

# Preparing Your Community in the Face of a Changing Climate

April 1, 2010

Sea Oaks Golf Course

Little Egg Harbor, NJ  
08087

Co-Sponsored  
by:



## Background

Global climate change is one of the most pressing challenges facing coastal communities today.

The Intergovernmental Panel on Climate Change concluded in February 2007 that it is "unequivocal" that Earth's climate is warming, and that it is

"very likely" (a greater than 90 percent certainty) that the heat-trapping emissions from the burning of fossil fuels and other human activities have caused "most of the observed increase in globally averaged temperatures since the mid-twentieth century".

According to the Union for Concerned Scientists, "the Northeast and the rest of the world face continued warming and more extensive climate-related changes to come—changes that could dramatically alter the region's economy, landscape, character, and quality of life." They go on to state, "By the end of this century, global sea level is projected to rise 7 to 14



inches under a lower emissions scenario and 10 to 23 inches under a higher-emissions scenario. Several lines of evidence indicate that these projections may be quite conservative. Even under these projections, many areas of the densely populated Northeast coast face substantial increases in the extent and frequency of coastal flooding and are at increased risk of severe storm-related damage.

This conference provided an opportunity for municipal leaders, scientists, resource managers, engineers, and others interested in the consequences of climate change to meet and discuss the latest science-based information, highest priority needs, and next steps.

## Conference Goals

- To facilitate a dialogue on key issues facing New Jersey's coastal estuaries related to climate change and sea level rise.
- To present sample adaptation tools and strategies.
- To share information amongst local stakeholders.

**Conference presentations can be found online in PDF format at:  
[www.jcnerr.org/education/coastaltraining/climatechange](http://www.jcnerr.org/education/coastaltraining/climatechange)**

# Agenda

## 9:00am – Welcome, Introductions by Partners and Opening Remarks

- Mike De Luca – Senior Associate Director, Rutgers Institute of Marine and Coastal Sciences
- Dr Stan Hales—Director, Barnegat Bay Partnership

## 9:15am - Opening Plenary—Setting the Stage for the Local Climate Change Conversation

- Jim Titus, Environmental Protection Agency

## 9:45am - A Status Update on Local Indicators of Sea Level Rise

- Dr Norb Psuty – Rutgers, Institute of Marine and Coastal Sciences
- Dr John Miller – Stevens Institute/NJ Sea Grant
- Dr Stew Farrell – Stockton College
- Dr Rick Lathrop – Rutgers, Center for Remote Sensing and Spatial Analysis

## 10:45am – Science Panel Q & A

## 11:15am – Break

## 11:30am - State and Federal Planning for SLR

- Scott V. Duell - Federal Emergency Management Agency
- Jeff Gebert - Chief Coastal Section, Army Corps of Engineers - Philadelphia District
- Marjorie Kaplan - NJ Department of Environmental Protection's Office of Climate and Energy

## 12:00pm – Sea Level Rise Planning Tools and Adaptation Strategies

- Identifying Hazard Areas in the Delaware Bay – Leigh Wood, NJ Coastal Management Office
- SLR Mapping Online – The Nature Conservancy, Sarah Newkirk
- Living Shorelines – Danielle Kreeger, Partnership for the Delaware Estuary Program
- Floodplain A and V Zones – Joe Ruggeri –NJ Department of Environmental Protection's State Floodplain Insurance Program Coordinators Office

## 1:00pm – Lunch

## 1:45pm – Brining Local Concerns to the Federal Level

- Josh Foster - Manager of Climate Adaptation, Center For Clean Air Policy

## 2:15pm – Conversation Café

## 3:30pm— Break with Vendors

## 4:00pm—Café Report out and Next Steps



# Conversation Café

The goal of the Conversation Café was to provide an opportunity for participants to share their thoughts with regard to climate change, sea level rise, climate adaptation and their assumptions regarding their local community's thoughts on climate change. The facilitated sessions were structured to garner the maximum amount of dialogue over a relatively short amount of time.

Each participant was pre-assigned to three out of four Café questions. Participants started with their first question assignment and after approximately 20-25 minutes, participants were instructed to rotate to the next question. This second rotation was followed by one final rotation.

Each of the four Café questions were administered by three to four facilitators and each facilitated group was made up of approximately six to twelve participants.

The Café questions were as follows:

- How worried are you about climate change?
- Identify your community's vulnerabilities (i.e. public infrastructure, waterfront structures, etc.)

- What are the barriers or constraints that prevent decision-makers from taking action on climate adaptation?
- What do you perceive to be the public's barriers to being concerned about and taking action on climate adaptation?



The following summarizes the feedback we received from participants in regard to each question. Effort was made to bin the individual responses to provide the general tone of the participants' feelings. In cases where the participants' responses were particularly informative, responses are provided verbatim.

## How worried are you about climate change?

The general consensus was that 'worried' is the wrong word; participants preferred to use 'concerned' instead. From the local planning perspective, some participants preferred to use the word "aggravated".

Overall, there was a broad range of responses with people feeling "very worried" to "not at all worried". For example, one participant ex-

pressed a minimal level of concern because "awareness has been raised and it all depends on how well humans can adapt. Humans are made to evolve/adapt and take on new challenges". Another participant noted that "policies are driven by catastrophe...people have difficulty adapting to extremes".

### Reasons to be concerned:

- Preservation of the current ecosystems.
- Abrupt changes and environmental stressors.
- Sea Level rise and its impact on coastal communities and infrastructure.
- Future generations.
- Saltwater intrusion.
- Ocean acidification.
- The lack of social justice associated with climate change effects.
- Local zoning does not currently take into account climate change.

**Overall, there was a broad range of responses with people feeling "very worried" to "not at all worried".**

**Participants recognized a number of vulnerabilities which can be placed under four categories: Infrastructure, Fiscal, Ecosystem and Social.**

Participants recognized the economic and societal issues that will come along with climate change, like a higher cost for food and fuel. There was much concern for the rising population and the ways in which climate change will exacerbate the demand for limited resources.

Participants felt strongly that the "public" needs to become more aware of climate change and sea level data that already exists. They felt that:

- Science needs to be put in layman's terms.
- Engage and inform young children in messaging; They not only carry the message into their future but bring the message home.
- The key is getting the right message across using the right form of media, although there was uncertainty on the right form of media.
- There is a technology gap between generations and we should possibly

be focusing on our younger generations.

Thinking positively, participants noted that many of the current mitigation tools are comprehensive and address water resource issues (quantity and quality) as well. They also indicated that it was positive that federal level agencies are recognizing the need to plan for climate change and sea level rise. There was an expressed need for locally relevant sea level rise and climate impact information.

**Identify your community's vulnerabilities**

In their discussions, participants recognized a number of vulnerabilities which can be placed under four categories: Infrastructure, Fiscal, Ecosystem and Social. There was also a recognition that their communities are subject to these vulnerabilities now and can fully expect them to increase as we experience more and more impacts of climate change.



Vulnerabilities that are worthy to note include, the fear of salt water intrusion reaching the aquifers and affecting the fresh water supply. Participants felt that the tourists and visitor's to NJ's coastal areas were vulnerable because they lack the knowledge about how and when to evacuate. Participants recognized the environmental vulnerability in that many of the natural environmental processes (i.e. salt marsh migration) will no longer be able to occur due to bulk-headed and built areas. There was also concern expressed over the uncertainty of the flood insurance industry. Participants discussed possibilities such as the complete loss of insurance, increases homeowners will see in their insurance premiums (regardless of where they reside) and the passing on of costs to other insurance holders (both locally and nationally).

In the category of social vulnerability, there was much discussion around the loss of traditional/historical uses of the coastal zone. Specific factors discussed included the loss of community character, family traditions, the loss of historic buildings and landmarks (i.e. lighthouses and Coast Guard Stations), and the loss of the bayman culture.

Although participants were

able to list much in the way of general vulnerability, it was clear that the towns need assistance in identifying their specific vulnerabilities. They expressed a need for mapping expertise (i.e. GIS and LiDAR-based models), especially in light of the loss of state funding which limited funding to enhance their capabilities to apply models.

Some of specific vulnerabilities which were highlighted were the Cape May Evacuation routes; two of their routes are already flooding during storms. The Rancocas Creek in Mount Holly is already experiencing frequent flooding and the fire and police stations are located in this vulnerable area. Participants cited vulnerability from



**Social Vulnerabilities**

- Poor
- Elderly
- Under-educated
- Affordable housing communities

**Fiscal Impacts**

- Government Offices
- Affordable housing
- Ports and shipping
- Tourism and loss of tax dollars

**Critical Vulnerable Infrastructure**

- Medical facilities/hospitals
- Power generation areas
- Roads
- Wastewater treatment facilities, sewers and sewer outfalls
- Evacuation Routes
- Bridges
- Transportation Systems
- Police , Fire and Emergency Services
- Schools, especially ones serving as emergency shelters
- Public Works facilities
- Aquifers and saltwater intrusion to storms and sea level rise
- Hazardous waste sites
- Transcontinental communication facilities

**Ecosystem Vulnerabilities**

- Beach and tidal marsh loss on both ocean and Bayfront (including the ecosystem services they provide)
- Forest Lands, especially with changes in salinity
- Species loss- wildlife trade offs, there will be some winners and some losers
- Migratory bird flyways
- Transition of lowland marsh to high marsh

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the loss of tourism dollars, especially in areas with boardwalks like Point Pleasant, Seaside Heights, Seaside Park and Island Heights. Also cited was the vulnerability of commercial fishing ports in areas such as Atlantic City, Point Pleasant and Belford.

**What are the barriers or constraints that prevent decision-makers from taking action on climate adaptation?**

Participants cited the economy and the associated high costs of the implementation projects as factors that are preventing decision-makers from taking action. Other barriers included the lack of consensus and/or common vision about what actions to take, especially in light of

political agendas which have short-term (election to election) agendas. One participant said, "We're asking short term politicians to make long term decisions".

There was feeling that there may also be conflicting mandates among municipal decision-making bodies such as emergency management, planning, land use, zoning, etc...

Participants agreed that the changes necessary in land-use management currently lacks political champions and coordination among organizations and government entities. Making changes at the local level is made more difficult by government distrust, conflicting mandates among regulators, and inconsistent recognition of the regional scale and scope of the problem.

There was agreement that there needs to be more done to educate the decision makers, especially when there is such difficulty in delivering the climate change message. Due to the distrust of the bearers of the climate change message, participants thought that it would be best to tailor the message in terms of human health and safety.

**What do you perceive to be the public's barriers to being concerned about and taking action on climate adaptation?**

Participants had many opinions regarding this question. Participants felt that the public had feelings like, "What's the point?", and, "We feel powerless. The issue is too large", "How does this affect MY life?". There was

agreement that the threatening discussions of “doom and gloom” are not effective. These messages should be replaced with “opportunities” and “hope”. There was the thought that the public discounts the future risks because they are too far away. Most people want to know about THIS month, not 25 and 50 years from now. Participants also felt that people have very short memories and past storm effects may be easily forgotten.

Participants felt that the climate change message is especially difficult to sell when projections are “proven” wrong - “I’ll never see the winter I saw in my youth” followed by record-breaking snow. One participant said, “There are no climate change skeptics in the Arctic Circle”. It was discussed that the public cannot add one more problem to their plate. As quoted by a participant, “How do you make this their priority when

it’s not deemed an immediate threat?”

Discussions also focused on the politics with climate change. Participants felt that the politicians are more concerned with re-election than they are about communicating with the public. People felt that the public was suspicious of all levels of government, and they are especially fearful of a government takeover. One participant mentioned that people have a feeling of, “the government will take care of us. They will fix it”.

Participants had many thoughts on the media’s role in the climate change discussions. They felt that the sources where people are getting their media are changing (i.e. newspaper coverage is dwindling) and the public is not getting the message. This is especially true when referring to different generations. One participant made the point that, “if you are under 30, you’re not listening to the radio or read-

ing the newspaper. You’re listening to your MP3 player.” Participants wanted to see more coverage on local television stations as they felt that this was viewed as a “trusted source”. One participant suggested that the public may trust the media more than they do the scientists.

There was the sense that the public is moving into specific cyber-sections of media (i.e. Fox News, on-line news, and talk radio) and the public is listening to those who agree with them. Participants noted that even the vocabulary used in the media is confusing - “global warming” versus “climate change”. One participant even made the statement that “weathermen and talk-show hosts are affecting public opinion and they’re just entertainers”. There was also the sense that mixed messages come from the media and politicians. In the media, consensus does not sell; controversy does. Overall, participants agreed that it was important that the public hear the message from someone that is not viewed as being “threatening”. Adding empirical evidence such as the changes in bird migratory patterns and gardening zones is another way to increase the effectiveness of the message.

**Participants noted that even the vocabulary used in the media is confusing - “global warming” versus “climate change”.**



Photo credit: Jim Titus, EPA

**Moving forward, a number of participants wanted to make sure that state and local level officials continue to be engaged in the discussions.**

There was recognition about the financial component of climate change and adaptation. Participants cited the recession and the feelings that money would be better spent on things with immediate results. Coastal homeowners want ocean-front, not ocean view. There were sentiments that when financial support dies at the state level, the local decision makers lose momentum. The local level may be willing to take the lead on some of these issues but need financial support from the state. One option presented included multiple municipalities joining forces and passing ordinances together – A “strength in numbers” strategy.

It was agreed that no one likes change and the management of change is a very difficult thing. The public needs to be provided with clear alternatives and achievable successes. People need to be better educated on the language of climate change because they are not science literate. For example, the public needs to know that there is a difference between the “weather” and the “climate”. There was a feeling that if we can’t even predict the weather, how can we predict climate change effects? It was agreed that the education needs to be crafted in a way that the public can relate and not be heavily scientific. Getting

climate education into the schools was a suggestion. Another suggestion was to include other sectors to help get the message out. One creative example included utilizing artist and architect groups to get involved in an “envision life in 2050” project. This model has been



done successfully in San Francisco Bay with their Rising Tides design competition: ([www.risingtidescompetition.com/risingtides/Home.html](http://www.risingtidescompetition.com/risingtides/Home.html)).

### **Evaluation of the Conference**

Participants were asked to evaluate the conference and its effectiveness. Close to eighty-six percent of evaluation respondents indicated that their knowledge of sea level rise increased as a result of the conference. Over eighty-two percent of those respondents reported the intent to apply the information. Regarding the conference goals, greater than eighty-nine percent of respondents felt that the conference was either “very effective” or “extremely effective” in facilitating a dia-

logue on key issues facing NJ’s coastal estuaries related to climate change and sea level rise. Greater than seventy-one percent of the respondents felt the conference was either “very effective” or “extremely effective” in presenting sample adaptation tools and strategies.

Greater than eighty-five percent of respondents felt the conference was either “very effective” or “extremely effective” in sharing information among local stakeholders.

Conference participants were asked what additional topics they would like to see at future conferences. The most common responses included:

- Case studies where local communities already have adaptation and mitigation tools and resources in place.
- Suggestions on getting the local community engaged in the climate change discussion.
- Workshops on managing development in the coastal zone with a

heavy focus on tools and regulatory strategies.

Moving forward, a number of participants wanted to make sure that state and local level officials continue to be engaged in the discussions.

**Next Steps**

The four organizations involved in the planning and delivery of this conference have a number of efforts planned to further the climate change conversation statewide, with local communities. The following lists a sample of the types of activities that are being planned.



**Barnegat Bay Partnership**  
 (These activities are part of the BBP's Climate Ready Estuary activities)  
[www.bbep.org](http://www.bbep.org)

- **Public Listening Sessions**

Building on the knowledge gained through this conference, BBP is partnering with JC NERR and NOAA's Coastal Services Center (CSC) to hold a series of facilitate public sessions to gauge regional "public" knowledge and interest in local climate change related issues. One of the primary goals for the "listening sessions" is to gain an understanding of the types of regional specific education and outreach materials that are need and begin developing those materials. The listening sessions will be held over the summer and fall of 2010.

- **Ocean County Multi-Jurisdictional Natural Hazards Mitigation Plan**

JC NERR and BBP have been asked to provide technical assistance by Ocean County Office of Emergency management in the redrafting of the

county's draft Plan.

- **Place-based Decision Support to Assess Vulnerability**

BBP will be further pilot NJ Coastal Management Office's "Place-based Decision Support to Assess Vulnerability" tool on a county wide basis as part of developing a climate change adaptation strategy (For a more in-depth description, see the Coastal Management Office section).

- **Wetlands Monitoring and Assessment Initiative**

BBP is working with the Partnership for the Delaware Estuary (PDE), the New Jersey Coastal Management Office and the United States Fish and Wildlife Service on a collaborative wetlands monitoring and assessment effort. For this project, the BBP and PDE are working with state and academic partners to establish a network of stationary reference sites; Sedi-

ment Elevation Tables or SET, covering different types of tidal wetlands. The overall goal is to establish baseline tidal wetlands conditions and establish a model for future monitoring and assessment programs for the various types of marshes found in the Barnegat Bay and Delaware Estuary. These efforts will help

**The Coastal Vulnerability Decision Support System (CV-DSS) will assist the JC NERR in providing place-based decision support systems to inform land use planning, floodplain management and emergency management in the face of accelerating sea level rise.**



mangers and restoration planners target limited resources to save and enhance marshes that are the most vulnerable, and valuable in our estuaries.



**Jacques Cousteau National Estuarine Research Reserve**

[www.jcnerr.org](http://www.jcnerr.org)

- **Living Shoreline Project at the Edwin B. Forsythe National Wildlife Refuge**

The JC NERR, in partnership with Rutgers' Haskins Shellfish Lab, will be providing technical assistance and scientific guidance for a living shoreline project along a 150 foot portion of the Refuge's 8-mile Wildlife Drive. This project is to be modeled after the Partnership of the Delaware's living shoreline projects as presented at the Climate Change Technical Workshop. The project's goal will to be slow the erosion of the marsh, but the project's objectives include utilizing volunteers, partners and the public in a hands on stewardship activity, raising the awareness of eroding shorelines and educating Refuge visitors about the impacts of sea level rise.

**The New Jersey Coastal Management Office (NJ-CMO) developed a protocol to assess vulnerability of a coastal area for both existing and future conditions.**

- **Place-based Decision Support System to Assess Vulnerability of New Jersey's Coast to Sea Level Rise**

The JC NERR, in partnership with Rutgers Center for Remote Sensing and Spatial Analysis, received funding through the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET) to develop a place-based Coastal Vulnerability Decision Support System (CV-DSS) by undertaking a geospatial analysis of vul-



**NJ Coastal Management Office**

[www.state.nj.us/dep/cmp/](http://www.state.nj.us/dep/cmp/)

- **Coastal Community Vulnerability Assessment Protocol**

In an effort to promote resil-



nerable development. The project will serve three main outcomes: 1) serve as a demonstration project as to the feasibility, utility and costs of enhanced GIS/LiDAR-based assessment of coastal infrastructure and habitat vulnerability to sea level rise; 2) develop a suite internet accessible geospatial and database visualization tools that will facilitate the dissemination of this information; and

ience and encourage coastal communities to pro-actively plan for (and not just react to) coastal hazards and accelerated rates of sea level rise, the NJ-CMO developed a "Coastal Community Vulnerability Assessment" protocol. The protocol is intended to assess the vulnerability of a coastal area for both existing and future conditions. The protocol assesses the vul-

nerability of a coastal area in four parameters - social, environmental, geographic and infrastructure.

The Coastal Management Office is working to apply the methodology on four communities along the Delaware Bay, including Salem City, Bridgeton, Fortescue Island, and North Cape May/Lower Township, to test the protocol on a smaller scale. In 2011, the NJCMD intends to apply the model in developed portions of the NJ shore and communities along the tidal portion of the Delaware River.

- **Getting to Resilience**  
The NJ-CMD is developing a

“resilience indicator questionnaire” to assist communities in an assessment and characterization of the tools and plans they currently have and the ability of those tools and plans to address the impacts of coastal hazards and sea level rise.

“Getting to Resilience” is intended for use with the “Community Vulnerability Assessment”. Once the vulnerability assessment has been conducted for (and with) the community the “Getting to Resilience” questionnaire will be administered with the assistance of our partners. The questionnaire will highlight strengths and identify weaknesses and gaps

in resilience that can be addressed by the community through government agencies, local businesses, and citizens. Completion of the questionnaire will also identify opportunities to enhance a community’s resilience.



**Urban Coast Institute**

[www.monmouth.edu/urban\\_coast\\_institute/](http://www.monmouth.edu/urban_coast_institute/)

- **Conservation and Restoration Priorities**

UCI, working with the American Littoral Society and Monmouth Conservation Foundation, developed a Conservation Priority and Restoration Priority Index (CPI/RPI) that can be used by local officials and stakeholder groups to identify conservation and restoration priorities and develop cost effective strategies to protect water quality and restore critical areas, including areas subject to sea level rise. The CPI/RPI tool will enable communities to select priority habitats utilizing existing digitized GIS spatial information and in field verification procedures. The next phase of the project will be to work with communities to identify priority sites and demonstration projects.

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**The framework is designed to help coastal communities structure and facilitate ongoing, community-wide adaptation processes to increase their resilience to sea level rise and inundation.**

- **Early Flood Warning System**

The UCI along with Stevens Institute of Technology and Monmouth County Office of Emergency Management are working with a group of local communities along the Navesink and Shrewsbury Rivers to establish a real-time flood warning system. This system was scheduled to go operational on April 15, 2010.

- **A National Sea Level Rise and Inundation Framework for Local Action**

UCI is working with the NOAA Coastal Services Center, other federal agencies and Ocean Research and Resources Advisory Committee (ORRAP), to follow up on a national Sea Level Rise-Inundation Community Workshop (December 3-5, 2009.) The workshop brought together leaders from a range of these communities to discuss and developed a framework on coastal inundation and sea level rise that can help guide where investments should be made to enable states and local governments to assess impacts and initiate adaptation strategies over the next decade. The framework is designed to help coastal communities structure and facilitate ongoing, community-wide adaptation processes to increase their resilience to sea level rise and inundation.



- **Community Vulnerability and Resilience**

UCI is continuing work to develop a coastal community resilience self assessment that incorporates key indicators relevant to hazard resilience in New Jersey. Under a grant funded by NJ Sea Grant, these efforts are being coordinated with the NJDEP Coastal Management Office, and NJ Sea Grant extension to target a few pilot communities in the summer and early fall 2010 to develop a GIS based mapping and vulnerability tool and a "Getting to Resilience" community self assessment. This project is also being coordinated with related efforts and initiatives at the Jacques Cousteau National Estuarine Research Reserve and Barnegat Bay Partnership to help ensure consistent approaches.