



Bridgeport Climate Preparedness Workshops

Summary of Findings

August, 2012

Bridgeport Climate Preparedness Workshops

Summary of Finding

Overview:

Clearly, the need for municipalities, regional planning organizations, the state and federal agencies to increase resilience and adapt to extreme weather events and mounting natural hazards is strikingly evident along the coast of Connecticut. Recent events such as Tropical Storm Irene, the October snow storm, and past tornados have reinforced this urgency and compelled leading communities like the City of Bridgeport to proactively plan and mitigate potential risks through a community driven process. Ultimately, this commendable type of leadership will reduce the exposure of Bridgeport's citizens, infrastructure and ecosystems and serve as a model for cities and towns across Connecticut, the Atlantic Seaboard and the Nation.

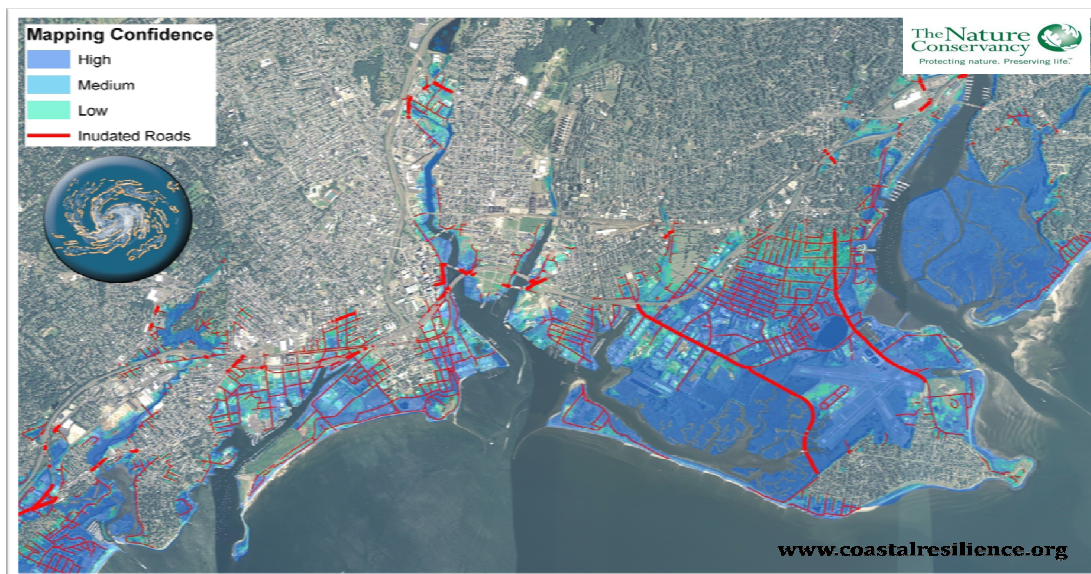
In the fall of 2011, a new partnership formed between the City of Bridgeport, Greater Bridgeport Regional Council, The Nature Conservancy, Clean Air Cool Planet, and The Regional Plan Association. The partnership's focus was on increasing awareness of risks associated with extreme weather and natural and climate-related hazards and assessing the risks, strengths and vulnerabilities within the City of Bridgeport. This focus was actualized through a series of initial presentations, individual interviews and outreach to build stakeholder willingness and engagement followed by a series of Climate Preparedness Workshops in the winter/spring of 2012. The core directive of this effort was the engagement with and between community stakeholders in order to facilitate the education, planning and ultimately implementation of priority adaptation action. To reinforce this directive the workshops had several central objectives including:

- Definition of extreme weather and local natural and climate-related hazards;
- Identification of existing and future vulnerabilities & strengths;
- Develop and prioritize actions for the City and a broad stakeholder network;
- Identify opportunities for the community to advance adaptive actions.



These Climate Preparedness Workshops for the City of Bridgeport utilized the National Oceanic and Atmospheric Administration Coastal Services Center’s “Roadmap for Adapting to Coastal Risk” as the framework coupled with visualization and decision-support provided by The Nature Conservancy’s Coastal Resilience: New York and Connecticut Program (www.coastalresilience.org) and TNC’s Risk Matrix approach. Through this workshop process, rich with information, experience, and dialogue, the participants produced findings which are outlined in this summary report. The following report provides an overview of the top hazards, current concerns and challenges, current strengths and assets, and recommendations to improve the City of Bridgeport’s resilience to natural and climate-related hazards today and in the future.

The summary of finding transcribed in this report, like any that concern the evolving nature of risk assessment are proffered for comments, corrections and updates from workshop participants and other stakeholders alike. The City of Bridgeport’s exemplary leadership on climate preparedness will benefit from the continuous and expanding participation of all those concerned within the community.



Projected flooding within the City of Bridgeport and adjoining communities during a Category 3 Hurricane (i.e., 1938 Hurricane). Source: The Nature Conservancy/NOAA Coastal Services Center.

Summary of Findings

Top Hazards for Greater Bridgeport Region

During the Workshops, participants from the community were asked to identify the top hazards for the Greater Bridgeport region (Box A). Inland and coastal flooding in the form of standing water as well as storm surge was identified as the top hazards by the majority of the participants. Extreme weather events in the form of snow and ice storms, rainfall, drought, excessive heat and wind were also listed universally across most workshop teams. Sea level rise and rising groundwater were listed by several teams along with tornados as a priority hazard for the Greater Bridgeport region. According to the participants, these hazards are already having a direct impact on several neighborhoods, natural areas (streams, wetlands, beaches, parks), roads, and other critical facilities within the City of Bridgeport (Box B).

Box A: Top Hazards for Greater Bridgeport Region

- #1** Frequency and Severity of Coastal and Inland Flooding
- #2** Storm Surge from Tropical Storms and Hurricane
- #3** Sea Level Rise and Rising Groundwater
- #4** Snow, Ice, Rain and Wind Storms
- #5** Droughts and Extreme Heat
- #6** Tornados and Earthquakes

Box B: Vulnerable Areas in City of Bridgeport

Neighborhoods: Black Rock, South End, Chopsey Hill,

Ecosystems: Ash Creek, Johnson Creek, Seaside Park, Pleasure Beach

Roads: East Main Street, Bishop Avenue, Boston Avenue, Viaducts and Bridge Crossings

Facilities: Tank Farms, Transportation, Shelters and Cooling Stations, Nursing Homes, Library and Museums, Schools, Gas Stations, Low Income Housing, Sewage Treatment, Marinas, Brownfields, Hotels, Seawalls, Parks





Current Concerns and Challenges Presented by Hazards

The City of Bridgeport currently has several concerns and challenges related to impact of hazards in the community. Many of these were brought to the fore during the recent experiences with extreme flooding in March, 2010, a tornado (June, 2010), Tropical Storm Irene (August, 2011) and the recent October snow storm (2011).

Emergency management access and ability to evacuate residents and commuters during an event were identified as a key concern. This included the inability to get emergency services to certain places due to flooding of major transportation routes, railroad overpasses, and surface streets (i.e., “Southend”). This issue presents a challenge to emergency providers for at-risk populations such as the high number of disabled and/or elderly (senior centers, public housing). Also identified was the current adequacy of sheltering and hospital facilities for displaced residents and their pets as well as cooling and warming centers during extreme weather events. The return of displaced peoples after an event was raised as a concern (i.e., medication, food availability, clothes, livable conditions, etc...). These issues are further complicated due to the diversity of the City’s demographics and the need to communicate in dozens of languages. Actionable news updates and instructions originating from city officials and emergency managers and delivered by trusted messengers (technology plus process) were identified as key to ensure preparedness and proactive responses by an informed and aware citizenry.

The immediate impact from flooding to critical facilities and infrastructure such as the power plant, airport, transportation routes (rail, primary and secondary roads, bus stations and lines), gas stations, energy transformers, private and public seawalls and levees, storm water and sewer, and the city and regional power grid (generator safety, emergency generators) were raised. Much of the concerns reflected the current age and capacity of the infrastructure (i.e., undersized and/or outdated storm-water/sewer infrastructure). In coastal areas of the City, certain storm drain outlets

are currently below the high tide line which prevents dewatering and increased residence time of flood waters. The structural ability due to age of existing flood gates was discussed as problematic during extreme events. Availability and redundancy of existing back-up power and generator capacity were highlighted as insufficient in some locations. The considerations of these impacts lead to discussions on the economic costs of recovery and business interruption. Associated risks to public health and safety included potential for disease outbreaks due to overflowing and standing sewage, surface and ground water contamination, leaching from landfills during high tides, mold outbreaks in flooded basements, mobilized debris in the streets and clogging storm drains, and the potential for release of toxic materials from brownfields and other storage facilities in flood-prone areas. Policy issues regarding building codes and enforcement were raised around existing housing stock and facility siting for current and future redevelopment.



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Concerns about environmental impacts to coastal and inland wetlands were raised including the loss of ecological productivity and storm protection through a conversion to mudflats and open water caused by rising sea level. This extended to parks, open space, and historic landmarks that have experienced flooding and impacts from storm surge. Recreational areas and natural lands (i.e., Stewart B. McKinney National Wildlife Refuge) were identified as being economically important, while contributing to the quality of life and to the overall commercial viability of the City. Urban forest management was also cited as a concern due to the lack of an adequate tree maintenance policy and capacity.

Additional concerns highlighted areas where the expertise of city officials, social services organizations, utility company employees, transit authorities and assorted specialists are required to determine how broader needs can be met. These include traffic pattern management and evacuation routes, more shelter capacity, ongoing educational and training programs, better interface with MetroNorth officials regarding their emergency plans



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and scheduled train station and rail line renovations, more progressive funding programs that cover new climate mitigation and adaptation projects (rather than primarily damage repair), disease prevention, water quality protection, natural resource and ecosystem protection, new zoning regulations and property tax policies, and evolving property insurance programs.



Current Strengths and Assets within Bridgeport

The City of Bridgeport views its recent experiences with increasingly extreme weather patterns and hazard events as ongoing issues to be addressed boldly and with urgency. Actions that the City has already initiated are focused on several key areas of preparedness:

Existing Assets

- New Emergency Operations Center with rigorous protocols, growing number of shared regional resources, and increasing level of training and expertise among staff;
- Recognition by the National Weather Service as the first “StormReady Community” in Connecticut;
- The City of Bridgeport’s Police Department’s special water rescue team and general increase in emergency preparedness; Full-time paid Fire Department.
- Increase in food supply assistance from the state coupled with new initiatives to increase local food production (i.e., urban agriculture);
- On-going dialogue between federal, regional, municipal and neighborhood levels on response and preparedness;
- Compelling commitment for inter-departmental engagement to update problem-solving techniques and continue Bridgeport’s revitalization process including climate preparedness and resilience planning;
- Strong social services network: faith-based community of 75 churches, sheltering facilities, and hospitals;
- Broad network of education resources that can assist with public awareness and outreach: public library network, university, and schools.
- Rich natural resources, recreational areas, and green infrastructure that provide buffering, water storage and protective capacity to the City along with the Bridgeport Harbor’s breakwater and riverine networks;

Current Strengths and Assets within Bridgeport cont...

New Standards in Advance Planning

- A financial allocation of \$50 million has been made to address the all-too-frequent flooding under railroad bridge crossings and viaducts;
- New building code provisions are being developed that would increase building stock resilience to damage from natural hazards, improve public safety, and take sea level rise into account;
- Strategic infrastructure improvements are being phased in along with new “green” technologies in sustainable design that will, when feasible, become part of Bridgeport’s future construction projects.



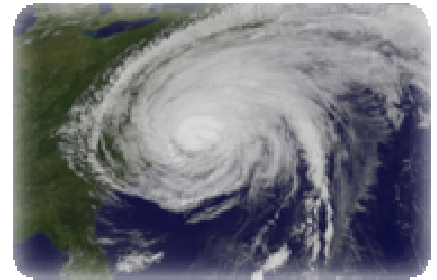
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Top Recommendations to Improve Bridgeport's Resilience to Hazards

The responses from the Workshop's participants regarding recommended actions to reduce exposure to natural hazards fell into several categories; pre-disaster planning and post-disaster response and recovery, development/redevelopment and infrastructure, and overall improvements to the City's climate preparedness and resilience. Pervasive throughout the discussion was the need to proactively manage the risk posed by these hazards as well as the need to comprehensively assess the return on actions within an economic, societal, and ecological context.



NWS

Emergency management before, during and after an event was a central focus for action. This included strengthening existing communication systems to ensure a widespread and rapid alert system via expanded communication networks (i.e., emergency managers, city departments, civic groups, churches, etc...) and methods (i.e., phone tree, twitter, facebook, door-to-door, etc...) to ensure needed evacuations occur well in advance of the event. This will require preparing, improving, and potentially increasing the current capacity of shelters (i.e., beds and staff) as well as warming and cooling centers across the City. It was suggested that increased capacity can come from the community if considered collectively with established facilities (i.e., churches, community centers, etc...). In the event of long-term disruptions, more consideration is needed to address not only short-term but long-term relocation issues amongst severely impacted neighborhoods. One critical issue that emerged is the need for increased education of residents about local emergency response and procedures (such as increased self-sufficiency planning and having portable emergency kits and stockpiled supplies of food and drinking water at-the-ready) along with follow-up surveys after major events to better inform contingency planning for the City and the region. The Barnum Museum was held up as a model for disaster preparedness for organizations and businesses in the community. Education about the array of risks presented by sea level rise and flooding, as well as the social services that are available after an event were singled out as high priorities.

Clean-up responses after events was identified as a priority; from improving coordination and quarantining impacted streets and neighborhoods to properly securing hazardous areas including high energy flood areas to chemical and fuel storage areas. Increasing opportunities to safely dispose of household hazardous materials was

identified as a proactive approach to reducing the dispersement of toxic substances from flooded homes and facilities. Anti-littering campaigns along with additional garbage collection and street sweeping were also suggested in order to reduce clogging of storm drains during rain and flooding events.

Actions associated with increasing the overall resilience of existing and future development and infrastructure was addressed across the teams. One of the largest projects is remedying the City's combined sewage overflow issue. Aside from the ongoing reengineering to effect a separation of storm water from sewage, response items focused on onsite retention and infiltration of surface runoff (i.e., detention ponds, rain gardens, rain barrels, bio-swales; disconnecting roof leaders) via stronger regulations and enforcement. It was suggested that improvements to older housing stock – in particular, disconnecting roof leaders/downspouts from the storm water system – could be incorporated as a contingency of resale. The incorporation of green infrastructure was seen as a positive adaptation approach that can reduce surface runoff to the storm water system while enhancing the aesthetics of Bridgeport. In some cases it was suggested that green infrastructure could also increase pedestrian and local areas of short-term refuge. Along and within flood-prone areas, the groups suggested planting native vegetation to maintain a buffer and increase the flood storage capacity. Land use policies that increase setbacks and explore incentives to reduce the placement of structures in vulnerable areas were recommended, particularly in identified redevelopment areas and



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transportation routes across the City. Where additional coastal armoring is deemed necessary due to sea level rise and storm surge, it was suggested that natural or softer engineering approaches be considered first including vegetated slopes, wetland creation and restoration along with the inclusion of other green infrastructure technics to limit surface runoff. Open space protection on undeveloped parcels, particularly waterfront property across the City, to afford the advancement of

tidal marsh and floodplains was clearly identified as a viable adaptation action. Redevelopment in general was viewed as a key long-term opportunity to adapt the City to flooding. It was suggested by the participants that this will require building to a higher standard — well above FEMA's 100-year flood zones (perhaps to the 500-year standard). Finally, emphasis was placed on improving urban landscapes through additional tree planting in suitable areas and trimming within a 50' corridor along power lines.

Several additional actions were suggested, such as increasing the use of underground utilities, upgrading the energy grid to manage excess and temporal fluxes, incentives for low-tech flood-proofing measures (i.e., furnace on 2nd floor), proactive approaches by property owners to reduce flood risk, the need to factor climate change impacts into critical infrastructure plans (i.e., bridges, bus route realignment), improve community amenities in and facilitate movement to neighborhoods away from the coastal zone (bike trails, parks, transportation access), and carefully assess and prioritize the highest risk locations across the City of Bridgeport.



CT Post

Workshop's Top Recommendations for Bridgeport

#1 Pre-disaster Planning & Post-disaster Response and Recovery

- Strengthening existing communication systems to ensure a widespread and rapid alert system via expanded communication networks.
- Develop and install color code evacuation routes (i.e., signs and website) that is accepted and followed by citizens of Bridgeport and the surrounding municipalities and are linked to well-marked sheltering facilities.
- Increases education and communications on response procedures amongst high density, public housing areas across City; especially in coastal areas.
- Assess/augment local areas of refuge network across the City and ensure residents are awareness of use and procedures during emergencies.
- Reassess and improve as needed coordinated post-disaster clean-up and contamination remediation efforts.
- Conduct a study to assess and prioritize the highest risk locations across the City.
- Consider enrollment of the City in FEMA's Community Rating System program.

Workshop's Top Recommendations for Bridgeport

#2 Development and Infrastructure

- Improve ability of drinking water supply reservoirs to accommodate high-intensity, short-duration rain events.
- Reassess the capacity of existing flood control structures across City; in particular Ox Brook, Rooster River, North Bridgeport.
- Expand the separation of sewer and surface runoff across more of the City's water/sewer infrastructure (i.e., CSO separation).
- Initiated longer-term opportunity to adapt the City to flooding through new building citing to elevations well above FEMA's 100 year flood zones (i.e., 500 year standard).
- Identify and integrate building code, land use policies and zoning regulation modification that minimize exposure of existing and future development and critical infrastructure and facilities.
- Consider expanding Energy Improvement Districts with policies and codes that promote efficiency and hardening of infrastructure.

#3 Overall Improvements in Climate Preparedness and Resilience

- Reassess current capacity and needs of sheltering, cooling and medical network across City as well as adjoining municipalities in the Greater Bridgeport Region.
- Continue to increase the effectiveness of the current emergency communication system and infrastructure with residents (i.e., communication trees) and commuters. Reassess effectiveness and shortfalls of emergency systems and infrastructure after major events.
- Increase community awareness and preparedness through education and outreach, via the religious communities, public libraries, the college and the university.
- Protect and restore natural systems on the watershed and full coastline scales; re-plant Remington Woods Riparian Zone, Pleasure Beach, inland wetlands, tidal wetlands (East End, Stratford Great Meadows, Harbor areas, Ash Creek).



Workshop's Top Recommendations for Bridgeport

#3 Overall Improvements in Climate Preparedness and Resilience

- Identify and seek further conservation through acquisition of marsh “Advancement Zones” as well as riparian corridor restoration projects throughout the City.
- Initiate strategically placed green infrastructure and building modification projects to improve on-site stormwater runoff retention and infiltration.
- Expand opportunities to collect household hazardous materials to proactively reduce the dispersment of toxic substances from flooded homes and facilities.
- Factor climate change impacts into all critical infrastructure improvement plans (i.e., bridges, bus route realignment).

Recommended Report Citation

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Workshop Participants: City Departments, Organizations and Other Entities

Aquarion Water Company	Congressman Jim Himes's FEMA staff
Barnum Museum	CT chapter, American Society of Landscape Architects
Beardsley Zoo	CT Dept. of Energy & Environmental Protection/Forestry
BGreen 2020 committee members	CT Dept. of Energy & Environmental Protection/Watersheds
Bridgeport City Council	CT Sierra Club
Bridgeport Emergency Mgmt & Homeland Security	EarthRise Design
Bridgeport Environmental Health Dept.	Fairfield County Community Foundation
Bridgeport Finance Dept.	GHD environmental consultants
Bridgeport Fire Dept.	Housing Authority of Bridgeport
Bridgeport Health & Social Services Dept.	Public Service Electric & Gas
Bridgeport Land Use, Construction & Review Dept.	Save the Sound/CT Fund for the Environment
Bridgeport Neighborhood Revitalization Zone Coord.	Sikorsky Aircraft
Bridgeport Office of Planning & Economic Development	SKEO environmental stewardship
Bridgeport Police Dept.	Stantec
Bridgeport Port Authority	Steelpointe Development/Bridgeport Landing
Bridgeport Public Facilities Dept.	Tradition Energy
Bridgeport Public Library	Trust for Public Land
Bridgeport Small & Minority Business Resource Office	U.S. Fish & Wildlife Service
Bridgeport Water Pollution Control Authority	United Illuminating
Bridgeport Zoning Dept.	University of Bridgeport
CBRE commercial real estate	Vita Nuova
	Wayne Clarke Landscape Architects

Note: Additional groups were represented during portions of the workshops and at the June briefing; those listed above participated in one or both full workshop sessions.

Workshops Project Team: Organization and Principal Contact

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