

# Stakeholder Engagement Report: Coastal Communities

## Climate Change Preparedness in New Jersey

October 2013

*Prepared for the New Jersey Climate Adaptation Alliance by  
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## **Introduction**

The Coastal Community stakeholder engagement process is part of a larger process being undertaken by the New Jersey Climate Adaptation Alliance to solicit input from stakeholders in a variety of sectors in order to formulate public policy recommendations that will enhance climate change preparedness in New Jersey. Stakeholders in the fields of Agriculture, Built Infrastructure (including utilities and transportation), Coastal Communities, Natural Resources, Public Health and Water Resources were engaged to better understand their perceptions of climate change impacts and to discern policy changes needed at the state and local levels in New Jersey to allow these sectors to better prepare for and respond to a changing climate.

## **Background on the Coastal Community Sector in New Jersey**

The Coastal Community sector, for the purposes of this process, was defined as individuals in an elected or appointed position or employed by a coastal community or county. These are individuals who work within the coastal zone and make decisions on behalf of a local community or county. As coastal professionals, their daily decisions and actions directly affect the Jersey Shore where millions of people reside, vacation and earn a living. The major categories of stakeholders included in the “Coastal Community” sector were Mayors, Committee Persons, Municipal Administrators and Clerks, Land Use Planners, Planning/Zoning/Land Use Board and Environmental Commission Members, local and county Emergency Managers, Construction Code Officials, Public Works Officials, Floodplain Managers, Stormwater Managers, municipal and county Engineers, and various county-level administrators and staff.

## **Approach**

### ***Targeted Stakeholders***

A variety of stakeholders from all New Jersey’s coastal municipalities and counties were invited to participate in “Coastal Community Listening Sessions” hosted at three locations along the New Jersey coastline – Tuckerton, Port Norris and Long Branch. The stakeholders were invited by an email sent out via Constant Contacts through the Jacques Cousteau National Estuarine Research Reserve (See Appendix A). A total of 1549 individuals received email invitations. The email was opened by 420 people, resulting in a 27.2% “open-rate”.

A total of 32 coastal community stakeholders participated in the listening sessions – five in Tuckerton, 12 in Port Norris and 15 in Long Branch. Stakeholders included municipal and county Emergency Managers, Public Works officials, Construction Code officials, Environmental Commission members, county Health Department, Wastewater and Economic Improvement officials, a Mayor and Deputy Mayor, a municipal Land Use Board member, and a county Recovery manager. This Coastal Community stakeholder process

also included natural resource managers and individuals working for non-governmental organizations and coastal advocacy groups, hence potentially creating overlap with the other sectors.

Additionally, an email invitation to participate in a “Climate Change and the Coast: Coastal Professional Opinion Survey” was sent to 2259 coastal stakeholders via Constant Contacts through the Jacques Cousteau National Estuarine Research Reserve (See Appendix B). The email was opened by 556 individuals, resulting in a 24.9% “open rate”. The survey was hosted through Rutgers University using Qualtrics online survey software.

A total of 116 respondents completed the online survey. Of the respondents, 35% work for municipal government, 15% for county government, 20% for state government, 8% for federal government, 13% for non-governmental organizations, 12% are consultants, and 6% work in private industry. Respondents hold a variety of positions within their communities; 31% are environmental specialists, 17% are emergency managers, and 15% are planners, other roles include planning board members, environmental commission members, natural resource managers, council members, public works staff, zoning officers, municipal engineers, and construction officials.

### ***Summary of Approaches***

The listening sessions followed a focus group format and style, adapted from focus groups facilitated by Susanne Moser in Monterey Bay, California in April and June 2012<sup>1</sup>. Each listening session was scheduled from 10:00am until 12:30pm and all sessions lasted the full two and a half hours. All participants were encouraged to speak and share throughout the facilitated discussion. Topics covered during the sessions included worries and challenges for the coastal community, coastal hazard preparations and climate change and sea level rise. The listening session outline, including specific questions asked of participants, can be found in Appendix C.

The online survey consisted of 14 questions. Topics included perceptions of climate change, levels of concern about specific climate-related impacts, what actions and programs are viewed as priorities to help coastal communities adapt to climate change, and perceived challenges to achieving preparedness. A copy of the survey questions can be found in Appendix D.

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<sup>1</sup> Climate Change in Paradise: Engaging the Community in Successfully Preparing for Monterey’s Future.  
[http://susannemoser.com/documents/ClimateChangeinParadise\\_final\\_000.pdf](http://susannemoser.com/documents/ClimateChangeinParadise_final_000.pdf)

## Summary

### *Perceptions of a Changing Climate*

Coastal Community leaders who participated in the listening sessions felt that the “slow, incremental process” of climate change(s) makes it hard to be proactive, resulting in primarily reactive actions by community leaders. They noted that climate change is not only a coastal problem, but a national issue. Stakeholders feel that the “average person” is ignorant to climate change impacts such as sea level rise, and that education is the key to achieving more awareness. They expressed a preference for illustrative education about climate impacts, as opposed to written climate “plans” that will not impart a sense of the necessity of action.

Coastal community leaders believe that people are always going to want to live at the coast, but there was a sense that coastal residents of the past were more nomadic and flexible and “moved with the shore” and “adapted to the changes”. Stakeholders expressed a need for more awareness and acceptance of change by learning from the past. There was acknowledgement that taking action towards climate change is going to require “changing the way people think”.

Participants stated that “backing away from the shore” was not going to be an option and that improved infrastructure and the investments are therefore necessary. There was a sense that conversations should be had regarding what level of investment is worthwhile but participants noted that if engineered beaches stop, population growth on the coast will stop. Conversely, if engineered beaches continue, people will continue to live and invest in coastal communities. It was suggested that a well thought out process needs to be developed to decide “where we pick our battles”.

Challenges to climate adaptation actions included the prohibitive cost of ordinance changes for municipalities already on tight budgets, and conflicts such as adding freeboard which then results in a violation of a height ordinance or the threat of lawsuits from residents with blocked views. State and federal agencies with “red tape”, “working in silos” and “conflicting regulations” between and among agencies were also noted as challenges to proactive decision making. It was suggested that there is a benefit of being able to act “autonomously”, in the sense of not having to answer to an elected governing body, when making climate adaptation action decisions. While regional authorities have this autonomy, most coastal community leaders do not. This lack of autonomy is further compounded by state, regional and watershed plans that do not currently address climate change.

Results of the online coastal professional survey are consistent with the listening sessions. The biggest challenges identified to achieving preparedness for climate change in New Jersey were lack of public awareness and acceptance of climate change impacts. Other major barriers identified include lack of political will, limited funding, and the difficulty of

convincing the public and local officials to plan for long-term climate change impacts when there is no apparent urgency.

### ***Climate Change Impacts of Greatest Concern***

Overwhelmingly, participants in the coastal listening sessions felt that flooding was the most pressing of the climate change impacts for their sector. Flooding concerns ranged from event based coastal flooding, precipitation derived inland flooding, flooding from storm surge and more permanent inundation caused from sea level rise. Conversations about flooding expanded into effects like compromised evacuation routes, an increased need for sheltering, coastal erosion, beach protection and concerns for community infrastructure (i.e. wastewater, stormwater, utilities, the occurrence of sinkholes and roadway collapses), and the need for home and roadway elevations.

Other climate impacts noted included increased threats from forest fires, prolonged high heat events, increased drought and the accompanying depletion of the aquifers, habitat conversions (both marshes and forested areas and associated fauna changes), and impacts to fisheries such as blue crabs, clams and oysters, saltwater intrusion and changes in disease organisms.

Increase in severe weather of various types was discussed. For example, coastal community stakeholders noted that the weather patterns have “shifted the tropics north” but there is also an increased occurrence of winter events which have necessitated disaster declarations.

Related to severe weather and storms were coastal community needs associated with these events – increased sheltering, backup generators, food, water and logistical support services such as the transportation of goods to areas with the most needs. Coastal community leaders spoke about the need to ensure continuity of operations and government, during and after a major storm event. An example provided was the need for Information technology (IT) support to make sure that municipal records are accessible somewhere else and backed up.

The need to look closer at emergency shelters was voiced. Keeping shelters up and running can be a challenge for coastal communities, especially when the individuals most at need for sheltering are also often the people without a social safety net. Additional challenges include using schools as shelters when schools are in session, having emergency power generation, meeting a variety of medical needs (both physical and mental) and security issues which include considerations such as gangs, illegal drugs and Meghan’s Law requirements that offenders are separated from families with children.

Word clouds were created based on the transcript from each of the listening sessions (Figure 1). Word clouds are created by giving give greater prominence to words that appear more frequently in source text. The word clouds below give an illustration of the most

discussed words and topics for each of the regional listening sessions. Although not a “scientific” reflection of the conversations, the differences and similarities between and among the word clouds provide an interesting insight into coastal community stakeholder thoughts as captured through three geographically diverse listening sessions.

Figure 1: Word clouds created from listening session transcripts taken at Tuckerton, Port Norris and Long Branch, respectively. Enlarged versions of the word clouds can be found in Appendix E.

Super Storm Sandy was a major part of the conversation at all three of the coastal community listening sessions. Attempts to facilitate the conversations away from Sandy often were successful in the short term but almost always the conversations would come back around to “The Storm”. The coastal community leaders who participated in the listening sessions would agree that Sandy was a “game changer”, although not in the sense of increased urgency around climate change. Sandy was a “game changer” in highlighting vulnerabilities along the coast, exposing gaps in emergency preparedness and the ability to be resilient, and accelerating the need to look at a variety of options for coastal protection.

Sandy exacerbated economic challenges for coastal communities. For example, small coastal community businesses that were already struggling with the economic downturn were “blown a knock down punch” with Sandy. Additionally, stakeholders noted that many homeowners share the sentiment that “we made it through Sandy, barely, but we could never do this again”. Coastal communities need to consider these community assets in terms of their effect on the community tax base. The reality of a diminished tax base is a

major issue for coastal communities post-Sandy. For example, communities that were already lacking adequate staffing in their police departments, public works departments, construction offices, etc. were significantly over-taxed during the height of Sandy and still are in the recovery phase. Coastal community leaders fear that because they are understaffed and overwhelmed post-Sandy, they are missing out on recovery funding and post-Sandy project opportunities.

Stakeholders noted that the utility sector needs to be “at the table” with coastal communities when working on preparedness issues. It should be noted that stakeholders gave the utilities sector mixed reviews for their response to Sandy. Coastal community leaders remarked on how Sandy highlighted how non-resilient communities are due to extensive amounts of aging infrastructure.

Sandy exposed (and exacerbated) the need for a large network of partners in order to be a “resilient coastal community”. Greater organization and cooperation between coastal communities and groups like the Red Cross and FEMA would be beneficial. Specifically, stakeholders referenced the large numbers of FEMA personnel deployed from other states into disaster areas. The stakeholders shared stories of conflicting narratives and confusing messages from FEMA personnel, who often did not have a great sense of local issues, regulations and the nature of New Jersey Home Rule. It was also noted that additional work is needed to coordinate the volunteer support that was so overwhelming post-Sandy, as well as the Citizen Emergency Response Teams (CERTS).

On a positive note, Sandy has necessitated the update of hazard, transportation and mitigation plans. The entire issue of mitigation is taking a spotlight now, and in some coastal communities greater appreciation for hazard mitigation is increasing local participation in county planning efforts, though in other cases the extensive work load from Sandy has hindered the ability for some localities to be fully participatory in planning processes. Property acquisitions (via New Jersey’s Blue Acres program) are taking place, and homes and businesses are being elevated. Grants are allowing coastal communities to meet needs such as generators for traffic lights and at shelter locations. Community sectors such as the wastewater utilities are now getting more attention due to the major damage experienced and the impacts that having these utilities offline meant for water quality. FEMA programs such as the Community Rating System (CRS) are gaining more traction since Sandy as a way to become more resilient and also to lower community flood insurance rates.

### ***Vulnerable Populations***

Coastal Community stakeholders had some concerns about the vulnerability of the large numbers of senior communities along the Shore. Their fears were specifically with respect to risk and preparedness communication. They noted that in a technology age, where information is increasingly being communicated electronically, traditional means of



communications for preparedness are still important to reach the senior population. According to the online survey, 91% of respondents expressed great concern for elderly populations. Other vulnerable communities of concern include the physically disabled (88%), mentally disabled (86%), the poor (87%), low income homeowners (83%), middle income homeowners (80%), racial minorities (78%) and non-English speakers (78%).

### ***Stakeholder Perceptions of Sectoral Preparedness***

It was very clear that most Coastal Community stakeholders are not taking actions now to prepare for climate change. From the listening sessions, it was clear that this sector is focused on storm recovery and preparedness for “the next storm” – in other words, the preparedness is focused much more on the here and now and not on the “slow progression” of effects of climate change(s). As noted earlier, the coastal community stakeholders that participated in the listening sessions indicated that climate change action is a “hard sell” to their municipalities because of the slow process of change, the lack of understanding of the issues by community members and municipal leaders and the conflicting priorities that take more time, attention and economic priority. As an example, one stakeholder noted that maintenance and expansion of soccer fields will always take precedence over discussing actions related to sea level rise. Another stakeholder noted that in rebuilding the Shore, communities are not being told to “build less houses, they are being told to build them higher”.

Stakeholders also referenced the politics that surround climate change, noting that coastal community leaders may not agree on “climate change” but can agree on smaller issues such as storm preparedness and coastal hazards resilience. It was also noted that with “entrenched old thinking”, the bottom line on taking actions\ is going to come down to changing the way people think, not just changing the way topics are worded.

Coastal community stakeholders felt that their community’s perception of the role of FEMA and other government agencies is a disincentive towards being proactive. Stakeholders expressed that there is a sense in their communities that “we don’t have to do much because the government will bail us out”. The misconception is that “FEMA will do all the work for people” when the reality is that homeowners have to do work upfront and be reimbursed by FEMA – if eligible. Coastal stakeholders also felt that second home owners, some of whom were surprised that their losses from Super Storm Sandy were not covered, have the political connections and money to create negativity for programs such as FEMA. Stakeholders suggested that agencies such as FEMA would provide greater benefit to the Shore if their time and energy could be spent on better educating the public ahead of disasters.

Lastly, there was a sense that a “not in my backyard” sentiment makes it difficult to move projects forward. . For example, JCP&L’s attempt to build a bigger and more resilient

substation, out of a floodplain, was shot down as no one wanted a substation in their backyard.

### ***Leading Practices***

Unfortunately, there were not a large number of leading climate adaptation practices cited by the coastal community sector. One of the notable adaptation practices was discussed by the Southern Monmouth Regional Sewerage Authority (SMRSA). SMRSA ([www.smrso.org](http://www.smrso.org)) was founded for the purpose of protecting and preserving the area's vital environment for current and future generations and by so doing ensuring a healthy ecology, a robust economy, and a high quality of life for the 50,000 southern Monmouth citizens they serve.

SMRSA champions a United States Environmental Protection Agency (US EPA) program called CREAT (Climate Resilience Evaluation & Awareness Tool). CREAT allows users to evaluate potential impacts of climate change on their utility and to evaluate adaptation options to address these impacts using both traditional risk assessment and scenario-based decision making. CREAT provides libraries of drinking water and wastewater utility assets (e.g., water resources, treatment plants, pump stations) that could be impacted by climate change, possible climate change-related threats (e.g., flooding, drought, water quality), and adaptive measures that can be implemented to reduce the impacts of climate change. The tool guides users through identifying threats based on regional differences in climate change projections and designing adaptation plans based on the types of threats being considered. Following assessment, CREAT provides a series of risk reduction and cost reports that will allow the user to evaluate various adaptation options as part of long-term planning. Over the last five years CREAT has been used as a decision making tool for the SMRSA in helping them to do life cycle analyses of infrastructure, factoring in climate change. They noted that they currently have one project completed, another project underway and another project planned, with assistance from the CREAT tool. An example of one project was the replacement of a Sandy-damaged pumping station with a mobile pumping station that allows for non-critical pieces to be sacrificed and for critical pumping pieces to be taken away before future storms. After the storm passes the critical pieces can be returned to the areas and operations can resume.

Stakeholders from SMRSA added that public awareness and education is important because they feel that their stakeholders need to know why they are making these decisions. They said that when “selling projects” to the elected officials, Board members and politicians, they first identify financial sources to show fiscal and borrowing capacity, then demonstrate engineering capacity and then present alternatives.

Another leading practice noted was the inclusion of climate change risk, especially sea level rise vulnerability, in the Hazard Mitigation Plan being written by Ocean County and as part of the Hazards Mitigation Plan update being written by Monmouth County. As climate change and sea level rise are not risks required to be covered by FEMA, these counties are being

proactive with respect to awareness and subsequent mitigation planning, with the future in mind.

In the survey, utilization of green infrastructure such as dunes, riparian buffers, and living shorelines was identified as the most important action or program needed to support New Jersey's coastal communities in preparing for and responding to climate change impacts, with 81% of respondents selecting this as very important and 16% selecting it as important (97% overall). Fully 100% of respondents agreed that infrastructure vulnerability assessments are important, with 64% citing this as a very important need. Other high priorities included coordination between municipalities and state resources (98% overall/66% very important), development of resilient emergency communications infrastructure (98%/65%), incentive programs to protect natural areas (96%/65%), rapid response systems for extreme events (94%/61%), and coordination between municipalities/mutual aid programs (97%/56%).

## **Recommendations**

Coastal Community stakeholders indicated that as professionals with largely the same interest – to protect their communities and residents - they could have a powerful combined voice on coastal issues. They indicated that even getting adjacent communities together presents challenges including a lack of willingness, lack of time, and competing interests. Stakeholders also expressed interest in bringing other sectors to the table to have a discussion about overlapping priorities, regional interests, and coastal risks and preparedness. It was suggested that an outside, neutral agency or institution could take on the role of bringing all coastal community sectors together to discuss regional issues, challenges, and opportunities.

A second recommendation made by the stakeholders was to cut the amount of “red tape” and “conflicting rules and regulations” of state and federal agencies. They indicated that the process of getting projects designed and permitting is staggering, and often these upfront costs exceed what coastal communities can afford - even before a project gets implemented. They noted that conflicting rules and mandates between groups within the state and between the state and federal agencies is confusing, counterproductive and halts projects before they can even get off the ground. A crosswalk of state and federal regulations, with special attention paid to potential conflicts between the regulations, would be a very useful exercise. Working between the agencies to eliminate conflicts would aid in easing the pathway to greater adaptive action on the part of coastal communities. From a perception standpoint, state and federal agencies working together to eliminate roadblocks would demonstrate a sense of support and resolve to address climate change preparedness.

Lastly, multi-jurisdictional hazard mitigation planning could serve as a solid platform and mechanism for advancing coastal community climate preparedness and sparking thoughts

and considerations for adaptive and mitigative actions. Based on the way hazard mitigation planning has happened to this point, these potentials are not fully being realized. Plans are almost always completed at a county-wide scale, led by a contracted consultant and housed under the county's Office of Emergency Management. Broadly stated, in the eyes of the coastal community stakeholders, this planning task sits within the authority of the community's emergency management professionals and is not usually informed by other municipal perspectives and specialties. In fact, some of the coastal stakeholders who participated in the listening sessions confused the hazard mitigation plan with storm response plans and emergency evacuation plans, indicating that community leadership does not fully understand the objectives and possible utilities of the planning process. This process could be greatly enhanced by encouraging additional municipal and county level branches to participate and lend their expertise. Ocean and Monmouth Counties, who are currently undergoing plan writing and rewriting respectively, have attempted to include sectors such as planning, engineering, and academia. Additional sectors to involve in the process include wastewater, stormwater, public works, the environmental commission, public utilities, the energy sector, nongovernmental organizations, public health, senior services, education, etc. These diverse perspectives would add insight into areas such as vulnerable populations and infrastructure and would likely suggest new mitigative and adaptive priorities. Recently, FEMA has been encouraging broader representation in the planning process, even going so far as to offer ongoing plan review throughout the process in addition to the final plan review and crosswalk with past plans. Additional federal, state, and county emphasis on the importance of cross-sectoral representation in the hazard mitigation planning process and encouragement of mitigation activities that take into account future conditions would boost the local community's drive to consider these effects and the necessary actions to adapt to these stresses.

### **Insights from the Authors**

Hosting the coastal community listening sessions in three locations around the state highlighted distinct differences in the perceptions of coastal community stakeholders. Specifically, the Delaware Bayshore (locally referred to as just "The Bayshore") stakeholders distinctly feel that they are the "forgotten" New Jersey shore, that their livelihoods are in jeopardy, and that they are "on the edge" of extinction. The Bayshore coastal community stakeholders feel they are being treated differently than the "Atlantic Coast" portion of the New Jersey Shore. On one hand, they feel that they are not getting much in the way of attention and support from the state agencies, but on the other hand they feel they have been disproportionately forced to consider retreat options, compared to how they perceive these types of strategies being discussed for the Atlantic Coast. To quote one stakeholder, "We get the feeling the state doesn't actually want us to sustain what we have but just let Blue Acres buy everything out and we go away". Additionally, stakeholders along the "Bayshore" feel they have no strong political voice representing their issues and well-being.

The “Bayshore” does represent a vastly different level of development than the Atlantic Coast shoreline. Of the forty miles of coastline in Cumberland County, 36 miles are preserved by state, federal or non-profit land management agencies. Issues with wells, septic tanks and major road flooding beg the need for a close look at the interplay of infrastructure, the built environment, the natural environment and vulnerability.

These listening sessions did not include discussions with the more urban coastal communities (like Hoboken, Jersey City, etc,) which would likely have a range of additional concerns, challenges and opinions beyond what is presented through the viewpoints of Monmouth and Ocean County and Bayshore community stakeholders. It may be advantageous and informative to host a listening session in the Hudson/Bergen coastal area to compare and contrast the perspectives of the stakeholders there with the results presented in this report.

In closing, climate adaptation within the coastal community sector presents a number of challenges such as the slow pace of visible changes, the intensity of other mandates and needs facing towns which often require short term municipal prioritization, and the lack of political will at the local and state level to take immediate actions on climate adaptation priorities. Often coastal stakeholders are burdened by a lack of time and staff, so resources are devoted to handling immediate priorities, thereby putting planning for the future on the back burner. This is especially true after Super Storm Sandy where coastal communities are trying desperately to recover, rebuild, and position their towns for financial and technical assistance to help them get back on their feet as quickly as possible. Planning processes such as hazard mitigation planning and post-disaster recovery planning offer opportunities for diverse stakeholder input and avenues to consider future conditions. If these planning conversations are facilitated with a cross-sectoral focus and with short and long term planning objectives in mind, they may serve as the best avenues, in the short-term, to be able to think and plan for the long-term.

## Appendix A: Copy of E-mail Sent to Advertise Listening Sessions



### **YOUR CHANGING COAST. YOUR VOICE. WE WANT TO LISTEN.**

Our coasts are changing at a fast pace. As coastal community leaders you have much to consider when keeping your communities safe and thriving.

#### **What are your biggest concerns now and into the future?**

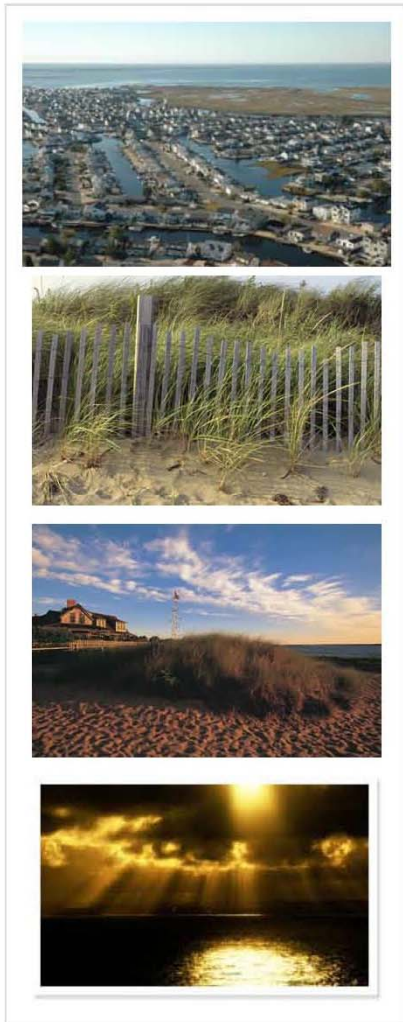
We want to hear from coastal community leaders about their most pressing coastal hazards and climate-related concerns and needs. Please join us to have your voice heard and to network with other coastal community leaders.

Join us for one of three sessions hosted from 10am - 12:30pm:

- July 25th - Jacques Cousteau Reserve (Tuckerton, NJ)
- July 31st - Bayshore Discovery Center (Port Norris, NJ)
- August 6th - Monmouth University (Long Branch, NJ)

**Learn More and Register by Clicking on the Location of Your Choice.**

## Appendix B: Copy of E-mail Sent to Advertise Online Survey



### **Climate Change and the Coast.**

#### ***As a Coastal Professional, Your Opinion is Need...***

I am part of a group at Rutgers University working to prepare New Jersey for the impacts of climate change. We would like to know your opinion about the impact these changes will have on the Shore. Your opinions will be used to help develop outreach and training programs that fit your needs, as well as craft policy recommendations at local, county and state levels.

**The survey should only take 10-15 minutes of your time. Please complete by August 23rd.**

Your thoughts and time are greatly appreciated as we work to make New Jersey more prepared and resilient.

Fondly,  
*Lisa*

Start the survey.

## **Appendix C: Discussion Questions for Coastal Community Listening Sessions**

Discussion Topics – (Adapted from S. Moser’s Focus groups held in Monterey Bay April and June 2012)

- Broad Questions:
  - o What are some words that describe your connection to the coast/Shore
  - o What are your worries about the coastal environment?
  - o What words would you use describe the major challenges facing the future of the coastal community where you live or work?
  - o How do you view these threats as compared to other concerns you deal with?
- Coastal Hazard Preparation
  - o What are some of the hazard preparations you are undertaking?
  - o What else needs to be done in this regard to support your efforts?
  - o Are you/how familiar are you with coastal hazard mitigation strategies and plans by community – local and county?
  - o What do you think needs to be done to improve local/county hazard mitigation strategies and plans?
- Climate Change and Sea Level Rise
  - o Do you think that climate change impacts are going to make coastal hazard preparation more difficult in the future?
  - o Please describe how climate will impact hazard planning.
  - o What are your other climate change –related concerns?
  - o How do you perceive these concerns affecting the coast/Shore?



## Tuckerton, NJ Word Cloud



### Port Norris, NJ Word Cloud



### Long Branch, NJ Word Cloud





## Appendix E: Coastal Communities Online Survey Questions

### Preparing for Climate Change Impacts in New Jersey: Coastal Communities Survey

Q1 Please read the following information and sign electronically in the box below, indicating your informed consent. Thank you for agreeing to participate in this online survey. This research is being conducted by Rutgers University in conjunction with the New Jersey Climate Adaptation Alliance. Leaders representing and serving New Jersey's coastal communities are being asked to participate. The purpose of the survey is to obtain data to assess New Jersey's most pressing concerns resulting from climate change as they affect coastal communities, and to help to prioritize a set of program, planning and policy adaptations that are necessary to prepare for and mitigate these impacts. There are no reasonable or discernible risks to your participation in this study. We are not asking for your name on the survey, and will only utilize information collected in summary form to categorize or further explain important differences. If we are able to deduce your identity, the research will be confidential. Confidential means that the research records will include some information about you and this information will be stored in such a manner that there is some linkage between your identity (as deduced but not specified) and the response in the research. The information collected about you includes your opinions about climate change risks, ratings of concern about climate change impacts and your assessment of the needs for various climate adaptation programs. Please note that we will keep this information confidential by not including your name in the data records, limiting individual access to the research data and keeping it in a secure location. The research team and the Institutional Review Board (a committee that reviews research studies in order to protect research participants) at Rutgers are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated. All study data will be kept for three years. The benefits of completing the survey are that you will contribute to further knowledge and insight about impacts to New Jersey from climate change and help to inform the development and prioritization of resources needed to support new or expanded programs or policies to address these impacts. The survey should take about 10-15 minutes to complete. Participation is completely voluntary and refusal to participate will result in no penalties. You may opt out of completion of the survey at any time while taking it. If you have questions related to the research, please contact Jeanne Herb, Associate Director of the Environmental Analysis and Communication group, 33 Livingston Ave., New Brunswick, NJ 08901, 848-932-2725, [jherb@ejb.rutgers.edu](mailto:jherb@ejb.rutgers.edu). If you have questions about your rights as a research subject, you may contact the IRB Administrator at Rutgers University at:

Institutional Review Board for the Protection of Human Subjects	Rutgers University
Research and Sponsored Programs	Office of
NJ08901-8559	3 Rutgers Plaza
0150	New Brunswick,
	Tel: 838 932
	Email: <a href="mailto:humansubjects@orsp.rutgers.edu">humansubjects@orsp.rutgers.edu</a>

- ☐ I have read and understand the risks and benefits of this research and agree to participate by typing my initials in this box. \_\_\_\_\_

Q2 We ask that you please answer these questions with respect to the coastal community or region that you serve. What New Jersey coastal community do you serve or represent?

Q3 Please indicate the sector in which you work. Select all that apply:

- ☐ Municipal / City Government
- ☐ State Government
- ☐ County Government
- ☐ Federal Government
- ☐ Non-Governmental Organization
- ☐ Consultant
- ☐ Private Industry
- ☐ Other \_\_\_\_\_

Q4 What best describes your position with respect to your authority or involvement in coastal New Jersey? Select all that apply:

- ☐ Mayor
- ☐ Council Member
- ☐ County Freeholder
- ☐ Other Elected Official
- ☐ Emergency Manager
- ☐ Zoning Officer
- ☐ Construction Official
- ☐ Planner
- ☐ Public Works
- ☐ Clerk
- ☐ Police
- ☐ Fire
- ☐ Wildlife/ Natural Resource Manager
- ☐ Environmental Specialist
- ☐ Environmental Commission Member
- ☐ Planning Board Member
- ☐ Task Force Member (please specify name of task force) \_\_\_\_\_
- ☐ Other \_\_\_\_\_

Q5 What county do you work in?

- ☐ Atlantic
- ☐ Bergen
- ☐ Burlington
- ☐ Camden
- ☐ Cape May
- ☐ Cumberland
- ☐ Essex
- ☐ Gloucester
- ☐ Hudson
- ☐ Hunterdon
- ☐ Mercer
- ☐ Middlesex
- ☐ Monmouth
- ☐ Morris
- ☐ Ocean
- ☐ Passaic
- ☐ Salem
- ☐ Somerset
- ☐ Sussex
- ☐ Union
- ☐ Warren

Q6 Do you live in the New Jersey coastal community that you serve?

- ☐ Yes
- ☐ No

Q4 If you do not live in the community that you serve, please indicate whether you live in:

- ☐ a different coastal community
- ☐ an inland (non-coastal) area

Q5 Do you Strongly Agree, Agree, Disagree or Strongly Disagree (or Don't Know) with the following statements?

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
Global climate change is not occurring.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Global climate change is mostly caused by human activity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Global climate change is a risk to New Jersey.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Global climate change is a risk to me, my family, and my friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The international scientific community understands the science behind global climate change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I trust the scientific community to truthfully report their findings related to climate change.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



<p>Our state and local officials understand the implications of global climate change for my region.</p> <p>The media I rely on communicate honestly with us about global climate change.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6 Please rate how concerned you are about the following climate change-related impacts to the coastal community where you work. IMPACTS RELATED TO THE ENVIRONMENT AND NATURAL RESOURCES

	Great Concern	Some Concern	Little Concern	No Concern	Not applicable
Higher air temperatures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Higher water temperatures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increasing intensity of rainfall events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sea level rise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drought	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decline in air quality (allergens, particulate matter, ozone, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decline in freshwater quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increase in saltwater intrusion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decline in marine water quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beach and dune loss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tidal wetland erosion and loss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spread of vector-borne disease and pathogens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Q7 IMPACTS RELATED TO EMERGENCY MANAGEMENT

	Great Concern	Some Concern	Little Concern	No Concern	Not applicable
Human rescues / strandings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Animal rescues / strandings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Deaths and injuries from storm events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased occurrence and severity of flooding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stress and strain on responders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Power outages	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased need for sheltering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heat stress / heat stroke	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disruption of food supplies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disruption of drinking water supply	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disruption to medical services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Q8 IMPACTS RELATED TO INFRASTRUCTURE

	Great Concern	Some Concern	Little Concern	No Concern	Not applicable
Damage to transportation infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to energy infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to communications infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to water supply infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to wastewater infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to boardwalks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to docks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Q22 IMPACTS RELATED TO PRIVATE PROPERTY AND ECONOMIC ACTIVITY

	Great Concern	Some Concern	Little Concern	No Concern	Not applicable
Private property damage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduction of property values	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduction in property tax revenue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to local businesses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loss of business income	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loss of jobs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to the tourism industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to the recreational fishing industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Damage to the commercial fishing and shellfish industries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Q23 IMPACTS TO VULNERABLE POPULATIONS

	Great Concern	Some Concern	Little Concern	No Concern	Not applicable
Elderly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poor / economically disadvantaged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-English speakers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Physically disabled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mentally disabled	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Racial minorities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low income homeowners	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Middle income homeowners	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (describe)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q24 Was the coastal community where you work impacted by Tropical Storm Irene (2011)?

- ☐ Yes
- ☐ No

Q11 If yes, in what ways was your community affected by Tropical Storm Irene? Select all that apply:

- ☐ Deaths
- ☐ Injuries
- ☐ Short-term stress
- ☐ Longer-term stress
- ☐ Minor flooding
- ☐ Severe flooding
- ☐ Minor property damage
- ☐ Major property damage
- ☐ Road closures
- ☐ Resident evacuation
- ☐ Nursing home / assisted living facility evacuation
- ☐ Power outages
- ☐ Other \_\_\_\_\_

Q12 Was the coastal community where you work impacted by Hurricane Sandy (2012)?

- ☐ Yes
- ☐ No

Q13 If yes, in what ways was your community affected by Hurricane Sandy? Select all that apply:

- ☐ Deaths
- ☐ Injuries
- ☐ Short-term stress
- ☐ Longer-term stress
- ☐ Minor flooding
- ☐ Severe flooding
- ☐ Minor property damage
- ☐ Major property damage
- ☐ Road closures
- ☐ Resident evacuation
- ☐ Nursing home / assisted living facility evacuation
- ☐ Power outages
- ☐ Other \_\_\_\_\_

Q15 What are the most important actions or programs needed to support New Jersey's coastal communities in preparing for and responding to climate change impacts?



	Very Important	Important	Not Very Important	Not at All Important	Don't Know
Development of local-scale climate forecasts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Property vulnerability assessments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Census of vulnerable populations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infrastructure vulnerability assessments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilization of hard infrastructure (e.g. jetties, bulkheads, sea walls)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilization of soft / green infrastructure (e.g. dunes, riparian buffers, living shorelines)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Utilization of rolling easements to enable natural landward migration of the shore	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elevation of structures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Property buyout programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Development of local climate adaptation plans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Development of state climate adaptation plans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coordination between municipalities (mutual aid)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coordination between municipalities and state resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expansion of vector and disease surveillance programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Rapid response system for extreme events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Development of resilient emergency communications infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provision of regional cooling and warming centers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Provision of regional shelters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expansion of flood warning system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planning for water supply protection and conservation programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Planning for regional transportation for ease of evacuation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assistance with stockpiling of supplies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitoring fisheries and shellfisheries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diversification of the coastal economy away from beach tourism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial support programs for homeowners to make homes more climate resilient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial support programs for municipalities to make infrastructure more climate resilient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial support programs for small businesses to make businesses more climate resilient	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Incentive programs (e.g. Blue Acres, community rating systems) to protect natural areas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q17 What are the biggest challenges to achieving preparedness for climate change?

Q18 Please rank the relative importance of these coastal community stressors. (Drag and drop to rank 1 to 6 with 1 being most important and 6 being least important):

- \_\_\_\_\_ Land Development Pressures
- \_\_\_\_\_ Climate Change
- \_\_\_\_\_ Economic Conditions
- \_\_\_\_\_ Changing Demographics (e.g. age, income)
- \_\_\_\_\_ Environmental Degradation / Pollution
- \_\_\_\_\_ Crime / Public Safety

Q25 Please rate your need for assistance on the following topics:

	Don't Need	Not Sure	Need and resources are available to me	Need and resources are NOT available to me
Improved understanding of how climate change might impact my community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information on how my community can adapt to climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial and technical assistance and/or incentives for climate adaptation planning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial and technical assistance and/or incentives to implement climate adaptation actions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Appendix F: Summary of Coastal Communities Online Survey

### **Preparing for Climate Change Impacts in New Jersey: Coastal Communities Survey**

Administered to over 2,000 stakeholders representing and serving New Jersey's coastal communities, including elected and appointed municipal officials, municipal staff, and state, county, and federal government staff.

Survey conducted online July 30 – August 13, 2013.

#### *Overview of Participants*

116 respondents completed this online survey. Of the respondents, 35% work for municipal government, 15% for county government, 20% for state government, 8% for federal government, 13% for non-governmental organizations, 12% are consultants, and 6% work in private industry. Respondents hold a variety of positions within their communities; 31% are environmental specialists, 17% are emergency managers, and 15% are planners, while others are planning board members, environmental commission members, natural resource managers, council members, public works staff, zoning officers, municipal engineers, and construction officials, among other positions. Respondents work primarily in three coastal counties: Ocean County (34%), Monmouth County (23%) and Atlantic County (14%). Sixty-six percent (66%) of respondents live in the coastal community which they serve. Of the 49 respondents not living where they serve, 37% live in a different coastal community while 63% live inland.

#### *Views on Climate Change*

84% of respondents believe climate change is occurring, with 62 of the respondents strongly disagreeing and 35 disagreeing with the statement “global climate change is not occurring”. 13% do not think that climate change is occurring. The majority of respondents (67%) believe that climate change is mostly caused by human activity, with 23% strongly agreeing on this point, 44% agreeing, 17% disagreeing or strongly disagreeing and 16% responding “don’t know”. Nearly all respondents (96%) feel climate change is a risk to New Jersey, and 83% think climate change is a personal risk to family and friends. 64% agree that the international scientific community understands the science behind climate change, while 21% disagree and 16% don’t know. 68% trust the scientific community to truthfully report their findings related to climate change while 24% do not. Trust in the media is fairly low, with 31% agreeing that the media communicate honestly about global climate change, 57% disagreeing, and 12% responding “don’t know”. Most respondents expressed little faith in state and local officials’ comprehension of climate issues, with 73% disagreeing or strongly disagreeing with the statement “our state and local officials understand the implications of global climate change for my region”, interesting given that the majority of respondents are themselves state or local officials.

### *Climate Change Impacts on Coastal Communities*

The majority of respondents expressed ‘great concern’ or ‘some concern’ about all of the climate change impacts presented in the survey, with the greatest concern related to increased occurrence and severity of flooding (94% concerned overall, 74% great concern/20% some concern).

Damage to critical utility infrastructure was also a major concern, with 94% expressing concern about damage to wastewater infrastructure (62% great/32% some), 92% about damage to water supply infrastructure (63% great/29% some), 90% about damage to energy infrastructure (55% great/35% some), 84% about damage to transportation infrastructure, and 83% about damage to communications infrastructure.

Of impacts related to the environment and natural resources, respondents were most concerned about tidal wetland erosion and loss (91% - 71% great/20% some), sea level rise (90% - 63% great/27% some), and beach/dune loss (91% - 58%/33%). Other natural impacts of concern included a decline in marine and freshwater quality (87% and 83% respectively), saltwater intrusion (84%), higher water temperatures (84%), and more intense rainfall events (83%).

Major concerns related to emergency management included deaths and injuries from storm events (84% - 57% great/28% some), disruption of drinking water supply (86% - 51% great/35% some), power outages (85% - 43%/42%), and stress and strain on responders (86% - 40%/46%). Primary economic concerns included loss of jobs (91%), damage to the commercial fishing and shellfish industries (86%), damage to local businesses (87%), damage to the recreational fishing industry (83%) and private property damage (83%).

Amongst vulnerable populations, respondents expressed the greatest concern for the elderly (91%), followed by the physically disabled (88%), mentally disabled (86%), the poor (87%), low income homeowners (83%), middle income homeowners (80%), racial minorities (78%) and non-English speakers (78%).

### *Impacts from Irene and Sandy*

The coastal communities of 90% of survey respondents were impacted by Tropical Storm Irene in 2011, with common impacts including minor flooding (74%), short-term stress (73%), minor property damage (73%), power outages (69%), and road closures (69%).

Fully 99% of respondents’ communities (all but 1 respondent) were affected by Hurricane Sandy in 2012. Common impacts included power outages (96%), road closures (92%), major property damage (89%), severe flooding (86%), resident evacuation (85%), and longer-term stress (84%). Deaths were reported by 26 respondents (23%) and injuries were reported by 55 respondents (48%).

### *Policy Priorities*

Utilization of green infrastructure such as dunes, riparian buffers, and living shorelines was identified as the most important action or program needed to support New Jersey's coastal communities in preparing for and responding to climate change impacts, with 81% of respondents selecting this as very important and 16% selected it as important (97% overall). Fully 100% of respondents agreed that infrastructure vulnerability assessments are important, with 64% citing this as a very important need. Other high priorities included coordination between municipalities and state resources (98% overall/66% very important), development of resilient emergency communications infrastructure (98%/65%), incentive programs to protect natural areas (96%/65%), rapid response systems for extreme events (94%/61%), and coordination between municipalities/mutual aid programs (97%/56%).

Other programs or activities that respondents identified as very important included planning for water supply protection and conservation programs, property vulnerability assessments, utilization of rolling easements to enable natural landward migration of the shore, elevation of structures, censuses of vulnerable subpopulations, planning for regional transportation for ease of evacuation, property buyout programs, development of local and state climate adaptation plans, financial support programs for municipalities to make infrastructure more climate-resilient, and expansion of flood warning systems.

### *Challenges*

The biggest challenges identified to achieving preparedness for climate change in New Jersey were lack of public awareness and acceptance of climate change impacts. Other major barriers identified include lack of political will, limited funding, and the difficulty of convincing the public and local officials to plan for long-term climate change impacts when there is no apparent urgency.

### *Issue Prioritization*

When presented with a list of six challenges to coastal communities in New Jersey and asked to rank them in order of importance, with 1 being most important and 6 being least important, the average rank order was 1) Land Development Pressures; 2) Climate Change; 3) Economic Conditions; 4) Environmental Degradation; 5) Changing Demographics; and 6) Crime/Public Safety.

### *Technical Needs*

Most respondents (51%) feel there is an adequate availability of resources to help them understand climate impacts on their community, though 25% said this was an unmet need. 32% feel there is an unmet need for resources related to how their community can adapt to climate change. Half (50%) of the respondents felt there was an unmet need for financial and technical



assistance and/or incentives for climate adaptation planning and to implement adaptive actions. Many were unsure of the availability of financial resources for climate adaptation planning and for implementation of climate adaptation activities, with 18% and 21% respectively responding that they were not sure whether there were resources available for these items.