Climate Change Preparedness in New Jersey: Leading Practices and Policy Priorities

May 22, 2013
New Brunswick, NJ

Conference Proceedings

Hosted by the New Jersey Climate Adaptation Alliance

Organized by the New Jersey Climate Adaptation Alliance in partnership with Rutgers, The State University of New Jersey, *Climate Change Preparedness in New Jersey: Leading Practices and Policy Priorities* brought together a diverse group of experts to highlight leading climate change preparedness practices both nationally and in New Jersey. Over the course of the day, the attendees discussed leading resiliency practices and identified critical gaps and needs within the Garden State.

This conference was designed to build upon the inaugural workshop held at Rutgers in November 2011 which highlighted climate risks and vulnerabilities for New Jersey and identified the need for a statewide alliance to enhance climate change preparedness. This forum provided an opportunity to examine the state of climate change adaptation in New Jersey in the context of activities underway across the country and to begin a dialogue about how to move forward with policies and adaptation activities that will best prepare the state for a changing climate. The conference focused on leading practices and trends in agriculture, public health, natural resources, transportation, utilities, water resources, coastal communities, urban and underserved communities, and insurance.

Key Takeaways

The May 22 conference pointed to the need for coordinated action at the state level to forestall serious economic, ecological, and public health impacts. Certain themes were emphasized by speakers throughout the day, including:

- Hurricane Sandy was a "game-changer" in raising awareness about climate change risks in New Jersey. Dr. Michael Greenberg of Rutgers University presented the results of a statewide poll which showed that there is now unprecedented support among the general public to accept more stringent land use regulations, although there is still a low willingness to pay to implement these programs and policies. Speakers noted that the crisis provided a major opportunity to make changes now that will enhance New Jersey's resilience to future climate challenges.

- Major storm events such as Hurricanes Irene and Sandy were an important learning experience for practitioners, highlighting key vulnerabilities and weaknesses in the state as well as demonstrating which adaptation practices were relatively successful.
- A major theme throughout the day was the critical need to engage in long-range planning for climate change impacts rather than focusing only on short-term solutions and disaster recovery. Several speakers pointed out that funding is readily available for disaster response, but difficult to come by for planning and investment activities that would lessen the damage from future disasters. In order to create the political will to fund planning, preservation, stewardship, and adaptation activities, there is a need to educate the public about the importance of spending money on preparedness planning rather than response.
- Speakers emphasized the need to integrate climate adaptation into existing planning and decision-making processes and programs. Utilities, transportation providers, natural resource managers, public health programs, and others already create long range plans that guide investment; climate change projections and impacts should be incorporated into these mainstream processes rather than being assessed separately.
- It is essential to broaden the set of stakeholders and bring more people into the conversation, and to make sure the needs of vulnerable communities such as racial minorities, immigrants, and the elderly are not ignored. Speakers stressed the importance of involving and educating the private sector and the general public about climate impacts in New Jersey in order to foster action at the state level.
- There is a role for both "green" and "gray" infrastructure to protect New Jersey against climate impacts. Speakers from a wide cross-section of industries and sectors discussed the role that natural defenses such as wetlands, dunes, and preserved open space can play in mitigating climate risks and protecting human populations.
- New Jersey's leaders need to make difficult decisions about where to retreat from and where to focus resources to protect existing development, because it is not feasible to protect every place in the state. Speakers recommended priority be given to protecting dense urban communities that cannot move.
- Practitioners discussed the need to manage for change, given the uncertainties inherent in any projections for the future. For example, natural resource professionals must periodically reevaluate not just their management practices but also their conservation goals in light of a changing climate. Utility managers discussed the necessity of revising infrastructure standards to focus on resiliency rather than merely reliability.
- The conversation about climate change needs to be redirected. It does not necessarily matter whether climate change is caused by human actions, or whether any particular weather events are attributable to climate change. The focus needs to shift towards implementing win-win activities and investments that will strengthen New Jersey across a wide range of possible climate models and projections.

Setting the Stage

Conference participants were greeted by Dr. James W. Hughes, Dean of the Rutgers Bloustein School of Planning and Public Policy, Anne E. Hoskins, Senior Vice President for Public Affairs and Sustainability at PSEG, and Honorable James J. Florio. All three highlighted the effects of Hurricane Sandy in raising awareness about climate change and noted that New Jersey now has a unique opportunity to implement policies that will make the state stronger in the face of future challenges. The poll results presented by Dr. Michael Greenberg confirmed that as a result of Sandy, there is now much greater public support for fairly stringent risk-reducing regulations, but there is still a low willingness to pay more in taxes to support these policies.

Dr. Tony Broccoli of Rutgers University gave an overview of climate trends in New Jersey, noting that the data presented were not projections but actual trends that are already occurring. The primary climate trends in New Jersey are increasing temperatures and warmer winters, an upward trend in precipitation with a greater share of rain falling during heavy rain events, and a rise in relative sea level, which will make impacts of coastal storms more severe even if there are no changes in storm intensity.

Specific Recommendations by Sector

The morning panels consisted of leading practitioners from across the country who presented an overview of best practices and examples in the fields of agriculture, natural resources, coastal management, public health, transportation, utilities, and water resources. After lunchtime keynotes by Vicki Arroyo, Executive Director of the Georgetown Climate Center, and Beverly Wright, Executive Director of the Deep South Center for Environmental Justice at Dillard University, attendees chose from three separate panels led by New Jersey practitioners who discussed climate adaptation practices specific to the state. The recommendations presented throughout the day are summarized below by sector.

Agriculture

Climate variability and change will have major effects on New Jersey's $1.1 billion agricultural industry, including earlier growing seasons, northward expansion of pests and plant diseases due to warmer temperatures, more frequent droughts, and damage to crops from flooding and extreme precipitation. Mark Robson, Dean of Agricultural and Urban Programs at Rutgers University, noted that small environmental changes translate into big agricultural changes, and that climate change is effectively rewriting the farmer's almanac in New Jersey.

William Hohenstein, Director of the Climate Change Program Office for the US Department of Agriculture, pointed out that because agriculture plays such a large role in greenhouse gas emissions, farming and ranching offer potentially significant low-cost opportunities to address climate change by altering management practices to achieve a reduction in CO2 emissions, and that farmland and forests can play important roles as carbon sinks.

Leading adaptation practices in the agricultural sector include breeding crops for drought and temperature tolerance, shifting to less water-dependent cropping systems, utilizing more efficient irrigation systems, altering planting dates, maintaining buffers around water sources, and using conservation tillage to improve soil quality, decrease runoff, and increase infiltration. Adaptation needs identified by both Hohenstein and Robson include drought early warning systems, programs to help farmers manage risk, and increased research on genetics, pesticides, and insecticides.

Public Health

Climate risks to public health include declining water quality, increases in vector-borne diseases historically confined to warmer climates, increases in cardiovascular and respiratory diseases as a result of worsening air quality and more extreme heat events, and more flooding and severe storms which lead to direct death and injury, water contamination, mold, displaced populations, and mental health disorders.

Presenters emphasized the need to identify vulnerable populations, enhance disease tracking mechanisms, and undertake targeted public education campaigns to raise awareness of personal preparedness practices. Michael McGeehin, Former Division Director of the National Center for Environmental Health at the Centers for Disease Control and Prevention, described the process of developing a climate adaptation plan in the context of public health, starting with an impact and vulnerability assessment and an inventory of current activities such as mosquito control programs and heat response plans that could be enhanced to respond to a changing climate.

George DiFerdinando, Director of the New Jersey Center for Public Health Preparedness at Rutgers University, underscored the importance of designing public health interventions that take into account how people actually behave during emergency events and in their daily lives. He noted that the public health community already has expertise in communicating health risks and delivering difficult messages, and that this expertise should be leveraged to link climate and environmental health in the public's perception and empower people to take responsibility for climate risks to their health. Robert Kley, Vice President and COO of the Mental Health Association of New Jersey, discussed the impacts of weather events on mental health and commented that although mental health is becoming a more mainstream issue, most people are still not good about accessing mental health services when they need them. He identified a need for more research on how social service delivery systems are impacted by disasters, including where there are increases and decreases in services sought.

Natural Resources

Climate change will alter ecosystems, resulting in major impacts to flora and fauna such as range shifts, increases in pests and invasive species, mismatches in timing including disruptions to migration patterns, and increased destruction from fires and floods. Climate change is not a

new stressor to natural resources but exacerbates many existing issues such as habitat loss and fragmentation, invasive species, and pests.

Bruce Stein, Director of Climate Adaptation for the National Wildlife Foundation, emphasized the need to alter not just conservation strategies but also to reevaluate preservation goals. Because a changing climate will have major implications for the viability of species in a given geographical area, natural resource managers will need to manage for change in the future; successful conservation will no longer be defined by managing for persistence and keeping natural environments "the way they are."

An important adaptation practice identified by Stein and others is the use of nature-based solutions to safeguard human communities. Wetland and dune preservation, habitat restoration, afforestation, and other green infrastructure strategies are important tools not just for ecosystem preservation but also for flood mitigation and water resource management. Vicki Arroyo presented Vermont as an example; after Hurricane Irene it was found that places where natural floodplains had been restored fared better during the storm. Patty Doerr, Director of Coastal and Marine Programs at the Nature Conservancy of New Jersey pointed to a similar experience in New Jersey; communities surrounding their South Cape May Meadows Preserve, a restored wetlands and beachfront preserve, saw very little flooding during Sandy compared with the rest of Cape May because the wetlands absorbed the excess water and the beach and dunes buffered the waves. According to Michael Catania, Executive Director of Duke Farms Foundation, New Jersey has done a good job with land preservation, and now needs to switch its focus to managing these lands adaptively so that natural areas continue to provide ecosystem services such as carbon sequestration, water filtration, and flood protection.

Speakers including Doerr, Catania, and Tim Dillingham, Executive Director of the American Littoral Society, discussed policy needs and priorities for New Jersey. One of the highest priorities is the development of a long-term plan for coastal and riverine areas, in which decisions are made on where to retreat from, where to concentrate development, and where to focus wetland and other natural restoration efforts. Other identified needs include a dedicated funding source for land stewardship, public-private partnerships for resource conservation, and more data and research regarding the current benefits of natural habitat and the effectiveness of various restoration techniques.

Utilities

Preparing the electrical grid for climate change was highlighted as a priority since so many other critical systems including transportation, medical, communications, water, sewer, and financial systems are dependent on electricity. Sue Tierney, the Managing Director of Environmental Analysis group, identified two major adaptation strategies for utilities: hardening infrastructure to make it less susceptible to damage from wind, flooding, and debris, and instituting resiliency measures that enable the system to recover more quickly from damage.

Tierney and Kim Hanemen, Vice President of Transmission for PSEG, emphasized smart grid technologies as a key component of resiliency; by knowing where the outages are, utilities can more quickly respond to and repair damage. Development of resiliency standards, ratemaking that encourages investment in new technologies, and vegetation management programs are examples of specific tactics that can be employed to make New Jersey's utilities more resilient. More investment is needed for hardening infrastructure, such as elevating or relocating infrastructure away from flooding, adding redundancy, and selectively undergrounding power lines.

Dennis Doll, President and CEO of Middlesex Water Company, highlighted the critical importance of water utilities to human health and safety and noted that while water utilities remained in service during Hurricane Sandy, much of the infrastructure is 150 years old and was not built with climate change in mind. Emphasis was placed on the need to educate regulators and taxpayers about the necessity of rate increases to support infrastructure investment that will make utilities more resilient.

Water Resources

A number of climate risks to water resources in New Jersey were identified by Daniel Van Abs, Associate Research Professor at Rutgers University, including a reduction in water supply due to drought, increased evapo-transpiration as a result of warmer temperatures, less groundwater recharge and more runoff due to storm events, saline intrusion resulting from sea level rise, and algal blooms due to warmer temperatures.

To adapt to and manage these risks, Paul Fleming, Manager of the Climate Resiliency Group at Seattle Public Utilities, emphasized the importance of mainstreaming climate change projections into existing decision-making processes. Collaborative partnerships were highlighted as critical, particularly partnerships between utilities and the scientific community in order to enhance the available science and data that utilities can use for long-range planning and life-cycle cost projections.

Fleming also emphasized the need for solutions beyond infrastructure to protect the water supply, such as more effective land use planning, increased use of green infrastructure, and implementing demand reduction and conservation practices amongst consumers. Lucy Vandenburg, Executive Director of PlanSmart NJ, presented the Together North Jersey project, a thirteen-county effort currently underway to develop a regional plan for sustainable development that seeks to incorporate these approaches.

Transportation

Climate change related impacts on transportation systems include buckling of rails and bridge expansion joints due to extreme heat, increased material stress which increases maintenance costs, road closures due to flooding and heavy precipitation, difficulty navigating waterways due

both to high water levels from floods and low water levels from droughts, and inundation of low-lying transportation infrastructure due to sea level rise. Bob Butkus, Domestic Preparedness Planner at the Ocean County Office of Emergency Management, highlighted the critical role that transportation infrastructure plays in emergency management, and observed that with three feet of sea level rise, existing evacuation routes from New Jersey's barrier islands will be effectively unusable during normal high tides.

John Posey, Director of the East-West Gateway Council of Governments, noted that many of the challenges posed by climate change are not new and existing adaptation tools such as intelligent transportation systems and asset management programs can be used to manage risks associated with climate change. Presenters emphasized the need to account for climate change in siting new and rebuilt transportation infrastructure. Other key adaptation strategies include the increased use of pervious paving and street trees, elevation of bridges, installation of flood gates in transit stations, and better evacuation route planning. Posey emphasized the important role that both green and gray infrastructure should play in mitigating impacts to transportation systems.

According to Jon Carnegie, Executive Director of the Voorhees Transportation Center at Rutgers, one of the challenges in adaptive planning for transportation systems stems from the wide variety of transportation infrastructure in the state (roads, bridges, tunnels, passenger rail, freight rail, bus, aviation, and ports) and the fact that many transportation assets are held at the local level. The Voorhees Center at Rutgers is currently conducting a major climate vulnerability analysis to assess risks to New Jersey's transportation systems. Other state and regional transportation agencies have also begun to conduct asset resilience studies and identify sustainable rebuilding strategies.

Coastal Communities

As a densely populated coastal state, it is critical for coastal communities in New Jersey to implement strategies that enhance resiliency in the face of rising sea levels and more severe flooding. Hurricane Sandy was an eye-opening experience that called attention to the vulnerability of the state to coastal flooding.

Coastal areas across the country are already beginning to incorporate climate change projections into their planning. Margaret Davidson, Director of NOAA's Coastal Services Center, pointed to Boston, which includes changes in temperatures and water levels in their planning processes and requires sea level rise to be considered over the design life of any new project. The Navy has already incorporated 16' of sea level rise into the design of their infrastructure at Norfolk; Central California and the Bay Area have undertaken a major climate initiative including mapping vulnerabilities, updating land acquisition and conservation plans, and developing required setbacks.

Presenters offered a host of recommended adaptation practices, include developing partnerships between the public and private sector to manage and spread risk, creating broad-based community resilience coalitions at the local and regional level, utilizing low impact development techniques, and updating codes, standards, guidelines, and hazard mitigation and emergency management plans to match changing climate realities. Davidson remarked that the Dutch are moving towards an increased use of green infrastructure such as marshes, barrier islands, and ridges to better protect people, and have begun relocating people from low-lying areas so there is room for rivers to flood, and that the same solutions should be employed in the United States. Vicki Arroyo noted that the Army Corps of Engineers needs to streamline permitting processes for soft armoring (green infrastructure), which is very time consuming compared with the process for getting a permit for hard armoring infrastructure solutions.

Lisa Auermuller, Watershed Coordinator at the Jacques Cousteau National Estuarine Research Reserve, presented tools that communities can use to assess risk and plan for the future, include NJ Floodmapper, a mapping tool to visualize sea level rise, and Getting to Resilience, an online tool to assemble municipal documents and help communities understand their needs and vulnerabilities. Mark Mauriello of the New Jersey Association for Floodplain Management highlighted the Community Rating System (CRS) and pointed out that many New Jersey communities are already taking some of the precautions and would get National Flood Insurance Program (NFIP) benefits just by filling out the paperwork. The more preparedness actions that a community engages in beyond the minimum NFIP requirements, the higher they score on the CRS scale, and the greater the cost savings and benefits to the community. Randy Solomon presented the Sustainable New Jersey program, which identifies actions towns can take to become more sustainable and provides tools, resources, and access to grants.

Participants emphasized the need for an increased focus on and funding for long range planning as opposed to short-term crisis response, better coordination between different agencies and levels of government, and a need for legislation addressing climate resiliency at the state level. Critical needs include government funding for acquisition and relocation, and an overhaul of regulations such that residences are required to be designed to standards that will be faced in the future.

Urban and Underserved Communities

Environmental justice and the disproportionate impacts of climate change on vulnerable populations were highlighted throughout the conference. Presenters called attention to critical issues affecting urban communities following storm events, particularly toxic contamination from flooding of hazardous sites, automobiles, and other debris. The poor, minorities, and the elderly have fewer resources both to prepare for and to recover from devastating weather events.

Beverly Wright, Executive Director of the Deep South Center for Environmental Justice at Dillard University, and Vicki Arroyo, Executive Director of the Georgetown Climate Center, highlighted

the experiences of residents in New Orleans following Hurricane Katrina. The importance of bottom-up community-based recovery planning and the equitable distribution of planning and recovery resources were highlighted as priorities in ensuring that the most vulnerable populations are not disproportionately impacted by climate change.

Flexibility in spending money at the community level is critically important, since so much is in flux in the wake of disasters. It is often unclear where money for rebuilding schools, medical centers, and other community resources should be directed or which neighborhoods and residents are going to return until people actually start moving back. Dr. Wright pointed out that weather disasters exacerbate existing housing inequities, since property values are lower in minority neighborhoods and therefore the insurance proceeds for rebuilding are lower. One relatively successful solution in New Orleans were community-based programs which provided gear for volunteers to do clean-up and provided job training to local workers in mold remediation and reconstruction.

Roland Anglin, Director of the Joseph C. Cornwall Center for Metropolitan Studies at Rutgers University, explained that climate change is fairly low on the political agenda for most underserved communities since it is less immediate than the many other needs afflicting poor communities. He emphasized the importance of telling clear, compelling stories linking climate change to health and safety impacts, and educating underserved communities on personal preparedness practices so that climate adaptation is as ingrained into people's mindsets as it is in Japan, Australia, and other parts of the world. Ana Baptista, Environmental and Planning Projects Director of the Ironbound Community Corporation in Newark, presented a host of recommendations for New Jersey, including training and funding community-based first responders, adjusting land use and zoning in dense urban environments, and developing a clearer understanding of the public health impacts to urban populations. Entire densely populated cities cannot relocate, so it is important to focus on protecting the populations within them, particularly the most vulnerable.

Insurance

Weather disasters lead to massive economic losses, many of which are not covered by insurance, such as debris removal, power outages, and the costs of emergency dispatch. The federal government spent $136 billion on disaster relief and recovery in 2011 through 2013. Insurance plays an important role in mitigating the macroeconomic cost of catastrophes. Recovery proceeds faster when insured and insured losses tend to be either inconsequential or moderately positive for economic growth because there is money available to rebuild and more construction occurs.

Megan Linkin, Natural Hazards Expert and Vice President of Global Partnerships at Swiss Re America, presented the option of parametric insurance indexed to weather events, a public-private solution in which governments pay premiums to cover a defined geographic area against a specific weather risk, and insurance companies pay out in the event that a defined set

of physical thresholds is met. For example, the Mexican government took out an insurance policy on Cancun; when a hurricane with barometric pressure below a specified level occurs in a specified geographic area, the Mexican government gets paid by the insurance company. The government gets paid according to a payout scale that is pre-agreed in the insurance policy, and they get paid as soon as the specified physical thresholds (e.g. barometric pressure) are met regardless of what the actual losses are. Because there is no loss adjustment and little claims administration is needed, there is a shorter time frame to get paid out in the event of disaster. The states of Utah and Alabama have taken out these types of insurance policies, and it is an option New Jersey should consider as a risk management strategy.