Report on Coastal Hazard Resiliency Capacity in the Northeast US Region

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Introduction

The goal of this regional capacity assessment for hazard resilience in the Northeast US is to:

1. Select a simple, rapid and meaningful tool to assess resilience regionally
2. Apply the tool to the Northeast US region by focusing on the interdependencies across the states as opposed to individual states or municipalities.

There are various resilience assessment methodologies, elements, characteristics and indicators that are available. At this time there is no one commonly agreed upon definition or indicators for coastal hazards resilience that is being used by NOAA. Though there are a few core characteristics and indicators that seem to be common in most of the documents. This assessment will take two assessment tools and qualitatively apply them to the Northeast region. This assessment is not meant to be quantitative or a definitive rating for the region. Its value is meant to be an initial effort to find a functional tool that can assist the coastal management community to identify their strengths and weaknesses for further exploration and action.

Two assessment tools have been selected based on their coverage of the most often cited characteristics and indicators of coastal hazards resilience and NOAA's support of their development. This report is focused on assessing the usefulness of these community-based tools for application and analysis at a regional scale. Our scores and results **should not be used** as a definitive conclusion at this time, however do reflect the trends as well as illustrate how these tools would need to be adapted for the regional scale. NOAA would need to follow-up with practitioners across the region to get a more informative and meaningful analysis.

Coastal Community Resilience Guide Assessment

A collaborative group of international experts, including URI's Coastal Resources Center and NOAA's Pacific Services Center, recently published a detailed methodology for conducting coastal hazard resiliency assessments for communities. The Coastal Community Resilience (CCR) methodology was developed for and tested in the Indian Ocean coastal communities impacted by the 2005 Tsunami; however the Guide builds upon international experience, including knowledge, tools and lessons learned from the US.

The CCR Guide, *How Resilient is Your Coastal Community? A Guide for Evaluating Coastal Community Resilience to Tsunamis and Other Coastal Hazards.* (US-IOTWS, 2007), provides a framework to integrate the goals of community development, coastal management, and disaster management. The eight elements of resilience that are considered essential for CCR are seen in the figure below, and listed in Table 1 with their desired outcomes. The CCR assessment tool is intended to serve as a rapid assessment approach to identify strengths, weaknesses, and opportunities to enhance resilience at local and national levels. It can be used in a systematic manner to assess a CCR program in a region or for a particular development program. Details of the CCR Guide and supporting materials are available in the full document, which is available on CRC's website.

The full assessment recommended by the CCR Guide is quite detailed and requires review of existing materials and interviews with key informants to assess the 32 individual benchmarks that describe the elements. This report only used the eight elements of coastal resilience and their respective desired outcomes to guide our *regional* analysis. This exercise was not completed for individual municipalities or states and did not explicitly utilize the individual benchmarks for the elements that were not assessed in this exercise. As seen in Table 1, this analysis uses the eight elements of resilience as a guide to our qualitative assessment of the Northeast US coastal hazard resilience. As a result of this cursory regional review, the team rated three elements as "good", four as "fair" and one at "low". This can then be used to understand the relative strengths and weaknesses of specific elements within the resilience framework.

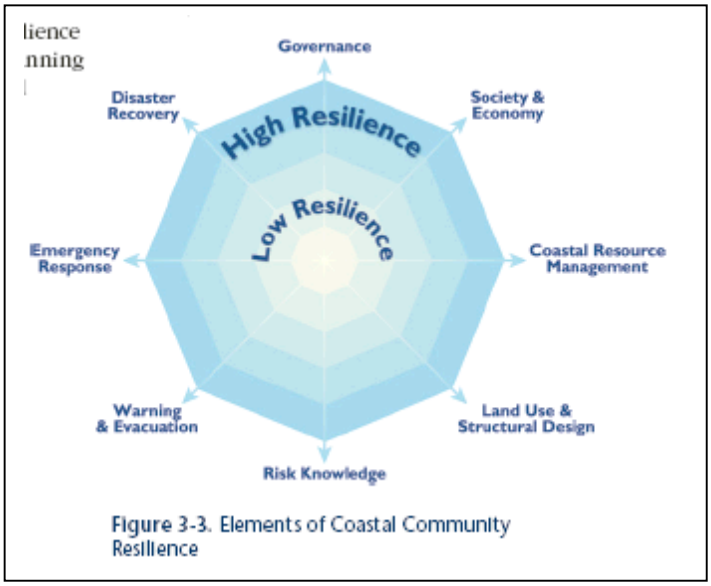

Figure 3-3. Elements of Coastal Community Resilience

The CCR Guide provides a useful tool that is adapted already to address coastal resilience from all scales of governance. However, by being this flexible it requires more knowledge of the assessment team to asking the right questions to key informants. For the purposes of the Northeast, the CCR guide could be adapted into a more quantitative tool by incorporating specific criteria such as found in the Self-Assessment tool introduced below. Some outcome indicators would need to be added to balance the focus on management outputs. While it was not presented in this report, the CCR guide also offers a method to assess the elements from a systems perspective, which is valuable for a regional scale

Table 1. Rapid Assessment of Resiliency Capacity for the Northeast Region

Element of Resilience & Desired Outcome	Comments (strengths and weaknesses)	Draft Capacity Rating (Good, Fair, or Low)
A. **Governance**: Leadership, legal framework, and institutions provide enabling conditions for resilience through community involvement with government.	There is a strong legal framework in each state that is highly decentralized to the municipal level; it is difficult to know if this home-rule system increases effectiveness of programs or not. Public involvement in hazard preparedness is weak due to complacency, insurance and costs of engaging them. Regional agreements are beginning to occur in the CRM community and regional institutions are now being promoted to provide a coordinating and advisory role. There is no regional framework that covers the whole region, however, FEMA, Army Corps of Engineers, EPA, and NOAA have regional offices/ representative that oversees the New England region, with programs decentralized to the state and municipal levels.	Fair
B. **Society and Economy**: Communities are engaged in diverse and environmentally sustainable livelihoods resistant to hazards.	The Northeast is a unique region of the US with strong local government roots and participation in community affairs. Though not so much with hazard mitigation. The economy is well diversified with pockets of communities dependent upon coastal resources health. The small business community that is prevalent throughout the region would be impacted the most by natural disasters. Overall a wealthy region that could fund wise development that was hazard resilient if the political will and incentives were stronger. The NFIP provides a disincentive to building outside of hazard areas. The region is under-insured which is one example of the perception of risk and complacency across the region overall. While some regional business groups exist, such as an informal consortium related to defense industries, the region has many independent business and sectors.	Good
C. **Coastal Resource Management**: Active management of coastal resources sustains environmental services and livelihoods and reduces risks from coastal hazards.	CRM in the region is strong with detailed policies, ecosystem based plans is select locations, and extensive permitting programs. Each state has a different way of implementing their CRM programs, with varied degree of hazards policies and land use linkages. Multiple restoration programs improve the health of estuaries. Coastal managers in the region are actively linking across the states informally to share lessons and political voice. Much of the coastal policy and permitting initiatives are implemented at the local level, so it is difficult to rank their effectiveness when scaling up to a regional level.	Good

Element of Resilience & Desired Outcome	Comments (strengths and weaknesses)	Draft Capacity Rating (Good, Fair, or Low)
D. **Land Use and Structural Design**: Effective land use and structural design that complement environmental, economic, and community goals and reduce risks from hazards.	The Northeast region has a significant amount of pre-existing structures (prior to the CZM act and NFIP Program) and historic buildings located in high hazard zones. All of the states use the International Building Code for new or substantially improved development. Flood maps are extremely outdated so municipalities are challenged to uphold risky development proposals within and adjacent to high hazard zones. The Northeast region has numerous municipal hazard mitigation plans. It is not clear whether this decentralized and small scale system increases resilience or not. Perhaps regional plans would. Structural mitigation is often co-funded by the US Army Corps of Engineers, which is implemented at a site-by-site basis.	Fair
E. **Risk Knowledge**: Leadership and community members are aware of hazards and risk information is utilized when making decisions.	The public seems unaware of the level of risk to coastal hazards or they are aware but complacent due to the infrequency of high impact events. Many residents seem unaware of their property being in the flood zone or that flood insurance is a separate policy. Technologically, the region has lots of expertise for assessing risks, though due to funding limits, maps are outdated and lack 1 to 2 foot contours or LIDAR. Outreach programs seem to have minimal impact. It is not clear how the states work together to analyze vulnerabilities across the region. Models and risk assessments are spotty, are not necessarily similar, and are not updated regularly.	Fair
F. **Warning and Evacuation**: Community is capable of receiving notifications and alerts of coastal hazards, warning at-risk populations, and individuals acting on the alert.	The Northeast has a good local and in-state warning and evacuation system. Hazards impacting flooding on interstate waters (rivers) have shown challenges for notifying businesses and the public. Evacuation maps are available for most communities. It is unclear the level of regional evacuation analysis that is available and their implications for vulnerable areas and high volume traffic areas (bridges, highways). Not clear how effective warnings are to the most vulnerable communities and non-English speaking groups, since there are no dry-runs and are (fortunately) not a regular event.	Good
G. **Emergency Response**: Mechanisms and networks are established and maintained to respond quickly to	The coordination between coastal managers and emergency managers is not consistent (eg. Massachusetts includes CZM at the emergency operations center while RI does not). There are also	Fair

Element of Resilience & Desired Outcome	Comments (strengths and weaknesses)	Draft Capacity Rating (Good, Fair, or Low)
coastal disasters and address emergency needs at the community level.	no known agreements between state coastal managers to provide support in advance or how to best coordinate interstate responses to issues such as port closures for energy resources.	
H. **Disaster Redevelopment**: Plans are in place prior to hazard events that accelerate disaster recovery, engage communities in the recovery process, and minimize negative environmental, social, and economic impacts.	While the Emergency Operations Plans may include short term recovery, there are no disaster redevelopment plans in the region. Rhode Island has initiated their planning process. Regionally, there should be redevelopment plans for specific regional assets such as ports and oil and natural gas distribution. Not all states have moratorium procedures for post-disaster recovery/rebuilding.	Low

Resiliency Index Self Assessment

This is a draft assessment tool that was presented to the Gulf of Mexico Alliance Resilience Working Group (Emmer and Swann, 2007) for application to communities in the Southeast US. Although the tool was designed for community level, it is used here, with only slight modification, as a test to reflect a regional assessment. The tool was left mostly the same, though our responses are based on a regional scale assessment. We found that this tool was not adequate for assessing regional systems and was mostly focused on the NFIP elements, which is typically implemented at the municipal level. Regardless, major issues that arise from doing this assessment show that the Northeast region is vulnerable to impacts. Specifically, regional impacts would be felt from impacts to ports and disruptions to the oil and gas supplies. The electricity system seems to have enough back up systems to avoid large system wide failures though power lines at the neighborhood level could take weeks to repair.

1. Are these critical facilities located in high risk areas and will they function:	
Critical Facilities	**Response**
Sewerage Treatment System	Most wastewater treatment facilities are located along coastal areas and have been there for a long time. Vulnerable to sea level rise. Impacts would be localized since most systems are municipality based. Could cause water pollution across a wider regional area. Additionally, there are still many neighborhoods that are on individual septic systems vulnerable to erosion as well as salt water intrusion from sea level rise.
Power grid	The power system is regional. It is uncertain the location of major facilities. The main transmission lines and system have multiple backups so it is fairly secure. The weak points are the lines in neighborhoods and to houses, often vulnerable to wind and tree damage.
Water supply system	In most states these systems serve single municipalities. Though in Massachusetts they are operated at a regional level. Many coastal communities are on private or municipal wells, which may be at risk to salt water intrusion from sea level rise.
Transportation/evacuation routes	The major interstate runs close to the coast in several areas. The main railroad system also has sections in the vulnerable high risk areas.
City Hall	Most of these facilities are located outside of the high risk areas. They are also very localized so that their impacts regionally are negligible. State and municipal Emergency Operations Plans have these all mapped and linked to emergency response networks.
Police Station	
Fire Station(s)	
Communications	
Emergency Operation Center	
Evacuation Shelters	
Hospitals	

2. Will your transportation/evacuation route(s) be blocked by the following and take more than a week to regain a pre-storm level of service **a.** Bridge(s) out	It is challenging to answer this question on a regional level. Due to the heavy traffic loads on the main interstate highways it would likely cause regional impacts after a storm. It is also anticipated that downed trees will be a major issue locally. On a regional scale the major impacts would be damages to the ports that transfer oil and natural gas to the region. The Northeast region only has a three day supply available of these fuels and there are no contingency plans should there be a disruption.

3. Does your community:	**Response:**
participate in the Community Rating System?	Participation in this program is very low. Only a small percentage of eligible coastal communities participate and those that do have a low score which doesn't reduce insurance rates as much as it could.
use an early warning system?	Yes, warning systems are available to the mass public.
have a Certified Floodplain Manager?	Yes, all states have a certified floodplain manager. Most towns do not have a floodplain manager.
have a professional planning staff with AICP credentials	Yes, most communities in the Northeast hire professional planners.
have an approved Hazard Mitigation Plan?	Yes, most municipalities now have a plan due to FEMA requirements.
have Memorandum of Understanding (MOU) or Memorandum of Agreement (MOA) with neighboring communities to help each other during times of disaster?	The emergency managers have these MOUs in place. Coastal managers don't have any agreements across states or do building officials.
have a comprehensive/strategic plan that includes a "Natural Hazard" section?	This varies by state and community.
Floodplain Manager or Planner participate in professional organizations?	Most towns in the Northeast hire professional planners and floodplain managers that are part of the Association of State Floodplain Managers and American Planning Association.

4. Has your community implemented mitigation measures?	
Elevation of residential, nonresidential, or infrastructure to local National Flood Insurance Program standards	Yes, all new buildings meet NFIP standards. Some towns raise the base flood elevation by a foot for added protection. Though it is not very common.
Relocation of buildings and infrastructure	Not very often.
Flood proofing non-residential structures	Yes, to meet NFIP standards
Education programs	Yes, states have some education programs but are

	under funded, and their effectiveness is inconsistent.
Acquisition of repetitive loss structures or infrastructure	Due to the high real estate values in the region this option is not used very often.
Incentives-based mitigation measures	Not common
Has your community adopted the International Building Codes?	All states have adopted the International Building Code.

5. FOR SMALLER COMMUNITIES ONLY. Is there a social system that defines the community or serves as the core of the community?

a. Religious unity Y or N
b. Cultural identity Y or N
c. Business cooperative or working relations Y or N
d. Family structure and values Y or N

This last question is not really applicable to the regional analysis. However, there are many small coastal communities with the quintessential New England village, fishing villages, summer-cottage compounds. As a region, New Englanders are said to be independent and as a whole, have relatively similar political perspectives.

Conclusions

This report tested two resiliency assessment tools for the Northeast region. This tabletop exercise has shown that there is value in conducting a regional assessment. It is recommended that a thorough analysis be conducted with multiple stakeholders to get a more accurate assessment of the region's ability to mitigate impacts from a regional event.

When conducting a regional assessment, the following suggestions should be considered:

- Resiliency needs to be assessed at multiple levels such as local/county, state and regional.
- Multiple tools might be needed to fit the different scales of assessment. For instance the LSU Self Assessment Tool used in this report is best suited for municipalities. While the CCR guide in this report can be adapted for larger scales.
- A cross-section of practitioners and experts needs to be engaged in the assessment to integrate the concerns, issues and knowledge in the coastal management, economic development and hazards management fields.
- There are important connections of dependencies between the scales that must be made clear in the analysis. This will highlight specific areas where regional attention should be given for improving services and plans.
- At the regional level, a systems analysis would be useful for understanding the linkages and impacts across the region when certain infrastructure or services are disrupted. Prime examples would be port facilities, oil and natural gas and transportation systems.

References

U.S. Indian Ocean Tsunami Warning System Program. 2007. "How Resilient is Your Coastal Community? A Guide for Evaluating Coastal Community Resilience to Tsunamis and Other Coastal Hazards." U.S. Indian Ocean Tsunami Warning System Program supported by the United States Agency for International Development and partners, Bangkok, Thailand. 144 p. Available on-line at http://www.crc.uri.edu/download/CCRGuide_lowres.pdf

Emmer, Rod and L. Swann. 2007. "Resiliency Index Community Self Assessment." Presentation to the Gulf of Mexico Alliance Resilience Working Group, September 18, 2007