

Sharing Information

As part of its ongoing workplan, the New Jersey Climate Adaptation Alliance has developed an online directory of climate change adaptation efforts within New Jersey to provide resources that assist in guiding practitioners through the adaptation planning process. The Directory brings together geographic data, tools, reports, model policies and ordinances, case studies, and current projects focused on evaluating vulnerabilities and developing and implementing climate change adaptation plans and strategies. The Alliance encourages readers to add to this directory and can do so by logging onto njadapt.rutgers.edu/resources/climate-adaptation-directory.

Report Organization

This report includes a chapter containing the policy recommendations of the Alliance organized into six major headings that correspond to the major gaps found in the December 2013 gap analysis *Resilience: Preparing New Jersey for Climate Change: A Gap Analysis from the New Jersey Climate Adaptation Alliance.* Additionally, during the course of the Alliance's stakeholder engagement process, considerable input was received regarding two topics that are not strictly related to climate adaptation and preparedness: climate change mitigation and emergency response. Many stakeholders expressed the need to complement climate change adaptation policy with policies designed to address the root causes of climate change targeting reducing emissions that cause climate change. Many recommendations were also made about ways to improve emergency response regardless of whether those responses are climate related events or occur for other reasons. Since these two areas are not directly related to climate change adaptation, discussion about them is not included in the recommendations section but, rather, is outlined in two appendices at the end of the report.

The recommendations section of this report goes into extensive detail to further articulate subrecommendations that are intended to better integrate climate change into existing planning and other strategies. The full set of recommendations is organized according to the following major subheadings:

1. Strengthen climate change preparedness and adaptation in New Jersey through the establishment of a statewide climate adaptation policy that is designed to significantly reduce New Jersey's vulnerabilities to a changing climate through actions that direct integration of science-based standards into state policies, programs and regulations and that direct actions consistent with the statewide policy be taken by State agencies, regional and local planning authorities and commissions, municipal and county government.

2. Implement standards, regulations and policies that apply a risk management approach to identify people, places and assets (including natural capital) most at risk to climate stressors and direct investment to risk reduction efforts as well as uses that are compatible with a changing climate.

3. Rely on existing governance structures and programs, to the greatest extent possible, and build partnerships with community-based organizations, as a means to integrate climate change adaptation and preparedness rather than create new programs.

4. Explore and implement creative strategies to generate stable funding for climate change adaptation and preparedness activities, favoring strategies that also result in reductions of emissions that cause climate change.

5. Promote education, training, outreach and innovative partnerships to better inform the public, decision makers and practitioners about climate change impacts and adaptation strategies to foster adaptation and preparedness capacity.

6. Undertake analyses and research to inform climate adaptation and preparedness practices in New Jersey.

EXAMPLES OF CLIMATE CHANGE ADAPTATION AND PREPAREDNESS ACTIVITIES ALREADY UNDERWAY IN NEW JERSEY

• Flood mitigation efforts within the Passaic River Basin in which voluntary buyouts are moving forward by municipalities such as Wayne by applying federal and local dollars to implement the recommendations of the Passaic River Basin Flood Advisory Commission to address chronic flooding in the region. New Jersey's Association for Floodplain Management is a strong statewide voice for important policies to enhance flood mitigation efforts.[1]

• The Jacques Cousteau National Estuarine Research Reserve (JCNERR) is working closely with communities to assist them in identifying and reducing their vulnerabilities to coastal flooding using the NJFloodMapper and Getting to Resilience tools.[2] The JCNERR team works in partnership with local government leaders to consider coastal flooding and other risks into community planning efforts.

• In May 2014, the New Jersey Board of Public Utilities approved a settlement agreement that would allow PSE&G to invest $1.22 billion into a variety of programs designed to strengthen its electric and gas systems to be more resilient against severe weather conditions.[3]

• With support from state, local, business and private partners, Sustainable Jersey™ has developed a climate change adaptation Task Force which is developing actions that municipalities can take to enhance climate change preparedness at the local level and earn points toward Sustainable Jersey certification.[4]

• With support from the New Jersey Recovery Fund, NOAA and the state Coastal Management Program, Rutgers University is developing an online geospatial platform to provide easy access to mapped information coupled to resiliency tools to support state and local climate adaptation efforts. Additionally, Rutgers is preparing a coastal flooding exposure assessment to identity geographic areas that are expected to be more highly prone to coastal flooding under future sea level rise projections.

• With support from the New Jersey Recovery Fund, NOAA and the New Jersey Department of Environmental Projection, New Jersey Future[5] is providing six coastal communities with dedicated planners to advance long-term risk mitigation and resiliency strategies. The planners are working to communicate future sea level rise projections and address their impacts, in partnership with JCNEER. At the state level, New Jersey Future advocates for the integration of resiliency measures into rebuilding efforts including hazard mitigation planning and infrastructure investments.

• In May 2014, the New Jersey Department of Environmental Protection announced that it has completed 107 closings on Hurricane Sandy-damaged homes in Sayreville and South River. The agency reports that it has identified 908 properties for buyouts in 11 municipalities where major flooding occurred from Sandy storm surge.[6]

• The State of New Jersey 2014 Hazard Mitigation Plan released by the New Jersey Office of Emergency Management includes consideration of sea level rise as a risk and also includes a focus on state facilities that may be particularly vulnerable.[7]

• The New Jersey Division of Water Quality recently issued guidelines for water utilities regarding flooding, emergency response, ensuring electrical generating capacity, and asset management.[8]

• The New Jersey Department of Environmental Protection, Bureau of Dam Safety and Flood Control has prepared a model floodplain ordinance that urges use of best available mapping data.[9]

• Efforts in New Jersey are benefiting from important work underway at the federal level as well, including FEMA's Coastal Construction Manual[10] and EPA's Climate Ready Water Utilities program.[11]

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[1] http://www.nj.gov/dep/passaicriver/
[2] http://www.prepareyourcommunitynj.org/
[3] http://www.njenergystrong.com/default.aspx
[4] http://www.sustainablejersey.com/actions-certification/actions/
[5] http://www.njfuture.org/
[6] http://www.nj.gov/dep/newsrel/2014/14_0052.htm
[7] http://www.ready.nj.gov/programs/mitigation_plan2014.html
[8] http://www.state.nj.us/dep/dwq/
[9] http://www.nj.gov/dep/floodcontrol/modelord.htm
[10] https://www.fema.gov/media-library/assets/documents/3293
[11] http://water.epa.gov/infrastructure/watersecurity/climate/index.cfm

Recommendations

"[T]he State should create a statewide Climate Change Working Group … to foster statewide preparedness planning, coordinate scientific and technical assessment of potential climate change impacts to the citizens and environs of New Jersey, and to frame adaptation policy.

A message of hope and defiance at a condominium complex in Ortley Beach (Patsy Lynch/ FEMA).

1.0 Strengthen climate change preparedness and adaptation in New Jersey through the establishment of a statewide climate adaptation policy that is designed to significantly reduce New Jersey's vulnerabilities to a changing climate through actions that direct integration of science-based standards into state policies, programs and regulations and that direct actions consistent with the statewide policy be taken by State agencies, regional and local planning authorities and commissions, municipal and county government.

1.1 Through legislative or executive action, the State should create a statewide Climate Change Working Group. The charge of the group would be to foster statewide preparedness planning, coordinate scientific and technical assessment of potential climate change impacts to the citizens and environs of New Jersey, and to frame adaptation policy. The working group would make recommendations for legislative action, where needed, and otherwise drive preparedness implementation through administrative channels and in cooperation with the private sector. The working group should recognize special and particular needs of different regions of the state and ensure that statewide policy allows for strategies to address regional needs. The composition and exact charge to the working group would be established by the Legislature or the Governor. However, the following recommendations are offered on working group structure:

- Leadership should be housed under an administrative department of state government (e.g. Secretary of State, Law & Public Safety or Environmental Protection);

- Membership should include all levels of government (state, county and municipal) as well as cabinet level participation and, given its prominent leadership in emergency preparedness and response, the New Jersey State Police and Office of Emergency Management should be represented;

- Representatives of the private sector should be directly engaged on the working group or involved in subcommittees designated by the working group;

- At large members representing the general public should also be involved, including representatives who can speak to the special needs of vulnerable locations and populations;

- The working group should consider a "Sector Based Approach" to focus public policy recommendations on discrete constituencies for coordinated planning and implementation of best practices to address climate adaptation;

- As a first order of business, the working group should structure, name and convene a science and technical advisory panel (STAP) to perform critical assessment work to help inform the activities of the working group;

- The Working Group should seek out opportunities to maximize cross border efforts that benefit climate adaptation and preparedness efforts in New Jersey through work with interstate agencies and collaboration with other States;

- The Working Group would benefit from considering the outcomes of extensive research and stakeholder engagement conducted by the New Jersey Climate Adaptation Alliance that provide the basis and background for these recommendations.

1.2 - A Science and Technical Advisory Panel (STAP) should be formed within the Climate Change Working Group and be charged with rapidly developing a New Jersey climate impact assessment to guide development of climate adaptation policy in New Jersey. The STAP would conduct a rapid synthesis of the most current scientific data for New Jersey to inform development of a climate impact assessment which, at minimum, includes:

- Projected changes in temperature, precipitation and sea level rise;

- Projections over mid and long term horizons (2030, 2050, 2100);

Ocean City dunes damaged by Tropical Depression Ida and a nor'easter in 2009 (Elissa Jun, FEMA).

• Projections of expected future precipitation patterns and extreme weather events and impacts on drought of record conditions;

• Identification of current and future risks to people, places and assets most vulnerable in New Jersey from climate change;

• A recommended approach to ensure that state policy can adapt to changes in climate science including identification of critical research and analytical gaps as recommended later in this report.

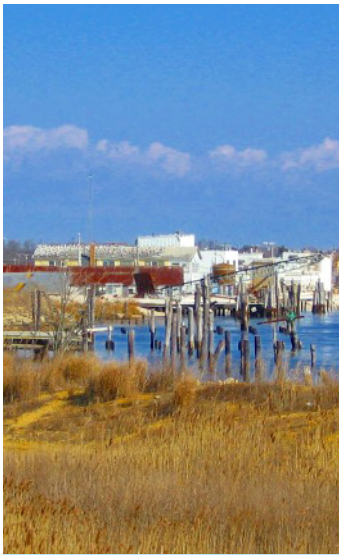
1.3 The climate impact assessment should serve to inform consistent development and adoption of statewide climate adaption policy. The impact assessment should inform and be integrated into existing government programs including, but not limited to: spending; standard setting; capital and infrastructure investment; long-term planning; education; economic development; research; analyses and data development.

1.4 State policy should be incorporated into long-term planning that governs regulations, program operations, allocation of infrastructure funds and capital planning to ensure that state policies and programs incorporate consideration of a changing climate into decision making and to ensure that climate adaptation and resilience is a priority goal with discrete outcomes, necessary resources, staff development and schedules for implementation. Programs already exist in New Jersey that are designed to undertake long term planning related to critical resources and assets throughout the State. Rather than create a separate new function to plan for climate change impacts in New Jersey, there are extensive opportunities to integrate consideration of the climate impact assessment into existing and ongoing long term planning. Planning that should incorporate the state climate change policy should include but not be limited to those that affect: wastewater and water supply and infrastructure planning; housing and state land use and redevelopment; transportation design and capital; identification of constrained lands for affordable housing; building codes; hazard mitigation; public health; habitat, forest and farmland preservation; coastal ecosystem protection and restoration; fisheries management; and energy.

1.5 All political jurisdictions of the State including State agencies, regional and local planning authorities and commissions, municipal and county government should incorporate the state climate change policy into capital planning and decision making. These efforts should include planning and decision making affecting expenditure of monies for capital improvements, infrastructure (including open space and farmland preservation, drinking water, wastewater, transportation, housing, shore protection, telecommunications and energy) and economic development investment. Satisfactory incorporation of the climate change policy into these decisions should be a condition of receipt of state funding.

1.6 Given New Jersey's unique geographic vulnerability to sea level rise, a comprehensive evaluation should be conducted to review policies and regulations governing the New Jersey coastal zone in light of climate change risks. Findings and insights from the evaluation should result in recommendations for statutory, regulatory and executive actions that will enhance the adaptive capacity of the coastal zone including recommendations for policy adoption as part of the routine Coastal Zone Management section 309 evaluation process.

Monmouth County farm flooded after heavy rains in 2005 (Jackie Sister 72, Creative Commons).



Planning for climate change is especially challenging for Delaware Bayshore communities such as Bivalve at the mouth of the Maurice River in Cumberland County (Dendroica Cerulea, Creative Commons).

The reevaluation should include consultation with federal and local governments and involve engagement of the public, local coastal governments and stakeholders. Geographically, it should address an inclusive definition of the state's coast, being certain to incorporate urban coastal areas and working waterfronts. Provisions to be reevaluated include those governing: land use development and redevelopment; impervious cover; beach replenishment; hazard mitigation and response; protection of natural areas and coastal habitats and impacts to locations for public access to coastal waters. The report should detail needs not present in current policies and regulations to adequately protect people, places and assets within the coastal zone from conditions of a changing climate and provide specific recommendations for statutory and regulatory change. Additionally, the evaluation should seek to identify design alternatives for maritime structures, such as docks and marinas that are, by nature, in vulnerable areas and identify strategies to apply incentives or establish standards for these alternatives.

1.7 Special challenges exist for climate change adaptation planning in certain geographic areas of the state, such as New Jersey's urban and Delaware Bayshore communities, as well as within certain vulnerable populations. A working group of experts should be convened to consider the outcomes of the statewide climate impact assessment on these geographic areas and vulnerable populations. The working group would be charged with offering recommendations on new approaches to the form and function of the targeted geographic areas and on strategies to best address the needs of vulnerable populations so that state climate change adaptation policies result in risk reduction as well as additional economic, community and environmental benefits. As part of this effort, consideration should be given to the limitations on options for adaptation in certain areas such as urban communities and the Delaware Bayshore. Efforts to protect socially vulnerable populations throughout the state from a changing climate should include but not be limited to addressing the needs of people of color, low-income populations, urban residents, senior citizens, people with compromised health and mobility access, people with low English proficiency and others.

1.8 The Municipal Land Use Law should be revised to require an element of the master plan that addresses natural hazards such as climate change. Such an element would be designed to direct municipalities to identify and assess the impacts of land use-related natural and other hazards as well as the associated risks and vulnerabilities that are likely to affect the municipality, including but not limited to storms, shoreline erosion, flooding, storm surge, wind, and landslides. Training should be made available for local officials on how to develop and implement such an element and its provisions.

2.0 Implement standards, regulations and policies that apply a risk management approach to identify people, places and assets (including natural capital) most at risk to climate stressors and direct investment to risk reduction efforts as well as uses that are compatible with a changing climate.

2.1 The State should enhance tools that can be used to support the goal of restricting and discouraging future development and redevelopment in areas identified as being of high risk to the impacts of current and future storms, flooding and sea level rise. Recognizing that there are inherent challenges in updating and incorporating future projections into maps that inform flood hazard risk mitigation efforts at the state, county and local level, the State should incorporate more stringent siting, design and construction requirements as part of flood hazard standards. The State should utilize the best available data for riverine and coastal flooding mapping reflecting both current conditions and science as informed by the newly established STAP. Additionally, a statewide coastal and riverine flooding exposure risk assessment should be conducted that incorporates data from prior storms (i.e. Hurricane Irene and Sandy), the updated flood hazard maps, information regarding current and future climate change scenarios, environmental conditions, probabilities of extreme weather events, data regarding repetitive losses, existing development patterns and recognition of particularly vulnerable populations.

The updated flood hazard maps and the flooding exposure risk assessment should be incorporated into regulations, policies, planning, capital and infrastructure investments in order to restrict and discourage future development and redevelopment in areas identified as being of high risk to current and future storms, flooding and sea level rise. This effort should include, but not be limited to incorporation into the areas outlined below:

- The flooding exposure risk assessment should be incorporated into a review of building construction and elevation standards to result in more stringent standards that provide the necessary safety precaution for projected increases in sea level rise and future development/impervious cover;

• The flooding exposure risk assessment should be consistently incorporated into State and countywide all Hazard Mitigation Plans as they are updated in the next cycle;

• The flooding exposure risk assessment should be used to develop comprehensive statewide guidelines for existing development in highest risk areas to guide/facilitate/promote strategic relocation using techniques such as Transfer of Development Rights and public acquisition, looking at what can reasonably be protected using current technology considering direct costs and benefits and application of policies that recognize indirect long-term ecosystem service costs and benefits. These guidelines should incorporate a statewide analysis of the long term public costs of development and redevelopment in high hazard areas as well as the long-term economy-wide costs of failing to act;

• The flooding exposure risk assessment should be used to inform a statewide ranking of climate risk to infrastructure most at risk (i.e., transportation, energy, telecommunications, drinking water and wastewater infrastructure);

• The flooding exposure risk assessment should be used to identify a statewide ranking of site remediation case priorities for sites in high risk areas to prevent increased exposure or mobilization of contaminants at high risk of flooding;

• The flooding exposure risk assessment should inform revisions to the Municipal Land Use Law that would require county and municipal master plans to identify and address, consistent with the policy at 1.8, above, high risk areas as part of local master plans and zoning and encourages the exceedance of state requirements to establish appropriate local ordinances that provide climate change adaptation functions including: protection of natural features such as dunes, overwash areas and tidal wetlands via strategies such as setback and buffer requirements as well as standards addressing stream corridors and steep slopes. Some of this effort can benefit from developing model local ordinances that integrate existing elements of the state's Coastal Zone Management rules that promote resiliency of natural systems to mitigate hazards.

• State Agencies, county and municipal governments, as well as regional planning entities and Metropolitan Planning Organizations, should incorporate the updated flood hazard maps and the flooding exposure risk assessment into planning and decision making including master planning and zoning decisions to reduce risk to

Governor Chris Christie and U.S. Energy Secretary Ernest Moniz announce "NJ TransitGrid," an electrical micro-grid capable of supplying power when the traditional centralized grid is compromised (Tim Larsen, Governor's Office).

A Red Cross volunteer assists a young woman at a shelter in Bound Brook after a nor'easter damaged her family's home (Andrea Booher, FEMA).

Above: Climate change will have complex impacts on New Jersey agriculture. Rising winter temperatures may drive the northward expansion of agricultural pests such as the brown marmorated stink bug (Photochem PA, Creative Commons). Heat and drought may damage crops (iStock).

people, places and assets as well as to enhance local economies;

• A risk assessment should be undertaken to identify specific types of new development for which even a limited chance of flooding is too great a threat. Federal Executive Order 11988, issued in 1977, directs federal agencies to avoid long and short term adverse impacts associated with occupancy and modification of the floodplains. FEMA guidance issued pursuant to the Executive Order lays out an eight-step process for federal agencies to utilize in making risk determinations. A risk assessment will allow New Jersey to identify types of development that should be prohibited in flood prone areas in the future, such as hospitals, health care facilities, nursing homes, facilities that handle hazardous materials, facilities associated with continuity of government operations, landfills, etc. as well as to determine whether to apply the FEMA guidance or a different standard in light of the statewide climate impact assessment.

2.2 An assessment should be conducted to determine the vulnerability of agricultural property, land and resources to a changing climate including activities on land as well as those affecting New Jersey's aquaculture in coastal waters. The statewide analysis should be detailed by agricultural use type and provide physical, biologic and economic considerations for a range of climate scenarios with a focus on agricultural resources of economic importance to New Jersey. A flood exposure assessment for agricultural lands and structures should also be conducted. The vulnerability assessment should identify a suite of adaptation measures that could be implemented to address vulnerability in both the short and long-term. This assessment should also include a method for individual agricultural practitioners and property owners to assess site and agricultural practice specific risk, along with leading practices to mitigate and adapt to such vulnerability. The assessment should include consideration of potential for increased invasive species and pests. It should also consider the opportunity to provide incentives and benefits to property owners whose farmland preservation efforts promote wetlands migration which provides climate adaptation protection. Collaboration with appropriate stakeholders and scientists should be a part of this assessment, and the design of this study should utilize the expertise of agricultural extension personnel.

2.3 An assessment is needed to determine the vulnerability of forests, tidal wetlands, critical habitats and other natural areas to a changing climate, and the value of these places and resources for reducing and/or adapting to climate change. The assessment should identify most vulnerable areas as well as best management practices for adaptation of forests, tidal wetlands and natural areas for conditions of a changing climate.

2.4 As part of ensuring compliance with regulations pursuant to the Safe Drinking Water Act, the Water Pollution Control Act and

the Water Quality Planning Act, NJDEP should require that all public water supply and public wastewater utilities develop, implement and periodically update plans for the identification and mitigation of natural and other risks to facility operations in light of the statewide climate change impact assessment. Updated plans should identify all facilities and operations that are at significant risk of damage due to flooding, storm surge and other events, with assessment of the level of risk and the extent to which damage would significantly reduce facility function, endanger public health or safety or damage the environment. Besides extreme weather events, drinking water supplies can be affected by other impacts from a changing climate such as increases in algal blooms that can cause toxic or taste and odor problems, invasive species that can clog intakes, increase in stream sediment load that may require additional filtration, etc. Such an assessment should include an analysis of infrastructure that has historically resulted in extensive combined sewer overflow events. Water utilities should be required to have plans in place for improved emergency preparedness procedures and equipment that will minimize the impacts of severe weather events and improve responsiveness to damages that do occur. Emergency preparedness involves both planning and investments, from communications technology to infrastructure "hardening" and relocation. These plans should incorporate climate change scenarios for predicted or predictable events including extremes that may be exacerbated by climate change as well as best management practices from EPA Climate Ready Water Utilities research.

2.5 The statewide climate change impact assessment should be used by Metropolitan Planning Authorities, NJDOT and other relevant agencies, to conduct a statewide transportation infrastructure vulnerability assessment. The assessment should identify transportation systems of greatest vulnerability as well as define specific actions to mitigate adverse impacts from storms, floods and other climate change impacts.

3.0 Rely on existing governance structures and programs, to the greatest extent possible, and build partnerships with community-based organizations, as a means to integrate climate change adaptation and preparedness rather than create new programs.

3.1 Development of climate change adaptation policy in New Jersey should recognize the existing health and environmental burdens already experienced by urban, low-income and communities of color that may be exacerbated by a changing climate. Identification of those existing burdens (e.g., air pollution, contaminated sites) is needed to not only draw attention to the added burden of climate change but also provides critical information for additional action. Enhanced programmatic attention (e.g. inspections, economic development funding, etc.) targeted at communities where disproportionate impacts exist and are exacerbated by climate change impacts, is needed.

3.2 Meaningful incentives should be developed and sustained at a statewide scale to encourage counties and municipalities to advance in targeted and comprehensive buy-out programs for flood and storm prone areas. One incentive that should be considered is providing full and reliable funding for a state payment-in-lieu of taxes program, which has been an integral element of the successful Green Acres / Blue Acres land acquisition programs which have now run out of funding, in order to ease the burden on local government buy-out programs.

3.3 Greater participation by a broader set of state and local agencies (including public health officers, local planning offices, environmental commissions, community and faith-based organizations, etc.) in state and local emergency management and hazard mitigation planning should be encouraged. The State Office of Emergency Management can serve to foster a participatory approach to emergency management and hazard mitigation planning which, in turn, can promote similar integration at the local level.

3.4 Analyze and determine how to effectively plan for debris management during disasters

Communities with poor air quality or contaminated sites may be disproportionately affected by climate change (top: John Isaac, UN Photo; bottom: EPA).

A water treatment facility in Middlesex County is under repair after water surges from Hurricane Sandy overran the pumping station (Patsy Lynch, FEMA).

"[During Hurricane Sandy] 1½ times the normal vegetative debris produced in the State each year was generated in a single day.

and storms events. In the aftermath of Hurricane Sandy it was clear that towns and counties were not sufficiently prepared to manage enormous quantities of storm debris. The job of state, county and municipal governments was complicated by the sheer magnitude of the impact of the Superstorm as 1½ times the normal vegetative debris produced in the State each year was generated in a single day. While the State, Counties and Municipalities effectively coordinated an extraordinary effort to remove material from the streets and out of harms' way in unprecedented time, the approval of some 325 "Temporary Debris Management Areas" (TDMA) did not advance sound environmental planning. It is recommended that the State better coordinate pre-planning approval of TDMA siting through formal incorporation or informal recognition in County Solid Waste Management Plans to enable sound planning and activation on an as needed basis in response to emergency situations. An alternative to this approach would be to effectuate pre-planning and siting of TDMA's through the New Jersey Office of Emergency Management's State Emergency Operations and Response Plan and Annex dedicated to debris management. It is also recommended that existing, permitted facilities, such as regional landfills, transfer stations, material recovery facilities and recycling facilities be seriously considered for designation in these plans as these sites are already approved for use by the NJDEP and are under strict supervision by the State and County Environmental Health Act agencies. Finally, debris management plans should also identify road networks necessary for clearing for access to critical infrastructure on a prioritized basis, making best use of existing critical infrastructure lists in each County. Maintaining or restoring access to critical infrastructure sites, such as hospitals, food stores, gas stations, wastewater treatment plants, etc. is essential to effective emergency response.

3.5 In partnership with state, county and local OEM organizations, enhanced compliance inspections and pollution prevention assistance should be provided by NJDEP to facilities using petroleum or hazardous materials that exist in flood prone areas. Technical assistance needs to be provided to these facilities to help them understand their vulnerabilities, including source reduction, debris management and securing vulnerable assets such as above ground storage tanks. In addition, the current regulatory structure for pollution prevention should be assessed to ascertain if there are significant opportunities for risk reduction for facilities operating in flood prone areas and during extreme weather events.

3.6 An assessment of farmland preservation strategies and coordinated agricultural, floodplain, and wetland easement purchases should be conducted for agricultural locations that may be vulnerable to inundation impacts associated with sea level rise or increased periodic flooding from a changing climate. A

Construction crews in Bay Head remove piles of debris left behind by Hurricane Sandy (Wendell A. Davis, Jr., FEMA).

coordinated purchase strategy, informed by a risk-benefit analysis, under a combination of programs could help increase flexibility for climate adaptation strategies when compared with easement purchases under a single program. Coordinated purchases could, for example, allow greater consideration and accommodation for wetlands retreat/migration. Also as part of this assessment, easement guidelines should be examined to allow for different purchase ratios to support modifications to upland preservation strategies where applicable.

3.7 Regulation of agricultural conservation practices under the Clean Water Act should be examined to determine the extent to which differences in federal and state regulation affects the speed or cost of implementation of climate adaptation strategies. New Jersey and Michigan are the only two states that have assumed administration of the Clean Water Act, creating the potential for differences in regulation of certain agricultural conservation practice standards (e.g. grassed waterways, wetland enhancement, etc.)[1] under federal and state law. Differences should be examined with the goal of minimizing barriers for farmers to apply conservation strategies that are also beneficial for climate adaptation purposes and consider the health and sustainability of other ecosystems.

3.8 State and local agencies should work with energy utilities to develop long-term resiliency plans for the electric distribution system and investigate the feasibility of alternative configurations including micro-grids or implementation of smart-grid technology to mitigate risk related to power outages. Issues associated with undertaking alternative configurations are highly complicated and may involve local and interstate considerations. A stakeholder-informed effort can help to proactively address confounding issues while meeting stated goals of enhancing resiliency of the electric distribution system.

3.9 New Jersey should develop and adopt a comprehensive climate adaptation public health strategy similar to efforts underway in other states and as guided by the federal Centers for Disease Control Building Resilience Against Climate Effects (BRACE) framework. New Jersey can benefit from participation in national efforts designed to incorporate the most current climate science into traditional public health planning processes through the development of a unified climate and health adaptation strategy. Other states, such as New York, Massachusetts, Minnesota, and California, have fully developed programs that include partnerships among state, county, local health officials and the academic community along with health care delivery providers and the NGO community. A statewide climate adaptation public health strategy should, at minimum, include:

- A geospatial risk analysis to examine current and future public health risks, hazards and social vulnerabilities statewide;

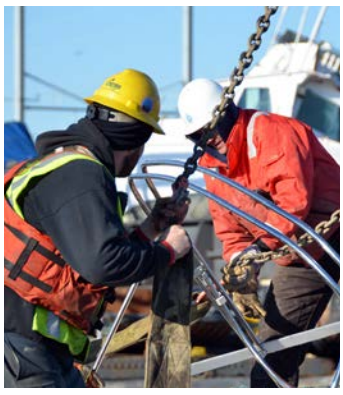
- Geospatial localized vulnerability assessments developed collaboratively with regional and local public health agencies and stakeholders, health care institutions and providers, the NJ Department of Health and NGOs. The local assessments can best identify needs and gaps within individualized municipalities;

- Identification of categories of populations especially vulnerable to climate change impacts and development of strategies to address the needs of those populations throughout the state.

3.10 Through partnerships of state, federal and local agencies, New Jersey should set a goal of 80% municipal participation in FEMA's Community Rating System program. Currently, approximately 11% of eligible NJ Municipalities participate in the CRS program which reduces flood risk to homeowners in participating municipalities.[2] Coordination among agencies is needed to meet this goal and at least one dedicated staff person should be tasked with advancing collaborative efforts to meet the goal. Additionally, NJOEM, along with FEMA and the Insurance Institute of Business and Home Safety should identify hazard mitigation strategies for urban areas, including developing leading practices that would help urban areas qualify

Coast Guard personnel work with the EPA to clean up oil spills after flooding in Bound Brook in 1999 (Andrea Booher, FEMA).

Workers remove a boat submerged in Raritan Bay. The vessel was damaged during Hurricane Sandy (Sharon Karr/ FEMA).



[1] Refer to http://www2.epa.gov/uswaters/list-conservation-practices-considered-normal-farming-under-clean-water-act-section-404 for the list of federally exempt conservation practices.
[2] http://www.fema.gov/media-library/assets/documents/27808

A message board outside Hoboken City Hall displays information for residents affected by Hurricane Sandy. In the aftermath of the storm, many residents had no power or access to broadcast news (Liz Roll, FEMA).

for the CRS rating system such as provisions for multi-family housing and recognizing the positive climate impacts of densely developed and transit oriented communities.

3.11 The Climate Change Working Group should convene a team of experts in coordination with local governments, the private sector and experts in the academic and the NGO community to recommend climate resilient construction and design guidelines and recommend amendments to regulations, codes and standards to meet new guidelines. Considerable work and study has already been conducted as to "leading practices" related to development of resiliency standards and protocols into construction design guidelines. The FEMA Mitigation Assessment Team (MAT) report[3] provides important insights on these issues. Additionally, the New Jersey Climate Adaptation Alliance commissioned a report from the Rutgers Center on Green Building to provide insights on these issues a well. As a result, extensive original research is likely not needed but, rather, what is needed is a stakeholder-informed deliberation on actions to be taken based on leading practices and state of the art recommendations. The team should be charged with:

- Giving consideration to design and engineering principles that look to leaders, such as the City of Boston, which has developed and implemented advanced building resilience standards via construction codes, energy and water use disclosure, as well as provisions that allow for requirements and authorization for more stringent codes in local planning and zoning than those set nationally or by the State;

- Making recommendations on changes needed to the Uniform Construction Code to adopt the construction and design guidelines as state policy; and

- Making recommendations in state policy as to other actions that are needed to implement the construction and design guidelines.

3.12 NJDEP and NJDCA should determine how to most effectively modify regulatory standards regarding stormwater runoff, stream flow, water quality based effluent limits in NJPDES permits and water allocations to incorporate implications of climate change for precipitation patterns (e.g., storm frequency, severity and volume) and stream flow changes (e.g., evapotranspiration and recharge changes). The modified standards are intended to incorporate the results of the STAP's climate impact assessment, including projections of future conditions, so that advanced watershed and stormwater modeling techniques being developed by academia and federal agencies adequately incorporate consideration of climate change impacts. The standards should also ensure that systems are in place to ensure regular maintenance of stormwater control and flood protection structures after their initial design and construction. Residents should not have a false sense of security if stormwater control and flood protection structures are not maintained.

3.13 Proposed shore erosion control projects should be required to consist of nonstructural shoreline stabilization measures, such as living shorelines, as a default design standard.

[3] http://www.fema.gov/media-library/assets/documents/85922

Coastal wetlands such as this area outside Atlantic City are a natural barrier to flooding due to storm surge and sea level rise.

Any divergence from the design standard will require a waiver for the utilization of structural measures (e.g. bulkheads), unless the area has otherwise been identified for the use of such structural alternatives.

3.14 Consideration needs to be given to the development and enforcement of mandatory mold standards to protect worker health and safety. The nature of such standards should be informed by input from the State's public health, labor and construction communities and standards can be complemented by development of a certification program for mold removal workers so as to protect consumers who hire such workers.

3.15 Enhanced surveillance during and after storm events is needed in communities that already experience other environmental burdens (e.g., contamination, industrial facilities containing hazardous materials). Coordination is needed among state, federal and local agencies to ensure that sufficient monitoring protocols are established and implemented following a storm event and inspections are undertaken in communities where residents may potentially be exposed to pollution and hazardous materials as a result of storm and climate impacts. Effective methods of communication with residents and community leaders are needed to ensure the community is fully informed in a timely manner of inspection and surveillance outcomes.

3.16 Efforts to foster collaborative partnerships between local neighborhoods (including community-based and faith-based organizations) and various governmental levels of emergency management (e.g., State, County and local OEM programs) should be encouraged. Such efforts should be designed to maximize opportunities to empower local community organizations to inform development of community-level preparedness plans and to participate in implementation of plans to ensure local needs are addressed and that local vulnerable populations are adequately identified as part of the planning process. This effort could be an excellent opportunity to build upon the current Community Emergency Response Teams (CERT) program that is run by the New Jersey State Police. Preparedness plans can also include systems that allow for residents to report local conditions during events and multiple methods of two-way communication to ensure residents are adequately informed of critically important information (including methods to address needs of low-English proficiency communities).

4.0 Explore and implement creative strategies to generate stable funding for climate change adaptation and preparedness activities, favoring strategies that also result in reductions of emissions that cause climate change.

4.1 The Governor or the Legislature should convene a Blue Ribbon Panel to examine approaches to establish dedicated funds to support climate change preparedness in New Jersey and prepare a report to the Legislature with recommendations. New Jersey can learn from innovative funding and financing mechanisms underway and under development in other states. Examples of potential mechanisms that were raised as part of the Climate Adaptation Alliance stakeholder process include:

- Establishing a dedicated source of funds via the state's Garden State Preservation Trust, Green Acres and Blue Acres programs that is focused on preservation of open space, cultural heritage assets, farmland and other treasures that are most at risk from a changing climate as well as those that are most beneficial to enhancing resilience;

- Establishment of authority that allows for the local adoption of stormwater service fees, such as stormwater utilities, that provide monies for operation and maintenance costs of stormwater systems[4]; and

- Creation of fees or surcharges that generate stable sources of funds for climate change preparedness and adaptation efforts while creating an inherent incentive for actions that result in reductions in greenhouse gas emissions. Examples may include: impervious cover fees, dedicated surcharge on gasoline, user based mileage fee, etc.

4.2 As part of their annual budget process, all state agencies and authorities should reflect the integration of the statewide climate change adaptation policy including capital programming and operating and maintenance funds for enhancing resiliency and climate adaptation.

4.3 The State should pursue opportunities to participate in regional multi-state regulatory and non-regulatory initiatives that not only result in significant reductions in emissions through creation of markets for low-carbon energy, transportation and other sources of greenhouse gas emissions, but that also generate revenue which can be invested in strategies to address the impacts that result from these emissions by enhancing climate change preparedness and adaptation in New Jersey. The recent issuance of the proposed rulemaking on power plant emissions by the United States Environmental

[4] http://water.epa.gov/infrastructure/greeninfrastructure/upload/FundingStormwater.pdf

A FEMA Community Relations specialist distributes Spanish-language literature in Somerset County (Michael Medina-Latorre, FEMA).

Protection Agency makes it necessary for New Jersey to take a fresh look at how it will achieve the mandates of the federal rule as well as the state's requirements under the Global Warming Response Act. This evaluation will likely include consideration of regulatory emissions standards, market mechanisms and voluntary strategies. Additionally, if designed to also address the statewide emissions targets set under the Global Warming Reponse Act, it will be necessary for this effort to consider strategies beyond the electric generating sector, such as the transportation sector which is the largest source of greenhouse gas emissions in New Jersey.

4.4 All state agencies, authorities and commissions should aggressively maximize efforts to secure federal funding for climate adaptation and preparedness efforts. New Jersey should leave no stone unturned in identifying and successfully garnering federal dollars to undertake climate adaptation and preparedness efforts. Establishment of the statewide Climate Change Working Group should serve as an important step forward to demonstrating New Jersey's serious and coordinated effort to prepare for a changing climate which is likely to bolster the state's effort to garner federal support. Achieving this goal will also require partnerships among state agencies, the NGO and academic communities, local governments and other entities to identify and apply for federal grants; the statewide Climate Change Working Group can serve to foster such partnerships.

4.5 The New Jersey Congressional Delegation should be encouraged to champion increased funding for existing flood mitigation programs managed by the Federal Emergency Management Agency. Areas to focus on could include:

• Stabilizing and increasing funding for the Pre-Disaster Mitigation (PDM) program which provides funding for county-wide all Hazard Mitigation Plans for most of New Jersey;

• With New Jersey leading the nation in the number of repetitive loss properties, boosting funding for the Flood Mitigation Assistance Program (which now incorporates the previous Repetitive Loss and Severe Repetitive Loss programs) is needed to address needs of owners of chronically damaged residential and business properties;

• Increasing the Cost of Compliance (ICC) for projects that reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program (NFIP). The ICC is now capped at $30,000 and needs to be raised to allow substantially damaged structures to comply with flood mitigation standards of the NFIP or, at minimum, allow for a regional adjustment of the ICC to recognize the sensitivity of the costs of flood mitigation measures which are sensitive to local material costs and services.

5.0 Promote education, training, outreach

A FEMA Mitigation specialist at a Disaster Recovery Center provides information to a Bay Head resident about some of the actions she can take to protect her home against storms such as Sandy (Patsy Lynch, FEMA).

and innovative partnerships to better inform the public, decision makers and practitioners about climate change impacts and adaptation strategies to foster adaptation and preparedness capacity.

5.1 The New Jersey Climate Adaptation Alliance could serve as a statewide partnership for educational and academic institutions, government, NGOs, private sector practitioners, the philanthropic community and others, to engage in a public education effort that effectively communicates climate change impacts and risks to New Jersey. This effort can serve to enhance awareness of and support for actions needed to protect New Jersey's people, places and assets from climate change impacts. Specific efforts could include:

- Programs aimed at the general public and sector-based practitioners to improve New Jersey's "literacy" about climate change impacts and needed strategies to increase resiliency statewide;

- Programs aimed at school-aged children based on simple and consistent messaging about climate change risks in New Jersey to promote family dialogue about climate change and ensure that New Jersey's future decision makers understand the widespread impacts of a changing climate now and in the future;

- Efforts that help the public understand the respective roles of utilities, infrastructure owners and operators, regulators and consumers with regard to the provision of reliable service, the control of utility service costs, the preparation for unanticipated and extraordinary events that affect service and the upgrade of utility infrastructure to meet the service needs and challenges identified by the Climate Change Working Group and the STAP. Our research revealed that utilities (i.e. water, electric, etc.) perceive a gap between the need to invest in infrastructure resilience and the willingness of the public to support the costs of such investment.

5.2 The Legislature should authorize enhanced training and qualifications for local officials regarding climate adaptation and resiliency planning. Local officials including planning and zoning board members are critical to ensuring local communities are prepared for a changing climate. Therefore, state training and certification programs, as well as state resources, related to climate change impacts and adaptation leading practices should be authorized for planning and zoning board members as well as for municipal engineers, including but not limited to flood hazards and mapping, stormwater management planning, climate change projections and green infrastructure.

5.3 Agriculture can benefit through innovative approaches to implementing climate change adaptation through public-private partnerships. There are a number of areas in which private-public partnerships can collaborate to better prepare New Jersey farmers for climate change such as: establishing a soil health focus group with a specific focus on developing guidance on soil health; developing markets and incentives for agriculture practices that provide climate benefits such as carbon sequestration, municipal pre-treatment benefits for stormwater filtration, or temperature mitigation in streams through soil holding activities or vegetative plantings; seed mix guidance in cover crop standards based on experiences of field practitioners who have field tested which seed mixes to plant at specific points in vegetable or specialty crop rotations; conducting peer-to-peer demonstration projects to enhance climate change adaptation practice adoption by farmers learning about the benefits of such projects from other farmers such as no-till agriculture to improve soil health, innovative ways to plant different families of cover crops earlier in the season or different types of cover crops that are drought or pest resistant (such as spelt).

5.4 A long-term sustained education and outreach curriculum for the agricultural community, farmers, commercial fishermen and shellfishermen on climate change impacts and management practices is needed. Trusted educational institutions in cooperation with NJ State agencies should work with the New Jersey agricultural sector in development of technical bulletins, fact sheets and outreach events.

5.5 A systematic and sustained curriculum of training to teach transportation facility managers, infrastructure engineers and operators the basics of risk analysis and climate science is needed. Transportation, facility and infrastructure engineers and operators need a better understanding of how changing climate conditions may impact transportation infrastructure as well as how to use and implement climate adaptation-related guidance and revised standards and procedures.

5.6 Education of health care providers and practitioners on climate change impacts is needed, as is an organized campaign to educate vulnerable populations about self-reliance in the case of extreme weather events, including high temperatures. Health care providers and vulnerable populations currently lack awareness of how climate change can directly impact public health. Having individuals

The Raritan First Aid Squad assists a resident shortly after Hurricane Floyd caused flooding in the area (Andrea Booher, FEMA).

educated and prepared, as well as increased capacity within the health care sector, can reduce morbidity and mortality from extreme weather, flooding, rising temperatures and concomitant impacts.

5.7 NJOEM, county, and local OEMs should improve statewide and local community communication protocols about potential hazardous risks during extreme weather events. The public and responsible agencies need to be better informed and prepared prior to an extreme weather event about potential effects of hazards such as contaminated floodwaters including raw sewage, oil, other hazardous substances, electrically charged wires, natural gas leaks etc. Enhancement of hazardous substance risk warnings that take into account the latest social science about effective communication should also be incorporated into HazMat Awareness and Operations training for emergency responders as well as flood warnings. Other programs that should be included in this effort include the National Weather Service and the New Jersey Office of the State Climatologist. Care needs to be given to ensure that warnings are communicated in ways that are meaningful to vulnerable populations (e.g. translation for low English proficiency residents, personal visits to homebound senior citizens, etc.).

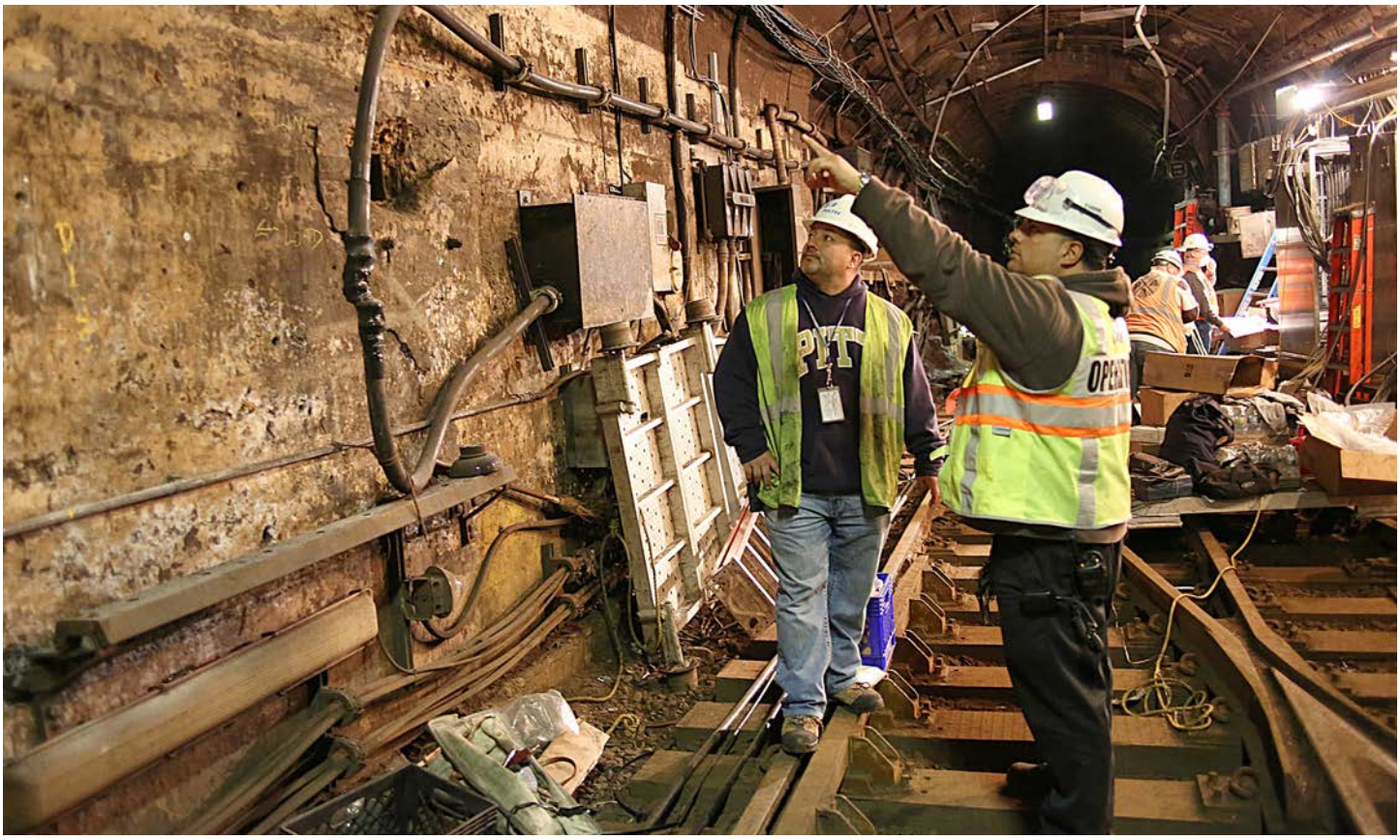
6.0 Undertake analyses and research to inform climate adaptation and preparedness practices in New Jersey.

6.1 Collaborative efforts involving state agencies, academic, federal and local governments as well as the NGO community are needed to undertake research and analyses on key issues to support climate change preparedness in New Jersey. Clear and coordinated articulation of science is needed so the results can be applied for policy, planning, and decision making at the local level. The STAP may also identify additional pressing areas of needed research and analysis. Major areas of research and analyses that were identified during our stakeholder process include:

- Enhanced baseline monitoring of natural resources and monitoring of natural resource impacts in the event of severe weather events;

- Development of monitoring protocols and responsibilities in urban areas in the event of severe weather events, with a focus on mobilization of contaminants as well as pathogens;

- Development of systems that effectively provide the public with more immediate notification about conditions during events, especially with regard to public health and safety. Such systems are needed to ensure



PATH Power Director Andre Bou (left) and Operations Director Mario Biancamano point out the water line inside a PATH tunnel. Salt water innundation during Hurricane Sandy badly damaged the PATH's electrical system (Adam DuBrowa, FEMA).

that residents are alerted to conditions both in a timely fashion and in ways that effectively communicate risk and ways that residents can reduce their risk;

• Impacts of climate change on recreational and commercial salt and freshwater fisheries;

• Modeling of regional climate impacts specific to New Jersey to improve the certainty of climate change impacts;

• Research regarding climate change and flooding and the spread of contaminated sediment;

• Assessment of current vector and disease surveillance programs with respect to impacts to human health and agricultural resources.

6.2 Study and analysis is needed to better understand whether New Jersey's current utility regulatory structure provides a disincentive for proactive climate adaptation implementation. Identify alternative regulatory approaches, their benefits and costs and make recommendations as to which strategies could be effective and reasonable to implement. An evaluation of the costs and benefits of alternative strategies in place in other states could be a useful resource to help inform the assessment. As part of that assessment, evaluate: what additional level of utility climate change preparedness is needed; if significant capital investment is needed to achieve higher levels of preparedness and resiliency, to what extent would ratepayers be willing to pay for them and to what extent are consumers willing to share in responsibility for preparedness efforts at the individual, family and community levels.

6.3 Analysis of the extent to which all-hazards planning within healthcare organizations is incorporating consideration of long-term impacts from climate change is needed. Opportunities may exist to incorporate the outcomes of the statewide climate change impact assessment into all hazards planning for healthcare organizations so as to ensure conditions of a changing climate are addressed.

6.4 A highly collaborative effort, including public, private and non-profit sectors, is needed to develop and propagate strategies that improve personal resiliency among New Jersey residents. This effort needs to involve the public health and emergency management communities as well as organizations that can foster collaboration via medical and mental health care providers. Additionally, specific focus needs to be given to collaborative approaches that are designed to improve preparedness in vulnerable populations.

6.5 Conduct the analysis that is needed to create a statewide system that could allow private health care practitioners and other health care providers to establish links in the event of emergency events to share and maintain refrigeration for critical medical needs (including vaccines and medicines).

6.6 Existing agricultural extension programs would benefit from a focused and enhanced effort dedicated to address climate change impacts to New Jersey agriculture. This effort could include:

• Retaining surface water for reuse and management of higher amplitude storm flows through a renewed emphasis on farm pond technical and engineering design from USDA NRCS to address drought as well as protection of soil and water quality and community property from damage;

• Engineering and design standards for conservation practices such as erosion control of grassed waterways now being impacted by increased storm intensity could be reviewed and updated;

• Enhancement of BMPs to incorporate climate change scenarios to improve reduction of stormwater runoff and increase soil health measures to reduce drought stress;

• Development of opportunities for climate resilient crops; adaptive plant, agricultural species and varieties; appropriate forest successional species; genetically adapted shellfish species. This portfolio could also include agricultural practices to address climate impacts including alternative methods for cover crop establishment; innovative and cost effective water and irrigation systems management and design; low cost weed, pesticide and vector control; design criteria for livestock protection structures and worker comfort and safety practices.

6.7 Study and analysis is needed to identify ways in which New Jersey's regulatory structure and policies for public investment could be adapted to remove barriers to and provide incentives for the use and improvement of green infrastructure, innovative design, and compatible uses that cost effectively promote climate adaptation while delivering additional ecosystem service or other benefits (e.g., recreation, viewsheds, etc). Any research in this area should look for evidence of strategies to use ecosystem restoration as a mechanism to increase resilience, including living shorelines, beneficial use of sediment, development of low-impact recreation consistent with natural areas and compatible with a changing climate.

Appendix A. Emergency Response

Throughout the climate preparedness policy development process, the New Jersey Climate Adaptation Alliance received much feedback regarding emergency response activities. With recent storm events, such as Hurricane Sandy and Tropical Storm Irene fresh in their minds, stakeholders and experts provided many ideas and recommendations about strategies that may be needed to improve effectiveness of response efforts in the event of disasters and extreme weather events. The Alliance also heard that emergency response is a reactive activity that operates regardless of the cause (e.g. climate change impacts versus homeland security). Thus, rather than providing a series of emergency response policy recommendations that could be applicable to multiple hazards, the Alliance is "reporting out" on the recommendations and insights we received regarding emergency response separate from overall recommendations that are specific to adapting to a changing climate.

Key areas of improvement that stakeholders identified centered on communications, operations and management of shelters, addressing acute medical needs, fuel accessibility, better coordination with local community groups, and addressing mental health needs. Some of the specific suggestions that the Alliance heard during the stakeholder process include the following:

1. There is a need to enhance efforts that determine the most technologically sound means of emergency communications, strengthen the resilience of those systems, establish protocols for their use and make them accessible to utilities, county and local governments.

2. Improved communication among state, county and local agencies is critical. There should be a unified emergency plan that is used by state, federal and county agencies that clearly sets forth communications protocols.

3. A statewide list of electronic medical prescriptions and a coordinated pharmacy plan is needed to ensure individuals can receive critical prescription medicines if sheltered.

4. An electronic and web-based registration system is needed within the shelter system to track citizens' movements within the shelter system while protecting their privacy.

5. An additional layer of staffing is needed within shelters to provide proactive resident advocacy, crisis counseling and effective communication among shelter staff and residents.

6. There is a need to set expectations and protocols for emergency preparedness and response planning and communications for utilities, cable and telecommunications companies in overlapping service territories and between BPU-regulated entities and the county and municipal governments in those territories.

7. New Jersey needs a strategic reserve for fuels for utility fleets and backup generators and needs to design an emergency distribution/access system.

8. Consideration should be given to providing the Governor with authority to direct state, county and municipal employees in the event of an emergency to staff shelters, etc.

9. New Jersey should develop a more comprehensive plan to address stockpile needs to ensure adequate supplies of food, water, medication, fuel and other supplies are available during emergencies.

10. There may be a need for New Jersey to offer a service to municipalities that would establish a statewide registry for voluntary municipal entry of records so that local officials have access to key sets of data in the event of a disaster.

11. New Jersey needs to place a greater emphasis on sheltering in place and sheltering in place needs to be identified as a priority for emergency management planning.

12. New Jersey should develop a partnership of social service agencies, academia, non-profits, local and state agencies to design a reform plan to address social service issues in shelters (violence, medications, psychiatric disorders, sexual predators, etc.).

13. Improved communication and coordination between first responders and those managing shelters, including national, state and local non-profit organizations and volunteers, is needed to provide effective sheltering. A set of best practices for local government communication with the public in extreme weather events would be very helpful. Improved systems to allow people living in shelters to communicate with family members are needed which could have the added benefit of reducing their shelter stay.

14. There should be an expansion of mental health and substance abuse services immediately after a climate-related event, along with proactive outreach and crisis counseling services to those in shelters and the most highly impacted communities. These services are most critical to those with chronic mental health and active substance abusers who rely on medication for their treatment.

15. A coordinated pharmacy plan is needed so that vulnerable populations are able get critical medicines in the event of disaster and in the days immediately after a disaster; many vulnerable populations may have evacuated without medications, prescriptions, identification or money to pay co-pays.

16. Especially in urban communities, disbursement of relief funds to residents in the event of emergency events should be done in partnership with urban community-based organizations (including faith based organizations) because those organizations know more about their communities and can help to address vulnerable populations and special needs of Low English Proficiency (LEP) populations.

17. More training is needed for emergency responders and shelter staff in terms of effectively dealing with vulnerable and special needs populations including the elderly and people with low English proficiency.

18. There is a need to reconsider sheltering-in-place locations.

Most municipalities provide shelters during disasters to those impacted directly by the disruptive event, which are typically located in municipal buildings or schools. While a necessary policy provision for any jurisdiction, these municipal structures are often not the best choices for shelter-in-place locations; many more resilient and less vulnerable structures are likely to exist beyond the municipally-owned building stock. Thus, jurisdictions should re-think disaster plans to better account for vulnerabilities in the shelter-in-place buildings they provide to residents; this may require new partnerships with private sector real estate developers and owners

Appendix B.Climate Mitigation

The New Jersey Climate Adaptation Alliance's mission is to address preparedness and adaptation to climate change. Although the stakeholder process undertaken by the Alliance focused on climate adaptation and was specifically designed to gain insights and perspectives from stakeholders about policy gaps and recommendations pertaining to enhancing adaptation in New Jersey, stakeholders offered their insights on the topic of climate mitigation.

Mitigation includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks, as opposed to climate change adaptation which is focused on strategies that adjust or prepares natural and human systems to address a changing climate.[1]

Although mitigation is not the focus of the Alliance's mission, nor are these ideas endorsed or recommended by the Alliance, the Alliance is committed to document what was heard through the stakeholder process. Thus, these ideas regarding strategies to address the cause of climate change by reducing greenhouse gas emissions represent the Alliance's good faith effort in reporting out what was heard from stakeholders. In particular, several of these recommendations focus on those areas where climate preparedness and mitigation overlap and can achieve complementary goals.

In general, we heard from many stakeholders in multiple sectors that policy in New Jersey should include a complementary focus on both adaptation as well as mitigation. More specifically, we heard that a new emphasis in New Jersey on enhancing resilience as a result of increased public awareness stemming from Hurricane Sandy should not be at the expense of also advancing effective climate change mitigation policy. In fact, we heard that New Jersey has an opportunity to use current interest in advancing resiliency at the state and local levels as an opportunity to also foster efforts to consider carbon footprints of resiliency actions. State technical assistance should be provided to communities to allow communities to better understand choices regarding green versus hard infrastructure and integrating this into development and redevelopment to prevent flooding, as well as distributed versus other energy choices. Building codes should be improved to increase energy efficiency, as well.

We also heard a frustration, particularly among environmental and natural resource stakeholders, that considerable effort went into developing statewide policies with regard to climate change mitigation (including adoption of statutes, regulations, and a stakeholder driven comprehensive plan) and that those efforts, which involved considerable investment of stakeholder effort, seem to be ignored with no alternative efforts to address statewide emissions reduction targets.

We heard that New Jersey seems to lack a cohesive plan for what mix of energy and fuels are to be encouraged or discouraged so as to meet statewide greenhouse gas emissions and other goals. For example, there is a perception among some stakeholders that the State has been encouraging the purchase of natural gas generators through their resiliency grant program, while it has been reported that some municipalities were interested in investing in solar based technologies. What we heard is that, without a clear and more definitive direction on those energy sources and fuels that are encouraged by the State, there are limited signals being sent to private entities to innovate and create new markets.

We heard from some stakeholders about specific policies that they believe should aggressively be advanced as priorities to move New Jersey closer towards meeting its long term greenhouse gas emissions targets including:

• Rejoining the Regional Greenhouse Gas Initiative (RGGI), with constitutional dedication of monies towards resiliency and adaptation programs. We also heard from the state's Environmental Justice community that Environmental Justice organizations, both at a state and national level, have opposed carbon trading programs. This opposition has been based on equity and other concerns attached to emissions trading programs[2];

• Constitutionally dedicating revenues contained in the Clean Energy Fund so that those dollars can exclusively be dedicated to renewable energy programs rather than offsetting deficits in the state budget;

• Making the state's renewable energy goals set via the Renewable Portfolio Standard more aggressive and maintaining a stringent definition of Class 1 renewables;

• Moving forward with offshore wind development through enforcement of the Energy Master Plan and promulgation of rules to provide financial incentives for development of projects that adequately address and mitigate for any natural resource impacts.

[1]See: http://www.epa.gov/climatechange/glossary.html
[2]See: http://www.dscej.org/images/stories/pdfs/climate_change.pdf

New Jersey Climate Adaptation Alliance

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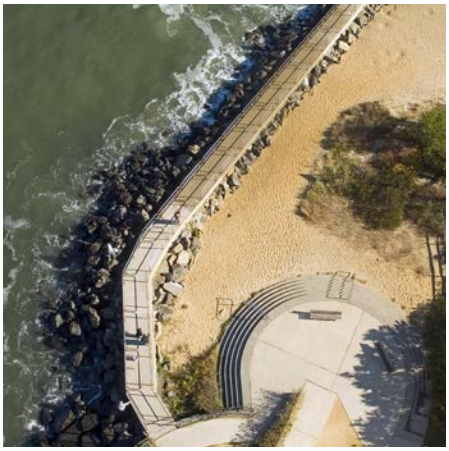
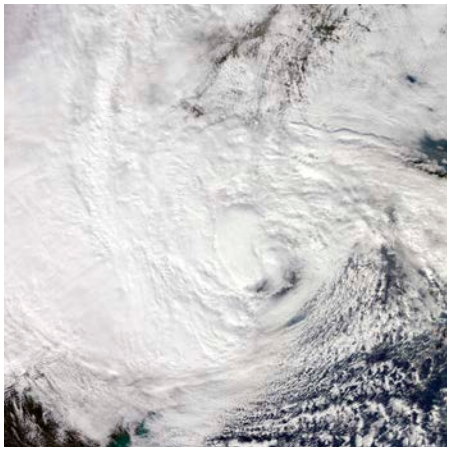
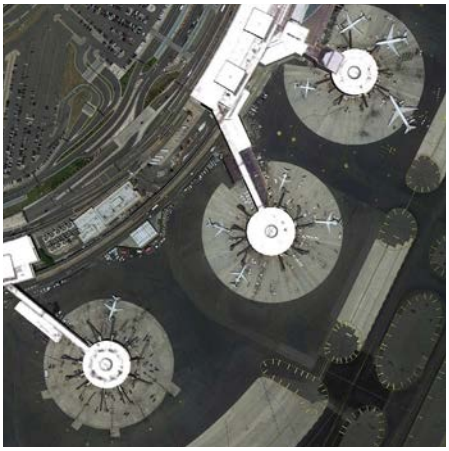


design and layout: gattuso media design

Front cover, clockwise from top left: NJ Flood Mapper; marsh, Cape May County (Szecska, Creative Commons); flooding in Ocean City (Evan Lyon, U.S. Coast Guard); northwest New Jersey farmland (Google Earth); Warren County residential development (Google Earth); highway cloverleaf (Google Earth). Back cover, clockwise from top left: Barnegat Lighthouse (BigStock), Hurricane Sandy (Jeff Schmaltz, LANCE MODIS Rapid Response Team, NASA GSFC); Newark-Liberty International Airport (Google Earth); Maurice River (Google Earth); Jersey City (Google Earth); industrial storage tanks (Google Earth).