

Connecticut Institute for Resilience and Climate Adaptation: Projects and Programs

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Director of Community Engagement

CIRCA Mission

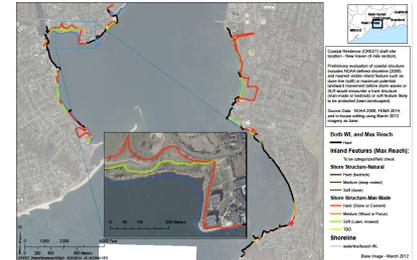
The mission of the **Connecticut Institute for Resilience and Climate Adaptation (CIRCA)** is to increase the resilience and sustainability of vulnerable communities along Connecticut's coast and inland waterways to the growing impacts of climate change on the natural, built, and human environment.

This goal will be accomplished by bringing together the world-class research and outreach capabilities of UConn with the extensive practical experience of CTDEEP to create and disseminate practical and sustainable strategies to enhance the resilience of the built environment while protecting natural ecosystems.



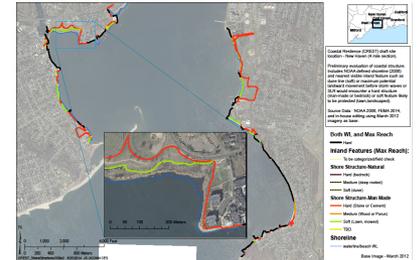
CIRCA Research Program Areas

- Coastal flooding, inundation, and waves
- Inland riverine flow and flooding
- Wastewater infrastructure vulnerability
- Living shorelines



CIRCA Policy & Planning Areas

- National Disaster Resilience Competition
- Finance
- Municipal policy and planning
- CIRCA Funding Programs
 - Matching Funds
 - Municipal Resilience Grant Program



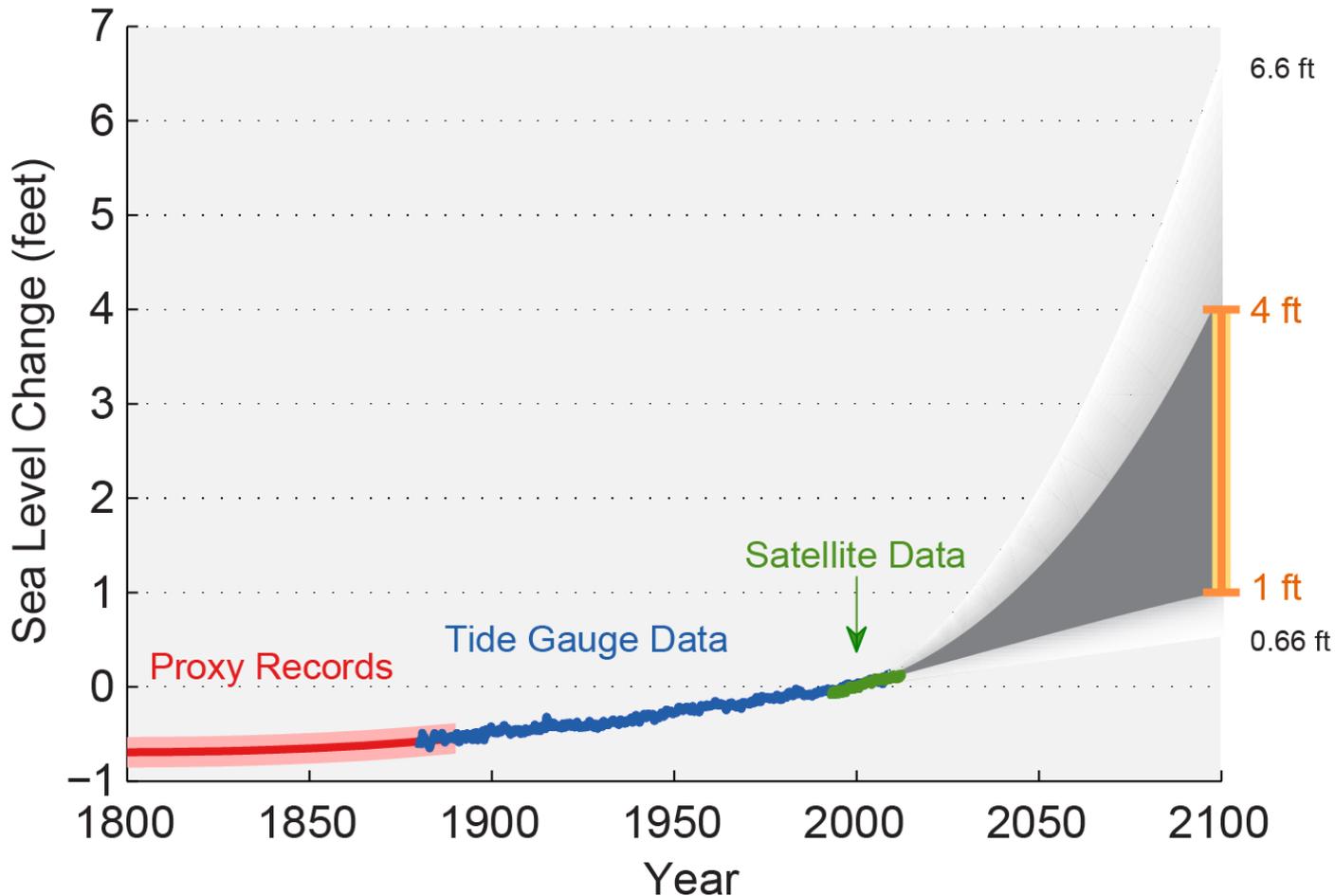
Professor James O'Donnell

COASTAL FLOODING, INUNDATION, AND WAVES

UConn



Climate Change Impacts: Global Sea Level Rise



What causes the sea level to change?

Terrestrial water storage, extraction of groundwater, building of reservoirs, changes in runoff, and seepage into aquifers

Surface and deep ocean circulation changes, storm surges

Subsidence in river delta region, land movements, and tectonic displacements

As the ocean warms, the water expands

Exchange of the water stored on land by glaciers and ice sheets with ocean water

SYR - FIGURE 3-4

Connecticut's Law on Planning for Sea Level Rise

- PA 13-179 references the NOAA CPO-1 that projects Global Sea Level Rise of **6.6 feet by 2100**
- SLR must be considered in
 - State and municipal plans of conservation and development
 - civil preparedness plan and program
 - municipal evacuation or hazard mitigation plans

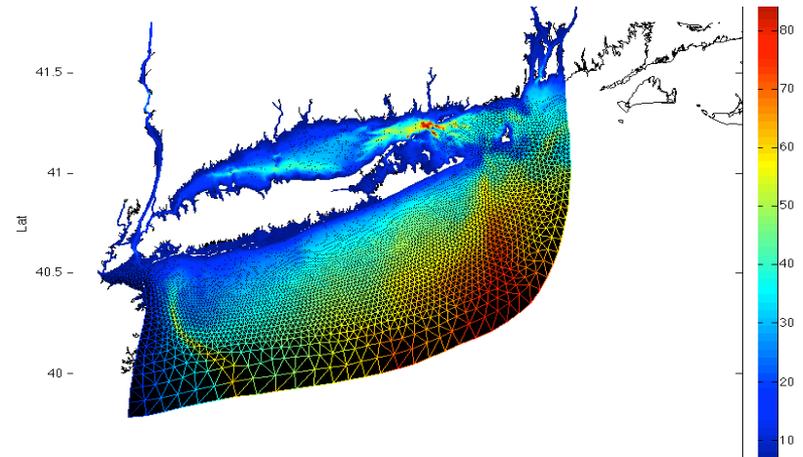


Flooding on Route 146
November 24, 2014
Bill Horne



CIRCA uses model that takes into account local characteristics of Long Island Sound

- Other models assume that the shape and currents of Long Island Sound are the same everywhere
- Map viewers use a bathtub model as opposed to a hydrodynamic model
 - NOAA Sea Level Rise Viewer
 - TNC Coastal Resilience Tool
 - Climate Central Surging Seas



Research Outcomes

- Models we have developed will allow us to extrapolate sea level flooding to the center of cities and headwaters of marshes.
- We can use the same approach with waves to develop design criteria for coastal erosion protection approaches
 - [NOAA CREST Project – wave data online CIRCA's website](#)
- We need to include the effects of rivers and precipitation more effectively.
- We need to test the predictions and communicate the results to towns and engineers

Professor Emmanouil (Manos) Anagnostou

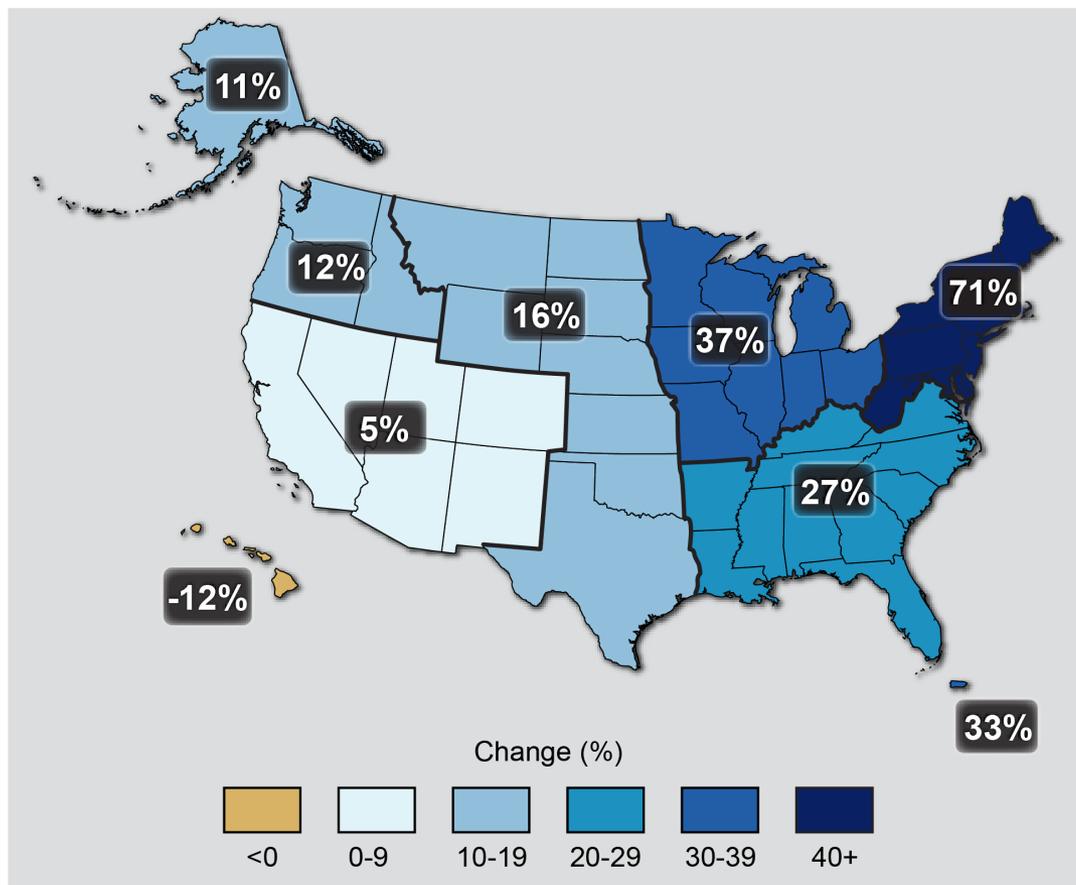
INLAND FLOODING AND ASSESSING THE VULNERABILITY OF CRITICAL INFRASTRUCTURE

UConn



Climate Change Impacts: Trend of increasing intense rainfall events

Observed Change in Very Heavy Precipitation



NCA, 2014

Riverine Flooding Project Goals

- Build a highly accurate prediction tool for inland flooding in Connecticut at the municipal scale
 - Incorporate the effects of evapotranspiration
 - Use high resolution topography
 - Include hydraulic structures (dams, etc.) for selected towns
- Use tool to predict how frequently and where it will flood in the state now and in the future
 - Look at past storms to predict the current situation
 - Look at the impact of the future climate on flooding (and drought)
- Integrate river flow predictions to coastal flooding model

Statewide Maps of Flood Inundation



Professor Christine Kirchhoff

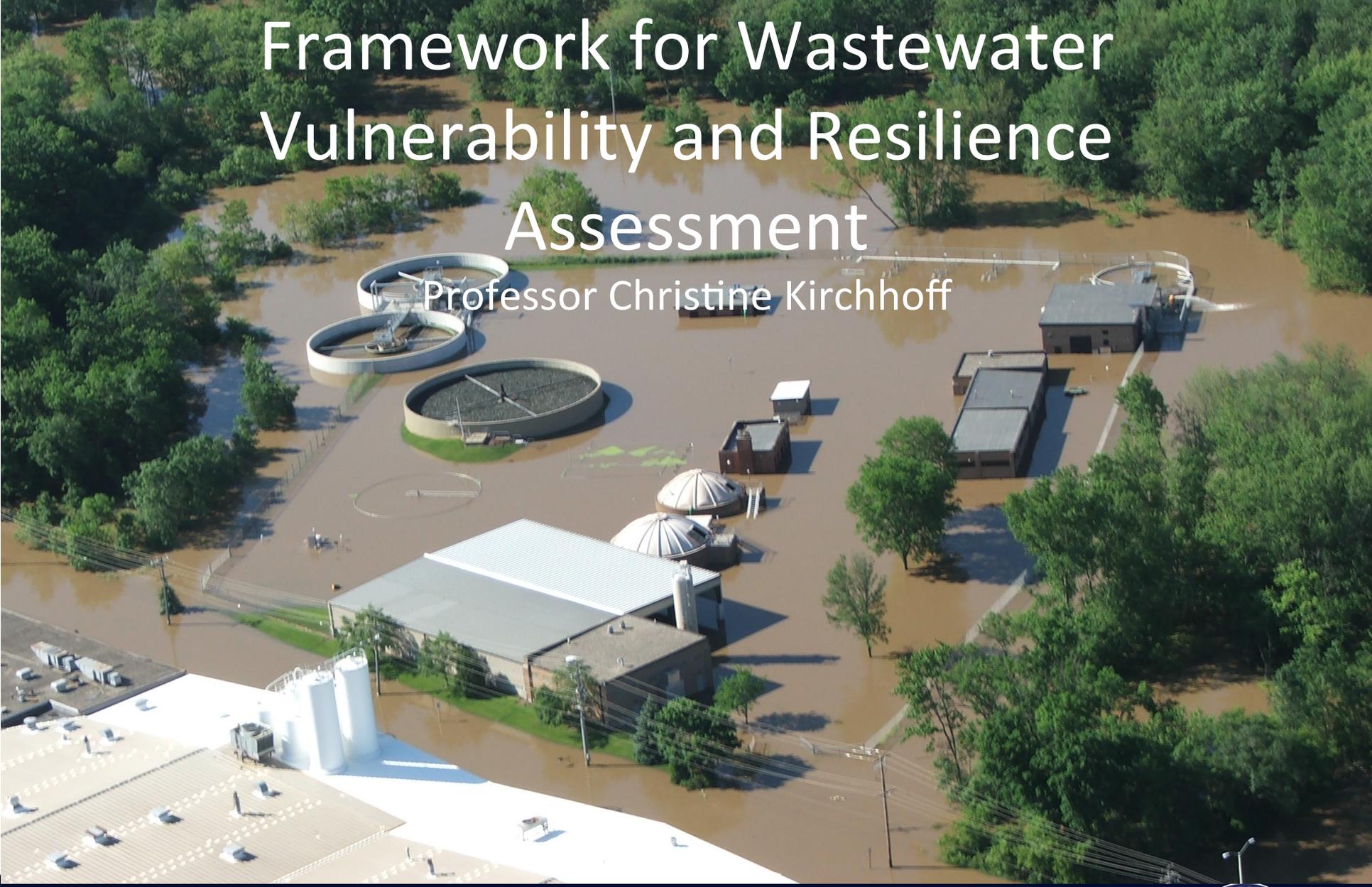
WASTEWATER INFRASTRUCTURE

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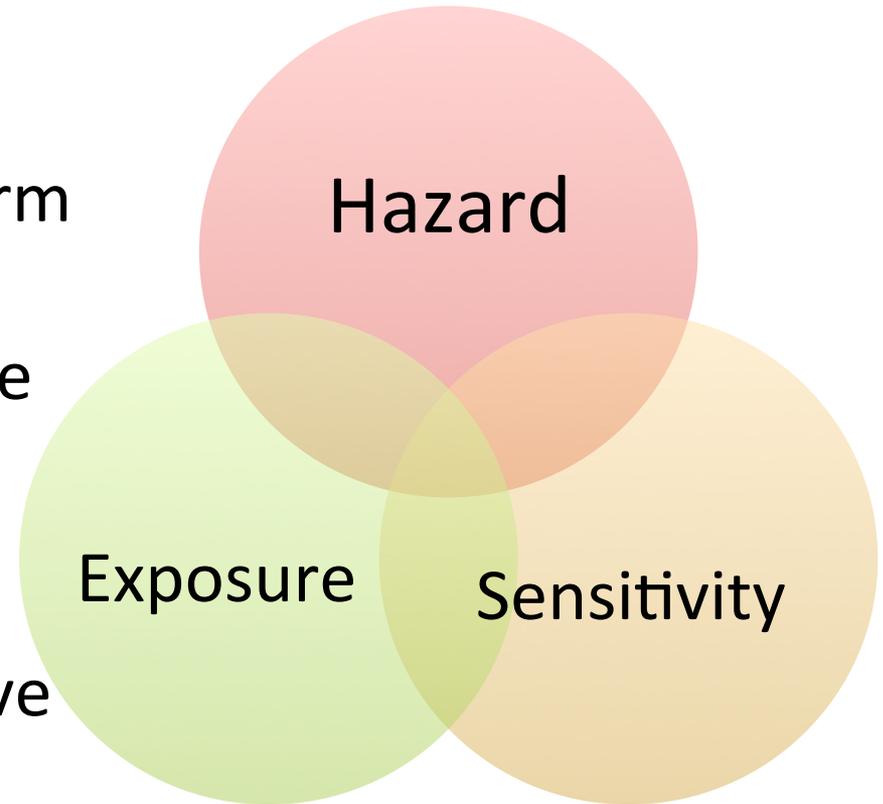
Framework for Wastewater Vulnerability and Resilience Assessment

Professor Christine Kirchhoff

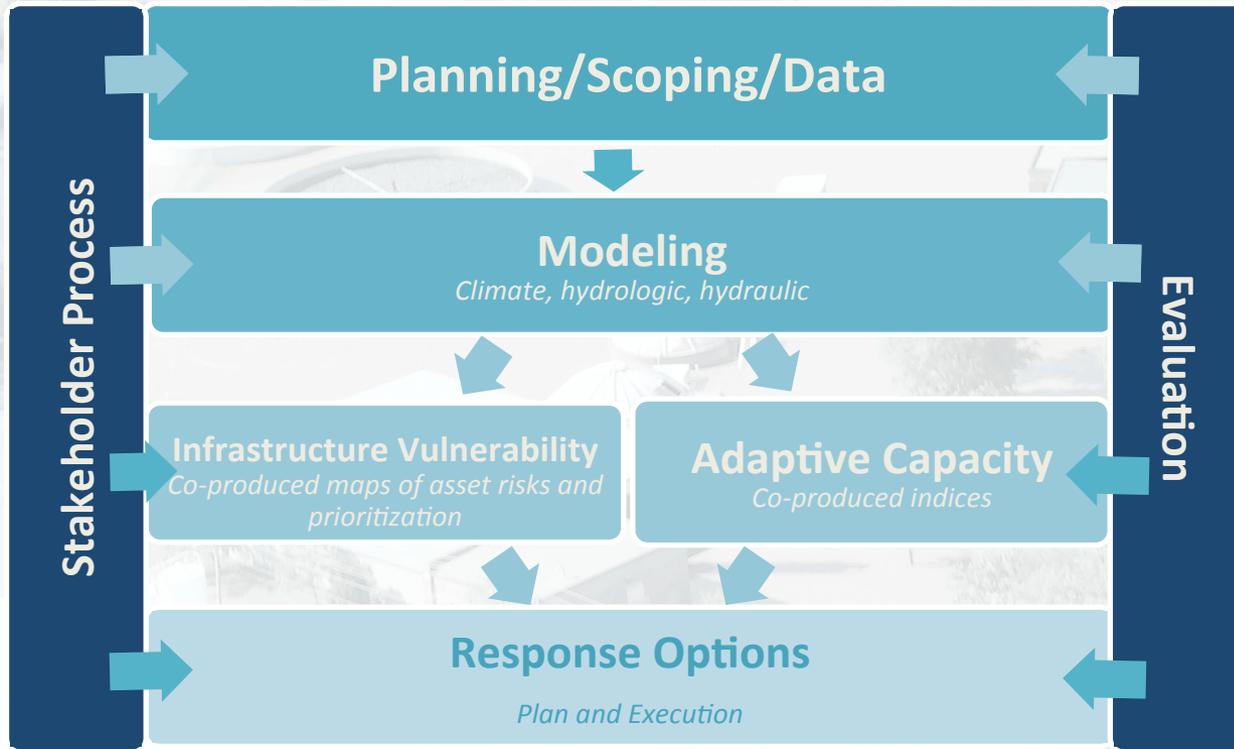


Assess Vulnerability as a function of...

- The hazard itself
 - E.g., Sea level rise, storm surge, wave action, extreme events, climate change
- The physical system
 - E.g., Location, protective measures, back-up systems



Resilience Framework



UConn Marine Sciences, UConn CIRCA staff, Sea Grant, and CT DEEP

LIVING SHORELINES

UConn



Living Shorelines Projects

- **Working Definition:** A shoreline erosion control management practice which also restores, enhances, maintains or creates natural coastal or riparian habitat, functions and processes. Coastal and riparian habitats include but are not limited to intertidal flats, tidal marsh, beach/dune systems, and bluffs. Living shorelines may include structural features that are combined with natural components to attenuate wave energy and currents.
- Wave information, siting tool, and review of approaches
- New England regional program to advance green infrastructure and living shorelines
- Feasibility study for creation and restoration of fringe wetlands for coastal resilience

Fringe Wetlands

- Wetland vegetation provides coastal protection by reducing wave heights and flooding of critical infrastructure.
- Wetlands slow and absorb flooding from storm surges by reducing flood peaks and durations through storage and drainage of flood waters.



Fringe wetland in Chesapeake Bay

Sources: J. Odonnell; Photo: <http://www.jefpat.org/livingshorelines.html>

FINANCE, POLICY, AND PLANNING

SAFR Connecticut Connections National Disaster Resilience Competition



Dannel P. Malloy
GOVERNOR
STATE OF CONNECTICUT



Phase 2 NDRC Winning Projects:

Bridgeport Resilience Corridor Network Pilot

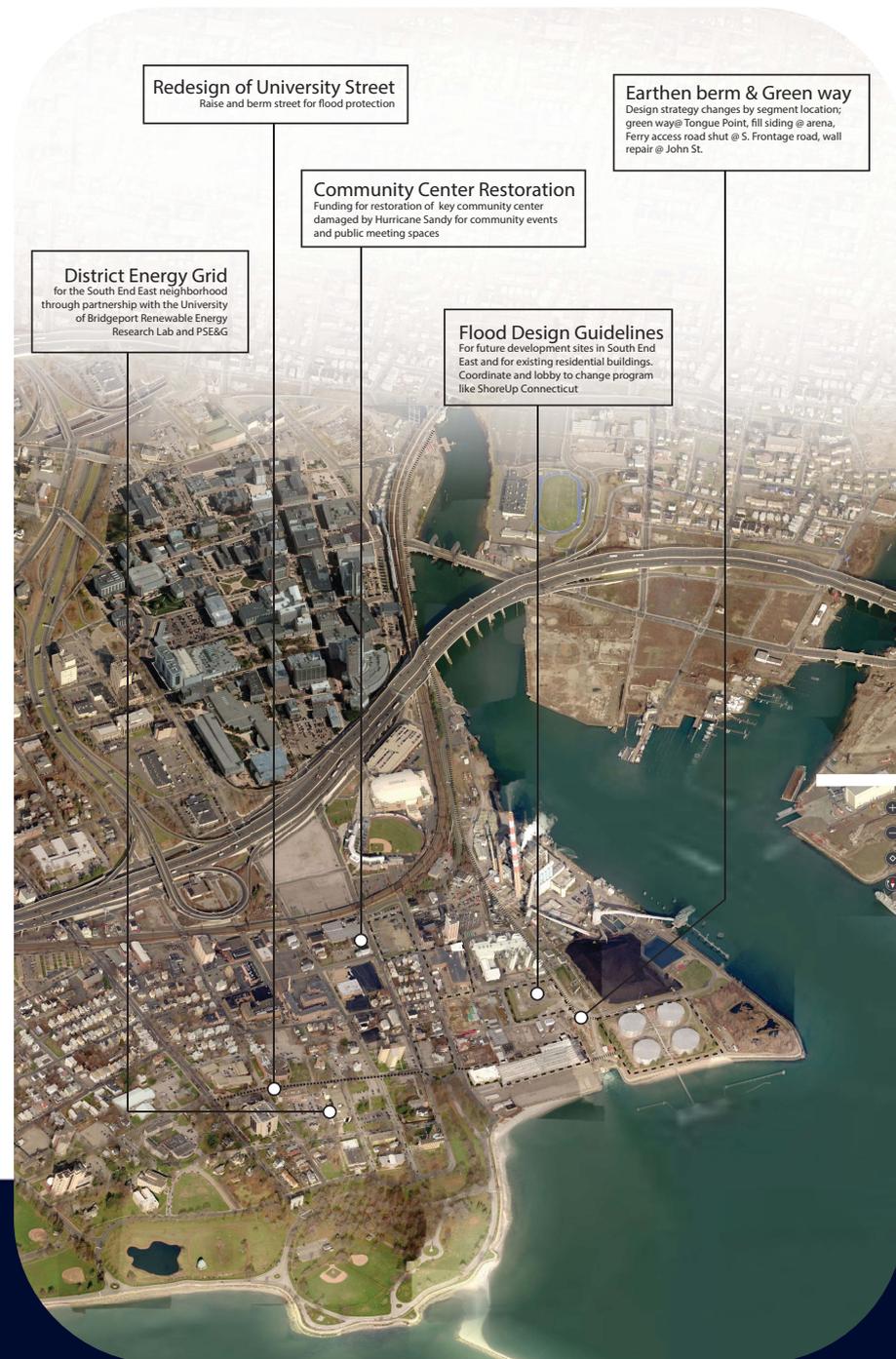
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Connecticut Connections Coastal Resilience Plan

\$54,277,359

*Prepared for the State of Connecticut by:
Parsons Brinckerhoff
Waggoner & Ball Architects
Alex Felson & Associates*

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Resilience Financing

- Check out Financing Fact Sheet on CIRCA Blog
- Tax Increment Financing (TIF) Districts
 - TIF districts capture the future net economic value increase from a resilience investment through district-level taxes or fees to finance that investment
 - PA 15-57 established use of TIF districts in Connecticut for economic development projects



Municipal Policy & Planning

An Integrated Resilience
Policy Agenda

Professor Joe MacDougald

Bruce Hyde, UConn Extension

Juliana Barrett, UConn Extension



Project Description

- Question select municipalities about two priorities.
 - 1. What are your immediate resilience projects.
 - 2. Which of those are funded currently, next year, or will be soon.
- Research best practices throughout country
- Make policy recommendations

CIRCA FUNDING PROGRAMS

Matching Funds Program

up to \$100,000 available

- CIRCA will consider requests from Connecticut municipalities, institutions, universities, foundations, and other non-governmental organizations for matching funds for projects that address the mission of the Institute.
- CIRCA Matching Funds will provide up to 25% of the primary funder's contribution other than municipal or State of Connecticut funds
- Proposals must leverage independent funding awarded through a competitive process.

Applications accepted on a rolling basis

Next review date: July 15

Municipal Resilience Grants Program

up to \$100,000 available

- Implement initiatives that advance resilience, including the creation of conceptual design, construction (demonstration projects or other) of structures, or the design of practices and policies that increase their resilience to climate change and severe weather.
 - Develop and deploy natural science, engineering, legal, financial, and policy best practices for climate resilience;
 - Undertake or oversee pilot projects designed to improve resilience and sustainability of the natural and built environment along Connecticut's coast and inland waterways;
 - Foster resilient actions and sustainable communities – particularly along the Connecticut coastline and inland waterways – that can adapt to the impacts and hazards of climate change; and
 - Reduce the loss of life and property, natural system and ecological damage, and social disruption from high-impact events.

Third Round Call for Applications Coming Soon

Municipal Resilience Grants Program

Round One

- *City of Milford* – Dune restoration for resiliency
- *City of New Haven* – Manual for preparing commercial infrastructure for flooding
- *Northwest Hills Council of Governments* – Low Impact Development
- *Town of Waterford* – Water treatment system resilience
- *Western Connecticut Council of Governments* – Regional FEMA Community Rating System Program



Municipal Resilience Grants Program

Round Two

- *Town of Oxford* – river flood risk and culverts
- *South Central Regional Council of Governments* – Adapting public drinking water
- *Southeastern Connecticut Council of Governments* – critical facilities vulnerability assessment



Stay in Touch with CIRCA!



- Sign up for the *Resilience Roundup* and *CIRCA Announcements*
 - Sign up on our home page circa.uconn.edu
 - National, state, and local news on climate impacts and adaptation
 - Resources for adaptation
 - Announcements of events and training opportunities

Questions?

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Sign Up for Resilience Roundup & Announcements

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