



Eastern Connecticut Risk & Vulnerability Assessment Workshop

January 11, 2012

**Waterford Town Hall - Auditorium
15 Rope Ferry Road
Waterford, Connecticut**

www.coastalresilience.org

Visualizing coastal impacts, planning wisely for the future and making smart choices today.

WORKSHOP REPORT

Purpose of Workshop:

The purpose of the workshop was to provide a forum to conduct a rapid risk and vulnerability assessment of coastal hazards in the Towns of Stonington, Waterford, East Lyme, and Old Lyme using NOAA Coastal Services Center's "Roadmap for Adapting to Coastal Risk" (NOAA CSC's Roadmap) and the Coastal Resilience Tool and Risk Matrix. This workshop was designed to provide the participants an opportunity to work together as a team from each Town and foster dialogue on risks and vulnerability across and amongst towns and regional planning organizations (RPOs) along eastern coast of Connecticut.

Purpose of this Report:

The purpose of this report is to capture and present the risk assessment process and responses by the four participating Towns and two regional planning organizations – Stonington, Waterford, East Lyme, Old Lyme, Connecticut River Estuary Regional Planning Agency and Southeastern Connecticut Council of Governments.

This report is divided into three sections:

- **Workshop Objectives and Outputs**
- **Individual Town's Rapid Risk and Vulnerability Assessment**
- **Commonalities in Risk and Vulnerabilities Across Towns**

A list of participating entities is provided at the end of this report.

Preferred Reference:

The Nature Conservancy. 2012. Eastern Connecticut Risk and Vulnerability Assessment Workshop Report. Waterford, Connecticut.

Workshop Objectives and Outputs:

The workshop objectives for the participating Towns and RPOs included:

- Define community goals and highlight priority issues for consideration throughout the assessment.
- Address hazards and climate change vulnerabilities through a comprehensive, yet rapid, assessment of local vulnerabilities.
Output: *Risk Assessment that includes Hazards and Societal, Infrastructure and Ecosystem vulnerabilities.*
- Identify commonalities and opportunities for coastal risk reduction
Output: *Summary of regional action that includes milestones and champions.*
- Post workshop the community teams to further consider and integrate results from risk matrix into existing or upcoming efforts.
Output: *Natural Hazard Mitigation Plan & Plan of Conservation and Development*

Pre-workshop Survey Results: Community Characterization and Hazard Profile

In preparation for this workshop, a survey designed to capture a community characterization and to develop an initial hazard profile per the NOAA CSC's Roadmap process was sent to each of the four towns. A summary of this information was provided at the workshop.

Individual Town's Rapid Risk and Vulnerability Assessment:

Risk and Vulnerability Process and Risk Matrix

The centerpiece of the workshop were several breakout session with separate work stations for each Town. At the onset of the breakout sessions each Town was asked to develop community goals that consider and reflect their risk from hazards. This exercise was followed by a focused rapid assessment of vulnerabilities and assets of each community for various hazards and sectors including infrastructure, societal, and ecological. This exercise was captured using a uniquely designed risk matrix (Lighthouse Consulting and The Nature Conservancy) for this workshop. Once a list or profile for each sector by hazard had been developed by the individual town teams, an initial designation of priority (High, Medium, Low) and urgency timeline (Short or Long-term, ongoing) by individual vulnerability was assigned. It is critically important to note that the dialogue included not only current vulnerabilities for each town but, current assets (e.g., communications, coordination, etc...) that are already in place and working.

The following is a summary of the community goals and risk matrix results by town. These results reflect the dialogue and input of those participants assembled during the workshop and is not meant to be prescriptive; rather these results are meant to enable further discussions in each community on risk, hazards and priority responses to reduce overall risk in these Towns with their respective Regional Planning Organizations.

Old Lyme

Community Goals that Consider/Reflect Risk from Hazards:

- Avoid and minimize risk by educating, enforcing and tracking FEMA floodplain requirements.
- Maintain existing town infrastructure at necessary levels to sustain current needs and uses.
- Maintain status quo to protect natural resources, preserve existing town character and maintain current levels of development.
- Efficient and quick recovery from storm events.
- Get FEMA to be more proactive in mitigation (e.g., buy-outs, stronger regulations).
- Avoid installation of infrastructure in vulnerable areas.
- Establish capacity for buy-outs and no rebuilds or undevelopment.

Top Hazards and Vulnerabilities (see risk matrix for actions):

Hazards: Flooding (Tidal Surge), Inland Flooding, CAT-3 Hurricane (wind, tidal surge, flooding), Flooding to the 100 and 500 yr FEMA lines.

Top Vulnerabilities

Infrastructure

- RT. 156 Shore Road inundation and wash out
- Altered natural stormwater drainage
- Above Ground Utilities

Societal

- Housing within FEMA +1 foot contour
- Impact on Tax Base of scenarios
- Conversion of seasonal to year-round residences
- Lack of common goals for the community

Ecosystem

- Loss/Conversion of Tidal Marsh and Floodplain southward of RT 156 and Black Hall River

Old Lyme, Connecticut (01/11/2012) Eastern Connecticut Risk Assessment Workshop

Vulnerabilities by hazards

Compare vulnerabilities by hazards, indicate
H-M-L priority for action over short or long term.
V = Vulnerability
A = Asset

Risk Martix developed by Lighthouse Consulting & The Nature Conservancy (01/2012)

Hazards (flooding, wind, etc)

Complete vulnerabilities/ assets by hazard type, indicate H-M-L priority for action over short or long term. V = Vulnerability A = Asset			Flooding (Tidal Surge)	Inland Flooding	Cat-3 (wind, tidal surge and flooding)	100 & 500 YR FEMA Lines	Priority for Action H-M-L	Time S/L term
Infrastructure vulnerabilities/assets								
V	Above Ground Utilities		Protect by hardening existing utility infrastructure				M	S & L
V	RT. 156 Shore Road inundation and wash out		Determine if Do Not Rebuild (DNR)				H (1)	S
V	Altered natural stormwater drainage		Protect and restore natural floodplain drainage and absorption/DNR				H (2)	S
A	Railroad line acts as dyke							
A	Mile Creek Road		Determine if Mile Creek can be used as alternate if RT 156 lost				L	L
Societal vulnerabilities/assets								
V	Housing within FEMA +1 foot contour		Determine residential DNR				H	S
V	Impact on Tax Base of scenarios		Assess impacts of reduction in tax base due to various realignmet scenarios				H	S
V	Conversion of seasonal to year-round residences		Begin planning for increased need for evacuation, shelters, wellness care and associated infrastructure				H	L
V	Lack of common goals for the community							
A	Past and present emphasis on Open Space paradigm							
A	Low assisted exacuation needs amongst the current community		Begin saving \$ for future increase in evacuation needs				H	S/L
Ecosystem vulnerabilities/assets								
V/A	Loss/Conversion of Tidal Marsh and Floodplain southward of RT 156 and Black Hall River		Continue Open Space Paradigm				H	S/L
V/A	Loss/conversion of Tidal Marsh and Floodplain southward of RT 156 and Black Hall River		Use FEMA authority to ID areas of high risk for people and high value for natural resources; Build recognition of ecosystem services and risk reduction into POCD;				H	S/L
A	Lack of marine or river shoreline armoring							

Waterford

Community Goals that Consider and Reflect Risk from Hazards:

- Ensure access and evacuation from all areas of town under any hazard scenario.
- Determine the adequacy of infrastructure to existing and future hazards.
- Maintain and improve where necessary all coordination and communications between municipal, state, and private entities.
- Increase consideration of water dependent uses across the town.

Top Hazards and Vulnerabilities (see risk matrix for priority actions):

Hazards: Coastal Flooding, Riverine Flooding, High Winds, Frozen Precipitation

Top Vulnerabilities

Infrastructure

- Millstone Power Plant, Power Transmission
- 28 Waste Water Treatment Pump Stations/Collection Stations
- Bridges and Roads
- New London Waste Water Treatment Plant; Lake Konomoc - Water Treatment Plant
- Isolation Points (156/213, Gardners Wood; Niles Hill Rd; Ridgewood; Bloomingdale Rd; Hunts Brook)
- Railroads - Amtrak & Canadian RR

Societal

- Vulnerable Populations
- Recreational Facilities (BB Fields; Beaches, etc...)
- Critical Social Facilities (Camp Harkness; Cultural Historic Districts; Private Schools)

Ecosystem

- Railroad - Transportation (Cranberry Pond Culvert)
- Jordan Cove Area (undersized drainage); Goshen & Alewife Cove (ecosystem conversion)
- Channel Erosion
- Open Space (Maintain and Obtain)
- Miller Pond (need flood storage, water source, base flow for Stoney Brook)

Eastern Connecticut Risk & Vulnerability Assessment Workshop – January 11, 2012

Waterford, Connecticut (01/11/2012) Eastern Connecticut Risk Assessment Workshop

Vulnerabilities by hazards

Compare vulnerabilities by hazards, indicate
H-M-L priority for action over short or long term.
V = Vulnerability
A = Asset

Risk Matrix developed by Lighthouse Consulting & The Nature Conservancy (01/2012)

Hazards (flooding, wind, etc.)

H-M-L priority for action over short or long term. V = Vulnerability A = Asset			Coastal Flooding		Riverine Flooding	High Winds	Frozen Precipitation	Priority H-M-L	Time S/L term
Infrastructure vulnerabilities/assets			Location	Ownership					
V	Millstone Power Plant	Rt 156	Dominion Power	Cord. & Comm. w/ Dominion/FEMA/DOHS	Same	Same	Same	M	Ongoing
V	Power Transmission	Town Wide	CL&P	Cord. & Comm. w/ CL&P/Dominion	Same	Same	Same	L	Ongoing
V	28 WWT Pump Stations/Collection Stations	Town Wide	Town	Assess/Locate vulnerable Man Holes that need to be made watertight to 200yr flood		Improve accessibility	Same	H	S
V	Bridges and Roads	Town Wide	Town	Cord with DOT on vulnerable state owned infrastructure: Rt 156 and 213 intersection				HHHH	L (10-20 yrs)
V	New London WWT Plant		City of New London	Assess impacts of flooding				M	Ongoing
V	Lake Konomoc - Water Treatment Plant		Town		Maintain and evaluate Drainage			M	Ongoing
V	Isolation Points (156/213, Gardners Wood; Niles Hill Rd; Ridgewood; Bloomingdale Rd; Hunts Brook)	All risk locations	Town	Detailed flood studies (FEMA; 3rd party; ACDE); Community Rating System participation; Mapping				H	S (5 Yrs)
V	Railroads - Amtrak & Canadian RR	Across Town		Coastal eval. Of culverts/drainage; Eliminate at-grade crossings		Tree cutting along lines		M	L
A	Fire House Team Approach (decentralized)	Town Wide	Town						
A	New Generator in School								
Societal vulnerabilities/assets									
V	Vulnerable Populations	Town Wide	Town	Cord. w/ other Town agencies (community services)				M	Ongoing
V	Recreational Facilities (BB Fields; Beaches, etc...)	Town Wide	Town	Emergency Comm. & Cord. at facilities				M	S
V	Critical Social Facilities (Camp Harkness; Cultural Historic Districts; Private Schools)	Town Wide	State/Town/Private	Cord. w/ owners: make sure plans are in place; Harrison's Landing, Jordan, Graniteville, Quaker Hill, Baptist Church School, WTFD Country School				L	S
A	Shared Regional Cooperation (Evac. Facilities)	Regional	NL, EL, Town						
A	Commodities/Goods Distribution Points	Mun. Complex	Town Depts.						
A	Special Needs Coord. (group homes, care fac.)	Localized	Private						
A	Emergency Comm. System - Interoperability	Town Wide	Town						
Ecosystem vulnerabilities/assets									
V	Railroad - Transportation (Cranberry Pond Culvert)	Millstone Pt.	Various	Eval. & modify culvert for tidal flushing				M	L
V	Jordan Cove Area (undersized drainage)	Jordan	Various	Cord. w/ Dominion/FEMA/DOHS					
V	Goshen & Alewife Cove (ecosystem conversion)		Various	Acquire Develop. Rights; dune restoration;				H	S
V	Channel Erosion	Various	Various	Acquire Develop. Rights; Education Prog				H	S
V	Open Space (Maintain and Obtain)	Various	Town/State	Acquisition (marsh migration)				H	Ongoing
V/A	Miller Pond (need flood storage, water source, base flow for Stoney Brook)	Miller Pond	?		Assess Flood storage; Cord.				
A	Barrier Beaches & Dune System	Harkness to Alewife	Town/State/Private						

Stonington

Community Goals that Consider and Reflect Risk from Hazards:

- Improve public access and safety during hazard events.

Top Hazards and Vulnerabilities (see risk matrix for priority actions):

Hazards: Flood, Winds, Storm Surge, Sea Level Rise

Top Vulnerabilities

Infrastructure

- Sewage Treatment Facilities
- Laneway Dam
- Sylvia's Pond Dam
- Emergency Access Points
- Flooding of Fire Stations
- Impacts to Septic Systems

Societal

- Apple Rehab Center, Stonington Combo, Palmer House
- Mystic Seaport; Historic Houses in Mystic
- Historic Center of Borough
- Critical Facilities: CVS Pharmacy, Mystic; Big Y Pharmacy and Food
- Commercial Fishing Fleet (Town Dock)
- Existing and future Rehab Centers

Ecosystem

- Coastal Wetlands town-wide

Eastern Connecticut Risk & Vulnerability Assessment Workshop – January 11, 2012

Stonington, Connecticut (01/11/2012) Eastern Connecticut Risk Assessment Workshop

Vulnerabilities by hazards

Compare vulnerabilities by hazards, indicate
H-M-L priority for action over short or long term.
V = Vulnerability
A = Asset

Risk Matrix developed by Lighthouse Consulting & The Nature Conservancy (01/2012)

Hazards (flooding, wind, etc)

			Flood	Wind	Storm Surge	Sea Level Rise	Priority for Action	Time
							H-M-L	S/L term
Infrastructure vulnerabilities/assets								
V	Sewage Treatment Facilities	Various Town	None	None	Link Plants and improve protective measures		H	L
V	Laneway Dam	Stonington Private	Remove Dam	None	None	None	H	S
V	Sylvia's Pond Dam	Stonington Private	Repair and Upgrade	None	None	None	H	S
V	Emergency Access Points	Various Public	Enlarge, Armor, Raise - other work arounds	None	Same as Flood	Same as Flood	H	L
V	Flooding of Fire Stations	Various Public	Relocate	None	Same as Flood	Same as Flood	M	L
V	Impacts to Septic Systems	Various Private	Investigate municipal + alt. systems	None	Same as Flood	Same as Flood	H	L
Societal vulnerabilities/assets								
V	Apple Rehab Center	Mystic Private	Evacuation Plan	Structure Eval - overhanging limbs	Same as Flood	Same as Flood	L	S
V	Stonington Combo	Stonington Public	Relocate	Structure Eval	Relocate	Relocate	L	L
V	Palmer House	Stonington Private NGO	None	Structure Eval	None	Access	L	L
V	Mystic Seaport	Stonington Private NGO	Seawall/Floodproof	Verify Plan of Action	Seawall	Seawall	M	L
V	Historic Center of Borough	Stonington Private	Evacuation Plan	Limbs	Evacuation Plan	Enhance seawalls	M	L
V	Historic Houses in Mystic	Mystic Private	Evacuation Plan	Limbs	Evacuation Plan	Enhance seawalls	M	L
V	CVS Pharmacy, Mystic	Mystic Private	Verify Emergency Plan	Same	Same	Same	M	S
V	Big Y Pharmacy and Food	Stonington Private	Verify Emergency Plan	Same	Same	Same	M	S
V	Commercial Fishing Fleet (Town Dock)	Stonington Public	Pier Extension	None	Same as Flood	None	H	S
V	Existing and future Rehab Centers	Stonington Private	Relocate/encourage development elsewhere	None	Same as Flood	Same as Flood	L	S
Ecosystem vulnerabilities/assets								
V	Coastal Wetlands town-wide	Stonington Various	Debris removal	None	Same as Flood	Provide for upland buffering and expansion	H	S

East Lyme

Community Goals that Consider and Reflect Risk from Hazards:

- Direct future growth so that no one aspect of the town overwhelms the other by balancing economic stability and the preservation of natural, recreational, and cultural resources.

Top Hazards and Vulnerabilities (see risk matrix for priority actions):

Hazards: Coastal Flood – Sea Level Rise, Inland Flooding, Ice/Wind Storms, Drought

Top Vulnerabilities

Infrastructure

- Electric System (Utilities)
- Public Water and Sewer
- Emergency Response and Hospitals
- Roads
- Dams
- Hazardous Materials
- Railroads
- Senior Housing
- National Guard/Prisons/Municipal Facilities (Police and Fire)

Societal

- Senior Housing/Populations
- Low Income Populations
- Boating/Industry
- Public/Local Communications (RVS 911)
- Parks & Recreation
- Businesses/Villages (Niantic, Flanders)

Ecosystem

- Salt Marsh (Rocky Neck, Watts, Niantic River/Bay)
- Rivers/Streams/Lakes/Ponds
- Beaches

Eastern Connecticut Risk & Vulnerability Assessment Workshop – January 11, 2012

East Lyme, Connecticut (01/11/2012) Eastern Connecticut Risk Assessment Workshop

Vulnerabilities by hazards

Compare vulnerabilities by hazards, indicate
H-M-L priority for action over short or long term.
V = Vulnerability
A = Asset

Risk Matrix developed by Lighthouse Consulting & The Nature Conservancy (01/2012)

Hazards (flooding, wind, etc)

H-M-L priority for action over short or long term. V = Vulnerability A = Asset			Coastal Flood - Sea Level Rise	Inland Flooding	Ice/Wind Storms	Drought	Priority for Action H-M-L	Time S/L term	
	Location	Ownership							
Infrastructure vulnerabilities/assets									
V	Electric System (Utilities)	Townwide	CL&P	ID vulnerable parts of system with CL&P	Same	Same	None	H	S/L
V	Public Water and Sewer	Townwide	Town	ID parts of system maintaining aux power from outside	Same	Same	Supply - H2O; Coord. with DEEP/region	H	S/L
V/A	Emergency Response/(Hosp)		Town/Shared	PD - relo; FD - relo	Same	Same	n/a	H	S/L
V	Roads		Town/State	ID Roads - elevate/imp./relocat	Same	Same	n/a	M	S/L
V	Dams		Town/State/Pri	ID Risks	ID - Reg. D.S. Flood/AWR	n/a	n/a	M	S/L
V	Haz. Materials		State/?	ID Risks	n/a	n/a	n/a	L	S/L
V/A	Railroads		Amtrak	ID Risk: wrk with Amtrak/CT DOT	n/a	ID Risk	n/a	M	L
V	Senior Housing		Private	ID	n/a	n/a	n/a	H	S
V/A	Nat. Guard/Prisons/Municipal Fac. (PD and FDs)		State/Town	ID Comm w/EMS	Same	Same	Cord. DEEP NL H2O	H	S/L
Societal vulnerabilities/assets									
V	Senior Housing/Population			ID Risk - Notification EVAC RT	Same	Same	H2O/HGAT; Cord. MED RESP EMS	H	S
V	Low Income populations			ID Risk - Notification EVAC RT	Same	Same	H2O/HGAT; Cord. MED RESP EMS	M	S/L
V	Boating/Ind.			Cord at risk loc.	Same	Same	n/a	M	S/L
V/A	Public/Local Communications (RVS 911)		Town	ID Defeciencies; cord rep/state/fed	Same	Same	n/a	H	S/L
V/A	Parks & Recreation		Town/State	ID Loss; redesign	Same	Same	n/a	M	S/L
V/A	Emergency Preparedness/Education			Update NHMP; EOP	Same	Same	n/a	H	S/L
V/A	Businesses/Villages (Niantic, Flanders)			ID Risk/Dev. Plan Zoning Change	Same	Same	Same	H	S/L
A	Nation Guard		State					M	L
A	Paid/Volunteer EMS		Town					M	L
Ecosystem vulnerabilities/assets									
V/A	Salt Marsh (Rocky Neck, Watts, Niantic River/Bay)		State/NGO/Town	ID Haz./mitigation Plan; Cord with State; park redesign to allow for migration	n/a	n/a	n/a	H	S/L
V/A	Rivers/Streams/Lakes/Ponds			ID Haz./mitigation Plan; Cord with State; park redesign to allow for migration	n/a	n/a	n/a	H	S/L
V/A	Beaches		Town/CB/OBP/GNH	ID Beaches at high risk from SLR	n/a	n/a	n/a	H	S/L
A	Nehantic SF/Yale Prop/Stone/OSW Hills		State/Town/Pri	n/a	n/a	Maintain Forest management	n/a	L	S/L

Commonalities in Risk and Vulnerabilities across Towns

The final agenda item of the workshop was a report out by each Town from the Risk Matrix followed by a facilitated discussion on shared or similar vulnerabilities across more than one the four participating communities. The following is a summary list of all the commonalities and associated actions raised by the collective group in an open dialogue in the order discussed.

- Regional water systems: Response to drought and excess rain.
 - Requires more involvement by Council of Governments.
- Sewage systems and the shared/dependent nature of the system.
 - East Lyme and Waterford => New London Waste Water Treatment Facility;
 - Restoration of power after events is top priority.
- The importance of Natural Resources within the context of individual municipalities and Long Island Sound.
- The need to integrate language and guidance regarding Sea Level Rise into key documents – Plans of Conservation and Development & Natural Hazard Mitigation Plans.
 - Provides a place for decision makers a point to that will support discussion of impacts and need for change.
- Critical role for Regional Planning Organizations in assisting with consideration of Sea Level Rise and coordination of multi-town adaptation.
 - Council of Governments needs to provide the planning framework and concept suggestion to ensure consistency amongst Towns.
- Need for state and federal ownership and involvement in solution.
 - Federal flood insurance modifications;
 - Expansion of FEMA maps;
 - Access issues on state/federal roads;
 - Flood building standards – increase and force buyouts.
- Post-storm redevelopment/buyouts that minimize future risk.
 - State and Federal incentives to rebuild is very high;

- Look at subsidies for sewers and roads.
- Surface water storage and management.
 - Dams, Culverts, impediments to flow;
 - Need to develop effective water management plans.
- Evacuation and other emergency responses to events.
 - Requires regional coordination – evacuation and shelter.
- Every community has a long list of “at-risk” places now based on past experiences.
- Preparedness education for general public.
 - Extended outages; business and industry continuity and recovery;
 - Communications when power goes out?
- Economic costs and context for adaptation.
 - Increased impact on businesses and economy in post-storm event;
 - Need to become more self-sufficient in depressed economy.
- Connecticut Light and Power – regional players need to be involved.
- Need for education of elected officials.
 - Include hazards language in official documents;
 - Increase conversations between department heads within and between municipalities and Council of Governments.

Participants:

Town of East Lyme

Town of Old Lyme

Town of Stonington & Borough of Stonington

Town of Waterford

Connecticut River Estuary Regional Planning Agency

Southeast Connecticut Council of Governments

Center for Land Use Education & Research

Community and Natural Resource Planning Program, UConn Extension

Contact Information:

Adam Whelchel, Ph.D.
The Nature Conservancy
55 Church Street, Floor 3
New Haven, Connecticut 06510-3029
awhelchel@tnc.org
(203) 568-6296

Nathan Frohling
The Nature Conservancy
nfrohling@tnc.org
(203) 568-6289

Holly Drinkuth
The Nature Conservancy
hdrinkuth@tnc.org
(860) 344-0716

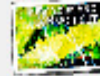
Acknowledgements:

To the Town of Waterford, thank you for providing such an outstanding facility for the Eastern Connecticut Risk and Vulnerability Assessment Workshop. In addition, a special thanks to Mark Amaral (Lighthouse Consulting Group, Inc.) for the outstanding facilitation during the workshop. Finally, thank you to all the participants that fully embraced the spirit of exchange and dialogue on the topic of risk and vulnerability.



Coastal Resilience Quick Start Guide

1. Go to www.coastalresilience.org
2. Click on "Geographies"
3. Click on "New York and Connecticut"
4. Click on "Future Scenario Map"
5. "Agree" to the Disclosure and Use policies



In navigation bar (top of map) click on "Zoom Button" (magnifying glass) to draw rectangle around area of interest.



Go to "Flood Scenarios" dropdown menu & select your projection.

Go to "Location Search Button" -type in your address & look for the red dot.



Create a map & share hyperlink by clicking on "Bookmark Link"

Visualizing coastal change, planning wisely for the future, making smart choices today

Coastal Resilience Quick Start User Guide