

## **Final Grant Report**

### **“Enhancing Rural Resiliency: A Vision and Toolkit for Adaptation in the Northwest Hills”**

Respectfully Submitted: December 11, 2018

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Northwest Hills Council of Governments



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“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.”

More information about CIRCA can be found at [circa.uconn.edu](http://circa.uconn.edu)



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## A. INTRODUCTION

The Northwest Hills Council of Governments respectfully submits this final report for the project titled “Rural Resiliency Vision and Toolkit for Adaptation in the Northwest Hills”.

It consists of a number of deliverables developed by Joanna Wozniak-Brown, PhD, Regional Planner, between December 2017 and December 2018.

This project would not have been possible without the generous funding the Connecticut Institute for Resilience and Climate Adaptation.

## B. EXECUTIVE SUMMARY

The Northwest Hills Council of Governments (NHCOG) is pleased to present the “Rural Resiliency Vision and Toolkit for Adaptation in the Northwest Hills”. This project is grounded in actionable, and achievable, adaptation strategies with a particular emphasis on the unique vulnerabilities and opportunities of a predominantly rural region.

As noted in the recently-released National Climate Assessment,

*“The impacts of climate change are already being felt in communities across the country. More frequent and intense extreme weather and climate-related events, as well as changes in average climate conditions, are expected to continue to damage infrastructure, ecosystems, and social systems that provide essential benefits to communities. Future climate change is expected to further disrupt many areas of life, exacerbating existing challenges to prosperity posed by aging and deteriorating infrastructure, stressed ecosystems, and economic inequality.”<sup>1</sup>*

In addition to important climate change mitigation efforts, it is critical to the economy, cultural, and social health of our communities that local-scale adaptation is underway. This toolkit will assist rural inland communities begin their resiliency efforts.

Rural communities have particular vulnerabilities and opportunities with respect to climate change. Strengthening local resiliency requires tailored strategies and tools to address those vulnerabilities, especially with limited local technical, administrative, and financial capacities. Hopefully, this toolkit will serve, not only the Northwest Hills region of Connecticut, but other smaller municipalities around the country.

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<sup>1</sup> USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-in-Brief [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 186 pp.

This project uses five primary categories, resembling the Connecticut Climate Preparedness Plan with the addition of cultural resources. This approach is designed to assist municipalities and partners quickly identify actions for which there is political will, funding availability, and our public interest. A number of the resiliency actions qualify for multiple categories or deliver multiple co-benefits. The categories are agriculture, cultural resources, infrastructure, natural resources, and public health.

The project consists of the following components

- A downloadable Resiliency Toolkit that contains:
  - a vulnerability overview for each category, potential partners, potential funding streams, and resiliency actions with potential informative resources;
  - Resiliency/adaptation actions for each category;
  - Two case studies for each topic; and,
  - Links to implementation guidance for municipalities.
- An interactive web-version of the Toolkit  
<https://resilientrural.com>
- A basic interactive web-map to assist towns in screening their vulnerabilities  
<http://nhcog.maps.arcgis.com/apps/webappviewer/index.html?id=dd66491024ac4dc98c3a3961dc7a2cc3>
- A rural resiliency vision statement and interactive visual  
<https://resilientrural.com/rural-resiliency-vision/>
- Final grant report to UConn CIRCA with recommendation to improve local and state resiliency

As discussed in the report, a number of recommendations emerged from the research and outreach conducted during this project. The recommendations are:

- Provide timely and reliable information;
- Address data gaps for rural and inland municipalities;
- Create educational workshops for local scale agencies/departments;
- Update Climate Preparedness Plan, and;
- Develop State-wide Resiliency Policy

## **C. PROJECT BACKGROUND AND CONTEXT**

As a region of 21-towns, the Northwest Hills will experience a variety of climate changes including changes to precipitation rates, shifts in seasons, increased high heat and high-ozone days, and extreme weather events. The Litchfield Hills Natural Hazard Mitigation Plan (2016) notes a high probability of several natural hazards including extreme winter weather, flooding, high winds, and wildfire. The region may also encounter dam/levee failure, drought, and earthquakes. These natural hazards will be precipitated or exacerbated by climate change. Furthermore, rural communities are uniquely vulnerable to climate change because of their: dependency on natural resources for agriculture, recreation, ecosystem services, and quality of life; geographic isolation, limited economic diversity, aging population, etc.; and limited

transportation, infrastructure, and health/emergency networks<sup>2</sup>. Rural communities also have less technical resources including GIS capacity and information like parcel maps and digital FEMA Flood Insurance Risk Maps (FIRM) maps.

Despite these vulnerabilities and complications, rural communities also have unique strengths. An active volunteer base, traditions of self-reliance and neighborliness, skilled natural resource knowledge, inventive and resourceful community decision-makers, and inter-municipal partnership & planning all contribute to the on-going resiliency of rural communities.

When the science and data become available, a full climate change vulnerability assessment, including flooding a can be conducted. At this time, with limited data and limited financial capacity, towns will be best served by a geographically-sensitive and capacity-minded compilation of climate change adaptation opportunities coupled with a vision for resiliency in the region. Hence, the Rural Resiliency Vision and Toolkit.

This toolkit is different, albeit congruous with the recently launched Sustainable CT program. Sustainable CT is a certification program that will assist towns in obtaining funds/grants for sustainability actions. Sustainability (defined below) can certainly overlap with resiliency. In fact, there are some resiliency actions in the Sustainable CT program such as a Historical Resources Inventory. Resiliency is mostly driven by the impacts of climate change. This Rural Resiliency project is not a certification program. It doesn't have any required paperwork or participation. It is simply a resource to help towns adapt to climate change.

This effort is consistent with NHCOG regional plans and policies. The 2017 regional Plan of Conservation and Development specifically identifies climate change-related policies including "assist the region's municipalities with identifying and addressing the potential impacts of increased temperatures, storm events, flooding and habitat degradation to increase local and regional resiliency" and specifically lists "prepare a climate change adaptation plan including a web-based toolkit" as a strategy to help achieve the goal.

While this project achieves several regional objectives, it will also be highly transferable to other towns. The broad offering of strategies will meet a municipality at its current financial, technical, and administrative capacity. Although the toolkit focuses on a particular region, it is our sincere hope that it will assist rural municipalities throughout the country.

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<sup>2</sup> Hales, D., Hohenstein, W., Bidwell, M. D., Landry, C., McGranahan, D., Molnar, J., ... Jadin, J. (2014). Ch. 14: Rural Communities. Climate Change Impacts in the United States: The Third National Climate Assessment. <https://doi.org/10.7930/J01Z429C>

## D. PROJECT DESCRIPTION, INCLUDING GOALS AND METHODS

This project required significant outreach to important stakeholder organizations, review of regional plans and examples of adaptation around the country, and collection of data and tools for the climate vulnerabilities and adaptation actions.

Below are the goals of the project and the methods used to achieve them:

### 1) Write short overview of climate change vulnerabilities for northwest Connecticut.

The climate vulnerabilities discussion was prepared from 2010 report, *The Impacts of Climate Change on Connecticut Agriculture, Infrastructure, Natural Resources and Public Health*, and Wozniak-Brown, Joanna, "Understanding Community Character as a Socio-ecological Framework to Enhance Local-scale Adaptation: An Interdisciplinary Case Study from Rural Northwest Connecticut" (2017).

### 2) Develop Toolkit with local-specific strategies with town examples & Resiliency Vision

The *Resilient Northwest Hills* vision consists of a vision statement and an interactive map module on <https://www.resilientrural.com>. Website screenshots are included in Appendix B. NHCOC members and attendees of the Rural Resiliency Sharing session of July 2018 were asked for feedback in early November 2018. Comments were incorporated prior to the issuing of this report but I expect it to continue to be refined over time.

The draft toolkit, attached here as Appendix A and to be developed on the website, will likewise continue to evolve as information on climatic vulnerabilities, GIS data, and adaptation tools emerge. The toolkit is arranged by the following themes: agriculture, cultural resources, infrastructure, natural resources, and public health. Each section has information on climate vulnerabilities, potential partners, potential funding, and actions that enhance resiliency. Where possible, actions are accompanied by examples, handouts, or guidance. The resiliency actions, collated into a comprehensive list in the tables provided in the toolkit, developed from a number of planning efforts from around the state or other adaptation plans such as Natural Hazard Mitigation plans including recent draft State Natural Hazard Mitigation Plan, the CT Climate Preparedness Plan, Draft Shared Stewardship: Connecticut State Historic Preservation Office's 2018-2023 Strategic Plan, the NHCOC Regional Transportation Plan, the NHCOC Comprehensive Economic Development Strategy plan, NHCOC Plan of Conservation and Development, the Water Utility Coordinating Committee documents, and Sustainable CT. A full list is provided with the comprehensive table.

The actions were reviewed by NHCOC members, NHCOC staff, and regional stakeholders.

The Rural Resiliency Vision consists of both text and an interactive image on the website. The Resilient Rural Vision Visuals are also included in the Toolkit.

**3) Review of regional plans/documents for overlap/consistency/synergy with specific adaptation strategies and general resiliency concepts.**

Regional plans and documents that contributed to this project are provided in the paragraph above. Resiliency-related tasks from those plans and programs were added as actions under appropriate categories.

**4) Develop ten case studies of adaptation for similar issues in similar settings.**

Two short case studies were developed for each topic (agriculture, cultural resources, infrastructure, natural resources, and public health). Each case study provides links to additional resources, funding streams, and contact information for the project manager.

**5) Creation of Informative Website**

The website (<https://resilientrural.com>) is a web version of the Rural Resiliency Vision and Toolkit. The web presentation allows for interactive exploration of vulnerabilities and the Resiliency Vision. It also allows for storage of reports and tools on the website so that it will remain accessible even if the originating resources or agencies change links.

The website hosts some helpful documents, including but not limited to:

- Two toolkit-related worksheets to help municipalities build a resiliency team and review planning documents for resiliency-related tasks.
- Local/municipally-focused adaptation process manuals.
- Urban heat island effects for each municipality in the NHCOC created by NASA/Goddard Institute. <https://resilientrural.com/wp-content/uploads/2018/11/NASA-NHCOC-heat-islands-by-town-Braneon-McConnell.zip>

Although data was limited, an [interactive web map](#) was prepared for this toolkit. The information has limitations but can be used for screening purposes and preliminary vulnerability studies. It has the following layers available for review:

- Critical Facilities for the NHCOC region developed by Joanna Wozniak-Brown from Natural Hazard Mitigation Plans (with the exception of Burlington since these facilities were not listed in their NHMP)
- Farms and Farmers' Markets in the NHCOC region developed by Joanna Wozniak-Brown
- Length of Growing Season by State
- Leaf and Bloom Dates - Change in First Leaf Date Between 1951-1960 and 2007-2016



- Estimated Floodplain (from EPA scientists for screening purposes, not to replace FEMA FIRM maps)
- Local historic districts, National Register of Historic Places, State Historic Places provided by Mark McMillan, CT DOT Office of Environmental Planning
- Social Vulnerability Index 2016 by the CDC

The landscape-style images accompanying the Rural Resiliency Vision (<https://resilientrural.com/rural-resiliency-vision>) was developed in partnership with Peter Miniutti, Director of UConn's Community Research and Design Collaborative, and Joanna Wozniak-Brown. The initial elements presented in the designs evolved from her research on rural character. The images were then crafted by Peter Miniutti in the same style as utilized in Connecticut's National Disaster Resilience Competition, depicting resiliency corridors. The information provided in pop-ups of the interactive map were developed during the toolkit creation and by extensive input at the Rural Resiliency Sharing Session in July 2018.

## 6) Project Outreach

Project outreach occurred in two primary ways, education and information solicitation. Input was sought from Regional Emergency Planning Team (REPT), Public Safety Task Force (PSTF) meetings, Emergency Management Directors, energy commissions, land use commissions, conservation commissions, from cultural, public health, and agricultural institutions in region.

Joanna Wozniak-Brown presented the project at the following forums:

- Presentation at NHCOC meeting – 10/12/17
- Presentation at DEHMS Region 5 REPT – 11/20/17
- Presentation at CIRCA Municipal Resiliency Forum – 5/11/18
- Rural Resiliency Sharing Session – 7/26/2018
  - Invitations to stakeholders from the NHCOC and organizations from each primary category
  - Flyer <https://resilientrural.com/wp-content/uploads/2018/11/Resiliency-Forum-Flyer.jpg>
  - Agenda <https://resilientrural.com/wp-content/uploads/2018/11/Sharing-Session-Agenda.pdf>
- Presentation at DEHMS Region 5 REPT Steering Committee and Survey– 8/8/18
  - Survey available here: <https://resilientrural.com/wp-content/uploads/2018/11/Survey-for-REPT-Steering-Committee.pdf>
- Southern New England American Planning Association Conference – 10/19/18
  - Presentation available here: <https://resilientrural.com/wp-content/uploads/2018/11/JWB-SNEAPA-Resiliency-Toolkit-Presentation.pdf>
- Presentation at NHCOC meeting – 11/8/18

Numerous local, regional, and state organizations were contacted and invited to provide the following:

- GIS maps;
- Adaptation case studies for topics such as agriculture, infrastructure, natural resources, public health, and cultural resources;
- Strategies or policies in your organization regarding adaptation/resiliency; and
- Current or forthcoming resources on adaptation or resiliency that may be helpful to municipalities or local organizations.

I provided examples of potential information including:

- ecological habitats at the highest risk from climate change: Cold Water Streams, Tidal Marsh, Open Water Marine, Beaches and Dunes, Freshwater Wetlands, Offshore Islands, Major Rivers, and Forested Swamps for the state and/or NW Hills
- Temperature changes in inland waterbodies
- changes in vector borne diseases in the state
- changes in vector populations (e.g. ticks, mosquitoes)
- private water well usage and/or failures
- Farmland properties in state
- Loss/gain of farmland
- Critical infrastructure in flood-prone areas (FEMA won't have digital FIRM maps for our region until 2022 so any existing digital flood data for northern CT would be very helpful)
- Maple syrup production in the state (and/or reports on Maple health in the state)
- Anticipated temperature impacts on bridges and dams
- Changes in forest flora and fauna composition
- Vulnerability/Adaptation reports for agencies, organizations, or municipalities in the state
- Lists of cultural resources that may be at risk to climate change in Connecticut (historical sites, buildings, social groups, etc.)
- Estimates on disproportionate climate change impact on vulnerable populations.

#### **E. EXPLANATION OF HOW PROJECT ADVANCED CIRCA MISSION AND PRIORITY AREAS**

This project is consistent with the mission of CIRCA, which 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 as it provides municipalities with actionable strategies to deal with specific climate change issues they are facing.

Specifically, this project addresses several priorities of CIRCA, especially:

- Develop and deploy natural science, engineering, legal, financial, and policy best practices for climate resilience; [by using the latest climate science and using adaptation best practices]
- Create a climate-literate public that understands its vulnerabilities to a changing climate and which uses that knowledge to make scientifically informed, environmentally sound decisions; [with informative and attractive information, the deliverables will inform regional stakeholders]
- 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; [designed for municipalities the toolkit will offer a range of options and focus on smart, measurable, actionable, reasonable, and timely goals]; and,
- Reduce the loss of life and property, natural system and ecological damage, and social disruption from high-impact events [offering current and actionable adaptation strategies that deal with known problems to mitigate risk and shorten the “traditional” adaptation process].

## F. PROJECT OUTCOMES & LESSONS LEARNED

Due to the complex nature of the project, existing regional knowledge and experience in climate change adaptation were crucial to the timely completion of this report.

Due to the broad-stroke nature of this project, a number of recommendations emerged by observation.

### **Provide Timely and Reliable Information**

As economic conditions fluctuate and towns consider long-term investments like infrastructure changes, it is essential that resiliency and adaptation information is current, reliable, and accessible to reduce barriers to implementation. According to Adapt CT’s report<sup>3</sup>, “municipalities need assistance communicating climate challenges and adaptation actions to local boards and the public”. There is a fundamental need to maintain the website for this project (resilientrural.com) regularly as well as update the analog report as necessary.

### **Address Data Gaps for Rural & Inland Municipalities**

At this time, there is a significant data gap in climate vulnerability-related data for Connecticut municipalities, especially for rural and inland municipalities. The data gaps include but are not limited to:

- Digital FEMA FIRM maps
- Parcel maps
- Local and state-wide historical resources mapping for municipalities

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<sup>3</sup> Hyde, Bruce and Barrett, Juliana. *Municipal Issues & Needs for Addressing Climate Adaptation in Connecticut*. Adapt CT. September 2017. (<https://resilientrural.com/wp-content/uploads/2018/11/Adapt-CT-Municipal-Needs-for-Adaptation.pdf>)

- Critical facilities locations (at local *and* state level) including local grocery and gas retailers. Example facilities included in Florida GATOR ([https://maps.floridadisaster.org/gis/rest/services/Facilities/Critical\\_Facilities/MapServer](https://maps.floridadisaster.org/gis/rest/services/Facilities/Critical_Facilities/MapServer))
- Climate change indicators
- Vulnerable populations especially Environmental Justice communities
- Public Health issue tracking
- Private well locations/usage tracking system especially for drought
- Review of dam strengths under climate stress
- Maps of vulnerable habitat types (Critical Habitats layer from CT DEEP does not contain the habitats listed in the Climate Preparedness Plan: ecological habitats at the highest risk from climate change: Cold Water Streams, Tidal Marsh, Open Water Marine, Beaches and Dunes, Freshwater Wetlands, Offshore Islands, Major Rivers, and Forested Swamp.)
- Waterbody temperatures

This information should be incorporated into ongoing state agency activity and the efforts of the State Data Officer. Strong efforts should be made to make this information accessible and visible to local decision-makers.

### **Create Educational Workshops for Local Scale Agencies/Departments**

Local land use commissions, building departments, public works, health departments/districts provide vital services and crucial planning/support functions at the local level. According to a study, public health officials feel that their agencies lack the expertise to assess the potential impacts of climate change in their jurisdiction and to create effective climate change adaptation plans<sup>4</sup>. It is imperative that local agencies have the most recent best practices available to them to increase local resiliency. California's Regional Collaborative for Climate Adaptation offered capacity building workshops ([https://www.georgetownclimate.org/files/report/GCC-Lessons-in-Regional-Resilience-Capital\\_Region-Jan\\_2017.pdf](https://www.georgetownclimate.org/files/report/GCC-Lessons-in-Regional-Resilience-Capital_Region-Jan_2017.pdf)).

### **Update Climate Preparedness Plan**

Climate science has fundamentally advanced since the previous Climate Preparedness Plan, completed in 2011. The next plan should include data downloadable/accessable by municipalities, identify responsible agencies/partners for actions, and develop a state-wide resiliency policy. The state should mandate regular updates to this plan and empower state agencies to incorporate resiliency into their regular responsibilities.

### **Develop State-wide Resiliency Policy**

At the moment, state agencies do not have resiliency-related policies and/or adaptation plans. While several account for climate change in their long-term planning, they also rely on industry-accepted standards, which may not be reliable for anticipated changes in storm events, for

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<sup>4</sup> Brown, L. (2016). Are We Ready? Report 2. Preparing for the Public Health Challenges of Climate Change. Journal of Public Health Management and Practice, 22(1), 102–104. <https://doi.org/10.1097/PHH.0000000000000356>

their project specifications. A coordinated effort to incorporate climate change mitigation *and* adaptation into agency operations would benefit many Connecticut municipalities.

Options for improving state-wide resiliency and local-scale action include:

- Incorporate resiliency into grant-making criteria or priority projects
- Require incorporation of resiliency into comprehensive plans
- Review state public health code for resiliency opportunities especially regarding septic systems and potable wells (e.g. is septic system design of 18" above the seasonal high water table sufficient for extreme precipitation events and do the well regulations enforce well elevations above the base elevation to meet flood elevations?)
- Increase communication between NWS and residents for severe weather alerts (e.g. lightning strikes in summer 2018)
- Maintain and expand CT DEEP Adaptation Toolkit especially with municipal/regional case studies
- Work with state-wide conservation agencies to downscale climate velocity and identify priority conservation areas/habitat corridors
- Empower SAFR to coordinate consistent policies, complete state agency adaptation/resiliency plans, and incorporate recommendations from Coordinated Water System Plan, Two Storm Panel, Drought Plan, CT NHMP, CIRCA products, etc.
- Coordinate with CT DOT to reach out to ACOE, FEMA, NOAA, USGS or any other reference agency to discuss the reference statistics used in design of transportation infrastructure to increase resiliency at the design phase.
- Consider use of program like CivicSpark, "a Governor's Initiative AmeriCorps program dedicated to building capacity for local governments to address climate change and water management needs" ([https://www.georgetownclimate.org/files/report/GCC-Lessons-in-Regional-Resilience-Capital\\_Region-Jan\\_2017.pdf](https://www.georgetownclimate.org/files/report/GCC-Lessons-in-Regional-Resilience-Capital_Region-Jan_2017.pdf))
- Review and advocate/improve federal financial risk management tools for agriculture
- Offer voluntary resilience audits for private property (from September 2018 MA State Hazard Mitigation and Climate Adaptation Plan)
- Assess vulnerability of cultural resources in next Preparedness Plan and implementing program for historic sites and state parks like the Climate Friendly Parks (CFP) Program from the National Park Service (NPS)
- Consider developing a Water Utility Resilience Program (WURP) similar to Massachusetts
- Conduct community inclusion mapping to determine vulnerable populations ([http://www.cohealthmaps.dphe.state.co.us/colorado\\_community\\_inclusion/](http://www.cohealthmaps.dphe.state.co.us/colorado_community_inclusion/))

## G. FINAL PROJECT SCHEDULE AND SUMMARY

Workplan: Enhancing Rural Resiliency: A Vision and Toolkit for Adaptation in the Northwest Hills		
1	Write short overview of climate change vulnerabilities for northwest Connecticut	Spring 2018

2	Develop Toolkit with local-specific strategies with town examples & Resiliency Vision	Winter 2017 – Fall 2018
3	Review of regional plans/documents for overlap/consistency/synergy with specific adaptation strategies and general resiliency concepts	Winter 2018
4	Develop ten case studies of adaptation for similar issues in similar settings (2 per topic)	Summer 2018
5	Informative and attractive website	Throughout project
6	Project Outreach	Throughout project

The final budget for this project was the grant total of \$54,863.

## H. PROJECT PRODUCTS

Appendix A: Print Version of Rural Resiliency Vision & Toolkit

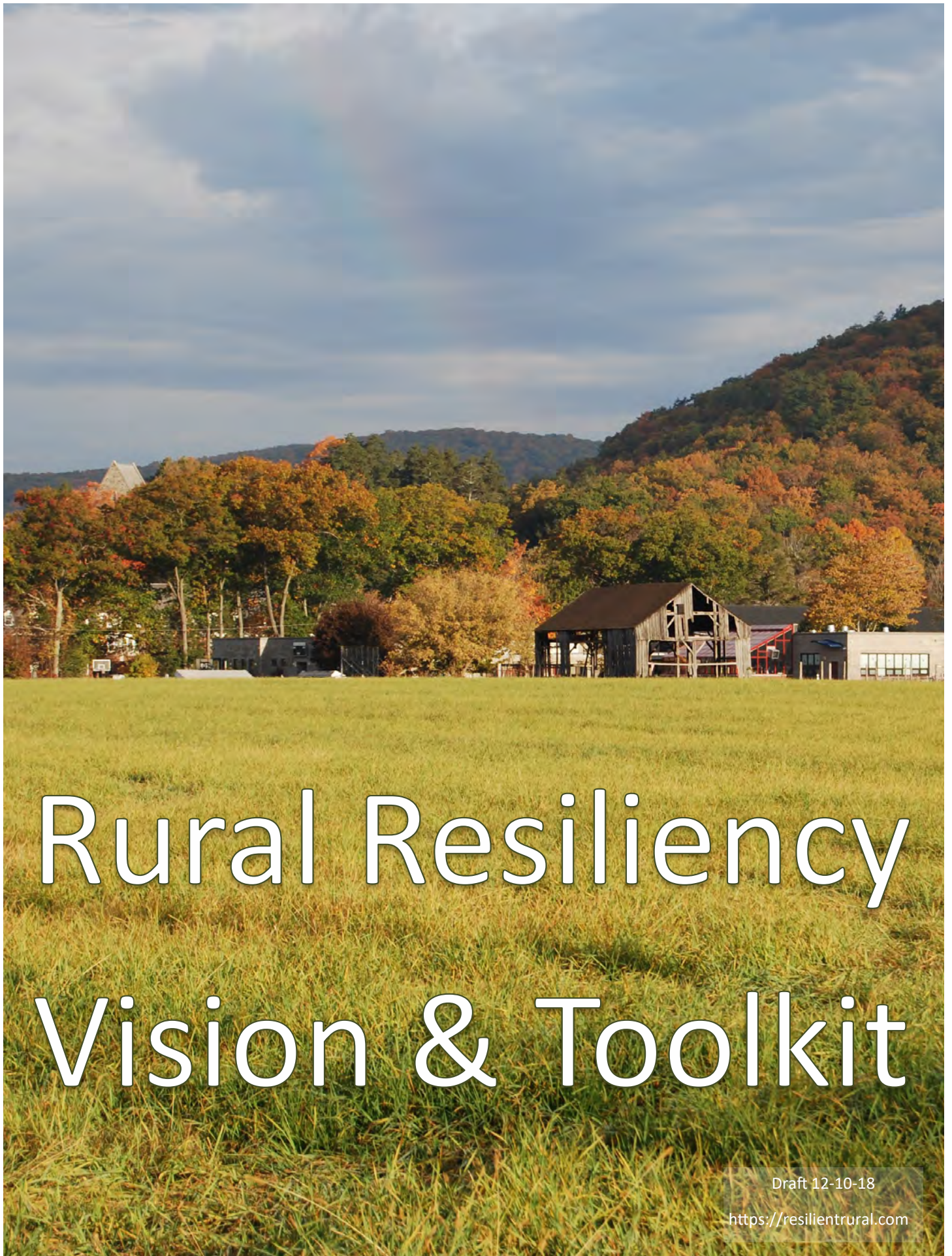
Appendix B: Website Screenshots

## **APPENDIX A**

### **PRINT VERSION OF RURAL RESILIENCY VISION & TOOLKIT**

Also available at <https://resilientrural.com>





# Rural Resiliency Vision & Toolkit

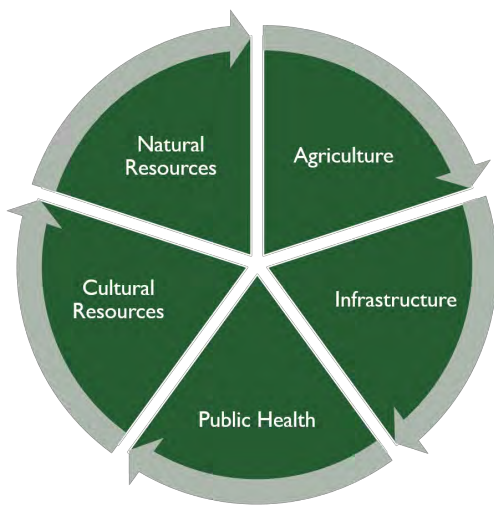
Draft 12-10-18

<https://resilientrural.com>



# Executive Summary

Climate change is happening and it's already affecting the way we live, work, and play in our communities. And rural communities are facing dramatically different vulnerabilities than urban municipalities. These vulnerabilities are amplified by challenges with staffing, financing, and technological capacity.



Climate change is often called a “wicked problem” since it crosses management groups, topic areas, and government structures. The resiliency actions and tools presented in this report are divided into Agriculture, Cultural Resources, Infrastructure, Natural Resources, and Public Health.

However, many of these actions will overlap with the different topics and with different staff responsibilities. That's why designating a municipal team is so important—to bridge those connections.

Even with the particular challenges, rural communities are also incredibly resilient with strong neighborly ties, traditions of self-reliance, and deep connections to their surrounding natural resources. Rural communities are uniquely poised to deal with the impacts of climate change, which are, indeed local.

**Rural Resiliency Toolkit is organized by the following Sections:**

**Implementing Local Resiliency**

Basic steps to implementing local resiliency and public participation guidance.

**Resiliency Planning Background**

Overview of the outreach and plan review that contributed to this toolkit.

**Rural Resiliency Vision**

A vision statement and interactive images (at [resilientrural.com](https://resilientrural.com)) for a future Resilient Rural Community.

**Resiliency Tools**

A menu of resiliency Actions and informative tools to meet towns where they are with funding, planning, and interest.

Each topic chapter delivers a brief overview of the possible impacts from climate change, partners and funding streams, and specific actions and tools that communities can consider.

It can seem overwhelming at first to chart a local resiliency strategy. However, with this toolkit, rural communities can start their resiliency journey regardless of current funding or capacity.

By implementing resiliency actions now, especially in long-range plans like capital improvement, transportation, or hazard mitigation plans, municipalities can make investments that will protect the community for generations to come.

Please check our website for more information related to Rural Resiliency at <https://resilientrural.com>.

# ACKNOWLEDGEMENTS

This project would not have been possible without numerous organizations and individuals, especially the following:

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Katie Lund, UConn CIRCA  
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If you have suggestions for actions, tools, or updates to this project, please email [info@resilientrural.com](mailto:info@resilientrural.com).

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# DEFINITIONS<sup>1</sup>

## **Adaptation**

The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

## **Adaptive Capacity**

The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

## **Climate Change**

Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use.

## **Climate Resilient Pathways**

Iterative processes for managing change within complex systems in order to reduce disruptions and enhance opportunities associated with climate change.

## **Exposure**

The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected.

## **Extreme weather event**

An extreme weather event is an event that is rare at a particular place and time of year. Definitions of rare vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile of a probability density function estimated from observations. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense. When a pattern of extreme weather persists for some time, such as a season, it may be classed as an extreme climate event, especially if it yields an average or total that is itself extreme (e.g., drought or heavy rainfall over a season).

## **Greenhouse gases (GHGs)**

Gases in the atmosphere, natural and anthropogenic, that absorb and emit radiation at specific wavelengths, creating a greenhouse (holding heat and energy) effect. Water vapor, carbon dioxide, nitrous oxide, ozone, and methane are the primary GHGs along with human-made compounds such as hydrofluorocarbons and sulphur hexafluoride. (adapted from Major & O'Grady, 2010)

## **Hydrological cycle**

The cycle in which water evaporates from the oceans and the land surface, is carried over the Earth in atmospheric circulation as water vapor, condenses to form clouds, precipitates over ocean and land as rain or snow, which on land can be intercepted by trees and vegetation, provides runoff on the land surface, infiltrates into soils, recharges groundwater, discharges into streams and ultimately flows out into the oceans, from which it will eventually evaporate again. The various systems involved in the hydrological cycle are usually referred to as hydrological systems.

# DEFINITIONS (CONTINUED)

## **Impacts (consequences, outcomes)**

Effects on natural and human systems. In this report, the term impacts is used primarily to refer to the effects on natural and human systems of extreme weather and climate events and of climate change. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. Impacts are also referred to as consequences and outcomes. The impacts of climate change on geophysical systems, including floods, droughts and sea level rise, are a subset of impacts called physical impacts.

## **Mitigation (of climate change)**

A human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs). This report also assesses human interventions to reduce the sources of other substances which may contribute directly or indirectly to limiting climate change, including, for example, the reduction of particulate matter emissions that can directly alter the radiation balance (e.g., black carbon) or measures that control emissions of carbon monoxide, nitrogen oxides, Volatile Organic Compounds and other pollutants that can alter the concentration of tropospheric ozone which has an indirect effect on the climate.

## **Representative Concentration Pathways (RCPs)**

Scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases (GHGs) and aerosols and chemically active gases, as well as land use/land cover (Moss et al., 2008). The word representative signifies that each RCP provides only one of many possible scenarios that would lead to the specific radiative forcing characteristics. The term pathway emphasizes that not only the long-term concentration levels are of interest, but also the trajectory taken over time to reach that outcome (Moss et al., 2010). RCPs usually refer to the portion of the concentration pathway extending up to 2100, for which Integrated Assessment Models produced corresponding emission scenarios. Extended Concentration Pathways (ECPs) describe extensions of the RCPs from 2100 to 2500 that were calculated using simple rules generated by stakeholder consultations and do not represent fully consistent scenarios.

## **Resilience**

The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation.

## **Sustainable development**

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987 in Mach, Planton, & von Stechow, 2015)

## **Vulnerability**

The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

# ACRONYMS

<b>APA</b>	American Planning Association
<b>CAKE</b>	Climate Adaptation Knowledge Exchange
<b>CART</b>	Connecticut Adaptation Resource Toolkit
<b>C/B Analysis</b>	Cost-Benefit Analysis
<b>CIRCA</b>	Connecticut Institute for Resilience and Climate Adaptation
<b>CLEAR</b>	Center for Land Use Education and Research
<b>COG</b>	Council of Governments
<b>DEEP</b>	Connecticut Department of Energy and Environmental Protection
<b>DEMHS</b>	CT Division of Emergency Management and Homeland Security
<b>DESPP</b>	CT Department of Emergency Services and Public Protection
<b>DPH</b>	Department of Public Health
<b>DOE</b>	Department of Energy
<b>DOT</b>	Department of Transportation
<b>EPA</b>	Environmental Protection Agency
<b>GCM</b>	Global Climate Models
<b>GHG</b>	Greenhouse Gases
<b>ICLEI</b>	International Council for Local Environmental Initiatives
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>LID</b>	Low Impact Development
<b>NCA</b>	National Climate Assessment
<b>NHMP</b>	Natural Hazard Mitigation Plan
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NPCC</b>	New York City Panel on Climate Change
<b>NRCS</b>	Natural Resource Conservation Service
<b>OPM</b>	Connecticut Office of Policy and Management
<b>P&amp;Z</b>	Planning and Zoning Commission
<b>POCD</b>	Plan of Conservation and Development
<b>RCP</b>	Representative Concentration Pathways
<b>REPT</b>	Regional Emergency Planning Team
<b>STAPLEE</b>	Social, Technical, Administrative, Political, Legal, Economic, Environmental
<b>TAHD</b>	Torrington Area Health District
<b>UConn</b>	University of Connecticut
<b>UCS</b>	Union of Concerned Scientists
<b>UN</b>	United Nations
<b>USDA</b>	United State Department of Agriculture
<b>USDA-FS</b>	USDA Forest Service
<b>WUCC</b>	Water Utility Coordinating Committee

# Introduction

The Northwest Hills Council of Governments (NHCOG) is pleased to present this Rural Resiliency Vision and Toolkit for adaptation in the Northwest Hills, made possible by generous funding from the Connecticut Institute for Resiliency and Climate Adaptation (CIRCA). This project is grounded in actionable, and achievable, adaptation strategies with a particular emphasis on the unique vulnerabilities and opportunities of a predominantly rural region. This project includes a vision of *A Resilient Northwest Hills* and a climate change adaptation toolkit for municipalities.

As noted in the recently-released 4th National Climate Assessment (2018), climate change is already affecting communities around the country:

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*"More frequent and intense extreme weather and climate-related events, as well as changes in average climate conditions, are expected to continue to damage infrastructure, ecosystems, and social systems that provide essential benefits to communities. Future climate change is expected to further disrupt many areas of life, exacerbating existing challenges to prosperity posed by aging and deteriorating infrastructure, stressed ecosystems, and economic inequality."*<sup>2</sup>

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In addition to important climate change mitigation efforts, it is critical to the economy, cultural, and social health of our communities that local-scale adaptation is underway. The goal of this toolkit is to assist rural municipalities with identifying and implementing appropriate resiliency actions.

As a region of 21-towns, the Northwest Hills will experience a variety of climate changes including changes to precipitation rates, shifts in seasons, increased high heat and high-ozone days, and extreme weather events. The Litchfield Hills Natural Hazard Mitigation Plan (2016) notes a high probability of several natural hazards including extreme winter weather, flooding, high winds, and wildfire. The region may also encounter dam/levee failure, drought, and earthquakes.



# Introduction

These natural hazards will be precipitated or exacerbated by climate change. Furthermore, rural communities are uniquely vulnerable to climate change because of their: economic dependency on natural resources for agriculture, recreation, ecosystem services, and quality of life; geographic isolation, limited economic diversity, aging population, etc.; and limited transportation, infrastructure, and health/emergency networks. Rural communities also have less technical resources including GIS capacity and information like parcel maps and digital FEMA Flood Insurance Risk Maps (FIRM) maps.

Despite these vulnerabilities and complications, rural communities also have unique strengths. An active volunteer base, traditions of self-reliance and neighborliness, skilled natural resource knowledge, inventive and resourceful community decision-makers, and inter-municipal partnership & planning all contribute to the on-going resiliency of rural communities.

When the science and data become available, a full climate change vulnerability assessment, including flooding, can be conducted. At this time, with limited data and financial capacity, towns will be best served by a compilation of climate change adaptation actions coupled with a clear vision for resiliency in the region—hence, the “Rural Resiliency Vision and Toolkit”.

"Rural America's importance to the country's economic and social well-being is disproportionate to its population, as rural areas provide natural resources that much of the rest of the United States depends on for food, energy, water, forests, recreation, national character, and quality of life. Rural economic foundations and community cohesion are intricately linked to these natural systems, which are inherently vulnerable to climate change."<sup>3</sup>

# Introduction

This project uses five primary categories, resembling the Connecticut Climate Preparedness Plan with the addition of cultural resources. This approach is designed to assist municipalities and partners quickly identify potential actions for which there is political will, funding availability, and public interest for implementation. A number of the resiliency actions fit multiple categories or deliver multiple benefits. The categories are Agriculture, Cultural Resources, Infrastructure, Natural Resources, and Public Health. In addition to this written report, the project includes the following components:

- A printable/downloadable Resiliency Toolkit (this report) that contains:
  - a vulnerability overview for each category, potential partners, potential funding streams, and resiliency actions with potential informative resources;
  - Resiliency/adaptation actions for each category;
  - Two case studies for each topic; and,
  - Links to implementation guidance for municipalities.
- An interactive web-version of the Toolkit (<https://resilientrural.com>)
- A basic interactive web-map to assist towns in screening their vulnerabilities <http://nhcog.maps.arcgis.com/apps/webappviewer/index.html?id=dd66491024ac4dc98c3a3961dc7a2cc3>
- A rural resiliency vision statement and interactive visual (<https://resilientrural.com/rural-resiliency-vision/>)
- Final grant report to UConn CIRCA with recommendation to improve local and state resiliency

This toolkit is different than, albeit congruous, with the recently launched Sustainable CT program. Sustainable CT is a certification program that will assist towns in obtaining funds/grants for sustainability actions. Sustainability (defined below) can certainly overlap with resiliency. In fact, there are some resiliency actions in the Sustainable CT program such as undertaking a Historical Resources Inventory. Resiliency is mostly driven by the impacts of climate change. This Rural Resiliency project is not a certification program. It doesn't have any required paperwork or participation. It is simply a resource to help towns adapt to climate change.

# Introduction

This effort is consistent with NHCOC regional plans and policies. The 2017 Regional Plan of Conservation and Development specifically identifies climate change-related policies such as "assist the region's municipalities with identifying and addressing the potential impacts of increased temperatures, storm events, flooding and habitat degradation to increase local and regional resiliency" and specifically lists "prepare a climate change adaptation plan including a web-based toolkit" as a strategy to help achieve the goal<sup>4</sup>. The toolkit also coincides with Goal 4 of the Northwest CT Comprehensive Economic Development Strategy 2018-2023, which is "continue to implement the Region's Transportation, Land Use, and Hazard Mitigation plans to address economic development issues and resiliency"<sup>5</sup>.

While this project achieves several regional objectives, it can be of service to other municipalities throughout Connecticut and rural municipalities throughout the country. The broad offering of strategies can meet a municipality at its current financial, technical, and administrative capacity.

# Chapter 1

## *Implementing Local Resiliency*

# Implementing Local Resiliency

There are a number of workbooks available to help communities implement resiliency or adaptation programs. It's important to choose a method that focuses on the municipal scale so the actions and guidance are appropriate to community budget, size, and capacity.

Like most planning projects, the basic steps to follow are: Plan, Do, Check, and Act. Implementing programs like this requires fine-tuning and gradual improvement over time based on changing conditions.

## Essentially, towns should:

1. Identify a Resiliency team (local Conservation Commission, Sustainable CT team, should be cross-departments). See Worksheet of suggested contacts for Resiliency Team (<https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-1-Adaptation-Resources-and-Contacts.docx>)
2. Review Existing Plans for Existing Resources & Vulnerabilities (See Worksheet for plans/documents to review <https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-2-Plan-Review-Checklist.docx>)  
\*Consider hosting vulnerability workshop alongside your Natural Hazard Mitigation Plan and/or Plan of Conservation & Development workshops. COGs or initiatives like the Nature Conservancy Community Resiliency Building Workshops can facilitate.
3. Review the Rural Resiliency Vision and Establish Local Resiliency Goals
4. Incorporate Resiliency Actions into Local Resiliency Goals
5. Establish an Implementation & Review Process

Here are some example handbooks about the process:

- **Community Resilience Manual Resources for Rural Recovery and Renewal Canada** (<https://resilientrural.com/wp-content/uploads/2018/11/Community-Resilience-Manual-Resources-for-Rural-Recovery-and-Renewal-Canada.pdf>)
- **Climate-Smart Conservation: Putting Adaptation Principles into Practice** ([www.nwf.org/ClimateSmartGuide](http://www.nwf.org/ClimateSmartGuide))
- **Canadian Institute of Planners, "Climate Change Adaptation Planning: A Handbook for Small Canadian Communities"**: Get Started; Analyze How Local Climate Will Change; Scope Potential Impacts; Assess Risks and Opportunities; Prepare Adaptation Plan; Adopt, Implement, Monitor and Review Adaptation Plan (Bowron & Davidson, 2011)
- **U.S. Climate Resilience Toolkit, "Steps to Resilience": Explore Climate Threats, Assess Vulnerability & Risks, Investigate Options, Prioritize Actions, Take Action.** (U.S. Federal Government, 2016a)
- **ICLEI Preparing for Climate Change Guidebook** (<https://resilientrural.com/wp-content/uploads/2018/11/ICLEI-Preparing-for-Climate-Change-Guidebook-.pdf>)

# Public Participation

Public participation is incredibly important in identifying critical resources, communicating risks, and prioritizing adaptation actions. It can be accomplished alongside many other planning processes like updates to the comprehensive plan or the natural hazard mitigation plan.

Public participation should accompany other outreach techniques implemented as a result of your adaptation efforts such as communication protocols for high heat days or outreach to vulnerable populations.

## Tools

### **Worksheet - Adaptation Resources and Contacts**

<https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-1-Adaptation-Resources-and-Contacts.docx>

### **Worksheet - Plan Review and Checklist**

<https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-2-Plan-Review-Checklist.docx>

**Antioch University New England Webinar “Getting the Message Out”** <http://www.communityresilience-center.org/webinars/getting-the-message-out/>

**Stakeholder Outreach & Community Support Tools** (<https://coresiliency.squarespace.com/articulate-the-roadmap>):

- **Urban Planning and the Public Participation Process:** Explores the use of technology and social media in planning processes.
- **Participation Tools for Better Community Planning:** An overview of public participation tools to help communities plan for land use and transportation programs.
- **Stakeholder Engagement Tools for Action:** An adaptable comprehensive strategy for engaging and maintaining stakeholder input.

### **Great American Adaptation Road Trip**

Interesting stories about climate adaptation from around the United States.  
<https://adaptationstories.com/>

### **Yale Program on Climate Change Communication**

<http://climatecommunication.yale.edu/>

### **National Oceanic Service, NOAA Infographics**

Focuses mostly on coastal issues but great examples of visual communication  
<http://Oceanservice.noaa.gov/infographics/>

# Chapter 2

## *RESILIENCY PLANNING BACKGROUND*

# CONSULTED PLANS

There are numerous plans created by municipalities, regions, and states, which guide their decision-making. Each of these plans and projects were the result of significant public outreach, research, and/or planning efforts. As such, the goals, recommendations, and resources developed from these plans or projects inform resiliency across the main topics. In addition to a review of resiliency information from other states or national documents, the following local, regional, and Connecticut planning-related documents were reviewed for this toolkit:

## **Consulted Plans/Programs (State or State-wide)**

- State Water Plan
- State Climate Change Preparedness Plan
- Draft Natural Hazard Mitigation Plan
- Draft Shared Stewardship: Connecticut State Historic Preservation Office's 2018-2023 Strategic Plan
- Sustainable CT

## **Consulted Plans (Regional)**

- NHCOG Regional Transportation Plan 2016
- NHCOG Northwest Connecticut Comprehensive Economic Development Strategy 2018-2023 Update
- Litchfield Hills Natural Hazard Mitigation plan
- NHCOG Plan of Conservation & Development 2017
- Housatonic River Management Plan. Dodson Associates. September 2006.
- Western Water Utility Coordinating Committee Integrated Report 2018

## **Consulted Plans (Local)**

- Natural Hazard Mitigation plans for towns in NHCOG region including Burlington, Canaan, Cornwall, Kent, North Canaan, Roxbury, Salisbury, Sharon, Warren, and Washington)
- Plans of Conservation & Development (municipal and regional)

## **CIRCA Products**

- NHCOG and Northwest Connecticut Conservation District, "Building Municipal Resilience & Climate Adaptation through Low Impact Development", CIRCA-funded project
- CIRCA, Municipal Resilience Planning Assistance for Sea Level Rise, Coastal Flooding, Wastewater Treatment Infrastructure, & Policy
- SAFR Connecticut Connections Vulnerability Assessment and Resilience Concept – National Disaster Resilience Competition (NDRC) (This project will use the concept of *Resilient Zones* to draft a narrative vision of a *Resilient Northwest Hills*)
- CIRCA, Drinking Water Vulnerability Assessment and Resilience Plan (<https://circa.uconn.edu/projects/drinking-water-vulnerability-assessment-and-resilience-plan/>)
- SCRCOG-Climate Adaptation and Resiliency Planning for Protection of Public Drinking Water
- CIRCA - Financing Resilience in Connecticut: Current Programs, National Models, & New Opportunities <http://nsglc.olemiss.edu/sglpj/vol8no1/3-french-et-al.pdf>



# OUTREACH

Over the course of this project, the following organizations and agencies were solicited for information:

- State Agencies
- Former Adaptation Subcommittee from the CT Climate Preparedness Plan
- Environmental Protection Agency
- UConn CIRCA
- Local historic commissions
- Local land use, energy, and conservation commissions
- Regional land trust organizations
- Agricultural advocacy organizations
- Municipal officials including chief elected officials, health departments, public works, and Emergency Management Directors
- Adaptation and resiliency projects from New Hampshire, Vermont, Rhode Island, California, and Colorado

Project outreach occurred in two primary ways, education and information solicitation. Input was sought from the Region 5 Regional Emergency Planning Team (REPT), NHCOC Public Safety Task Force (PSTF), Emergency Management Directors, energy commissions, land use commissions, conservation commissions, and from cultural, public health, and agricultural institutions in region. The author of the toolkit presented the project at the following forums:

- Presentation at NHCOC meeting – 10/12/17
- Presentation at DEHMS Region 5 REPT – 11/20/17
- Presentation at CIRCA Municipal Resiliency Forum – 5/11/18
- Rural Resiliency Sharing Session – 7/26/2018
  - Invitations to stakeholders from the NHCOC and organizations from each primary category
  - Flyer <https://resilientrural.com/wp-content/uploads/2018/11/Resiliency-Forum-Flyer.jpg>
  - Agenda <https://resilientrural.com/wp-content/uploads/2018/11/Sharing-Session-Agenda.pdf>
- Presentation at DEHMS Region 5 REPT Steering Committee and Survey– 8/8/18  
Survey available here: <https://resilientrural.com/wp-content/uploads/2018/11/Survey-for-REPT-Steering-Committee.pdf>
- Southern New England American Planning Association Conference – 10/19/18  
Presentation available here: <https://resilientrural.com/wp-content/uploads/2018/11/JWB-SNEAPA-Resiliency-Toolkit-Presentation.pdf>
- Presentation at NHCOC meeting – 11/8/18

# OUTREACH (Continued)

Numerous local, regional, and state organizations were contacted and invited to provide the following:

- GIS maps;
- Adaptation case studies for topics such as agriculture, infrastructure, natural resources, public health, and cultural resources;
- Strategies or policies in your organization regarding adaptation/resiliency; and
- Current or forthcoming resources on adaptation or resiliency that may be helpful to municipalities or local organizations.

Invited examples of potential information included:

- ecological habitats at the highest risk from climate change: Cold Water Streams, Tidal Marsh, Open Water Marine, Beaches and Dunes, Freshwater Wetlands, Offshore Islands, Major Rivers, and Forested Swamps for the state and/or NW Hills
- Temperature changes in inland waterbodies
- changes in vector borne diseases in the state
- changes in vector populations (e.g. ticks, mosquitoes)
- private water well usage and/or failures
- Farmland properties in state
- Loss/gain of farmland
- Critical infrastructure in flood-prone areas (FEMA won't have digital FIRM maps for NHCOC region until 2022 so any existing digital flood data for northern CT would be very helpful)
- Maple syrup production in the state (and/or reports on Maple health in the state)
- Anticipated temperature impacts on bridges and dams
- Changes in forest flora and fauna composition
- Vulnerability/Adaptation reports for agencies, organizations, or municipalities in the state
- Lists of cultural resources that may be at risk to climate change in Connecticut (historical sites, buildings, social groups, etc.)
- Estimates on disproportionate climate change impact on vulnerable populations.

# Chapter 3

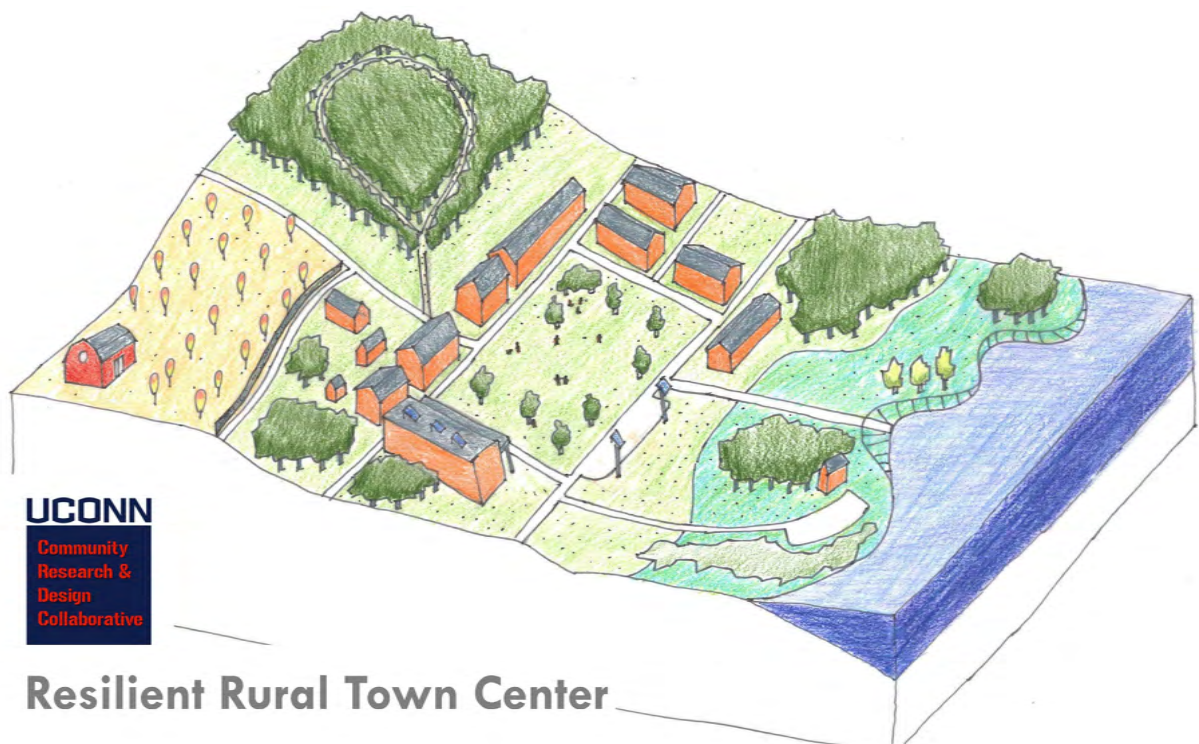
## *Rural Resiliency Vision*

A Rural Resiliency Vision includes a holistic approach, combining sector-specific climate adaptations with traditional rural character components. Specific care should be taken to address issues that occur at greater frequency or impact in rural communities due to their specific circumstances. The following Resilient Rural Community Vision Statement was crafted from the climate change preparedness documents, local plans of conservation and development, research on rural character, and outreach efforts.

Rural resiliency illustrations are available in Appendix A for agriculture, cultural resources, infrastructure, natural resources, public health, and a resilient rural town center. These illustrations were developed using rural characteristics listed in Wozniak-Brown (2017) and created by Peter Minutti of the University of Connecticut.

**Explore the Resilient Rural Vision images available here:**

<https://resilientrural.com/rural-resiliency-vision/>



**Resilient Rural Town Center**

# Resilient Rural Community Vision Statement

Rural resiliency is the ability of a rural community or region *to withstand, recover from, and successfully adapt to economic and environmental change and to emerge stronger and better adapted. A truly resilient rural community and region will implement strategies to manage change while maintaining and celebrating its rural character.*

## ***A Resilient Rural Community:***

- Learns about the threats from climate change;
- Incorporates resiliency across local plans and staff positions in local government;
- Strengthens their town center so that residents may still work, live, and play;
- Prepared to respond to large-scale disasters and small-scale changes;
- Able to manage extreme events with minimal disruption of day to day activities;
- Practices responsible and system-wide planning;
- Continues to improve their adaptive capacity and resiliency planning;
- Listens to multiple stakeholders;
- Provides equitable access to the social services, health care, and education needed to maintain capacity, flexibility, and high quality of life;
- Offers a diverse range of housing and multi-modal transportation options;
- Protects small businesses, farms, and historical resources;
- Encourages neighbors helping neighbors;
- Manages its natural resources responsibly;
- Designs infrastructure appropriate to the community;
- Develops strong partnerships with public, non-profit, and private groups throughout the region; and,
- Celebrates the unique rural character attributes of their community.

# Chapter 4

## *Resiliency Tools*

# INTRODUCTION

This chapter focuses on the Climate Change Adaptations and Resiliency Tools and has the following sections:

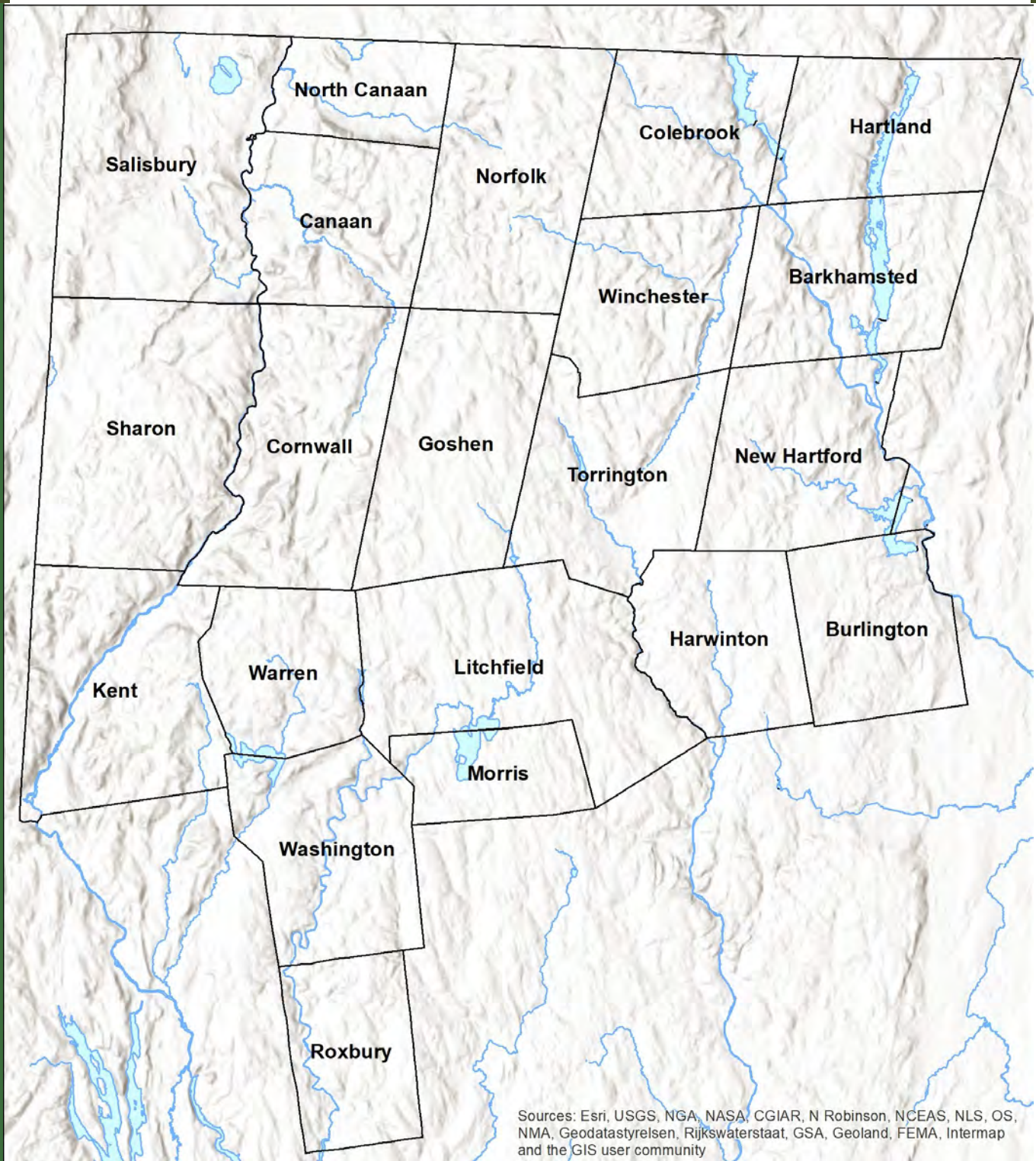
- General Impacts of Climate Change and Adaptation Tools
- Agriculture
- Cultural Resources
- Infrastructure
- Natural Resources
- Public Health

The "**General Impacts**" section provides an overview of climate change and background on resiliency. The subsequent sections follow this basic outline: Category Description, Vulnerability Overview, Potential Partners, Potential Funding Streams, General Tools, and Actions.

- The **Category Description** provides a brief overview of what the category entails with a little background on that category in Connecticut.
- The **Vulnerability Overview** includes a general list of potential vulnerabilities associated with each category in Connecticut. These vulnerabilities may vary in risk depending on location and are not necessarily transferable to other geographies.
- The **Potential Partners** listed may be able to assist with various parts of implementing the action with funding knowledge, technical expertise, or serving as a team member.
- **Potential Funding Streams** are not exhaustive but may provide alternatives to traditional municipal funding opportunities.
- **General Tools** provide overall guidance about the category and strategies for climate adaptation.
- **Actions**, also listed in Appendix B, are specific activities that can be conducted at the local scale for each category and sub-category. Useful tools or examples are provided underneath each action.

For the purposes of this toolkit, the terms resiliency and adaptation are used often. Simply put, resiliency is the ability to respond to hazardous changes and return to routine day to day operations. It is for both short-term impacts (e.g. hurricanes) and long-term impacts (e.g. warming temperatures). Adaptation includes the strategies put in place to make a place resilient, such as flood walls or cooling centers.





# GENERAL IMPACTS



# Category Overview

As science continues to improve, large scale climatic changes and their resulting impacts are becoming more obvious with calculable devastation. Climate change, previously referred to as "global warming", is a label for the global changes to typical meteorological patterns with cascading impacts. The name was changed from 'global warming' to reflect the broader changes that are happening.

Climate change information can be found at international, national, state, and regional scales. Most of these impacts are estimated using predictive modeling based on the range climate change drivers. The most recent reports include:

- IPCC Intergovernmental Panel on Climate Change (IPCC) report International Fifth Assessment Report
- National Climate Assessment (2018)
- CT Impacts of Climate Change (2010)
- CT Climate Change Preparedness Plan (2011)

Northwest Connecticut has a lot to offer current and future residents, job seekers, businesses, and entrepreneurs, including:

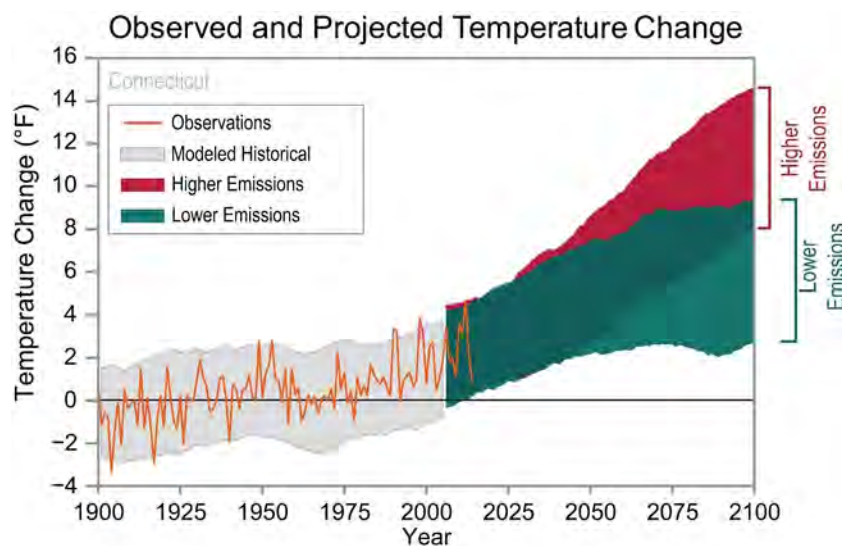
- Highly educated workforce;
- Regional location with access to NYC and Boston markets;
- High quality of life, including arts and cultural amenities, great schools, strong culture of volunteerism/civic pride, historic New England villages and Main Streets;
- Outstanding outdoor recreational amenities, including hiking, biking, skiing, and boating
- Farmers markets, small farms, and a regional Food Hub;
- Robust ecosystem of support for small businesses, entrepreneurs, and start-ups; and
- Strong advanced manufacturing and healthcare sectors.

*(Northwest Connecticut Comprehensive Economic Development Strategy 2018-2023 Update)*

# Category Overview

Generally, climate change impacts to Connecticut include:

- Overall, Connecticut is getting warmer. Average temperatures could rise between 8 to 12 F degrees in summer. Summers in western Connecticut by 2070 will resemble Virginia or Georgia under lower- emissions or higher emissions scenarios, respectively (Frumhoff et al., 2007). Temperatures may increase between 4 and 7.5 degrees F by 2100 with heatwaves increasing in frequency, duration, and intensity according to earlier reports (Adaptation Subcommittee, 2011). It seems likely that the northern sections of Connecticut may experience slightly higher temperature changes than the coastal areas (Kunkel et al., n.d.).
- Winter precipitation will be mostly rain.
- Precipitation will occur in heavier events with extensive flooding possible.
- Summer drought conditions will increase.
- Warmer temperatures will bring earlier breakup of winter ice on lakes and rivers with earlier peak river flows (10 days to two weeks earlier, Frumhoff et al. 2007).
- Streamflow could drop by 10% by end of the century (Frumhoff et al. 2007).
- Sea level may increase by 12 to 23 inches by the end of the century.
- Intense events and sea level rise may increase flood zone and inundation areas.
- From 1958 to 2012, the Northeast has seen a 71% increase in "very heavy" (heaviest 1% of all daily events) precipitation (Walsh et al., 2014). By the end of the century, it may increase by 5 to 10% more; despite the increases and likely heavy downpours, droughts may be more frequent and intense or last longer (Adaptation Subcommittee, 2011).



Runkle, J., K. Kunkel, S. Champion, D. Easterling, B. Stewart, R. Frankson, and W. Sweet, 2017: Connecticut State Climate Summary. *NOAA Technical Report NESDIS 149-CT*, 4 pp. Figure 7.1

## Potential Partners

- ◇ UConn CIRCA
- ◇ CT DEEP
- ◇ CT DEEP - Bureau of Energy and Technology Policy, Office of Climate Change Technology & Research Division
- ◇ Adapt CT
- ◇ Councils of Governments
- ◇ Local college/universities
- ◇ EPA Region One
- ◇ Local Land Use Commissions
- ◇ Department of Public Works (local and state)
- ◇ CT DOT
- ◇ FEMA
- ◇ DEHMS
- ◇ DESPP



## Potential Funding Streams

- ◇ Connecticut Institute for Resiliency & Climate Adaptation (CIRCA) Matching Grants Program & Municipal Resilience Grant Program
- ◇ Northwest Connecticut Community Foundation
- ◇ Connecticut Community Foundation
- ◇ [Funding Fact Sheet "Financing Resilience in Connecticut: Current Programs, National Models, and New Opportunities."](#)



# General Tools

## Connecticut Impacts

### CT DEEP Climate Adaptation planning

[https://www.ct.gov/deep/cwp/view.asp?a=4423&q=532604&deepNav\\_GID=2121](https://www.ct.gov/deep/cwp/view.asp?a=4423&q=532604&deepNav_GID=2121)

### Connecticut Physical Climate Science Assessment Report

<https://circa.uconn.edu/ct-climate-science/#>

### Building the Knowledge Base for Climate Resiliency (2015)

Produced by the New York City Panel on Climate Change, this report offers a lot of information about the impacts of climate change on the New York metropolitan area, including portions of Connecticut. The previous report (2009) was used for the Connecticut Climate Change Preparedness Plan.

### The Impacts of Climate Change on Connecticut Agriculture, Infrastructure, Natural Resources and Public Health (2010)

(<https://resilientrural.com/wp-content/uploads/2018/10/CT-impactsofclimatechange.pdf>)

The Adaptation Subcommittee of Governor's Steering Committee on Climate Change present the impacts of climate change on four main categories, as identified by the enabling legislation. The categories are infrastructure, natural resources and ecological habitats, public health, and agriculture.

### National Climate Assessment Connecticut Fact Sheet (<https://resilientrural.com/wp-content/uploads/2018/11/NCA-Connecticut-Factsheet.pdf>)

### Connecticut Climate Preparedness Plan (2011)

The steering committee (now Governor's Council on Climate Change or GC3) produced a swatch of adaptation strategies. They focus on the topics of agriculture, infrastructure, natural resources, and human health since the legislature directed them to these topics. Regardless, a number of the suggested strategies require municipal action and even leadership. For example, the report suggested: educate local health department staff on climate change impacts, minimize combined sewer overflows, Implement new or modified policies that would encourage appropriate land use and reduce repetitive losses (Adaptation Subcommittee of Governor's Steering Committee on Climate Change, 2011)([https://resilientrural.com/wp-content/uploads/2018/10/CT-connecticut\\_climate\\_preparedness\\_plan\\_2011.pdf](https://resilientrural.com/wp-content/uploads/2018/10/CT-connecticut_climate_preparedness_plan_2011.pdf))

### A Report to the Town of Groton and Communities throughout New England from ICLEI-Local Governments for Sustainability and Connecticut Department of Environmental Protection"

April 2011, Missy Stults and Jennifer Pagach [http://www.groton-](http://www.groton-ct.gov/depts/plandev/docs/Final%20Report_Groton%20Coastal%20Climate%20Change%20ProjectJP.pdf)

[ct.gov/depts/plandev/docs/Final%20Report\\_Groton%20Coastal%20Climate%20Change%20ProjectJP.pdf](http://www.groton-ct.gov/depts/plandev/docs/Final%20Report_Groton%20Coastal%20Climate%20Change%20ProjectJP.pdf)

**Other programs in Connecticut:** Resilient Bridgeport, Stamford 2030, New Haven Climate & Sustainability Framework, Nature Conservancy Coastal Resilience Tool

# General Tools

(Continued)

## General Climate Change Resources

### **Worksheet - Adaptation Resources and Contacts**

<https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-1-Adaptation-Resources-and-Contacts.docx>

### **Worksheet - Plan Review and Checklist**

<https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-2-Plan-Review-Checklist.docx>

**National Climatic Data Center**— *A comprehensive resource focusing on climate change and climate related impacts by NOAA.*

**NOAA Climate Literacy Program** <https://cpo.noaa.gov/Meet-the-Divisions/Communication-Education-and-Engagement/Climate-Literacy>

### **International Fifth Assessment Report (2014)**

These Intergovernmental Panel on Climate Change (IPCC) reports are major international efforts across numerous scientific disciplines. They offer a physical science basis for climate change, mitigation, adaptation/vulnerability observations, and a synthesis report. There's also a "Summary for Policy-makers."

<https://www.ipcc.ch/report/ar5/>

### **U.S. National Climate Assessment (2018)**

This report summarizes the impacts of climate change across the United States. It is a partnership of experts and Federal Advisory Committee with extensive review by other agencies and experts. <https://nca2018.globalchange.gov/>

### **U.S. Climate Resilience Toolkit**

<https://toolkit.climate.gov/>

### **U.S. Climate Resilience Toolkit - Northeast US Resilience**

<https://toolkit.climate.gov/regions/northeast/building-resilience-northeast>

### **PrepData** <https://www.prepdata.org/>

Climate data visualization and interactive map

### **Antioch University New England Webinar "Navigating the US Climate Resilience Toolkit"**

<http://www.communityresilience-center.org/webinars/navigating-the-u-s-climate-resilience-toolkit/>

# General Tools

(Continued)

## Adaptation Guidance

**"Assessing Your Community's Economic & Climate Resiliency" NY Climate Smart Communities webinar**  
<https://goo.gl/dQfPsw>

### **RPLC -CAPR Building Capacity for Rural Adaptation**

Lauren Rethoret, Ingrid Liepa, Video, PowerPoint

### **Connecticut Adaptation Resource Toolkit (CART)**

<http://www.ct.gov/deep/cwp/view.asp?a=4423&q=531864>

### **EPA Climate Change: Resilience and Adaptation in New England (RAINE)**

Searchable case-studies throughout New England

<https://www.epa.gov/raine/search-resilience-and-adaptation-new-england-raine-database>

### **Climate Change Adaptation Resource Center (ARC-X)**

<https://www.epa.gov/arc-x>

**Climate Adaptation Knowledge Exchange (CAKE)** Put together by Island Press and Eco-Adapt, CAKE is an online forum aimed at building a shared knowledge base for managing natural systems in the face of climate change. The website includes information about adaptation case studies, links to climate change tools, and other resources. CAKE also puts out a monthly newsletter with recent adaptation-related developments. <http://www.cakex.org/>

### **Adaptation Clearinghouse** (Georgetown Climate Center)

Links to resources, expert organizations, assessments and state and local adaptation plans. <http://www.georgetownclimate.org/adaptation/clearinghouse>

**State and Local Climate Adaptation Plans** (Center for Climate and Energy Solutions) <http://www.c2es.org/us-states-regions/policy-maps/adaptation>

### **New Jersey Getting to Resilience: A Community Planning Evaluation Tool**

<http://www.prepareyourcommunitynj.org/>

### **The Nature Conservancy's Community Resilience Building Workshop**

<https://www.communityresiliencebuilding.com/>

**Antioch University New England Webinar "Incorporating Climate Solutions into Day to Day Adaptation"** (<http://www.communityresilience-center.org/webinars/3260/>)

Participants in this webinar learned how to approach development, financing and implementation of climate adaptation strategies across all municipal planning activities.

# General Tools

(Continued)

## Northeast States & Canada Information

**NHDES - Adaptation Tool-kit**—New Hampshire has recently developed an Adaptation Tool-kit. The Tool-kit has information on state, regional, and local initiatives as well as suggestions for climate change messaging, starting community conversations, case studies, vulnerability assessments, planning, implementation, funding and other resources.

**The Resilient Vermont Project**— A project led by the Institute for Sustainable Communities that is developing statewide recommendations to build climate resiliency into Vermont communities, state and environment.

**Resilient Massachusetts** - <http://resilientma.org/> - The Massachusetts Climate Change Clearinghouse (resilient MA) is a gateway for policymakers, local planners, and the public to identify and access climate data, maps, websites, tools, and documents relevant to climate change adaptation and mitigation across Massachusetts.

**Vermont Agency of Natural Resources Climate Change Team**— Web site for information on climate change and what it means for Vermont and Vermonters. Includes a catalog of ongoing climate-change initiatives, reports on the state's greenhouse gas emissions, some background on the climate change issue, a discussion of the adaptation issues including a series of white papers addressing adaptation in eight sectors; a library of state plans and reports, a list of actions individuals can take to make a difference, and a link to a quarterly newsletter.

**New York Climate Smart Communities** <https://climatesmart.ny.gov/> - Climate Smart Communities (CSC) is a New York State program that helps local governments take action to reduce greenhouse gas emissions and adapt to a changing climate. Benefits include leadership recognition, free technical assistance, and access to grants.

**Maine Adaptation Toolkit** <https://www.maine.gov/dep/sustainability/climate/adaptation-toolkit.html>

**New Jersey Getting to Resilience: A Community Planning Evaluation Tool**

<http://www.prepareyourcommunitynj.org/>

**Northeast Regional Vulnerability Assessment** <https://www.climatehubs.oce.usda.gov/hubs/northeast/topic/northeast-regional-vulnerability-assessment>

**New England Federated Partners** - Collection of federal agencies cooperating to advance resiliency. <https://toolkit.climate.gov/NEFP>

**2018 CRRF Panel – Canada in a Changing Climate: Rural and Remote Communities**

Sean Manners, Kelly Vodden, & Amp Kipp, Video

**2018 CRRF Rural Resilience**

Stephen Penner, Diane Looker, Stephanie Gariscsak, & Tracey Harvey, Video

# General Tools

(Continued)

## Local & Regional Projects

### Local Communities Adapting to Climate Change

This online course, put together by the Lincoln Institute of Land Policy, the Consensus Building Institute, and Bio-Era, is intended to guide decision makers and other stakeholders in managing the risks associated with climate change at the local and regional levels. <http://web.mit.edu/tschenk/www/AdaptationCourse/index.html>

### Antioch University New England Webinar "Regional Collaboration for Resilience: How to build effective, sustainable cross-jurisdictional climate collaboratives"

(<http://www.communityresilience-center.org/webinars/regional-collaboration-for-resilience/>)

### Hartford Climate Stewardship Initiative (mostly climate mitigation efforts but informative)

<https://hartfordclimate.org/our-plan/>

### Northwest Hills COG Vulnerability Screening Map

<http://nhcog.maps.arcgis.com/apps/webappviewer/index.html?id=dd66491024ac4dc98c3a3961dc7a2cc3>

### SCCOG Resilience Initiatives

- Hazard Mitigation Plans
- Critical Facilities Assessment
- CRS Study (on-going)
- Regional Resilience Guidebook (*The Nature Conservancy*)
- Regional POCD

### Local Resilience Initiatives

- East Lyme coastal resilience study (on-going)
- Preparing for Climate Change in Groton, CT
- Bank St New London CT coastal flood mapping and design
- Stonington, CT Resiliency Plan
- Waterford municipal infrastructure resilience project
- Waterford climate change risk vulnerability, risk assessment and adaptation study
- ECSU and Windham community resilience building workshop





# AGRICULTURE

# Category Overview

In rural communities, agriculture remains an important contribution to resource conservation, regional economies, and community character. Farms and agriculture are prioritized in local comprehensive plans in the Northwest Hills.

In addition to the food system, agriculture provides numerous economic benefits especially through co-benefits through "agri-tourism" such as pick-your-own apples, berries, plums, etc.; event hosting such as weddings; and health/spa/yoga retreats.

Agriculture in Connecticut contributes up to \$4.0 billion in output, 21,696 jobs, and significant social and environmental benefits (Lopez, R.A., Boehm, R., Pineda, M., Gunther, P., and Carstensen, F. Economic Impacts of Connecticut's Agricultural Industry: Update 2015. Zwick Center for Food and Resource Policy Outreach Report No. 47, University of Connecticut, September 2017)

According to the Northwest Connecticut Food Hub Feasibility Study (March 2016), agriculture in the region:

- Produces diverse products, ranging from standard vegetable products (tomatoes and potatoes) to proteins and dairy to maple syrup and honey.
- Has about 1,207 farms across 90,963 acres with the highest number of farms in the state.
- Has these top agricultural product categories: dairy, vegetables, fruit, and cattle/calf.

Farms and farmers' markets are depicted on the [interactive web map](#).

# Vulnerability Overview

- Maple syrup, dairy operations, warm weather crops, shellfish, and apple/pear production most at risk.
- Maple syrup may be impossible by 2080. ([See potential maple syrup adaptations](#))
- Increased population of pests/pathogens like colonial worm and water mold.
- Increased chance for run-off/leaching during storm events
- Increased severe weather like tornado/hurricane/hail/drought and increase in CO2 damage to crops
- Farms in low-lying areas at risk of flooding.
- Shellfish susceptible to pH changes in ocean.
- Too much precipitation and hail/ice could damage fruit.
- Changing frost dates create uncertain growing season.
- Witch hazel, bio-fuel, grapes may expand production.
- Warm weather produce may have longer growing season.
- Changes to transportation with threats to rail and ocean shipping routes.
- Connecticut may be able to expand food production with decreases in water availability and increases in fires in other regions.
- Local skills may increase resiliency.

In addition to the climatic shifts, agriculture is also vulnerable to large market pressures for fuel and product sales, costs of land and equipment, losses of large parcels, and loss of inter-generational farming knowledge. However, there are opportunities as a result of climate change in local food markets, longer growing seasons and certain crops like biofuel, witch hazel, and grapes

## Potential Partners

- ◇ Housatonic Valley Association
- ◇ Northwest Conservation District
- ◇ Local and regional land trusts
- ◇ American Farmland Trust
- ◇ Working Lands Alliance
- ◇ Partnership for Sustainable Healthy Communities
- ◇ USDA
- ◇ CT Department of Agriculture
- ◇ Northwest Hills Food Hub
- ◇ Food Solutions New England
- ◇ Connecticut Food System Alliance
- ◇ CT Grown Program
- ◇ CT Agricultural Experiment Station
- ◇ DEEP Food Waste Reduction & Recovery
- ◇ CT Extension
- ◇ UVM Extension - Center for Sustainable Agriculture
- ◇ Connecticut Resource Conservation and Development
- ◇ CT Farm Bureau
- ◇ Advocate
- ◇ Local and regional land trusts
- ◇ New CT Farmers' Alliance

## Potential Funding Streams

- ◇ CT Resource Conservation and Development
- ◇ CT Department of Agriculture Farm Viability Grants
- ◇ USDA Natural Resources Conservation Service
- ◇ USDA Farm Service Agency (FSA) – CT  
[www.fsa.usda.gov/ct](http://www.fsa.usda.gov/ct)
- ◇ USDA Equip
- ◇ CT Farm Energy Program [www.ctfarmenergy.org](http://www.ctfarmenergy.org)





# General Tools

**Adaptation Resources for Agriculture: Responding to climate variability and change in the Midwest and Northeast.** Janowiak, Maria, Daniel Dostie, Michael Wilson, Michael Kucera, R. Howard Skinner, Jerry Hatfield, David Hollinger, and Chris Swanston. 2016. Tech. Bulletin 1944. Washington, DC: U.S. Department of Agriculture. 70p.

**Institute for Agriculture & Trade Policy** - Review of state adaptation plans that include agriculture.  
<https://www.iatp.org/state-climate-adaptation-plans>

The **Climate Smart Farming program** (<http://climatesmartfarming.org/resources/preparing-smallholder-farm-families-to-adapt-to-climate-change/>) is a voluntary initiative that helps farmers in New York and the Northeastern US. They also have specific resources for small farms (<http://climatesmartfarming.org/resources/preparing-smallholder-farm-families-to-adapt-to-climate-change/>).

## **USDA Adaptation Resources for Agriculture**

[https://www.climatehubs.oce.usda.gov/sites/default/files/adaptation\\_resources\\_workbook\\_ne\\_mw.pdf](https://www.climatehubs.oce.usda.gov/sites/default/files/adaptation_resources_workbook_ne_mw.pdf)

**Best Management Practices for On-Farm Climate Change Resilience in the Northeast: Social, Ecological and Economic Implications.** January 20, 2016 Webinar. Presenters/Authors: David Conner, Associate Professor, Rachel Schattman, PhD Candidate, University of Vermont, Burlington, VT <http://www.climatewebinars.net/webinars/best-management-practices-for-on-farm-climate-change-resilience-in-the-northeast/>

## **USDA Northeast Climate Hub** [www.climatehubs.oce.usda.gov/northeast](http://www.climatehubs.oce.usda.gov/northeast)

With fact sheets on cover-cropping, managing grazing to improve climate resilience, and weather/climate considerations: <https://www.climatehubs.oce.usda.gov/archive/northeast/educational-materials/adaptationfactsheets.html>

## **USDA Report on Climate Change and Food Security**

[http://www.usda.gov/oce/climate\\_change/FoodSecurity.htm](http://www.usda.gov/oce/climate_change/FoodSecurity.htm)

## **UVM- Vermont Farm Resilience in a Changing Climate Initiative**

<http://www.uvm.edu/sustainableagriculture/>

## **USDA- Extension Centers**

Education for Extension Professionals, crop advisors and foresters to increase climate literacy  
[www.Climatelearning.net](http://www.Climatelearning.net)

## **Cornell Northeast Regional Project website for Animal Agriculture and Climate Change**

[http://www.manuremanagement.cornell.edu/Pages/Animal\\_Ag\\_Climate/AnimalAgClimateChange.html](http://www.manuremanagement.cornell.edu/Pages/Animal_Ag_Climate/AnimalAgClimateChange.html)

**Clovercrest Farm: A Family Dairy in Charleston, Maine** : <https://www.climatehubs.oce.usda.gov/hubs/northeast/project/clovercrest-farm-family-dairy-charleston-maine>

# General Tools

(Continued)

**"Unique challenges and opportunities for northeastern US crop production in a changing climate" Journal Article**

<https://link.springer.com/article/10.1007/s10584-017-2109-7>

**"Climate change effects on livestock in the Northeast US and strategies for adaptation" Journal Article**

<https://link.springer.com/article/10.1007/s10584-017-2023-z>

**American Farmland Trust and Connecticut Conference of Municipalities**

"Planning for Agriculture: A Guide for Connecticut Municipalities" [https://www.ct.gov/doag/lib/doag/farmland\\_preservation\\_/2012\\_planning\\_for\\_ag.pdf](https://www.ct.gov/doag/lib/doag/farmland_preservation_/2012_planning_for_ag.pdf)

**Freund's Farm, East Canaan, CT Case Study**

<https://resilientrural.com/wp-content/uploads/2018/12/Agriculture-Freunds-Farm-East-Canaan.pdf>

**Interlace Farm & Agroforestry Case Study**

<https://resilientrural.com/wp-content/uploads/2018/12/Agricultural-Interlace-Farm.pdf>

## Actions Overview

The section is divided into the following major categories:

- Increased Management of Resources
- Land Use
- Infrastructure Changes
- Regulatory/Policy Changes
- Education/Outreach/Technical Assistance
- Bees & Pollinators

# ACTIONS

## Increased Management of Resources

<b>1Ag</b>	<b>Provide incentives for energy and water efficiency through technical assistance and grant programs. Promote policies to reduce energy use, conserve water, and encourage sustainability.</b>
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**Potential Partnerships:** Farms, USDA, CT RC&D, local land use commissions, energy commissions

**Tools:**

**USDA NRCS Energy Audits**

**CT Farm Energy Program**

**New York State Resilient Farming (CFR) Program**

<https://www.nys-soilandwater.org/programs/crf.html>

<b>2Ag</b>	<b>Conserve/reduce water use/demand among all user groups for example reduce water losses in distribution systems.</b>
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**Potential Partnerships:** Farms, USDA, CT RC&D, land trusts

**Tools:**

**USDA NRCS**

**Case Study—** Agroforestry in Essex, NY

<b>3Ag</b>	<b>Provide incentives for energy and water efficiency through technical assistance and grant programs.</b>
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**Potential Partnerships:** Farms, USDA, CT RC&D

**Tools:**

**USDA COMET-farm**

<http://cometfarm.nrel.colostate.edu/>

**Connecticut Farm Energy Program**

<https://www.ctfarmenergy.org/>

<b>4Ag</b>	<b>Increase storage of precipitation among all user groups. Remove regulations that prohibit capture of runoff from roofs, parking lots, etc. Allow storage in ponds, cisterns and tanks for use in greenhouses and horticulture operations.</b>
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**Potential Partnerships:** Farms, local land use commissions, Public Works, CT DOT, Conservation Districts, UConn NEMO

<b>5Ag</b>	<b>Encourage water re-use including, but not limited to: remove regulations, institute health practices, or educate public on how to reclaim water for irrigation, cooling, washing, processing, etc.</b>
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**Potential Partnerships:** Conservation Commissions

# ACTIONS

## Increased Management of Resources

6Ag	Increase soil organic matter and utilize surface cover through cover crops, mulches, crop rotations and tillage practices. Promote good soil/landscape management. Utilize quality land/soil management practices (good drainage, no till agriculture to prevent erosion).
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**Comments/Descriptions:** Consider areas of town properties that require periodic cutbacks every few years or suffer from invasive species; these might benefit from cover crops (such as clover to benefit pollinators) or other productive vegetation (fruit/nut trees for the community). Ask Conservation Commission for advice for creating seasonal habitats or appropriate plantings. Consider property's use, i.e., if public access maybe edible ornamentation might be preferable.

**Potential Partnerships:** Conservation Commissions

**Tools:** USDA/RC&D Soil Health workshops and resources <https://ctrctd.org/agriculture/soil-health-initiative/>

7Ag	Identify on-farm adaptations for specialized products such as maple syrup or dairy.
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**Potential Partnerships:** Farms, USDA, CT RC&D

**Tools:**

**Maple Syrup adaptations**

<https://resilientrural.com/wp-content/uploads/2018/11/Maple-Syrup-Case-Study-from-NY-ClimAID.pdf>

8Ag	Increase the use of sustainable and organic growing methods and management practices and reduce uses of fertilizers, dyes, pesticides in property management where possible.
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**Potential Partnerships:** Farms, CT NOFA

**Tools:**

**UCS What is Sustainable Agriculture?**

<https://www.ucsusa.org/food-agriculture/advance-sustainable-agriculture/what-is-sustainable-agriculture>

9Ag	Develop and promote community garden spaces on municipal land.
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**Comment/Description:** Sustainable CT Action 4.3.

**Potential Partnerships:** CEOs, local agricultural commissions, land trusts

10Ag	Increase crop diversity (including native crops)
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**Potential Partnerships:** Farms, local agricultural commissions



# ACTIONS

## Land Use

11Ag	Consider the need for access to new lands for expansion of maple sugar operations in the near term, to buffer orchards and dairy farms, and to allow for land to grow new varieties of fruit trees and dairy support crops.
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**Comments/Descriptions:** Incorporate farmers into discussion for POCD and conservation areas (especially higher elevations). Consider long-term road-side maintenance and replacement of maple trees.

**Potential Partnerships:** Local agriculture commissions, agriculture advocacy organizations, land use commissions

12Ag	Continue preservation of prime and important farmland soils in order to secure ecosystem services these lands provide. Continue to protect prime and important farmland soils close to population centers. Include in state and local POCDs, open space management plans, and Natural Resources Inventories.
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**Potential Partnerships:** local land use commissions, Housatonic Valley Association, Connecticut Farmland Trust, USDA/NRCS, CT Dept of Ag., land trusts

**Tools:** CT Environmental Conditions Online (CT ECO) Map Viewer

13Ag	Consider soil-based zoning that directs development away from agricultural soils.
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**Potential Partnerships:** local land use commissions

**Tools:**

Kent, CT Soil-based zoning regulations

14Ag	Encourage preservation of small, sustainable, diverse, community-supported farms in order to secure the ecosystem services these lands provide while educating the public about the importance of agriculture systems.
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**Potential Partnerships:** local land use commissions, agricultural advocacy groups, economic development groups, CT NOFA, land trusts

**Tools:** CT Dept of Ag "Community Farms Preservation Program" (former program)

15Ag	Encourage reuse of brownfields for agricultural use (such as aquaponics), as appropriate. Reuse urban buildings for agriculture and promote vertical agriculture, e.g. green roofs, etc.
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**Potential Partnerships:** local land use commissions, agricultural advocacy groups, economic development groups

**Tools:** CT DECD Brownfields Program

**EPA FAQs on Brownfields and Agriculture** <https://www.epa.gov/brownfields/frequent-questions-about-brownfields-and-urban-agriculture>

# ACTIONS

## Land Use

16Ag	Increase the amount of land in organic production systems and promote protection of these lands.
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**Comments/Descriptions:** Incorporate farmers into discussion for POCD.

**Potential Partnerships:** Local agriculture commissions, agriculture advocacy organizations, land use commissions, CT NOFA

17Ag	Identify and protect soil landscapes that are critical for groundwater recharge.
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**Potential Partnerships:** Northwest CT Conservation District, Housatonic Valley Association

18Ag	Analyze use of marginal agricultural lands to grow sustainable biomass and fuel such as switch grass and willow.
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**Potential Partnerships:** farms, local agricultural commissions

**Tools:** **USDA SARE Biofuel Facts** <https://www.sare.org/Learning-Center/Fact-Sheets/The-Sustainability-of-Biofuel-Fact-Sheet-Series>

## Infrastructure Changes

19Ag	Work with state agencies on infrastructure improvements to sewage treatment plants to minimize or halt combined sewer overflows to reduce runoff onto productive soils.
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**Potential Partnerships:** DOH, DOT, OPM, EPA

**Tools:**

**EPA Combined Sewer Overflow Program** <https://www.epa.gov/npdes/combined-sewer-overflows-csos>

20Ag	Renovate or build new dairy barns to maximize passive ventilation and employ active cooling technologies where needed. Review regulations and procedures to allow for higher roofs in barns and electricity use for fans.
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**Potential Partnerships:** Farms, USDA, CT RC&D

**Tools:**

**Extension.org “Ventilation & Cooling Systems for Animal Housing”** <https://articles.extension.org/pages/32633/ventilation-and-cooling-systems-for-animal-housing>

# ACTIONS

## Infrastructure Changes

**21Ag** Increase filtration and pervious surface to handle stormwater runoff.

**Comments/Descriptions:** Incorporate LID into planning and zoning regulations and town operations. Cross reference with Sustainable CT Action 2.8.

**Potential Partnerships:** Public Works and local land use commissions

**Tools:** town of Morris LID manual <https://circa.uconn.edu/building-municipal-resilience-and-climate-adaptation-through-low-impact-development/> ; **CT NEMO program** <http://nemo.uconn.edu/>

**22Ag** Utilize new hydrologic data for the designs and standards for all agricultural infrastructure and conservation practices.

**Potential Partnerships:** local farms, USDA, USGS, CT DOT/US DOT

## Regulatory/Policy Changes

**23Ag** Assess and amend regulations to allow for agriculture processing facilities for value added products, meat slaughter and processing, etc. so that Connecticut farmers can meet market demands for locally grown products and reduce waste of blemished fruit and vegetables and can take advantage of the longer growing season, far-away markets and benefit from hail-damaged and excess fruit not picked by consumers during pick-your-own times.

**Potential Partnerships:** local land use & economic development commissions, CT Dept of Ag, UConn, COGs, Chambers of Commerce, Community Foundations

**Tools:** CT Planning for Agriculture Guide; CT Dept. of Ag "Farmer's Guide to the Rules of Processing & Selling Meat or Poultry in Connecticut" [http://www.ct.gov/doag/lib/doag/marketing\\_files/farmers\\_guide\\_to\\_processing\\_and\\_selling\\_meat\\_and\\_poultry\\_in\\_ct.pdf](http://www.ct.gov/doag/lib/doag/marketing_files/farmers_guide_to_processing_and_selling_meat_and_poultry_in_ct.pdf)

**UConn "Starting a Food Processing Facility"**

[http://cag.uconn.edu/nutsci/nutsci/foodsafety/Food\\_Processing\\_landing\\_page/Start\\_CT\\_food\\_processing\\_business.php](http://cag.uconn.edu/nutsci/nutsci/foodsafety/Food_Processing_landing_page/Start_CT_food_processing_business.php)

**24Ag** Assess and amend regulations to decrease barriers and promote farm practices that address climate adaptation and sustainability, e.g. building codes for greenhouses, misting and irrigation systems, etc. Reduce administrative burdens on farmers for installation of high tunnels, low/caterpillar tunnels, greenhouses, ventilation systems, or structures i.e. general use of technologies for passive and active cooling measures in dairy barns, irrigation and other adaptive infrastructure. Especially for actions that will reduce vulnerabilities to flooding, invasive pests, or high heat days.

**Potential Partnerships:** local land use commissions, CT Dept of Ag, UConn, USDA NRCS, Working Lands Alliance, CT Farm Bureau, SCCROG Urban-Rural Agricultural Collaborative, land trusts

**Tools:**

**NY Climate Smart Communities Webinar "Agriculture & Climate Change Adaptation: A Role for Municipalities"** <https://goo.gl/aTQtTP>

# ACTIONS

## Regulatory/Policy Changes

<b>25Ag</b>	<b>Create regulations or reduce barriers to encourage agriculture, agri-tourism, and use of renewable energy (including anaerobic digestion) on working farms.</b>
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**Comments/Descriptions:** Cross reference with Sustainable CT Action 4.3.

**Potential Partnerships:** local land use commissions, CT Dept of Ag, UConn

**Tools: Example of Agricultural Overlay District and promotion of agri-tourism**

[https://co.thurston.wa.us/PLANNING/planning\\_commission/agenda/2013-08-07/pc-agenda-20130807-attachment-staff-report-agritourism.pdf](https://co.thurston.wa.us/PLANNING/planning_commission/agenda/2013-08-07/pc-agenda-20130807-attachment-staff-report-agritourism.pdf)

<b>26Ag</b>	<b>Encourage local zoning regulations (e.g., concerning lights, noise) that enable agricultural workers to harvest during the cooler parts of the day (e.g. early morning).</b>
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**Potential Partnerships:** local land use commissions, CT Dept of Ag, UConn

**Tools:** CT Planning for Agriculture Guide, Right to Farm ordinances

<b>27Ag</b>	<b>Continue to redevelop the infrastructure needed to grow, process, store, market, sell, and eat local and regional foods. Consider food hub potential i.e., Northwest Hills Council of Governments Food Hub Viability Study or a Food Action Plan.</b>
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**Potential Partnerships:** COGs, farmers, farm-to-table organizations, CT Dept of Ag.

**Tools:**

**NHCOG Food Hub** (website under-development)

**Food Action plan**

<http://www.seattle.gov/environment/sustainable-communities/food-access/food-action-plan>

**CLiCK Willimantic** <https://clickwillimantic.com/>

<b>28Ag</b>	<b>Provide regulations for seasonal work-force housing.</b>
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**Potential Partnerships:** local land use commissions, local land use commissions, CT Farm Bureau

**Tools:**

**Kent CT Zoning Regulation 3234** Permitted by Special Permit

<b>29Ag</b>	<b>Identify local and regional sources of agricultural products that can be used in local facilities such as schools.</b>
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**Potential Partnerships:** NHCOG Food Hub; CT Dept of Ag Farm to School Program, local farms

**Tools:**

**Dawn Crayco FoodCorps CT/CT Farm to School Collaborative**, <http://www.farmtoschool.org/>

**Connecticut Farm to School Program** <https://www.ct.gov/doag/cwp/view.asp?a=2225&q=299424>

# ACTIONS

## Regulatory/Policy Changes

30Ag	Implement general farm-friendly zoning regulations which better define agriculture, provide farmers flexibility for ancillary uses on farms, allow on-farm sales, adequate signage to farms, & appropriate, small scaled meat processing. Allow maximum flexibility in policies, rules, regulations, standards, & funding; practicing a philosophy of adaptive management will allow agriculture to be the most successful.
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**Comments/Descriptions:** Real estate agents should communicate acceptance of working farms in the town to potential new buyers. Cross-reference with Sustainable CT Action 4.3, and Agriculture category, and NHCOD POCD Goal 3

**Potential Partnerships:** Partners for Sustainable Healthy Communities, Upper Housatonic Valley National Heritage Area, CT NOFA, Advocate, local agriculture & land use commissions, agricultural schools

**Tools:** Advocate “Creating Farm Friendly Communities” <https://advocatect.org/creating-farm-friendly-communities/> ; CT Planning for Agriculture Guide

## Education/Outreach/Technical Assistance

31Ag	Provide outreach, education and networking opportunities needed for both existing and new farmers. Expand course opportunities at CT community colleges and high-schools on topics relevant to farming, agricultural science, and marketing especially for climate change
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**Potential Partnerships:** Conservation organizations, land trusts, NWRWIB, local colleges and universities, New CT Farmers Alliance

32Ag	Encourage, promote, and support local and/or regional farmers' markets by hosting on town green or promoting in local communications.
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**Potential Partnerships:** CEOs, local agricultural commissions, land trusts

33Ag	Assist farms in preparing emergency response plans.
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**Potential Partnerships:** Conservation organizations, Public Works, private land owners, utilities

**Tools:**

CT Farm Bureau Emergency Preparedness for Farmers [www.cfba.org/emergency.htm](http://www.cfba.org/emergency.htm)

USDA Risk Management Agency Insurance Agent Locator [www3.rma.usda.gov/apps/agents](http://www3.rma.usda.gov/apps/agents)

UConn Farm Risk Management and Crop Insurance Program [www.ctfarmrisk.uconn.edu](http://www.ctfarmrisk.uconn.edu)

34Ag	Encourage farms to develop Nutrient Management Plans.
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**Potential Partnerships:** NWCD, USDA NRCS, CT DEEP

**Tools:**

Cornell Dairy Guidance

[http://www.manuremanagement.cornell.edu/Pages/Popular\\_Pages/Fact\\_Sheets.html](http://www.manuremanagement.cornell.edu/Pages/Popular_Pages/Fact_Sheets.html)

# ACTIONS

## Bees & Pollinators

35Ag	Encourage pollinator diversity in open space habitats. Manage open space habitats for a diversity of bee nesting sites such as open grasslands and power line right- of-ways for ground-nesting bees. Leave dead and downed trees for tree-nesting bees. Conserve riparian buffers which protect bare ground surrounding rivers for ground-nesting bees that prefer bare ground with loose soil.
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**Potential Partnerships:** Conservation organizations, Public Works, private land owners, utilities, USDA NRCS, UConn Extension, Master Gardeners, land trusts

**Tools:** Pollinator-Friendly Best Management Practices for Federal Lands

<https://www.fs.fed.us/wildflowers/pollinators/BMPs/>

**UConn CAES “A Citizen’s Guide to Creating Pollinator Habitat in Connecticut”** [http://www.ct.gov/caes/lib/caes/documents/publications/pollinators/a\\_citizen%E2%80%\\_creating\\_pollinator\\_habitat\\_in\\_connecticut.pdf](http://www.ct.gov/caes/lib/caes/documents/publications/pollinators/a_citizen%E2%80%_creating_pollinator_habitat_in_connecticut.pdf)

36Ag	Educate open space managers about the importance of pollinators and land management techniques to encourage these pollinators. Encourage a diversity of native flowering herbaceous plants and shrubs, especially early and late-blooming plants, and bunch grasses’ (for bumble bees) to provide pollen.
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**Potential Partnerships:** Conservation organizations, Public Works, private land owners, utilities, local landscaping companies, land trusts

**Tool:** “Field, Farm, Forest, and City: Sustaining Pollinator Health to Build Ecosystem Resilience” <https://toolkit.climate.gov/case-studies/field-farm-forest-and-city-sustaining-pollinator-health-build-ecosystem-resilience>

37Ag	Encourage informed backyard bee rearing of the European honeybee by homeowners that have attended beekeeping information sessions, such as those provided by the CT Beekeeping Association or the Back Yard Beekeepers Association.
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**Potential Partnerships:** local agricultural commissions, conservation organizations, private land owners

38Ag	Provide education to homeowners through informational talks, such as those offered by the Connecticut Agricultural Experiment Station, and print media on the importance of pollinator diversity, including information to distinguish wasps from bees and evaluate stinging risks. Pollinator education information also should include information to prevent pollinator pests, such as the carpenter bee.
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**Potential Partnerships:** local agricultural commissions, conservation organizations, private land owners, USDA, UConn, land trusts

# ACTIONS

## Bees & Pollinators

39Ag	Encourage homeowners to maintain their property to support pollinator diversity. Encourage homeowners to plant native plants, such as goldenrod, that are beneficial to pollinators. Encourage homeowner organic lawn care to reduce applications of pesticides that could affect pollinators. Encourage homeowners to better target invasive plant control herbicide applications through spot spray or cut and paint methods instead of broadcast spraying which could kill pollinator-beneficial, native plants.
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**Potential Partnerships:** local agricultural commissions, conservation organizations, private land owners, land trusts

**Tools:** UConn CAES “A Citizen’s Guide to Creating Pollinator Habitat in Connecticut” [http://www.ct.gov/caes/lib/caes/documents/publications/pollinators/a\\_citizen%E2%80%99s\\_guide\\_to\\_creating\\_pollinator\\_habitat\\_in\\_connecticut.pdf](http://www.ct.gov/caes/lib/caes/documents/publications/pollinators/a_citizen%E2%80%99s_guide_to_creating_pollinator_habitat_in_connecticut.pdf)





# CULTURAL RESOURCES



# Category Overview

Cultural Resources is the most varied of the categories and includes less tangible concepts that contribute to the overall character of a place. The 2006 NPS Management Policies define cultural resources as "archaeological resources, cultural landscapes, ethnographic resources, historic and prehistoric structures, and museum collections."

In addition to these historical objects, cultural resources also includes important socio-cultural components such as different ethnic groups, traditional land use activities, and the human-landscape interaction through recreation. Rural character, especially in Northwest Connecticut is a strong portion of cultural resources since it is a defining vision for most of the region's municipalities. Communities must take care to develop strategies that protect their local character and cultural resources since they are usually important motivations for residents and visitors alike. Cultural resources include:

- The region's residents, especially vulnerable populations such as elders, indigenous people, disabled/handicapped, children, refugees and migrants, and low income groups;
- Significant landscape and scenic areas;
- Historical properties (districts, sites, views, etc. On local, state, national, and international lists);
- Traditional events such as an annual harvest festival, Ice Watch, summer concert series, or holiday celebrations;
- Traditional land use such as hunting, agriculture, or religious uses;
- Recreation and tourism;
- Village/Town Center
- Rural Character components (DISS)

At the time of this writing, Colebrook, Harwinton, Roxbury, and Salisbury are Certified Local Governments which helps communities access funding and technical assistance.

# Vulnerability Overview

Reviewing the vulnerability of cultural resources can be much like the Plan of Conservation and Development process. It likely requires community-wide outreach, review of local plans and documents, and input from a variety of stakeholders. The existing POCD may be a useful place to start to identify key character areas, demographic groups, and historical sites. While you're reviewing your community's cultural resources, consider the following:

- Many historical buildings are located in flood zones.
- Historical buildings may not be insulated or sealed. May not have contemporary air handling systems.
- Many vulnerable groups including low-income, elderly, Native American, and non-English speaking groups.
- Traditional gathering locations like fairgrounds and town greens do not have shelter from natural disasters or high heat.
- Trees along roads at town entrances may be second growth generation and nearing end of life or at risk from trimming.
- Lack of farm transitions may reduce traditional farming knowledge.
- Local traditions and events may need heat/cooling and intense storm plans.

"Historic resources are part of a community's shared identity and function as places of memory and meaning for local residents (Hayden, 1995; Jenks, 2008). The physical fabric of a community can be seen as both reflecting and reinforcing cultural norms and social relations (Schein, 1997). If that fabric is destroyed, members of a disaster-affected community may be forced to ask fundamental and destabilizing questions about the nature of their relationship with each other and with the space in which their lives have been lived (e.g., Gans, 1962, pp. 281–335; Otte, 2007). Protecting historic resources can preserve a community's shared identity and reinforce connections between neighbors and the larger community (FEMA, 2005; Jones, 1986)." <sup>6</sup>

## Potential Partners

- ◇ CT SHPO
- ◇ National Endowment for the Humanities
- ◇ NPS
- ◇ Local historic districts & commissions
- ◇ Local cultural organizations
- ◇ CT DECD
- ◇ Friends of Main St.
- ◇ NWCT Community Foundation
- ◇ Connecticut Tourism Bureau
- ◇ American Association of Museums
- ◇ The Office of Travel and Tourism Industries
- ◇ American Association for State & Local History
- ◇ Heritage Preservation
- ◇ Discover New England
- ◇ Colleges & Universities
- ◇ US Small Business Association
- ◇ US Economic Development Agency
- ◇ Northwest Connecticut EDC Board
- ◇ NWCT Arts Council
- ◇ Housatonic Heritage
- ◇ NWCT Chamber of Commerce
- ◇ NWRWIB
- ◇ Connecticut Landmarks
- ◇ CT League of History Organizations
- ◇ Connecticut Main Street Center
- ◇ Connecticut Trust for Historic Preservation
- ◇ Connecticut Preservation Action
- ◇ CT DOT Environmental Planning Office
- ◇ The Friends of the Office of State Archaeology, Inc.
- ◇ Torrington Historic Preservation Trust  
www.preservetorrington.org
- ◇ The Institute for American Indian Studies  
Museum & Research Center
- ◇ Connecticut Humanities Council
- ◇ Connecticut Archaeology Center
- ◇ Local & regional land trusts

## Potential Funding Streams

- ◇ Basic Operational Support Grants for Historic Preservation Non-Profits
- ◇ Certified Local Government Program
- ◇ [Good to Great](#)
- ◇ Historic Restoration Fund Grants
- ◇ Preservation Restrictions/Easements
- ◇ Hurricane Sandy Disaster Relief Assistance Grant for Historic Properties
- ◇ Survey & Planning Grants
- ◇ Threatened Properties Fund Grants
- ◇ National Trust Preservation Funds
- ◇ National Trust for Historic Preservation: Johanna-Favrot Fund for Historic Preservation.
- ◇ National Trust for Historic Preservation: Cynthia Woods Mitchell Fund for Historic Interiors
- ◇ Save America's Treasures Funding
- ◇ Preserve America Grant Program
- ◇ Federal Investment/Rehabilitation Tax Credit
- ◇ National Park Service Historic Preservation Fund Grants-in-Aid
- ◇ US Department of Commerce Economic Development Administration
- ◇ Connecticut Council for Philanthropy

# General Tools

**CDC's Social Vulnerability Index** <https://svi.cdc.gov/map.html>

Communities can use the interactive map as well as download county-wide maps. Access the Litchfield County Social Vulnerability Index here: [https://resilientrural.com/wp-content/uploads/2018/11/Social-Vulnerability-Index-Connecticut2016\\_Litchfield.pdf](https://resilientrural.com/wp-content/uploads/2018/11/Social-Vulnerability-Index-Connecticut2016_Litchfield.pdf)

**National Park Service Climate Change Response Strategy 2010** (<https://resilientrural.com/wp-content/uploads/2018/11/National-Park-Service-Climate-Change-Response-Strategy.pdf>)

**NPS Cultural Resources Climate Change Strategy** ([https://resilientrural.com/wp-content/uploads/2018/11/NPS-2016\\_Cultural-Resoures-Climate-Change-Strategy.pdf](https://resilientrural.com/wp-content/uploads/2018/11/NPS-2016_Cultural-Resoures-Climate-Change-Strategy.pdf))

**Adaptation planning For Historic Properties Report** - [https://floridadep.gov/sites/default/files/Adaptation-Historic-Properties\\_0.pdf](https://floridadep.gov/sites/default/files/Adaptation-Historic-Properties_0.pdf)

**SHPO Resiliency Report from Goodwin** - Forthcoming December 2018

**Draft Shared Stewardship: Connecticut State Historic Preservation Office's 2018-2023 Strategic Plan** ([https://www.ct.gov/cct/lib/cct/State\\_Plan\\_Draft.pdf](https://www.ct.gov/cct/lib/cct/State_Plan_Draft.pdf))

While not available yet, CT SHPO intends to develop its resiliency efforts as noted in the draft Shared Stewardship: Connecticut State Historic Preservation Office's 2018-2023 Strategic Plan . There will be additional resources on the SHPO website and staff will be working with municipalities and local preservation organizations to enhance resiliency.

**HUD's Economic Resilience Planning Evaluation Tool:** The Economic Resilience Planning Tool provides users with a number of best practices to integrate aspects of economic disaster mitigation, preparedness, and recovery into economic development plans.

**"Preservation Meets Resiliency: Municipal and State Planning for the Future" Presentation** (<http://crcog.org/wp-content/uploads/2018/04/4-Historic-Resources-Resiliency.pdf>)

**Tribal Climate Change Guide to Funding, Science, Programs and Adaptation Plans**

<https://tribalclimateguide.uoregon.edu/adaptation-plans>

This sortable spreadsheet can help tribes find potential funding sources and other resources. Maintained by University of Oregon.

**Survey and Planning Grants**, CT Dept. of Economic & Community Development, Offices of Culture and Tourism <http://www.cultureandtourism.org/cct/cwp/view.asp?a=3933&q=414860>

# General Tools

(Continued)

**Policy Guide on Historic and Cultural Resources**, American Planning Association <https://www.planning.org/policy/guides/adopted/historic.htm>

**Preservation & Climate Change**, National Trust for Historic Preservation <http://forum.savingplaces.org/learn/issues/sustainability/climate-change>

**Historic Preservation and Cultural Resources: Protecting Our Heritage**, FEMA <https://www.fema.gov/media-library/assets/documents/5714>

**Case Study—CT State Historic Preservation Office Resiliency Assessment**  
<https://resilientrural.com/wp-content/uploads/2018/12/Cultural-Resources-SHPO-Resiliency.pdf>

**Case Study—Mapping Manitoba's Historical Sites**  
<https://resilientrural.com/wp-content/uploads/2018/12/Cultural-Resources-Manitoba-Historical-Sites-Mapping.pdf>

## Actions Overview

The section is divided into the following major categories:

- Archaeological & Ethnographic Resources
- Social & Governance Resilience
- Local Economy
- Cultural Landscapes
- Rural Character Components

"The Housatonic River Valley is one of the most beautiful places in New England and is easily accessible from Hartford, Boston and New York City. Sightseeing and visiting historic and cultural attractions are significant activities in the Valley. The opportunities for boating, fishing, camping, hiking, and other active pursuits draw tourists to the Valley."<sup>7</sup>

# ACTIONS

## Archaeological & Ethnographic Resources

1Cr	Identify resources and responsible management groups. Identify building/structure resources such as museum collections and their responsible management groups. Inventory historic, iconic or landmark structures (i.e. covered bridges, mills, etc.) and their managers/owners.
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**Comments:** Cross reference with Sustainable CT Action 3.1: Map Tourism and Cultural Assets and Action 4.5 Inventory and Assess Historic Resources and with Draft Shared Stewardship: Connecticut State Historic Preservation Office's 2018-2023 Strategic Plan Goal #4 "Develop a Resiliency Strategy for Historic Resources". Are they in the floodplain? Is there adequate insurance? Can the buildings be retrofitted for flooding and climate control? Are there capital improvement plans for historically accurate repairs? Are they located in a safe area? What can the history tell us to prepare for climate change? If site is in an immediately vulnerable area (flood zone), encourage responsible site manager to collect information as soon as possible. Do important historic sites and attractions have continuity plans? Are there plans to adapt to changing heat and precipitation conditions?

**Potential Partnerships:** OHP, NPS, area university; CT State Historic Preservation Office (SHPO); The Institute for American Indian Studies Museum & Research Center; CT DOT; local museums and historical societies, Connecticut historical agencies, land trusts

### Tools:

Cathy Labadia at CT SHPO; Brian D. Jones, CT State Archaeologist

"Hunters and Gatherers, Villages and Farms: A Preservation of the Cultural Resources of the Housatonic River Valley" by Russell Handsman

2006 Housatonic River Management Plan

Mapping Historic Sites In Rural Manitoba: Development, Themes, And Applications

<https://youtu.be/PrJvp1S6EHk>

Connecticut Freedom Trail. Published with the Amistad Committee, Inc. <http://www.ctfreedomtrail.org/>

Historic Barns of Connecticut. <https://connecticutbarns.org/>

Mills: Making Places of Connecticut. <https://connecticutmills.org/>

National Historic Landmarks in Connecticut, <https://www.nps.gov/nhl/find/statelists/ct.htm>

FEMA's "Floodplain Management Bulletin on Historic Structures" <https://www.fema.gov/media-library/assets/documents/13411>

Certified Local Government Program

CT SHPO Case Study <https://resilientrural.com/wp-content/uploads/2018/12/Cultural-Resources-SHPO-Resiliency.pdf>

2Cr	Include Native American populations in identification, adaptation, and protection of culturally important resources and traditional ecological knowledge.
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**Potential Partnerships:** local tribal communities; The Institute for American Indian Studies Museum & Research Center

# ACTIONS

## Social & Governance Resilience

3Cr	Review local and regional land use plans in anticipation of development pressures and shifts in development patterns due to climate change i.e. potential movement away from flood zones. Integrate with emergency and infrastructure planning as well. Consider traditional land uses especially livelihood uses (farming, logging, fishing) in these plans.
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**Potential Partnerships:** local land use commission, COGs, CT OPM, DEHMS

4Cr	Assess potential social impacts of climate change on incomes, and other measures of well-being in vulnerable communities
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**Potential Partnerships:** CEOs, social service agents, CT DPH

**Tools:** Strengthening Social Resilience to Climate Change, World Bank <http://projects.worldbank.org/P120170/strengthening-social-resilience-climate-change?lang=en>

**Building Social Resilience: Protecting And Empowering Those Most At Risk**

<https://www.gfdrr.org/building-social-resilience-protecting-and-empowering-those-most-risk>

5Cr	Create climate communication materials in multiple locations & languages. Establish open communication with various community groups in your municipality including those typically disenfranchised, the elderly, and economically disadvantaged.
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**Comments:** Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications, NWCT CEDS Plan Goal 1, and POCD Goal 1.

**Potential Partnerships:** local municipal departments

**Tools:** NobidadeTV and RIDOH Climate Change Program prepared bilingual program on climate change and health with focus on asthma, air pollution, heat, storms, flooding, and emergency preparedness (<https://youtu.be/VdComMYFW1E>)

**Building Social Resilience: Protecting And Empowering Those Most At Risk**

<https://www.gfdrr.org/building-social-resilience-protecting-and-empowering-those-most-risk>

**Participation Tools for Better Community Planning**

[http://www.lgc.org/wordpress/docs/freepub/community\\_design/guides/Participation\\_Tools\\_for\\_Better\\_Community\\_Planning.pdf](http://www.lgc.org/wordpress/docs/freepub/community_design/guides/Participation_Tools_for_Better_Community_Planning.pdf)

6Cr	Create Regional Task Force on historic and cultural resources to assist in funding, locating, and protecting important regional sites.
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**Potential Partnerships:** CT SHPO, NW CT Arts Council, Senior centers, municipal social agents , land trusts

# ACTIONS

## Local Economy

7Cr	Encourage business to create business continuity plans for disaster situations.
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**Comments:** These plans should consider loss of electricity, flooding, interruptions in supply chain, employee access to work, and employee safety. Cross reference with Sustainable CT Action 1.4.

**Potential Partnerships:** CT Dept. of Economic & Community Dev., Friends of Main St., NW CT Chamber of Commerce

**Tools:**

**Bristol RI Business Preparedness**

<https://www.bristolri.us/DocumentCenter/View/157/Disaster-Preparedness-for-Businesses-of-All-Sizes-PDF>

**CA Sierra Camp Business Resilience Initiative**

<http://www.sbcsierracamp.org/business-resilience-initiative/>

8Cr	Install signage to welcome people and direct people to shops, restaurants, historical sites, recreational opportunities. Publicize existing recreational assets.
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**Comment:** Cross reference with POCD Goal 4.

**Potential Partnerships:** NHCOC, local economic development commission, Parks & Rec, land trusts

**Tools:** NHCOC Regional Trails Map [www.northwesthillscog.org/nhcogtrails](http://www.northwesthillscog.org/nhcogtrails)

9Cr	Integrate climate change and adaptation issues into advanced training in university, community college, and technical training programs. Education and job training programs to re-tool workforce to take advantage of green economy growth. Coordinate with local workforce boards to improve technical skills and to promote traditional skills.
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**Comments:** Cross reference with Sustainable CT Action 1.5 , CEDS Goal 3, and POCD Goal 1.

**Potential Partnerships:** NWCC, UConn, NWRWIB, NWCT Chamber of Commerce, social service agencies

**Tools:** 2017 CRRF- Dependency at a Distance: Implications of Workforce Mobility for Community Resilience Video 1 (<https://www.youtube.com/watch?v=ff8i-6qHndc&t=24s>) Video 2 (<https://www.youtube.com/watch?v=Mg6n63zH9-k&t=26s>)

10Cr	Identify opportunities for businesses to take advantage of climate impacts that may demand new products and services. Work with business and economic development groups poised to take advantage of new resilience-related market opportunities to find out how the local government could help.
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**Comment:** "Every climate risk is a business opportunity for your town" Rural Resiliency Sharing Session participant

**Potential Partnerships:** local economic development commission, chambers of commerce



# ACTIONS

## Local Economy

11Cr	<b>Increase opportunities for seasonal-dependent businesses (e.g. ski slopes, farms, etc.) to make additional revenue during off seasons. Develop tourism policies integrating economic and resource conservation issues in the face of potential and observed consequences of climate change. Assess the effects of climate change on hunting, fishing opportunities , outdoor recreation, and the related tourism industry. Assess the effects of climate change on special designated natural areas that attract tourists such national parks and forests.</b>
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**Potential Partnerships:** local land use commissions, local, regional, and state tourism agencies; recreation agencies and advocates, CT DEEP, NPS, USGS, Housatonic River Commission, regional conservation organizations

**Tools:**

**Recreation's Role in Community Resiliency**

[https://www.brandonu.ca/rdi/files/2014/03/Recreations-Role-in-Community-Resilience\\_.pdf](https://www.brandonu.ca/rdi/files/2014/03/Recreations-Role-in-Community-Resilience_.pdf)

**Climate Change in Park City: An Assessment of Climate, Snowpack, and Economic Impacts, Stratus Consulting Inc. (2009)**

<http://www.parkcitygreen.org/Documents/2009-Climate-Changein-Park-City-Report.aspx>

12Cr	<b>Relocate or demolish at-risk municipal facilities that cannot be made resilient, and consider establishing an acquisition or buyout plan for at-risk commercial properties.</b>
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**Potential Partnerships:** CEOs, local land use commissions

**Tools:** local or multi-jurisdictional Natural Hazard Mitigation Plans

13Cr	<b>Explore opportunities for local and regional collaboration on resilience with regional governmental entities, chambers of commerce, or regional industry associations.</b>
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**Potential Partnerships:** NHCOC, local commissions, chambers of commerce

# ACTIONS

## Cultural Landscapes

14Cr	<b>Consider climate impacts to access/public comfort/feasibility etc. of traditional community gatherings and events like country fair, harvest picnic, Memorial Day commemorations.</b>
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**Comments:** Are the traditional events located in areas prone to flooding? Are there shade areas? Is the time of day okay for heat?

**Potential Partnerships:** CEOs, economic development group, event hosts, land trusts

15Cr	<b>Conduct Scenic Resource Inventory. Review special character areas, priority rural character traits of town, special land use operations, cemeteries, agricultural areas, town green, and other unique attributes in your town. Inventory iron historical sites, scenic roads, stone walls, ridgelines, view-sheds, and legacy trees.</b>
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**Comments:** Plan for scenic roads noted in NHCOG Regional Transportation Plan. Develop management plans to account for tree life, flood areas, and surrounding land use.

**Potential Partnerships:** local museums and historical societies, Connecticut historical agencies, local land use commission, CT SHPO, CT National Register Coordinator

**Tools:**

**Local Natural Resource Inventory; Mapping Historic Sites In Rural Manitoba: Development, Themes, And Application** <https://www.youtube.com/watch?v=PrJvp1S6EHk&feature=youtu.be>; **Scenic road ordinances** (Canaan, Kent, New Milford, Sharon) ; **State Scenic Road designations** like Route 7 from the Kent-New Milford Town line north to the Canaan-North Canaan Town line and Route 4 from the River to Dunbar Road in Sharon In Housatonic River Management Plan 2006. ; **“Developing Your Community Heritage Inventory”** <http://publications.gov.sk.ca/documents/96/97930-InventoryGuide.pdf>

16Cr	<b>Review river and waterway access points for high-erosion zones during low-flow events; also consider sensitivity of waterbodies under temperature changes.</b>
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**Comments:** Public access may need to be re-designed or reduced to maintain health and scenic quality of water-body.

**Potential Partnerships:** Housatonic River Commission, CT DEEP, USGS, regional conservation organizations

17Cr	<b>Identify large stands of climate sensitive flora such as conifers. Discuss alternative management strategies for trees with the utilities esp. along scenic character or town entryways.</b>
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**Comments:** Are these stands vulnerable? If so, is there a potential migration route to appropriate habitat? (for example, conifers to higher altitudes or northern slopes). Dense forests can be most dangerous. Proper management to increase tree crown and trunk may improve tree strength. Cross reference with Infrastructure and management of utility lines.

**Potential Partnerships:** regional conservation organizations, Conservation Commissions, CT DEEP, CEOs, Public Works, Utilities, land trusts

**Tools:** UConn Stormwise Program (Tom Wordsley)

# ACTIONS

## Buildings & Structures

18Cr	Include historic resources in POCDs & economic development plans. Address natural hazards to these resources. Include in implementation matrix. Include historic assets and historic districts as critical features that merit protection and/or planning when considering Disaster Mitigation Plans, Emergency Operations plans, and Natural Hazard Mitigation Plans. Include in mutual aid agreements as necessary. Incorporate cultural/historic resources into-post-disaster plans including recovery plans, debris management plans, recovery ordinances.
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**Comments:** Cross reference with Sustainable CT Action 4.1.

**Potential Partnerships:** local economic development commission, local museums and historical societies, Connecticut historical agencies, land use commissions, EMDs, CEOs; REPT ESF Chair for Long Term Recovery Planning

**Tools:**

**The Federal Emergency Management Agency's (FEMA) "Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning"**

<https://www.fema.gov/media-library/assets/documents/4317>

**The Economics of Historic Preservation: A Community Leader's Guide Washington, D.C.: National Trust for Historic Preservation, 2005**

19Cr	Educate owners of historic properties on maintaining and protecting their historic buildings. Assist owners of historic properties to protect their sites.
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**Potential Partnerships:** local museums and historical societies, Connecticut historical agencies

**Tools: NPS Cultural Resources Climate Change Strategy.**

[https://resilientrural.com/wp-content/uploads/2018/11/NPS-2016\\_Cultural-Resoures-Climate-Change-Strategy.pdf](https://resilientrural.com/wp-content/uploads/2018/11/NPS-2016_Cultural-Resoures-Climate-Change-Strategy.pdf)

**Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings**

<https://www.nps.gov/tps/standards/treatment-guidelines-2017.pdf>

20Cr	Implement a Historic Preservation Ordinance.
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**Potential Partnerships:** local land use commission, historic commissions/organizations

**Tools: Historic Preservation Ordinance examples** [https://conservationtools.org/library\\_items/topic/107-Historic-Preservation-Ordinances](https://conservationtools.org/library_items/topic/107-Historic-Preservation-Ordinances)

# ACTIONS

## Rural Character Components

21Cr	<b>Foster civic and community pride, promote unique attributes. Continue seasonal communal events. Create events that allow all ages to interact. Encourage neighborhood events like block parties, pot lucks, harvest celebrations, etc.</b>
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**Comments:** annual harvest festivals, holiday light parades, Ice Watch, tomato festivals, etc. Encourage oral history collections between students and senior centers

**Potential Partnerships:** CEOs, Friends groups, local historic commissions, volunteer groups, parenting groups, local/regional school districts, libraries, senior centers, local land use commissions, neighborhood organizations, affinity groups

22Cr	<b>Encourage and promote traditional life skills like composting, seed harvesting, clothing repair etc. Promote your community's traditional trades e.g. A skills co-operative where all members share talents</b>
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**Potential Partnerships:** local historical society, gardening club; local economic development commission

23Cr	<b>Encourage local school to require community service hours especially with local civic organizations to understand how their involvement effects local governance.</b>
------	--

**Potential Partnerships:** local/regional school districts, civic groups/commissions

24Cr	<b>Create multiple methods of attendance at local meetings. Use social media. Create mechanism for participation by part-time residents in town meetings, town committees, and local leadership positions.</b>
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**Potential Partnerships:** CEOs, town clerks

**Tools:**

**Rural Knowledge Mobilization and Social Media** <https://www.youtube.com/watch?v=s2wZzVWcBdM&feature=youtu.be>

25Cr	<b>Reduce tax burdens for volunteers.</b>
------	---

**Potential Partnerships:** CEOs, local volunteer departments

# ACTIONS

## Rural Character Components

26Cr	Create mix of housing stock for young families and elderly.
------	---

**Comments:** Cross Reference with Sustainable CT Action 8.1 and 8.2 and POCD Goal 1.

**Potential Partnerships:** NHCOC Regional Housing Council; NHCOC 5th Thursdays events

27Cr	Direct development away from character areas and towards village centers. Design for flexibility of use i.e. home businesses.
------	---

**Comment:** Cross reference with POCD Goal 1.

**Potential Partnerships:** local land use commissions

28Cr	Include a diversity of needs and limitations while developing resiliency actions.
------	---

**Comments:** Incorporate equity and environmental justice stakeholders (such as associations of elderly, disabled, and health-compromised; low-income groups; farm workers; and small business owners)

**Potential Partnerships:** social service agents, state-wide advocacy groups, local community leaders

**Tools:**

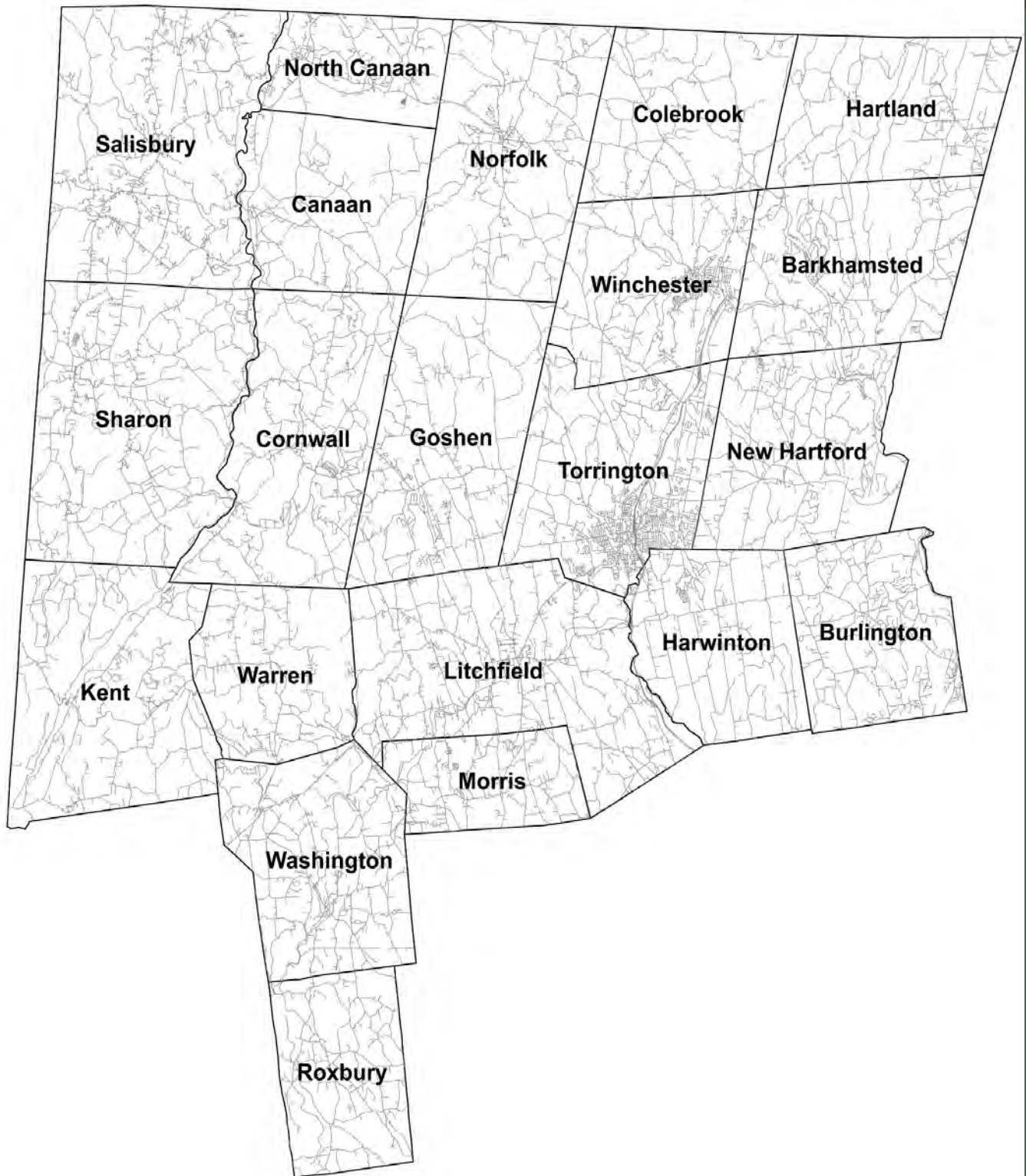
**Sustainable CT Equity Toolkit**

**Antioch University New England Webinar "Equitable Adaptation: Collaborating for Resilience"** (<http://www.communityresilience-center.org/webinars/equitable-adaptation-collaborating-for-resilience/>)

**Morello-Frosch et al. 2009. The Climate Gap: Inequalities in How Climate Change Hurts Americans & How to Close the Gap. PERE, USC Program for Environmental and Regional Equity.** <http://dornsife.usc.edu/pere/publications/>

**National Equity Atlas** <http://nationalequityatlas.org/>

Note: Rural Character Components are from the Wozniak-Brown, Joanna, "Understanding Community Character as a Socio-ecological Framework to Enhance Local-scale Adaptation: An Interdisciplinary Case Study from Rural Northwest Connecticut" (2017). <https://aura.antioch.edu/etds/343>



# INFRASTRUCTURE

# Category Overview

In the Northwest Hills region, infrastructure consists of: dams, road networks, electrical and communications networks, dams, bridges, railroad, water supply systems, sanitary and storm sewer networks, recreational trails, etc. The owners/operators of each particular piece of infrastructure are responsible for the maintenance of the structure. This may be the municipality, state, or private land owner. The maintenance may be the responsibility of the owner or operator but the loss of use may negatively impact a much larger segment of the population. This can make maintenance of the structure with respect to climate change when there is limited technical capacity or funding access. For example, private landowners may maintain dams on their property but do not have the awareness or capacity to analyze and modify the dam to meet climate change impacts from solar radiation, sedimentation, or debris from storm events.

Designs for future infrastructure should incorporate climate change impacts to the highest standards. Municipalities should take care to review the standards with the appropriate experts to protect their long-term investments.

## Vulnerability Overview

- Vulnerable populations have limited access to transportation.
- Limited transportation available to transport vulnerable residents to shelters.
- Tree-trimming has altered roadsides to accommodate overhead infrastructure.
- Confusion around possibilities for residential solar.
- High heat may limit speed on passenger rails.
- Increased water needs for irrigation and individual consumption.
- Existing culvert sizes may be inappropriate for flood events and habitat requirements.
- Bridge heights, especially on private driveways and local roads, may not be sufficient height.
- Many railroad lines, wastewater treatment, and water supply/treatment are located in potential flood areas.
- Leaching from active and inactive landfills could increase with significant storm events.
- Flooding is a significant vulnerability in many of the Northwest Hills municipalities. At this point in time, flooding locations are identified by local knowledge and review of FEMA's Flood Insurance Rate Maps (FIRM). Identifying vulnerable flooding areas should improve at the completion of FEMA's Risk MAP evaluation and digitization of the FIRM maps. Both are expected to be completed in 2022. Below is a list of some areas susceptible to flooding through the region according to the applicable Natural Hazard Mitigation Plans.



## Flooding Areas Noted in Natural Hazard Mitigation Plans

Barkhamsted	The long bridge at Pleasant Valley has a history of ice jams. Saville Dam lacks a dam failure study, making the risk from the dam unknown. (LHNHMP)
Burlington	Digital Firm maps have made it "easier to demonstrate floodplain boundaries to property owners." Flood prone areas include: Upson road, Foote Road, Covey & Hotchkiss Roads, Main Street in Whigville, Prospect Street in Whigville, Scoville Road, Vineyard Road, Westside Boulevard, Monce Road, and Route 4.
Canaan	Significant floodplains especially in Falls Village between Route 126 and Route 7. Beaver dams along Cobble Road. Chronic flooding along Music Mountain.
Colebrook	The lower end of Sandy Brook near Riverton Road commonly floods, sending water into people's basements. The town is home to numerous dams that could fail during a flood event. (LHNHMP)
Cornwall	Historical flooding at West Cornwall bridge, beaver dams, flooding and erosion along River Road. Mill Brook washed out at Lower River Road during Tropical Storm Irene.
Goshen	The drainage area at Woodridge Lake is particularly of concern according to the town road supervisor due to the increased density of development in this area. Road flooding has occurred in this area in recent years and there is a need for a comprehensive stormwater drainage study of this part of town to better define drainage improvement needs. (LHNHMP)
Hartland	No specific spots mentioned.
Harwinton	The area of greatest concern locally is Leadmine Brook, which continues to flood periodically resulting in the closing of Lead Mine Brook Road. Lake Harwinton Dam is the facility of greatest concern to local officials, and this dam is scheduled to be improved in the near future. (LHNHMP)
Kent	Flooding along Route 7 on east side and Schaghticoke Road on west side from Housatonic River. Ice jams along Housatonic River. Flooding along Kent Hollow Road from West Aspetuck River.
Litchfield	Beavers plug culverts on local streets such as Brooks Road, which require routine maintenance by town forces to remove. (LHNHMP)
Morris	Flooding caused by beavers remains a problem. The East Shore Road area experiences periodic flooding due to poor drainage. (LHNHMP)
New Hartford	Several critical facilities noted in potential floodplain. Public Works Department proposed for relocation. Beavers have caused problems in culverts. Culvert at Carpenter Road is undersized.
Norfolk	Flooding on Parker Hill Road at Hall Meadow Brook and along Blackberry River. (LHNHMP)
North Canaan	No specific spots mentioned.
Roxbury	Flooding near Judds Bridge, Hodge Park, Wellers Bridge, Route 67, Squire Road at Route 67, and Botsford Hill Road at Route 67. Small private dams are significant concern.
Salisbury	Flooding near Salmon Kill Road, Housatonic River Road, Dugway Road, Old Asylum Road, Lincoln City Road, and Riga Road.
Sharon	Beaver dams especially along West Cornwall Road and Surdan Mountain Road. Flooding at main business area near supermarket (Low Road, Murtagh Road, and Route 41).



Torrington Drainage problems cause seasonal flooding at Oak Avenue and Albert Street, and at Vista Drive. Flooding along the Naugatuck River remains a concern despite flood control dams installed after the flood of 1955. The city has a large number of properties requiring flood Insurance from FEMA. These properties will become increasingly difficult to maintain if flood insurance premiums increase. (LHNHMP) .

Warren Sucker Brook Corridor of concern. College Farms Road, Reed Road, and Curtiss Road were washed out or toppled during Tropical Storm Irene.

Washington Significant flooding along Shepaug River.

Winchester Pratt Street, where periodic flooding damages yards and the local road on a regular basis needs upgrades to its drainage systems. Inadequate storm drains on Gay Street, Case Avenue and Center Street result in periodic flooding. Flood control gates at the Highland Lake outlet control structure need to be replaced. Beaver dams frequently result in plugged culverts on local streets such as along the Old Waterbury Turnpike near Rugg Brook Reservoir. The town has actually needed to close a section of this road due to a recurring problem with water ponding and road washout. (LHNHMP)

Litchfield Hills Natural Hazard Mitigation Plan 2016 Update includes: Barkhamsted, Colebrook, Goshen, Hartland, Harwinton, Litchfield, Morris, New Hartford, Norfolk, Torrington and Winchester. Towns served by individual plans created in 2014: Canaan, Cornwall, Kent, North Canaan, Salisbury, Sharon, Roxbury, Warren, and Washington. The multi-jurisdictional plan for the former Central Connecticut region 2016 includes Burlington.



Photo by Charlie Kellogg, "Hurricane Irene Flood Damage in W Cornwall CT, Creative Commons license by NC-SA 2.0. [https://www.flickr.com/photos/papa\\_charliegeorge/6116504512](https://www.flickr.com/photos/papa_charliegeorge/6116504512)

## Potential Partners

- ◇ CT DOT
- ◇ US DOT
- ◇ Federal Highway Administration
- ◇ NHCOG Road Supervisors Committee
- ◇ Water and electric utilities
- ◇ Municipal potable water, sanitary sewer, and storm-sewer operators
- ◇ Local Public Works Departments
- ◇ USDA Rural Development
- ◇ Northwest ConneCT
- ◇ COGs
- ◇ Transit Districts
- ◇ CT DEEP
- ◇ CT NEMO



## Potential Funding Streams

- ◇ USDA Rural Development (assistance with municipal water systems, well replacement for elderly, etc.)
- ◇ CT OPM LOTCIP, STEAP grants
- ◇ CT Department of Administrative Services
- ◇ DEHMS/FEMA Flood Mitigation, Pre-disaster Mitigation, and Hazard Mitigation Grants
- ◇ US FHWA
- ◇ EPA
- ◇ FEMA
- ◇ US HUD



# General Tools

## **CT DEEP Climate Adaptation and the Built Environment and Infrastructure**

[https://www.ct.gov/deep/cwp/view.asp?a=4423&q=531944&DEEPNav\\_GID=2121](https://www.ct.gov/deep/cwp/view.asp?a=4423&q=531944&DEEPNav_GID=2121)

**NWF Green Works for Climate Resilience** (<https://resilientrural.com/wp-content/uploads/2018/11/NWF-Green-Works-for-Climate-Resilience.pdf>) This guide discusses sea-level rise, coastal flooding, and erosion (includes marine as well as freshwater coasts in the Great Lakes region); drought and increasing aridity; extreme heat and the urban heat island effect; inland flooding and stormwater management; and changes to the natural landscape. It has a number of example case-studies for different infrastructure adaptations.

**US DOT Adaptation Plan 2014** <https://resilientrural.com/wp-content/uploads/2018/11/US-DOT-Adaptation-Plan.pdf>

**Climate Change Adaptation and Resilience Case Studies**, FHWA [https://www.fhwa.dot.gov/environment/climate\\_change/adaptation/case\\_studies/](https://www.fhwa.dot.gov/environment/climate_change/adaptation/case_studies/)

**National Climate Assessment Highlight on Infrastructure** (<https://resilientrural.com/wp-content/uploads/2018/11/NCA-Highlight-on-Infrastructure.pdf>)

**US Resiliency Council** <http://usrc.org/> While the information is primarily about seismic hazards, the USRC is currently developing ratings for other hazards, including wind, wildfire and flood.

**VTrans Climate Change Adaptation White Paper 2012**– This report is an overview of climate related adaptation and resilience oriented efforts both underway and under consideration by the Vermont Agency of Transportation.

**DHS's Incorporating Resilience into Critical Infrastructure Projects:** This guide provides those working on critical infrastructure programs with information and steps to take that can enhance the resilience of critical infrastructure systems. It will help decision makers prioritize projects that advance resilient infrastructure through design and investment choices.

**Lessons Learned from Irene** (<https://www.nado.org/lessons-learned-from-irene-vermont-rpcs-address-transportation-system-recovery>) Severe flooding was particularly devastating for transportation infrastructure, requiring the Vermont Agency of Transportation (VTrans) to take a leading role in the recovery. The extent of the damage, however, proved too much for a single agency to manage alone. VTrans' leadership sought help from the state's 11 regional planning commissions (RPCs) to assume responsibility for assessing needed local road repairs.

**NIST's Community Resilience Planning Guides:** *Community Resilience Planning Guide for Buildings and Infrastructure Systems* provides communities with an approach to improve their resiliency by prioritizing resources and incorporating resiliency into zoning, codes, policies, and economic development activities, in order to manage risks from hazards to buildings and infrastructure. NIST's Economic Decision Guide accompanies the Community Resilience Planning Guide to help communities evaluate decisions for resiliency-focused capital investment projects.

# General Tools

(Continued)

**Adaptation Assessment Guidebook: New York City Panel on Climate Change (2010)** Annex A has several very useful questionnaires for reviewing vulnerabilities of communications, energy, transportation, water and waste, and policy infrastructure

**Case Study SECCOG Critical Facilities**

<https://resilientrural.com/wp-content/uploads/2018/11/Infrastructure-SECCOG-Critical-Facilities.pdf>

**Case Study Town of Morris LID Manual**

<https://resilientrural.com/wp-content/uploads/2018/12/Infrastructure-LID-Manual.pdf>

## Actions Overview

The section is divided into the following major categories:

- Energy
- Land Use
- Facilities & Buildings
- Solid Waste Management
- Transportation
- Water
- Communications

# ACTIONS

## Energy

<b>1In</b>	<b>Purchase or install Class I clean energy sources to power municipal buildings (including Board of Education).</b>
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**Comments:** Cross-reference with Sustainable CT Action 6.4.

**Potential Partnerships:** CT PURA, local/regional school districts, Public Works/Building Manager

**Tools:** **2014 Integrated Resources Plan For Connecticut, CT DEEP** [http://www.ct.gov/deep/lib/deep/energy/irp/2014\\_irp\\_final.pdf](http://www.ct.gov/deep/lib/deep/energy/irp/2014_irp_final.pdf)

<b>2In</b>	<b>Inventory the existing fleet and complete and adopt a Municipal Fleet Improvement Strategy. Conduct a study of opportunities to provide electric vehicle charging stations throughout the region.</b>
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**Comment:** Cross-reference with Sustainable CT Action 6.6 and NHCOC Regional Transportation Plan

**Potential Partnerships:** CEOs, CT DEEP, NHCOC

**Tools:** Example Ridgefield CT Municipal Fleet

<b>3In</b>	<b>Review status of generators for critical facilities, gas stations (especially if long distance between closer station), schools, town halls, etc.</b>
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**Comment:** Incorporate with Natural Hazard Mitigation Plan.

**Potential Partnerships:** EMDs, CEOs

<b>4In</b>	<b>Consider creating a Microgrid program for critical facilities in your community. Develop municipal-wide renewable energy incentive program.</b>
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**Comment:** Cross reference with Sustainable CT Action 1.6.

**Potential Partnerships:** CEOs, local conservation organization, Conservation Commission, CT DEEP, PURA

**Tools:** **CT Green Bank (Solarize Connecticut, C-Pace municipalities, Lead by Example)**

**CT Microgrid Program** (<https://www.ct.gov/deep/cwp/view.asp?a=4405&Q=508780>)

**NY Climate Smart Webinar "Building Clean and Resilient Local Power: NY Prize Update & Microgrid Case Studies"** [http://www.dec.ny.gov/docs/administration\\_pdf/cscnyprize.pdf](http://www.dec.ny.gov/docs/administration_pdf/cscnyprize.pdf)

<b>5In</b>	<b>Direct mid and large scale commercial solar installations away from farm fields and core forests and toward brownfields and industrial sites.</b>
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**Comment:** Task from POCD Goal 2.

**Potential Partnerships:** land use commissions, Utilities, NorthwestConnect, CT PURA, CT DOT, Public Works



# ACTIONS

## Land Use

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|-----|--|
| 6In | Consider climate change vulnerabilities and adaptation for siting and design of new and redesigned/ reconstructed facilities. Avoid flood prone or erosion prone areas for infrastructure, especially if underground or underwater transmission and pipe lines are a preferred alternative. Where practicable, relocate infrastructure outside of coastal and inland flooding zones. Where practicable, relocate cultural resources outside of coastal and inland flood zones; where relocation is infeasible, protect areas around cultural resources from coastal and inland flooding, as allowed by law, using methods that minimize adverse environmental impacts. |
|-----|--|

**Potential Partnerships:** land use commissions, utilities, NorthwestConneCT, CT PURA, CT DOT, Public Works, CT DAS

**Tools:** EPA WEPPCAT Water Erosion Prediction Project (WEPP) Model <https://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=153583>

- |     |   |
|-----|---|
| 7In | Assess energy and communications infrastructure operations and maintenance plans with respect to changing climate conditions including electricity conduits, electric grid and communication infrastructure (towers, lines, etc.), and communication lines to water, salt intrusion, and more frequent and stronger storm events. Communicate with power/communications/sewer/water utilities about enhancing resiliency of systems prior to significant construction in downtown areas. Require the location of utilities underground in new developments or during redevelopment whenever possible. Discuss alternative management strategies for trees with the utilities esp. along scenic character or town entryways. |
|-----|---|

**Comments:** Movement of infrastructure underground considered in Kent Natural Hazard Mitigation Plan. Dense forests can be most dangerous. Proper management to increase tree crown and trunk may improve tree strength. Also a Natural Resource action.

**Potential Partnerships:** Utilities, NorthwestConneCT, CT PURA, CT DOT, Public Works

**Tools:** Tree management - UConn Stormwise Program, Tom Wordsley

- |     |  |
|-----|--|
| 8In | For communications, emergency generators and fuel supplies are often in basements or ground level, and vulnerable to flooding – building codes may have to be revised to allow for positioning this infrastructure at higher levels. |
|-----|--|

**Potential Partnerships:** EMDs, building department

# ACTIONS

## Facilities & Buildings

**9In** Work with FEMA on building relocation policy after destructive events.

**Potential Partnerships:** CEOs, EMDs, REPT ESF Long-term Recovery, land use commissions

**10In** Monitor changes to forest fire frequency and intensity and consider wildfire retrofitting.

**Comment:** Cross reference with Natural Resources

**Potential Partnerships:** CT DEEP, local land trusts, municipal departments

**Tools:** California Governor's Office of Planning and Research "Fire Hazard Planning" report [http://opr.ca.gov/docs/Final\\_6.26.15.pdf](http://opr.ca.gov/docs/Final_6.26.15.pdf)

**11In** Develop vulnerability assessments for the community including public properties, cultural resources, critical facilities, etc. to identify vulnerabilities and prioritize actions. Implement a Tree Hazard Management Program to encourage responsible planting practices and minimize future storm damage to buildings, utilities, and streets.

**Comments:** POCD Goal 2 and Sustainable CT Action 4.4. Also a Cultural Resources & Natural Resources action.

**Potential Partnerships:** Public Works, Tree Warden, local conservation groups, land use commissions

**Tools:** SECCOG Critical Facilities Vulnerability Assessment <https://resilientrural.com/wp-content/uploads/2018/11/Infrastructure-SECCOG-Critical-Facilities.pdf>

**CT NRCS Conservation Technical Assistance**

**Nature Conservancy Climate Wizard** <http://www.climatewizard.org>

**Conservation Commissions & Climate Change** <https://resilientrural.com/wp-content/uploads/2018/11/Conservation-Commissions-and-Climate-Change-NH.pdf>

**US National Phenology Network** <https://www.usanpn.org/>

**Resilient Rural Webmap** <http://nhcog.maps.arcgis.com/apps/webappviewer/index.html?id=dd66491024ac4dc98c3a3961dc7a2cc3>

**12In** Manage municipal properties to reduce heat island affect.

**Comments:** Cross-reference with Public Health.

**Potential Partnerships:** Public Works

**Tools:** Heat Island Effects in Northwest Region <https://resilientrural.com/wp-content/uploads/2018/11/NASA-NHCOG-heat-islands-by-town-Braneon-McConnell.zip>



# ACTIONS

## Facilities & Buildings

13In	Improve building codes to account for more frequent and stronger storms.
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**Potential Partnerships:** local land use commissions and departments

14In	Change property tax structure to provide incentives for setbacks, rolling easements, and covenants to preclude building and reconstruction in vulnerable areas.
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**Potential Partnerships:** CT legislature, local Board of Finance

15n	Provide support to vulnerable populations (i.e., environmental justice communities, the elderly and disabled) to ensure residence resilience to climate change, including incentives for relocation if re-engineering is not feasible.
-----	--

**Potential Partnerships:** Social service agents, EMDs, health providers

16In	Incentivize residents to weatherize their homes.
------	--

**Potential Partnerships:** TAHD, health districts, Conservation Commission, building department

**Tools:** Connecticut's Weatherization Assistance Program from CT DEEP

Weatherization Assistance Program for low-income and elderly from US DOE

17In	Modify zoning regulations and Plans of Conservation and Development to minimize risks from development of coastal and inland flood zones. Retrofit critical structures to comply with current building codes and develop a reinforced "safe room". Create incentives for individuals and businesses to reduce risk of losses due to climate through building design codes. Ensure that shelters have appropriate wind protections. Modify buildings to reduce impact on, and vulnerability to climate change including passive cooling and rain water controls such as rain gardens.
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**Comments:** Cross link to Public Health - Emergency Response.

**Potential Partnerships:** EMDs, Public Works, CEOs, building department

**Tools:** CT Building Code

# ACTIONS

## Solid Waste Management

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|------|---|
| 18In | New and reconstructed infrastructure, including landfills and transfer stations, should be located in areas less vulnerable to climate change. Evaluate ability and need to armor or relocate transfer station and related solid waste infrastructure located within sea level rise or inland flooding areas. Harden solid waste storage areas against extreme precipitation, wind events, flooding, etc. |
|------|---|

**Potential Partnerships:** Transfer stations, CT DEEP, Public Works, local businesses

- |      |   |
|------|---|
| 19In | Devise alternative routes or collection locations to service those areas that will be isolated by flooding. |
|------|---|

**Potential Partnerships:** Transfer stations, trash collection businesses, Public Works

- |      |  |
|------|--|
| 20In | Update aging solid waste infrastructure considering green practices that may be more resilient to climate change impacts, especially precipitation and stormwater effects. |
|------|--|

**Potential Partnerships:** Transfer stations, CT DEEP, Public Works, resource recovery authorities

## Transportation

- |      |   |
|------|---|
| 21In | Investigate the impacts of developments on the whole watershed and downstream effects on transportation infrastructure to evaluate effects and determine design criteria, e.g., culvert and drainage system sizing. |
|------|---|

**Potential Partnerships:** Public Works, CT DOT

- |      |  |
|------|--|
| 22In | Consider hardening airports and/or landing areas against extreme storms. |
|------|--|

**Comment:** Coordinate with CEDS Goal 4

**Potential Partnerships:** FAA, CT DOT, local airports

# ACTIONS

## Transportation

- |      |   |
|------|---|
| 23In | Identify portions of railroad at-risk to flooding and erosion. Identify frequently flooded and/or washed out roads. Consider abandonment of roads and bridges when re-engineering would be too costly to adapt to climate change, or when better environmental and resiliency options or alternative routes exist. Adjust road maintenance schedules for changing seasons. Identify at risk areas along roadways that may be at risk of erosion or prone to drifting snow & high winds. |
|------|---|

**Comments:** Coordinate with CEDS Goal 4. Review Naugatuck and Housatonic Railroads. If scenic road, take special care to consider how to maintain scenic qualities but maintain safe passage if necessary. Also a Natural Resources concern. from Litchfield Hills NHMP

**Potential Partnerships:** Public Works, CT DOT, railroad owners, land trusts

**Tools:** Fact sheet on municipality's ability to abandon a road continually threatened by flooding is forthcoming from AdaptCT.

**USDA Climate Hubs' "The Future of Winter Roads"**

<https://www.climatehubs.oce.usda.gov/hubs/northeast/topic/future-winter-roads>

**EPA WEPPCAT Water Erosion Prediction Project (WEPP) Model**

<https://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=153583>

- |      |   |
|------|---|
| 24In | Coordinate emergency evacuation and supply transportation routes with emergency preparedness systems to ensure capacity and resilience of escape routes compromised by natural disasters related to climate change. |
|------|---|

**Potential Partnerships:** REPT, EMDs, CEOs, CT DOT, Public Works

- |      |   |
|------|---|
| 25In | Improve sidewalk connectivity and develop Model Sidewalk Ordinance. |
|------|---|

**Comment:** Cross referenced with NHCOC Regional Transportation Plan.

**Potential Partnerships:** Public Works, CEOs

**Tools:** Community Walk Score <https://www.walkscore.com/about.shtml>

- |      |   |
|------|---|
| 26In | Increase trail equity and access throughout the region. |
|------|---|

**Comment:** e.g. Housatonic Bike/Walk Trail, Naugatuck River Greenway, Sue Grossman Still River Greenway; Cross reference with Cultural Resources

**Potential Partnerships:** local land trusts, Parks & Rec, NHCOC, CT DOT, Public Works

**Tools:** NHCOC Regional Trails Assessment

- |      |   |
|------|---|
| 27In | Request design standards for infrastructure projects that incorporate climate projects like maximum temperatures. |
|------|---|

**Potential Partnerships:** ACOE, FEMA, NOAA, USGS, CT DOT, Public Works

# ACTIONS

## Transportation

28In	Consider the level of watershed development, and potential LID and green practices that may affect engineering designs and level of development from transportation infrastructure like planned road improvements. Increase communication, collaboration and planning among watershed authorities and the public to decrease stormwater by promoting LID and green BMPs. Promote and require preservation of natural features that treat and infiltrate runoff such as buffers, wetlands and related landscape conditions to reduce runoff by infiltration or detention in biologically active conditions and reduce primary pollutants including organic matter/nutrients. Remove or modify impediments to natural treatment and storage (e.g., impervious cover, culverts, dams) to accommodate LID techniques.
------	---

**Comments:** Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications. Cross reference with NHCOC POCD Goal 2 and WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations"

**Potential Partnerships:** Public Works, municipal departments, land use commissions, CT DOT, NWCD, and Lake Waramaug Task Force

**Tools:** Town of Morris LID Manual

**Stormwater Calculator with Climate Assessment Tool, EPA** <https://www.epa.gov/water-research/national-stormwater-calculator>

**EPA Green Infrastructure website** <https://www.epa.gov/green-infrastructure> **Managing Wet Weather with Green Infrastructure Municipal Handbook** [https://www.epa.gov/sites/production/files/2015-10/documents/gi\\_munichandbook\\_green\\_streets.pdf](https://www.epa.gov/sites/production/files/2015-10/documents/gi_munichandbook_green_streets.pdf)

**Enhancing Sustainable Communities With Green Infrastructure: A Guide to Help Communities Better Manage Stormwater While Achieving Other Environmental, Public Health, Social, and Economic Benefits (2014), EPA** <https://www.epa.gov/smartgrowth/enhancing-sustainable-communities-green-infrastructure>

**Green Infrastructure Tools, NOAA** <http://oceanservice.noaa.gov/news/sep15/green-infrastructure.html>

29In	Develop joint transportation strategies with adjacent communities, regions and states to accommodate changing conditions and transportation system use. Balance needs of natural resources and human safety for determining which transportation infrastructure to reconstruct or relocate. Communicate regional transit assets and options. Encourage transit-oriented development with residential/commercial areas along bus routes and/or train/bus stations.
------	---

**Comment:** Cross reference with Regional Transportation Plan and POCD Goals 1 & 4, Sustainable CT Action 5 and CEDS Goal 4. Related project: NWTD regional transit facility.

**Potential Partnerships:** REPT ESF Transportation, Public Works, CT DOT, NWCTD, NHCOC, local land use commissions, Councils of Government, local economic development commissions

**Tools:** Climate Change Adaptation Guide for Transportation Systems Management, Operations, and Maintenance <https://ops.fhwa.dot.gov/publications/fhwahop15026/>

# ACTIONS

## Transportation

30In	During bids for infrastructure projects, request materials designed for higher incidences of heat stress and intense flooding to prevent or reduce buckling or softening. Consider use of "cool pavement" to reduce heat island affect and protect surface water.
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**Comments:** Coordinate with CEDS Goal 4

**Potential Partnerships:** CEOs, Public Works, CT DOT

**Tools:** **Hartford's Green Infrastructure Handbook** <https://circa.uconn.edu/wpcontent/uploads/sites/1618/2018/09/Green-Infrastructure-Handbook.pdf>

**Pavement Interactive—Cool Pavement** <https://www.pavementinteractive.org/reference-desk/pavement-management/impacts/cool-pavementgeneral/>

31In	Create an Inventory of all road-stream crossing structures (i.e., bridges and culverts) in town and prioritize for replacement, based on conservation benefits, minimizing flood risk, and maintenance need. Re-establish connectivity and more natural flows along our rivers and streams by removing or modifying existing structural impediments, such as dams, and culverts. Work with CT DOT on context dependent adaptation strategies and other tools to expand the adaptive capacity of an at-risk structure. Develop and implement a municipal sediment control plan to prevent clogged drainage systems such as routine street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground (from Litchfield Hills NHMP)
------	---

**Comment:** Cross reference with Natural Resources

**Potential Partnerships:** local/regional conservation organizations, Public Works, CT DOT

**Tools:** **HVA Culvert Assessment Program** <https://resilientrural.com/wp-content/uploads/2018/11/Natural-Resources-HVA-Culvert.pdf>

**North Atlantic Aquatic Connectivity Collaborative Database search page** [https://naacc.org/naacc\\_search\\_crossing.cfm](https://naacc.org/naacc_search_crossing.cfm)

**US DOT Vulnerability Assessment Scoring Tool** <https://toolkit.climate.gov/tool/vulnerability-assessment-scoring-tool-vast>

32In	Communicate with USGS to maintain stream gages to monitor peak flow, water volume, temperature, etc.
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**Comment:** Cross reference with Natural Resources

**Potential Partnerships:** local/regional conservation organizations, Public Works, CT DOT

33In	Many small communities have limited road access. Communities' access should be reviewed and, where needed, upgraded to ensure resilient ingress and egress. Assess viable options to improve access to these areas and integrate into building, land use, and public works planning documents.
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**Potential Partnerships:** Public Works, CT DOT

# ACTIONS

## Water

34In	Consider dams in or up-stream from your municipality. Discuss with the management and with CT DEEP about the dams safety and plans for long-term resiliency. Confirm its ability to handle increasingly intense storms. Don't forget smaller (especially earthen) dams throughout your community. Check municipal records for the required Emergency Action Plans for Class B and C dams as they should be submitted to the town every two years. Include dam failure inundation areas in the CT Alert emergency contact database. For privately owned dams, encourage each dam owner regardless of Class to have a maintenance plan and an Emergency Operations Plan/Emergency Action Plan. Also encourage them to implement recommendations resulting from state inspections (from Litchfield Hills NHMP).
------	--

**Comment:** Cross reference with communications suggestions in Cultural Resources and Public Health - Emergency Response

**Potential Partnerships:** CT DEEP, hydropower facilities, private property owners, EMDs

**Tools:** local or multi-jurisdictional Natural Hazard Mitigation Plans

35In	Determine new levels of terrestrial stormwater and nonpoint source pollution (e.g., through comprehensive watershed-based planning) related to climate change and determine standards required to address quantity and quality issues.
------	--

**Potential Partnerships:** Public Works, CT DOT, local conservation organizations

**Tools:** Stormwater Calculator with Climate Assessment Tool, EPA <https://www.epa.gov/water-research/national-stormwater-calculator>

**Storm Water Management Model with Climate Adjustment Tool** <https://www.epa.gov/water-research/storm-water-management-model-swmm>

36In	Update aging stormwater and nonpoint infrastructure with consideration to sizing and retrofitting LID techniques to accommodate climate change adaptation and minimize runoff and flooding damage. Rehabilitate sewer systems to minimize groundwater infiltration and inflow of stormwater and snowmelt into the sanitary sewer system. Where warranted as the only solution, increase stormwater storage and treatment infrastructure, especially in highly urbanized areas. Implement municipal stormwater maintenance program to clear debris from drainage facilities (Litchfield Hills NHMP). Consider zero net growth in impervious surfaces in the municipality.
------	--

**Comments:** Mapping of impervious surfaces may assist in MS4 requirements.

**Potential Partnerships:** Public Works, CT DOT, local conservation organizations

**Tools:** Antioch University New England Webinar "Where to Put the Water: Assessing the Vulnerability of Urban Stormwater Systems to a Changing Climate" <http://www.communityresilience-center.org/webinars/where-to-put-the-water-assessing-the-vulnerability-of-urban-stormwater-systems-to-a-changing-climate/>

# ACTIONS

## Water

- |      |   |
|------|---|
| 37In | <b>Include climate change into local emergency operation plans, state Hazard Mitigation Plans, and similar response programs.</b> |
|------|---|

**Comment:** Cross reference with all other topics

**Potential Partnerships:** EMDs, REPT, COGs

**Tools:** **Worksheet—Plan Cross References** <https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-2-Plan-Review-Checklist.docx>

- |      |  |
|------|--|
| 38In | <b>Develop a long-term beaver management plan that includes: control measures to mitigate localized flooding created by beavers; consideration of the use of beaver deterrent devices such as beaver stops or beaver bafflers and consideration replacing culverts frequently impacted by beavers with free span bridges (from Litchfield Hills NHMP).</b> |
|------|--|

**Potential Partnerships:** EMDs, Public Works, CT DOT, local conservation organizations

- |      |   |
|------|---|
| 39In | <b>Implement Ice Jam Observer Training. Conduct geo-morphic assessment to identify potential causative mechanisms for ice jam formation where ice jams had not historically formed.</b> |
|------|---|

**Comments:** Especially town of Kent, long bridge at Pleasant Valley in Barkhamsted

**Potential Partnerships:** EMDs, local conservation organizations, REPT, River conservation organizations, CT DOT, CT DEEP **Tools:** **Shane Csiki, NH DES—Training:** <https://www.des.nh.gov/organization/commissioner/gsu/fegh/documents/201711-ice-jam-presentation.pdf>

- |      |   |
|------|---|
| 40In | <b>Evaluate your community for flood resiliency. Identify critical facilities in flood zones. Ensure adequate barricades are available to block flooded areas in flood prone areas of the town.</b> |
|------|---|

**Comments:** (E.g. Relocate the New Hartford Public Works Garage out of the Farmington River Floodplain and Winchester Public Works Garage- Litchfield Hills NHMP)

**Potential Partnerships:** EMDs, CEOs

**Tools:** **local or multi-jurisdictional Natural Hazard Mitigation Plans**

**SECCOG Critical Facilities Vulnerability Assessment** <https://resilientrural.com/wp-content/uploads/2018/11/Infrastructure-SECCOG-Critical-Facilities.pdf>

**Fall 2019 “New Hampshire Flood Response Toolkit”**

**EPA Flood Resilience Checklist** <https://www.epa.gov/sites/production/files/2014-07/documents/flood-resilience-checklist.pdf>

**Maine Flood Resilience Checklist (2017)** [https://digitalmaine.com/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1520&context=mgs\\_publications](https://digitalmaine.com/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1520&context=mgs_publications)



# ACTIONS

## Water

- |      |   |
|------|---|
| 41In | Coordinate with emergency management to identify sites that store hazardous materials and develop risk management plans for power failures, flooding, heat fluctuations, etc. Create inventory and map of Brownfields sites and identify sites at risk of flooding. |
|------|---|

**Comment:** Cross reference with Sustainable CT Action 1.1.

**Potential Partnerships:** Fire department, EPA, local health department, local businesses

- |      |   |
|------|---|
| 42In | Communicate flood risk to residents and encourage them to purchase flood insurance. |
|------|---|

**Potential Partnerships:** EMDs, health departments

**Tools:** My RainReady <http://myrainready.cnt.org/>

**Federal Insurance: Moonshot Starter Kit** <https://www.fema.gov/media-library/assets/documents/166428>

- |      |   |
|------|---|
| 43In | Evaluate and improve emergency power provisions to assure uninterrupted pump station service during heavy storms with associated power outages. Evaluate and improve, where necessary, the capacity of pump stations that are subject to infiltration and inflow. |
|------|---|

**Potential Partnerships:** Utilities, Public Works

**Tools:** Waterford Municipal Infrastructure Resilience Project Sewer Pump Station Assessment & Adaptation <https://circa.uconn.edu/waterford/>

- |      |   |
|------|---|
| 44In | Implement a training program for wastewater treatment facility operators to educate them on how to prepare for climate change, e.g., extreme storms, high temperatures. |
|------|---|

**Potential Partnerships:** Utilities, Public Works

**Tools:** New England Interstate Water Pollution Control Commission website <http://neiwppcc.org/our-programs/climate-change/preparing-extreme-weather-wastewater-utilities/>

- |      |   |
|------|---|
| 45In | Educate municipal inland wetland commissions and water pollution control authorities about emergency permit requirements for temporary equipment needed to protect wastewater treatment facilities located near regulated inland or coastal wetlands. Investigate protection strategies (e.g., berms, dikes) to protect treatment infrastructure after consideration of non-structural, less hardening alternatives and/or or relocation of infrastructure subject to sea level rise and inland flooding. |
|------|---|

**Potential Partnerships:** CT DEEP, CT DPH, Utilities, Public Works, CACIWC

# ACTIONS

## Water

46In	<b>Reduce policies or regulations that limit use of greywater for non-potable uses like irrigation. Implement wastewater reuse for non-potable uses, such as golf course irrigation, to decrease potable water treatment needs and address water shortages.</b>
------	---

**Comment:** Cross reference with WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations"

**Potential Partnerships:** local land use commissions, health departments

**Tools:** "Requiring new homes to reuse water (Residential Gray Water Stub-out Building Code), 2013, Chula Vista, CA" <https://greencitiesca.squarespace.com/water-1/chula-vista-residential-graywater>

**United States Environmental Protection Agency. (2012). Water Recycling and Reuse: The Environmental Benefits.** <http://www.epa.gov/region9/water/recycling/>

47In	<b>Assess existing on-site (subsurface disposal) systems for effects related to climate change and, where necessary, consider alternative on-site technologies or abandonment in favor of public/community wastewater treatment systems.</b>
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**Potential Partnerships:** Utilities, Public Works

48In	<b>Consider the potential higher groundwater levels in design standards for separation distances and other relevant standards.</b>
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**Potential Partnerships:** Utilities, Public Works

49In	<b>Consider a Water Use Restriction Ordinance to implement conservation during periods of water shortage. Encourage water conservation best management practices for snow making for ski destinations in Connecticut. Provide an incentive to encourage water conservation of public water supply and/or develop local drought ordinances. Develop a drought communications plan to inform residents about voluntary and mandatory drought restrictions and Develop an early warning system to notify the general public about water shortages.</b>
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**Comment:** Cross reference with Drought Communications Plan in Natural Resources section and Sustainable CT Action 2.6 and WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations" Cross reference with Litchfield Hills NHMP. Consider as Natural Resources and Public Health Action as well.

**Potential Partnerships:** CEOs, CT Water Planning Council, local land use commissions, TAHD, local health districts

**Tools:** Greenwich Drought Ordinance; 2018 CT Drought Preparedness and Response Plan [https://www.ct.gov/waterstatus/lib/waterstatus/2018.11.06\\_state\\_drought\\_plan\\_adopted.pdf](https://www.ct.gov/waterstatus/lib/waterstatus/2018.11.06_state_drought_plan_adopted.pdf)

**Northeast Drought Early Warning Center** <https://www.drought.gov/drought/dews/northeast>

**US Drought Portal** <https://www.drought.gov/drought/resources/reports>

**CT Water Status Site** <https://www.ct.gov/waterstatus/site/default.asp>

# ACTIONS

## Water

50In	Participate in the Water Utilities Coordinating Committees to assist in developing regional and statewide solutions to water shortages and emergencies including strengthening coordination of regional water supplies to encourage water conservation.
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**Potential Partnerships:** CEOs, Public Works, COGs, utilities

51In	Incorporate potable water management concerns into local POCDs (e.g. water conservation, water Exclusive Service Areas, water management through zoning regulations, etc.)
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**Comments:** Cross reference with WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations"

**Potential Partnerships:** local land use commissions and departments

52In	Review regulations for common sense use of rain barrels. Ensure regulations encourage collection strategies that reduce access by mosquitoes.
------	---

**Comments:** Cross reference with action under agriculture to increase storage of precipitation.

**Potential Partnerships:** TAHD, health districts, Conservation Commission, building department

**Tools:** King County, WA program to incentivize or give away rain barrels

53In	Purchase land around water supplies to increase the surrounding conservation buffer area
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**Comment:** Cross reference with Natural Resources - land acquisition

**Potential Partnerships:** Water utilities, WUCCs, conservation organizations, land trusts

54In	Water supply plans pursuant to CGS section 25-32d should include climate change vulnerability analyses and risk assessments for surface supply, including future drinking water availability, competing needs and options for adaptation and mitigation. Incorporate climate resiliency or other green planning practices into waste supply treatment design manuals for water reuse to lessen demand on potable water.
------	---

**Potential Partnerships:** WUCCs, utilities

55In	Increase public water supply hook-ups for private wells subject to salt intrusion. Use "smart" applications for road treatments during winter storms.
------	---

**Potential Partnerships:** TAHD, CT DPH, CT DOH, Public Works, CT DOT

**Tools:** Dr. Gary Robbins, UConn; Minnesota Stormwater Manual [https://stormwater.pca.state.mn.us/index.php/Road\\_salt\\_smart\\_salting\\_and\\_winter\\_maintenance](https://stormwater.pca.state.mn.us/index.php/Road_salt_smart_salting_and_winter_maintenance)

# ACTIONS

## Water

<b>56In</b>	<b>Increase effluent quality of wastewater treatment to allow for water reuse for non- potable uses.</b>
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**Potential Partnerships:** Water Utility Coordinating Committees (WUCC); CT DPH; health departments, CT DEEP

<b>57In</b>	<b>Identify small community water systems struggling with supply, quality, and management issues. Water systems, especially small systems, should increase technical capacity to anticipate and mitigate impacts from droughts. They should also coordinate water use restrictions with town/state ordinances. Update and repair antiquated and leaking distribution infrastructure.</b>
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**Potential Partnerships:** WUCCs; CT DPH; health departments

**Tools:** EPA CREAT <https://www.epa.gov/crwu/creat-risk-assessment-application-water-utilities>

**2018 CT Drought Preparedness and Response Plan** [https://www.ct.gov/waterstatus/lib/waterstatus/2018.11.06\\_state\\_drought\\_plan\\_adopted.pdf](https://www.ct.gov/waterstatus/lib/waterstatus/2018.11.06_state_drought_plan_adopted.pdf) ; **USDA Rural Development**

<b>58In</b>	<b>Community water systems, besides having a backup emergency generator, should plan for extended power outages with redundant fuel systems or larger fuel capacities. Water systems should coordinate with the utilities and EMDs to ensure the systems are on the priority electrical restoration list even with standby power.</b>
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**Potential Partnerships:** EMDs, community water systems, Utilities, Public Works

**Tools:** local and multi-jurisdictional natural hazard mitigation plans

**Creating Resilient Water Utilities (CRWU), EPA** <https://www.epa.gov/crwu>

**Table 5-1, Theme 1-A recommendations on generator usage in Drinking Water Vulnerability Assessment and Resilience Plan**

<b>59In</b>	<b>Decrease pharmaceutical and other emerging toxic chemical concentration in water supply that might be further spread by climate change effects by strengthening federal rules, and educating homeowners about safer disposal practices.</b>
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**Potential Partnerships:** health services, local pharmacies, NHCOC Prescription Assistance network

# ACTIONS

## Communications

60In	Map locations of communications infrastructure vulnerable to floods, storm surges, extreme thermal or precipitation events, wildfire, etc.
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**Potential Partnerships:** Utilities, Public Works

61In	Identify redundancies and re-routing potential in communication infrastructure for emergency switching should primary systems fail. Adequately insure communications infrastructure to ensure that reconstruction can occur in the event of a climate related disaster.
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**Comment:** Cross link to Public Health - Emergency response

**Potential Partnerships:** Utilities, Public Works, REPT, Amateur Radio Network

62In	Work with FirstNet (public safety broadband network) to improve communications coverage.
------	--

**Comment:** Cross link to Public Health - Emergency response

**Potential Partnerships:** EMDs, REPT, COGs

63In	Develop sustainability checklists for planning, zoning, building, health department permit applications to incorporate sustainable design elements. Compile a checklist that cross-references the by-laws, regulations, and codes related to flood damage prevention that may be applicable to a proposed project and make this list available to potential applicants.
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**Comments:** Cross Reference with Sustainable CT Action 4.2 and WUCC Integrated Report recommendations.

**Potential Partnerships:** local conservation organizations, building departments

**Tools:** local/multi-jurisdictional Natural Hazard Mitigation Plans





# NATURAL RESOURCES

# Category Overview

Natural resources are, generally, the ecosystems and ecosystem services in the air, water, land, and biota. Connecticut has a large range of natural resources due to its hydrography, location along the Atlantic Ocean, and several mountain ranges. This range of resources is also influenced by the unique microclimates present throughout the state. Key habitats noted in the Connecticut Wildlife Action Plan include: upland forest, upland woodland and shrub, upland herbaceous, forested inland wetland, shrub inland wetland, herbaceous inland wetlands, tidal wetland, freshwater aquatic, estuarine aquatic, and unique natural or man-made habitats (agricultural lands, vernal pools, utility corridors, etc.) (Terwilliger Consulting 2015). Although the Connecticut Climate Preparedness Plan discusses coastal habitat and the impacts of sea level rise, it is not discussed in this toolkit as the Northwest Hills is an inland region.

## Vulnerability Overview

- Enhanced habitat for kudzu, chestnut blight, gypsy moth, etc.
- Cold water streams, tidal marsh, open water marine, beaches/dunes, freshwater wetlands, offshore islands, major rivers, and forested swamps are most at risk habitat types.
- Fragmented biological corridors limit migration of aquatic and terrestrial species.
- Increased temperatures reduce habitat for coldwater species like brook trout, brown trout, and slimy sculpin.
- Droughts and intense storm events increase mortality for birds and amphibians.
- Changes to growing seasons will impact avian migration.
- Precipitation timing and amount will affect wetlands and vernal pools.
- 19 invasives will have moderate to large increase in abundance.
- Forest composition will change to more southerly oak-hickory forest mix.
- Larger species may benefit from climate change while smaller less mobile species struggle.



## Potential Partners

- ◇ Connecticut Extension Services
- ◇ Connecticut Audubon
- ◇ The Audubon Society
- ◇ The Nature Conservancy
- ◇ Rivers Alliance
- ◇ Housatonic Valley Association
- ◇ Northwest Conservation District
- ◇ Local and regional land trusts
- ◇ National Fish & Wildlife Foundation
- ◇ World Wildlife Fund
- ◇ Aton Forest
- ◇ White Memorial Conservation Center
- ◇ Housatonic River Commission
- ◇ American Forest Foundation
- ◇ Northeast Climate Hub
- ◇ Forest Guild
- ◇ Yale School of Forestry and Environmental Studies
- ◇ Northern Institute of Applied Climate Science
- ◇ North Atlantic Landscape Conservation Cooperative
- ◇ New England Forestry Foundation
- ◇ MassConn Sustainable Forest Partnership
- ◇ Connecticut Resource Conservation and Development
- ◇ Lake Lillinonah Authority
- ◇ CT NEMO



## Potential Funding Streams

- ◇ Wildlife Conservation Society's Climate Adaptation Fund
- ◇ USDA Natural Resources Conservation Service
- ◇ US DOI
- ◇ UConn CIRCA
- ◇ US DOT
- ◇ FEMA
- ◇ NOAA
- ◇ National Fish & Wildlife Foundation
- ◇ Kresge Environment Program
- ◇ Doris Duke Charitable Foundation
- ◇ CT DEEP
- ◇ CT DPH
- ◇ Ford Foundation
- ◇ National Environmental Education Foundation



# General Tools

## **EPA EnviroAtlas**

<https://www.epa.gov/enviroatlas>

## **USDA Climate Change Adaptation Plan 2014**

[https://resilientrural.com/wp-content/uploads/2018/11/USDA\\_Climate\\_Change\\_Adaptation\\_Plan\\_2014.pdf](https://resilientrural.com/wp-content/uploads/2018/11/USDA_Climate_Change_Adaptation_Plan_2014.pdf)

## **USDA New England and Northern New York Vulnerability Assessment Gallery**

<https://usfs.maps.arcgis.com/apps/MinimalGallery/index.html?appid=ca7b3b10aea840838faed403468132f0>

**Adaptation Workbook** <https://adaptationworkbook.org/> **from** Northern Institute of Applied Climate Science (NIACS) The Adaptation Workbook is a structured process to consider the potential effects of climate change and design land management and conservation actions that can help prepare for changing conditions. Develop custom adaptation plan for a property or site.

## **Center for Progressive Reform "From Surviving to Thriving"**

[http://www.progressivereform.org/survivingthriving\\_main.cfm](http://www.progressivereform.org/survivingthriving_main.cfm)

**"Embracing Change: Adapting Conservation Approaches to Address a Changing Climate"** <https://www.wcsclimateadaptationfund.org/resources>

## **Climate Change Adaptation Manual (2014) by Natural England and RSPB**

<http://publications.naturalengland.org.uk/publication/5629923804839936>  
From England but very useful adaptation strategies for cultural/rural heritage traits.

**The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States**, U.S. Climate Change Science Program <http://www.climatescience.gov/>

## **Inventory & Monitoring, National Park Service**

<https://science.nature.nps.gov/im/index.cfm>  
Northeast Temperate Network, Inventory & Monitoring, NPS <https://science.nature.nps.gov/im/units/netn/index.cfm>

## **Conservation in a Changing Climate**

A Land Trust Alliance project, this website offers reports and guides for land conservation practitioners. <http://climatechange.lta.org/>

## **USA National Phenology Network**

<https://www.usanpn.org/>

## **Climate Wizard, Nature Conservancy**

<http://www.climatewizard.org/>

# General Tools

(Continued)

**Climate-Smart Conservation: Putting adaptation principles into practice** <https://www.nwf.org/Educational-Resources/Reports/2014/06-06-2014-Climate-Smart-Conservation>

**Climate Change Vulnerability Assessment and Adaptation Plan (2014)** [https://www.usda.gov/oce/climate\\_change/adaptation/adaptation\\_plan.htm](https://www.usda.gov/oce/climate_change/adaptation/adaptation_plan.htm)

**Case Study Housatonic Valley Association Culvert Assessment**

<https://resilientrural.com/wp-content/uploads/2018/12/Natural-Resources-HVA-Culvert.pdf>

**Case Study South Kingstown Land Trust Climate Change Pilot Project**

<https://resilientrural.com/wp-content/uploads/2018/11/Natural-Resources-SKLT-Pilot-Project.pdf>

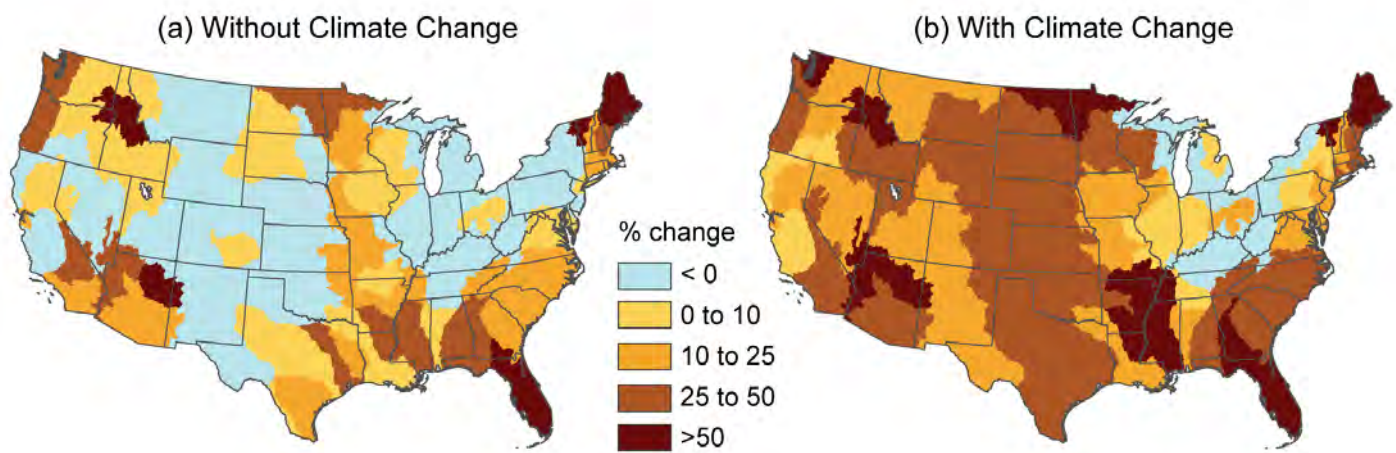
## Actions Overview

The section is divided into the following major categories:

- Resource Management
- Municipal & Regional Activities

\*The CT Climate Preparedness Plan divides this section into the various habitats. Since this toolkit is for municipalities, the habitat actions have been combined. Land trusts and conservation organizations may wish to see some actions by habitat and can review the state plan.

### Projected Changes in Water Withdrawals



Third National Climate Assessment Figure 3.11<sup>8</sup>

# ACTIONS

## Resource Management

1Nr	Identify, prioritize, and acquire or ease riparian land and wetland properties adjacent to high priority coldwater resources. Prioritize restoration and management activities including; revegetation of stream banks/riparian zones and stocking of resilient strains and species. manage water withdrawals/diversions to maintain characteristic connectivity and hydrology.
-----	---

**Potential Partnerships:** local conservation groups, land use commissions, CT DEEP, Housatonic River Commission, HVA, CT DEEP

2Nr	Create an Inventory of all road-stream crossing structures (i.e., bridges and culverts) in town and prioritize for replacement, based on conservation benefits, minimizing flood risk, and maintenance need. Re-establish connectivity and more natural flows along our rivers and streams by removing or modifying existing structural impediments, such as dams, and culverts. Re-establish connectivity and more natural flows along our rivers and streams by removing or modifying existing structural impediments, such as dams, and culverts. Modify upstream flood control and water management infrastructure and the operation thereof to allow for regular flooding of floodplain forests where feasible.
-----	--

**Comment:** Cross link to Infrastructure

**Potential Partnerships:** HVA, Public Works, CT DOT, Housatonic River Commission

**Tools:** HVA Culvert Assessment Program <https://resilientrural.com/wp-content/uploads/2018/11/Natural-Resources-HVA-Culvert.pdf>

**North Atlantic Aquatic Connectivity Collaborative Database search page** [https://naacc.org/naacc\\_search\\_crossing.cfm](https://naacc.org/naacc_search_crossing.cfm)

**Documents required by FERC for hydropower facilities along regional rivers like Shoreline Management Plan, Critical Habitat Management Plan, Recreation Plan and Programmatic Agreements mentioned in Housatonic River Management Plan 2006.**

3Nr	Promote opportunities for warmwater gamefish in rivers where populations of temperature intolerant species decline.
-----	---

**Potential Partnerships:** CT DEEP, recreational organizations

4Nr	Advance land use policy/regulations (riparian buffer zones, stormwater management BMPs and Low Impact Development) that reduce temperature impacts to coldwater streams and throughout watersheds
-----	---

**Potential Partnerships:** local land use commissions, Housatonic River Commission, land trusts, Rivers Alliance of Connecticut

**Tools:** Town of Morris LID Manual; green infrastructure

# ACTIONS

## Resource Management

5Nr	Identify and protect critical ground water source/recharge areas in your jurisdiction.
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**Potential Partnerships:** CT DEEP (especially Aquifer Protection Program)

6Nr	Increase expertise at the municipal review level to ensure that infrastructure improvements (e.g., culverts) and development will not alter existing natural hydrology.
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**Potential Partnerships:** local land use commissions and departments

7Nr	Examine watershed management practices and land acquisition strategies to reduce nutrient and pollutant loading (e.g., water quality conditions, manure management).
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**Comments:** Cross reference with Agriculture and Infrastructure

**Potential Partnerships:** local land use commissions, Public Works, local conservation organizations

8Nr	Promote comprehensive nutrient and runoff BMPs, regulations and policies (municipal and state) for lakes, pond, and impoundments to reduce eutrophication. Advance land use policy/regulations for vegetative shoreline buffers in developments adjoining lakes and ponds. Maintain vegetative buffers between local roads and waterbodies. Reduce nitrogen runoff through the use of alternative manure technologies (e.g., manure biodigester, composting).
-----	---

**Comments:** Cross reference with Infrastructure—LID

**Potential Partnerships:** local land use commissions, Public Works, CT DOT, local farms

**Tools:** Town of Morris LID Manual; green infrastructure

9Nr	Promote upland forest resilience by increasing the use of fire control techniques through controlled burns and selective regeneration projects (improves diversity in forest age and species composition). Include open patch habitat and closed canopy habitat within overall forest habitat.
-----	--

**Potential Partnerships:** CT DEEP, Public Works, land trusts, private land owners

10Nr	Manage deer population densities to allow for sufficient forest regeneration.
------	---

**Comments:** Cross reference with Public Health and tick management

**Potential Partnerships:** Hunting organizations, CT DEEP, land trusts

# ACTIONS

## Resource Management

11Nr	<b>Promote best management plans and regulations among private landowners and foresters to increase sustainable management for resilient forests.</b>
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**Potential Partnerships:** CT DEEP Public Works, land trusts, private land owners  
**Tools:** NY Watershed Agricultural Council's Forestry Program information <https://mywoodlot.com/>  
**Forest Adaptation Resources:** climate change tools and approaches for land managers, 2nd edition USDA: Forest Service <https://resilientrural.com/wp-content/uploads/2018/11/Forest-Adaptation-Resources-Climate-Change-Tools-and-Resources-Land-owners-.pdf>  
**Forestry Management course** <https://www.forestadaptation.org/FAPPOne>  
**Forestry Management for land owners** [https://forestadaptation.org/sites/default/files/AFF\\_MassConn\\_Landowner\\_FactSheet.pdf](https://forestadaptation.org/sites/default/files/AFF_MassConn_Landowner_FactSheet.pdf)

12Nr	<b>Adopt conservation subdivisions and zoning reform to increase forest block size and reduce edge effects.</b>
------	---

**Potential Partnerships:** local land use commissions  
**Tools:** Town of Morris LID Manual; green infrastructure

13Nr	<b>Incorporate the impacts of extreme events into forest management practices. Promote increased understanding of such events among land owners and professional foresters.</b>
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**Potential Partnerships:** CT DEEP, Public Works, land trusts, private land owners  
**Tools:** Creating and Maintaining Resilient Forests in Vermont: Adapting Forests to Climate Change [http://fpr.vermont.gov/sites/fpr/files/Forest\\_and\\_Forestry/The\\_Forest\\_Ecosystem/Library/Climate%20change%20report\\_final\\_v6-18-15a.pdf](http://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/The_Forest_Ecosystem/Library/Climate%20change%20report_final_v6-18-15a.pdf)  
**Climate Change Response Framework, Northern Institute for Applied Climate Science** <https://forestadaptation.org/new-england>

14Nr	<b>Greatly enhance land protection resources and incentives for private landowners to retain carbon sequestration value of forests.</b>
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**Potential Partnerships:** CT DEEP, CT DRS, local land use commission

15Nr	<b>Promote principles of “smart growth” to also retain carbon sequestration values of forest and to better facilitate public transportation systems and energy transmission infrastructure, including wide scale distributed generation options for renewable energy.</b>
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**Potential Partnerships:** local land use commission; NWCTD, local buses

# ACTIONS

## Resource Management

- |      |   |
|------|---|
| 16Nr | <b>Increase community preparedness for the potential of more frequent and intense wildland fires. Educate public on fire ignitors and accelerants. Teach homeowners about removal of fuel during high fire seasons.</b> |
|------|---|

**Potential Partnerships:** EMDs, local emergency response

**Tools:** Firewise Communities Program

## Municipal & Regional Activities

- |      |  |
|------|--|
| 17Nr | <b>Consider climate change in local natural resource inventories and open space plans.</b> |
|------|--|

**Potential Partnerships:** local land use commissions

**Tools:** CT NRCS Conservation Technical Assistance

**Plan Review Worksheet** <https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-2-Plan-Review-Checklist.docx>

- |      |   |
|------|---|
| 18Nr | <b>Communicate with USGS to maintain stream gages to monitor peak flow, water volume, temperature, etc.</b> |
|------|---|

**Comments:** Also noted in "Connecticut Department of Transportation Climate Change and Extreme Weather Vulnerability Pilot Project, Recommendations" and WUCC Integrated Report; cross-reference with Infrastructure

**Potential Partnerships:** CT DEEP, USGS, EMDs, local conservation organizations

- |      |  |
|------|--|
| 19Nr | <b>Evaluate land acquisition for adaptation purposes (considering sea level rise, increase in frequency of severe storms, wildfire threat, loss of wildlife and fisheries habitat, etc.)</b> |
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**Potential Partnerships:** local land trusts, local land conservation organizations

**Tools:** Nature Conservancy Resilient Landscapes [https://www.conservationgateway.org/](https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx)

[ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx](https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx)

- |      |   |
|------|---|
| 20Nr | <b>Implement Green Grounds and Maintenance Program esp. reduction of use of nitrogen-based fertilizers and indiscriminate pesticides.</b> |
|------|---|

**Comment:** Cross reference with Sustainable CT Action 2.11.

**Potential Partnerships:** Public Works, landscaping companies, golf courses, schools

- |      |  |
|------|--|
| 21Nr | <b>Work with recreational land managers to identify vulnerabilities that could limit or eliminate public access.</b> |
|------|--|

**Comment:** Cross reference with infrastructure, public health, and cultural resources

**Potential Partnerships:** Parks & Rec, Public Works, local conservation organizations



# ACTIONS

## Municipal & Regional Activities

22Nr	<b>Promote habitat resilience by managing invasive species, in particular exotic insects including woolly adelgid, Asian longhorn beetle, emerald ash borer and gypsy moth. Plan for the impact of vectors like diseases and pests (e.g. avoid Ash trees in landscaping due to the Emerald Ash Borer). Develop invasive species management plan for municipal properties and encourage local nurseries to eliminate sale of invasive plants.</b>
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**Comment:** Cross reference with Sustainable CT Action 2.10 and POCD Goal 2.

**Potential Partnerships:** Public Works, Parks & Rec, local conservation organizations, CT DEEP, land trusts, private property owners

**Tools:** CT NRCS Conservation Technical Assistance

**CT Regulations on Movement of Firewood** <https://www.ct.gov/deep/cwp/view.asp?A=2697&Q=508886>

23Nr	<b>Link forest thinning projects to biomass reuse opportunities. This will support forest restoration/mitigation projects, which in turn will reduce the potential for catastrophic fires while providing economic benefits, such as alternative energy sources and workforce development.</b>
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**Potential Partnerships:** CT DEEP, local land trusts, Public Works, schools, NWRWIB

**Tools:** Case Studies in Forest Health and Woody Biomass Utilization Webinar <https://www.youtube.com/watch?v=kyEvvcIbxAQ>

24Nr	<b>Coordinate with local conservation groups to identify areas of cultural importance, priority conservation areas and environmentally sensitive habitats.</b>
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**Potential Partnerships:** local land trusts, local land conservation organizations

**Tools:** Land Trust Alliance Land and Climate Program <http://www.landtrustalliance.org/topics/climate-change>

**The Nature Conservancy Northeast Resilience Alliance** <https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/ne/Pages/default.aspx>

25Nr	<b>Conduct a Natural Resources Inventory.</b>
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**Potential Partnerships:** Conservation Commissions

**Tools:** CT NRCS Conservation Technical Assistance

**Eco-Assets for Rural Municipalities** <https://www.youtube.com/watch?v=LvX7wee7JDw&feature=youtu.be>  
**Town of Kent Natural Resources Inventory**

# ACTIONS

## Municipal & Regional Activities

26Nr	Identify and construct a robust and resilient habitat corridor through the region. Consider use of purchase of development rights or conservation easements to protect climate vulnerable habitats. Coordinate with bordering towns and states on shared ecological challenges especially on invasive pests and shoring infrastructure.
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**Potential Partnerships:** HVA, The Nature Conservancy, EPA, Housatonic River Commission, CT DEEP, NHCOC, regional conservation organizations

**Tools:** Housatonic River Management Plan

**Byers, E and K. Marchetti. 2005. The Conservation Easement Handbook. Trust for Public Land and Land Trust Alliance.** [http://learningcenter.lta.org/attached-files/0/57/5752/CEH\\_preview.pdf](http://learningcenter.lta.org/attached-files/0/57/5752/CEH_preview.pdf)

**Western Governors' Association, Trust for Public Land, and National Cattlemen's Beef Association. 2001. Purchase of Development Rights.** <http://www.westgov.org/wga/publicat/pdr.pdf>



# PUBLIC HEALTH

# Category Overview

The Public Health category refers to the risk and exposure of residents to potential toxins and/or hazards through acute or chronic conditions. Climate change will impact human health through numerous ways including: temperature-related death and illness, air quality impacts, extreme events, vector-borne diseases, water-related illness, food safety/nutrition/distribution, mental health and wellbeing. It refers to both individual and population-wide health.

Emergency management is an important component of public health; moreover, it continues to be imperative that emergency management officials and public health officials coordinate their preparation, response, and recovery plans for hazardous conditions.

## Vulnerability Overview

- Limited shelters with capacity for special care residents.
- Limited shelters that allow family pets.
- Some habitual roadside maintenance activities may increase erosion and run-off, destabilizing roadside banks
- Longer growing season and increased moisture may expand opportunities for existing pests such as mosquitoes and ticks.
- Greater prevalence for pests can increase vector-borne diseases such as equine encephalitis, West Nile Virus, Lyme Disease, babesiosis, etc.
- Possible increased range for southern pests and diseases like dengue and Zika.
- Elderly and low-income may have limited cooling and heating options.
- Changes to precipitation may limit groundwater recharge and reduce water for residential wells.
- Blue-green algae and milfoil may increase presence in waterbodies.
- Increased number of low air quality/high ozone days.
- Flooding, electricity outages, and cost impacts on private wells
- Lack of consistency among cartographic data such as critical facilities, flooding locations, private drinking water well location, drought clusters that threaten private wells, etc.

## Potential Partners

- ◇ CT DESPP
- ◇ CT DPH
- ◇ CT DEHMS
- ◇ CT DEEP
- ◇ REPT DEHMS Region 5
- ◇ Local Health Departments
- ◇ Regional Health Districts
- ◇ Local Social Service Agents
- ◇ Visiting Nurses' Associations
- ◇ Regional health providers (clinics, hospitals, etc.)
- ◇ Local sanitarians

## Potential Funding Streams

- ◇ Connecticut Health Foundation
- ◇ DEHMS/FEMA Flood Mitigation, Pre-disaster Mitigation, and Hazard Mitigation Grants
- ◇ FEMA (Federal Emergency Management Agency) Preparedness (Non-Disaster) Grants
- ◇ EPA Local Governments Reimbursement Program
- ◇ US Department of Commerce
- ◇ US Department of Health and Human Services
- ◇ US Department of Housing and Urban Development
- ◇ US Department of Labor





# General Tools

## **Connecticut Rural Health Report**

<http://www.ruralhealthct.org/report.htm>

## **Preparing for the Public Health Challenges of Climate Change**

<http://www.ruralclimatenetwork.org/sites/default/files/Preparing%20for%20the%20Public%20Health%20Challenges%20of%20Climate%20Change.pdf>

## **Connecticut Local EMD and Municipal Official Handbook - March 2018**

[https://portal.ct.gov/-/media/DEMHS/\\_docs/EMD-CEO-Handbook-Feb-2018.pdf?la=enEPA](https://portal.ct.gov/-/media/DEMHS/_docs/EMD-CEO-Handbook-Feb-2018.pdf?la=enEPA)

## **EPA Climate Change Impacts on Human Health -**

[https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-human-health\\_.html](https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-human-health_.html)

## **The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment - <https://health2016.globalchange.gov/>**

A scientific overview of the impacts of climate change on human health from temperature-related death and illness, air quality impacts, extreme events, vector-borne diseases, water-related illness, food safety/nutrition/distribution, mental health and wellbeing. Impacts of Climate on Human Health Executive Summary ([https://resilientrural.com/wp-content/uploads/2018/11/ClimateHealth2016\\_00b\\_Exec\\_Summary\\_small.pdf](https://resilientrural.com/wp-content/uploads/2018/11/ClimateHealth2016_00b_Exec_Summary_small.pdf))

**CDC Climate and Health Project**— A resource by Centers for Disease Prevention and Control that outline health risks and health strategies related to climate change. Also is information on the CDC's Climate – Ready Cities and States Initiative, in which NH and VT are participating.

**CDC's Social Vulnerability Index** <https://svi.cdc.gov/map.html>

## **American Public Health Association (APHA) - Climate Change**

<https://www.apha.org/climate>

## **APHA "Adaptation in Action: Grantee Success Stories from CDC's Climate and Health Program" [https://www.apha.org/-/media/files/pdf/topics/environment/adapt\\_in\\_action.ashx?](https://www.apha.org/-/media/files/pdf/topics/environment/adapt_in_action.ashx?la=en&hash=CD4C4796038251FEF5C1208104DF2FED145D13B2)**

[la=en&hash=CD4C4796038251FEF5C1208104DF2FED145D13B2](https://www.apha.org/-/media/files/pdf/topics/environment/adapt_in_action.ashx?la=en&hash=CD4C4796038251FEF5C1208104DF2FED145D13B2) Communities across the nation are taking action to reduce the effects of climate change on health. Adaptation in Action: Grantee Success Stories from CDC's Climate and Health Program (PDF) highlights successful ways communities have responded to the challenge of climate change.

**Plan4Health Success Story: Disasters Toolkit for Texas Rural Communities** <https://planning.org/blog/blogpost/9135329>

**Vermont Department of Health Environmental Public Health Tracking: Climate Change**— As part of its Environmental Health Tracking Program, the department has recently begun tracking the incidences of heat stress and heat-related fatalities. While Vermont has not yet experienced the number of prolonged extreme heat events that many other states have, heat stress is expected to become a more significant risk in the lives of Vermont residents.

# General Tools

(Continued)

**Rhode Island Climate Health Program** [https://rihealth.maps.arcgis.com/apps/MapJournal/index.html?appid=1d57fba5e14c4b86b27f329a733d679d&mc\\_cid=5ba8ef4c5c&mc\\_eid=4d705d84f4](https://rihealth.maps.arcgis.com/apps/MapJournal/index.html?appid=1d57fba5e14c4b86b27f329a733d679d&mc_cid=5ba8ef4c5c&mc_eid=4d705d84f4)

**NHDES Strategic Plan to Address the Health Impacts of Climate Change in New Hampshire**—The Environmental Health Program worked with the state public health system and conducted a needs assessment to better understand the capacity to address climate change. The results of the needs assessment were used to develop a strategic plan to assist the public health system in being better prepared for the impacts of climate change. <https://www.des.nh.gov/organization/divisions/air/pehb/ehs/ehp/documents/strategic-plan.pdf>

**Massachusetts Environmental Public Health Tracking - Climate and Health Profiles**  
[https://matracking.ehs.state.ma.us/Climate-Change/climate\\_and\\_health\\_profile.html](https://matracking.ehs.state.ma.us/Climate-Change/climate_and_health_profile.html)

**EPA Climate Change and Health Factsheets**  
<https://archive.epa.gov/epa/climate-impacts/climate-change-and-health-factsheets.html>

**FEMA Emergency Management in a Changing Climate**  
<https://www.fema.gov/climate-change>

**George Mason University Center for Climate Change Communication -Conveying the Human Implications of Climate Change**  
<http://www.climatechangecommunication.org/all/conveying-the-human-implications-of-climate-change/>

**Case Study Town of Brookfield Tick Communication Campaign**  
<https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Tick-Communication.pdf>

**Case Study Minnesota Climate and Health Program**  
<https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Minnesota-Climate-and-Health.pdf>



# ACTIONS OVERVIEW

The section is divided into the following major categories:

- Best management practices
- Research, monitoring, and education
- Policy, Legislation, Regulation & Funding
- Emergency Management

*“While all Americans are at risk, some populations are disproportionately vulnerable, including those with low income, some communities of color, immigrant groups (including those with limited English proficiency), Indigenous peoples, children and pregnant women, older adults, vulnerable occupational groups, persons with disabilities, and persons with preexisting or chronic medical conditions.”<sup>9</sup>*

# ACTIONS

## Best Management Practices

1Ph	<b>Incorporate climate change into local and regional public health programs. Coordinate among local, regional, and state health departments to monitor impacts and identify climate change adaptation strategies.</b>
	<p><b>Potential Partnerships:</b> Health departments, sanitarians, health districts, CT DPH</p> <p><b>Tools:</b> NACCHO Essential Actions for Resilience  <a href="https://www.naccho.org/uploads/downloadable-resources/Essential-Actions-for-Climate-Resilience-Fact-Sheet.pdf">https://www.naccho.org/uploads/downloadable-resources/Essential-Actions-for-Climate-Resilience-Fact-Sheet.pdf</a></p> <p><b>NACCHO 12 Steps to Operationalize Climate Change in a Local Health Department</b>  <a href="https://www.naccho.org/uploads/downloadable-resources/NA634PDF-12Steps.pdf">https://www.naccho.org/uploads/downloadable-resources/NA634PDF-12Steps.pdf</a></p> <p><b>Minnesota Climate &amp; Health Case Study</b> <a href="https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Minnesota-Climate-and-Health.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Minnesota-Climate-and-Health.pdf</a></p>
2Ph	<b>Conduct public health vulnerability studies. Identify populations, communities, and geographic areas most at risk for the identified health risks. Consider the public health needs of vulnerable populations in climate change adaptation planning. Identify locations of vulnerable residents. Coordinate with utilities to reduce shut-offs during high heat or extreme cold events.</b>
	<p><b>Potential Partnerships:</b> Health departments, sanitarians, emergency managers, REPT, CT PURA, electrical utilities</p> <p><b>Tools:</b> CDC Health Vulnerability <a href="https://www.cdc.gov/climateandhealth/pubs/AssessingHealthVulnerabilitytoClimateChange.pdf">https://www.cdc.gov/climateandhealth/pubs/AssessingHealthVulnerabilitytoClimateChange.pdf</a></p> <p><b>Appendix G: G. Mapping 101: Joining census data for beginning GIS users from Minnesota Extreme Heat Toolkit.</b> <a href="http://www.health.state.mn.us/divs/climatechange/docs/appendix_g.pdf">http://www.health.state.mn.us/divs/climatechange/docs/appendix_g.pdf</a></p> <p><b>Antioch University New England Webinar Enhancing the Resilience of Seniors</b> <a href="http://www.communityresilience-center.org/webinars/enhancing-the-resilience-of-seniors-in-your-community/Climate%20Change,%20Health,%20and%20Populations%20of%20Concern">http://www.communityresilience-center.org/webinars/enhancing-the-resilience-of-seniors-in-your-community/Climate Change, Health, and Populations of Concern</a> <a href="https://archive.epa.gov/epa/climate-impacts/climate-change-and-health-factsheets.html">https://archive.epa.gov/epa/climate-impacts/climate-change-and-health-factsheets.html</a></p>
3Ph	<b>Continue to develop and update all municipal emergency preparedness plans for extreme weather events. Evaluate current early extreme weather events warning system and emergency response plans. Develop or strengthen joint protocols for multi-jurisdictional response to a broad spectrum of climate-related emergencies and disasters. Establish communication mechanism to coordinate efforts between disaster relief and public health agencies. Partner with health districts/departments to exercise pandemic response plans.</b>

**Comments:** Coordinate with regional NWS offices for correct coverage locations. Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications.

**Potential Partnerships:** CEOs, EMDs, CT DPH, CT DESPP, REPT, DEHMS

# ACTIONS

## Best Management Practices

4Ph	<b>Manage municipal properties to reduce heat island affect. Provide potable water and shaded areas in public spaces during community events. Consider adding lighting to allow for use of recreational facilities at cooler points of the day. Seek state criteria for school closings and outdoor play during extreme heat events. Research and follow cooling station best management practices. Develop a strategy for providing and communicating heat wave behavioral adaptations such as air conditioning availability and increased fluid intake. Develop communications plan for extreme heat for the public and vulnerable populations through schools, daycares, landscape/construction businesses, sports teams/camps, and senior living facilities, etc.</b>
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**Comments:** Cross-reference with Infrastructure

**Potential Partnerships:** Public Works, CEOs, School districts, health departments

**Tools:** **Potential Heat Island areas in NHCOC Region** <https://resilientrural.com/wp-content/uploads/2018/11/NASA-NHCOC-heat-islands-by-town-Braneon-McConnell.zip>

**EPA Heat Island Effect** <https://www.epa.gov/heat-islands>

**Excessive Heat Events Guidebook** [https://www.epa.gov/sites/production/files/2016-03/documents/ehguide\\_final.pdf](https://www.epa.gov/sites/production/files/2016-03/documents/ehguide_final.pdf)

**RI Heat Safety** <http://www.riema.ri.gov//resources/citizens/prepare/threats/documents/Heat%20Safety.pdf>

**Minnesota Extreme Heat Toolkit Appendices** "Messages should include information on what to do (e.g., how to prevent illnesses from extreme heat) (see Appendix E for a tip sheet), symptoms of heat-related illnesses (see Table 2 on page 2-3), characteristics of persons more vulnerable to extreme heat (see Table 3 on page 2-5), and where to go for more information." and Appendix J for sample media release

5Ph	<b>Manage municipal properties to eliminate or reduce vector habitat (e.g. standing stagnant water). Implement management strategies in public spaces to reduce disease-carrying pests such as ticks and mosquitoes. Enhance preparedness for disease prevention of vector-borne and water-borne diseases following floods and storms. Develop communication plan for residents about on-property tick and mosquito management.</b>
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**Comments:** Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications.

**Potential Partnerships:** DOT, Public Works, health districts, local health depts

**Tools:** **Case Study - Brookfield CT Health Department Tick Outreach** <https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Tick-Communication.pdf>

**Vermont Tick Tracker** <http://healthvermont.gov/tracking/tick-tracker>

6Ph	<b>Reduce public exposure to algal blooms in recreational swimming areas</b>
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**Potential Partnerships:** DOT, Public Works, health districts, local health depts., local land use commissions

**Tools:** Health districts' Sanitarians perform water sampling and visual assessments for algal blooms and advise as necessary. Management of storm-water run-off through Low-Impact Development Practices reduce their occurrences.

# ACTIONS

## Best Management Practices

7Ph	<b>Develop communications for visitors and seasonal/permanent residents about evacuation routes and heating/cooling/emergency shelter locations esp. if animal-friendly. Provide information to pet owners on protecting their pets from extreme heat. If possible, identify a local cool place that may be willing to accept people and their pets. Encourage residents and businesses to use Town social media/web sites for information sharing. Ensure senior centers and shelters have cooling systems. Consider extending hours at municipal buildings, public spaces, and commercial areas like movie theaters and shopping malls where air conditioning is available. Also consider free public transportation to shelters.</b>
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**Comments:** Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications

**Potential Partnerships:** health districts, local health depts, EMDs, CEOs, Parks & Rec, Public Works

**Tools:** Improving ADA access to cooling centers: **Chapter 7 of the ADA Best Practices Tool Kit for State and Local Governments** <http://www.ada.gov/pcatoolkit/toolkitmain.htm>.

**Minnesota Climate & Health case study** <https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Minnesota-Climate-and-Health.pdf>

8Ph	<b>In the aftermath of extreme events, prepare for additional trauma due to dispossession, mental health challenges and post-traumatic stress disorder.</b>
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**Potential Partnerships:** DESPP, DEHMS, health depts./districts

9Ph	<b>Assess food security for all sectors of society in the state/region.</b>
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**Comments:** Support local sustainable agriculture to improve food security; cross-reference with agriculture

**Potential Partnerships:** CT DPH, CT Dept of Ag

**Tools:** **USDA Food Security Assessment Toolkit** [https://www.ers.usda.gov/webdocs/publications/43164/15810\\_efan02013a\\_1\\_.pdf?v=0](https://www.ers.usda.gov/webdocs/publications/43164/15810_efan02013a_1_.pdf?v=0)

10Ph	<b>Develop partnerships and/or policies to prevent power and water companies from shutting off services to their customers due to nonpayment of bills during extreme heat events.</b>
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**Potential Partnerships:** CEOs, social service agents, PURA

11Ph	<b>Institute extreme weather protocols for municipal employees especially for high-heat and low air quality days. Develop communication plan for residents about poor air quality and high ozone days. Coordinate with CT DEEP about maintaining regional air quality.</b>
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**Comments:** CT DEEP and Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications

**Potential Partnerships:** EMDs, health departments, CEOs, Public Works

**Tools:** **EPA EnviroFlash Air Quality Alert Program** <http://www.enviroflash.info/>

# ACTIONS

## Research, Monitoring, and Education

<b>12Ph</b>	<b>Develop an education campaign for students, residents, and visitors on natural hazards and preparedness. Provide outreach to seasonal home-owners on how to protect against frozen pipes and water damage during the winter with the loss of electricity, including information on automatic shut-off switches or alarms (LHNHMP). Distribute resources through town hall, community events, local/regional websites, social media. September is National Preparedness Month.</b>
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**Comments:** from Litchfield Hills NHMP & Burlington Annex of Hazard Mitigation Plan for the Former Central Connecticut Region

**Potential Partnerships:** NHCOC, health districts, CT DPH, CEOs, EMDs, Public Works, Building Department, local/regional schools

**Tools:** Litchfield Hills NHMP

**RI Citizen Preparedness Flood Safety** <http://www.riema.ri.gov//resources/citizens/prepare/documents/Flood%20Safety.pdf>

**RI Citizen Preparedness** <http://www.riema.ri.gov//resources/citizens/prepare/threats/documents/Hurricane%20Preparedness.pdf>

**FEMA Training** <https://training.fema.gov/is/courseoverview.aspx?code=IS-909>

**Ready.Gov** <https://www.ready.gov/>

**CT DPH Hurricane Prep** <https://resilientrural.com/wp-content/uploads/2018/11/CT-DPH-Before-Hurricane.pdf>

**Red Cross thunderstorm prep** <https://resilientrural.com/wp-content/uploads/2018/11/Red-Cross-thunderstorm.pdf>

**Red Cross Generator Use** <https://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/power-outage/safe-generator-use.html>

**FEMA Avoiding Hurricane Damage: A Checklist for Homeowners** <https://www.fema.gov/media-library/assets/documents/13737?id=3340>

<b>13Ph</b>	<b>Increase public awareness and education on opioid abuse and misuse.</b>
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**Potential Partnerships:** health districts & depts., NHCOC Prescription assistance network

**Tools:** TAHD is currently administering a DEMHS grant entitled SPF-Rx which is designed to help combat the opioid crisis and an ad campaign called "Change the Script".

<b>14Ph</b>	<b>Develop plans to deal with vector-borne diseases from ticks and mosquitoes especially in case of need for rapid response. Implement educational programs for schools and the public on how to help control vector (e.g. ticks and mosquitoes) breeding sites.</b>
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**Potential Partnerships:** REPT, health districts, local health depts.

**Tools:**

**Vermont Tick Tracking Program** <http://www.healthvermont.gov/tracking/tick-tracker>

**Brookfield CT Tick Communication Program** <https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Tick-Communication.pdf>

# ACTIONS

## Research, Monitoring, and Education

15Ph	Review potable water vulnerabilities in both private well and public water supply systems across community. Encourage private well owners with vulnerable well locations to seal well and to grout the space between the casing and bore hole and/or relocate the well on the property. Develop GIS database of private wells or parcels with wells. Track and communicate incidences of private water well failures with health departments especially in drought conditions. Encourage residents to sample their wells on an annual basis, especially following significant storm events. Encourage private well owners extend well casing above flood level if in a delineated FEMA flood zone or commonly known flooding area even if above 1ft above grade. Research possibility of solar-powered or hand-powered pumps for residents/facilities dependent on potable well water. Well depth will determine feasibility of different technologies.
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**Comments:** Cross reference with Sustainable CT Action 2.6

**Potential Partnerships:** Dept of Consumer Protection, DPH Private well program, local health departments and districts, building departments

**Tools:** "Drinking Water Vulnerability Assessment and Resilience Plan" by CT DPH & CIRCA

**Fairfield CT GIS private well parcel database**

**CT DPH Well Casing Extension** [https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/drinking\\_water/pdf/wellcasingextensionpdf.pdf?la=en](https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/drinking_water/pdf/wellcasingextensionpdf.pdf?la=en)

16Ph	Coordinate with water utilities to protect reservoirs and aquifer protection areas.
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**Potential Partnerships:** WUCC, CT DPH, local water utilities

17Ph	Develop a database of morbidity and mortality caused by climate change.
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**Potential Partnerships:** health districts, CT DPH

18Ph	Intensify vector associated disease monitoring from vectors such as ticks and mosquitoes.
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**Potential Partnerships:** health districts, local health depts

19Ph	Develop GIS StoryMap that communicates the multiple ways that climate change intersects with public health.
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**Potential Partnerships:** CT DPH

**Tools:** RI Climate Health Storymap [https://rihealth.maps.arcgis.com/apps/MapJournal/index.html?appid=1d57fba5e14c4b86b27f329a733d679d&mc\\_cid=5ba8ef4c5c&mc\\_eid=4d705d84f4](https://rihealth.maps.arcgis.com/apps/MapJournal/index.html?appid=1d57fba5e14c4b86b27f329a733d679d&mc_cid=5ba8ef4c5c&mc_eid=4d705d84f4)

# ACTIONS

## Policy, Legislation, Regulation & Funding

**20Ph** Seek funding to provide for adequate updates to municipal water & sewage infrastructure.

**Potential Partnerships:** CT DAS, DPH, USDA, Local Public Works

**21Ph** Review existing septic system regulations for capacity from increased soil saturation from storm events.

**Potential Partnerships:** CT DPH, health districts, local health depts

**Tools:** CT Public Health Code

## Emergency Management

**22Ph** Work with FirstNet (public safety broadband network) to improve communications coverage. Communicate with vulnerable populations on cooling centers, emergency shelters, and transportation options to avoid exertion in heat. Expand use of existing communication tools and develop a comprehensive contact list of organizations representing vulnerable populations as a resource for preparedness and response to extreme events. Encourage all businesses and residents, particularly older adults, to sign up for emergency information systems in your community (Nixel, Everbridge, etc.).

**Comments:** Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications and POCD Goal 2.

**Potential Partnerships:** CEOs, social service agents, local health departments, EMDs, volunteer emergency responders, senior centers

**Tools:** CA DOH Climate change & Health Equity Program <https://www.cdph.ca.gov/Programs/OHE/Pages/CCHEP.aspx>

**Kern County California -utility and county government to sponsor cooling centers.**

**Building Older Adults' Resilience** <https://resilientrural.com/wp-content/uploads/2018/11/Building-Older-Adults-Resilience-Toolkit-RAND.pdf>

**firstnet.gov**

**23Ph** Consider developing a Memorandum of Understanding with schools or school bus company to utilize school buses for mass transportation during an emergency. Ensure regional evacuation plans include health care facilities, senior housing, disabled residents, and those without transportation.

**Potential Partnerships:** REPT ESF-1 Transportation working group, EMDs, school bus companies, Transit Districts

**24Ph** Partner with health departments/districts to promote health services like flu shots, inspections for issues that exacerbate respiratory illnesses.

**Potential Partnerships:** health districts, local health districts, pharmacies

**Tools:** TAHD's "Healthy Home" Program



# ACTIONS

## Emergency Management

25Ph	Develop plan to insure uninterrupted prescription refills for residents with chronic medical conditions.
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**Potential Partnerships:** Pharmacies, NHCOC Prescription Assistance network

26Ph	Create and assist community-supported neighbor-to-neighbor networks across the community that are accessible to all income levels (e.g., villages, fraternal organizations, faith-based communities, neighborhood associations).
------	--

**Potential Partnerships:** EMDs, volunteer emergency responders, senior centers, Community Foundations

27Ph	Develop redundant back-up power systems, possibly via renewable energy (solar, wind) for critical facilities to keep those facilities operational and avoid outcomes of displaced or decreased workforce and increased social/health stress for extended power outages. Develop redundant infrastructure, backup power, and increase system storage and conduct more comprehensive emergency response planning to improve resiliency. Reach out to buildings where vulnerable populations reside, such as hospitals, nursing homes, etc. to evaluate back up power generation during extreme heat or cold events and extended power outages.
------	--

**Comments:** Cross reference with Microgrid Action in Infrastructure and WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations"

**Potential Partnerships:** CEO, EMDs, volunteer emergency responders, senior centers, REPT

28Ph	Encourage residents over 18 to join community emergency response teams or medical reserve corps.
------	--

**Comments:** Cross reference with health districts Medical Reserve Corps outreach efforts.

**Potential Partnerships:** CERT, REPT, senior centers

29Ph	Increase frequency and expand topic coverage of Community Emergency Response Team (CERT) trainings to better respond to natural hazard events.
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**Potential Partnerships:** EMDs, CEOs, REPT

30Ph	Create a Community Hub to assist in relay of critical information, especially during disaster. Community Hub identifies needed equipment such as generator, storage space, amateur radio network, etc.
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**Potential Partnerships:** Regional Emergency Planning Team ESF -2 Communications Chair Steve Savage; CT ARES (Amateur Radio Emergency Service)

**Tools:** Larimer Community Hub <https://www.larimer.org/emergency/larimer-connects/community-hubs-0>

# ACTIONS

## Emergency Management

31Ph	Develop Time to Recovery Goals Matrix with minimal, operational, and functional time goals to identify priority restoration locations.
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**Potential Partnerships:** REPT, DESPP, DEHMS

**Tools:** Resilient Design Performance Standard [http://www.bccollaborative.org/uploads/6/6/0/6/66068141/resilientdesignperformancestandard\\_adopted\\_05.13.2016.pdf](http://www.bccollaborative.org/uploads/6/6/0/6/66068141/resilientdesignperformancestandard_adopted_05.13.2016.pdf)

32Ph	The Town should continue to require the installation of fire protection water in new developments. Establish a maintenance and testing schedule for dry hydrants/fire ponds and require an annual budget funding for maintenance and repairs. Towns should also consider mutual aid tankers and properly maintain key waterholes for refilling emptied tankers.
------	---

**Comments:** from Litchfield Hills NHMP

**Potential Partnerships:** CEOs, local fire departments, land use commissions

33Ph	Establish a designated area for brush disposal following storm related events that generate debris and/or storage of snow. Identify methodology for tracking cost of debris management for potential FEMA reimbursement.
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**Comments:** from Litchfield Hills NHMP

**Potential Partnerships:** local Public Works

34Ph	Provide public information on safe fire practices (check with DEEP fire rating, fire extinguisher availability, etc.)
------	---

**Comments:** from Litchfield Hills NHMP

**Potential Partnerships:** local fire departments

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# Images

All images, unless otherwise noted, are credited to Joanna Wozniak-Brown.

The Rural Resiliency landscape images were crafted by Peter Minutti, University of Connecticut.

## Case Study Images

### **Agriculture Freund's Farm**

New Dairy Barn at Freund's Farm built in 2016. Credit: Cabot Creamery, Provided by Matt Freund

### **Agriculture Interlace Farm**

Pond on Interlace Farm, provided by Meghan Giroux

### **Cultural Resources CT State Historic Preservation Office**

Sloane Museum, Kent, CT Photo from CT DECD, <https://www.ct.gov/cct/cwp/view.asp?a=2127&q=302262>

### **Cultural Resources Manitoba Historic Sites Mapping**

Shergrove School (no date) by R. M. Stevenson Source: [Archives of Manitoba, School Inspectors Photographs, GR8461, A0233, C131-3, page 31. Retrieved from http://www.mhs.mb.ca/docs/sites/shergroveschool.shtml](http://www.mhs.mb.ca/docs/sites/shergroveschool.shtml)

### **Infrastructure SECCOG Critical Facilities**

Location of New London Fire Station, provided by Amanda Kennedy, credit: SCCOG GIS/FEMA

### **Infrastructure town of Morris LID Manual**

Cover of LID Manual, image created by Joanna Wozniak-Brown, report by Steve Trinkaus, P.E.

### **Public Health town of Brookfield Tick Communication**

"Blast Rack Card" from Ridgefield BLAST, from <https://www.ridgefieldct.org/blast-lyme-tick-borne-disease-prevention-program/pages/blast-materials>

### **Public Health Minnesota Climate & Health Program**

Screenshot of "Planning for Change and Health Impacts" Youtube Video <https://www.youtube.com/watch?v=Hlb4E8d7F08&list=PLnv1INVkmxmvgeSWcbXwIWJarnAqx5GAw&index=15>

### **Natural Resources HVA Culvert Assessment Program**

Barrier Culvert in Kent, CT, provided by HVA, credit: HVA

### **Natural Resources South Kingstown Land Trust Pilot**

SKLT Facebook Photo 8/13/09, "Carpenter Farm in Perryville, on Post Road and Moonstone Beach Road", retrieved from <https://www.facebook.com/SouthKingstownLandTrust/photos/a.439912441922/120756561922/?type=3&theater>

## Icons



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# Appendix A

## Agriculture

A resilient rural agriculture system grants farmers the flexibility and support needed to conduct resiliency activities. Education of farmers and by farmers will be paramount as we transition to a new climate system. Local food systems should match the topography, geography, and climatic predictions of a given region. Businesses should look to patronize local farms. Municipalities should actively seek out ways to support local farms through sensible regulation, encouraging agri-tourism, and inviting educational events. On-farm resiliency will depend on smart water management, livestock and crop transitions, and infrastructure investments.





## Cultural Resources

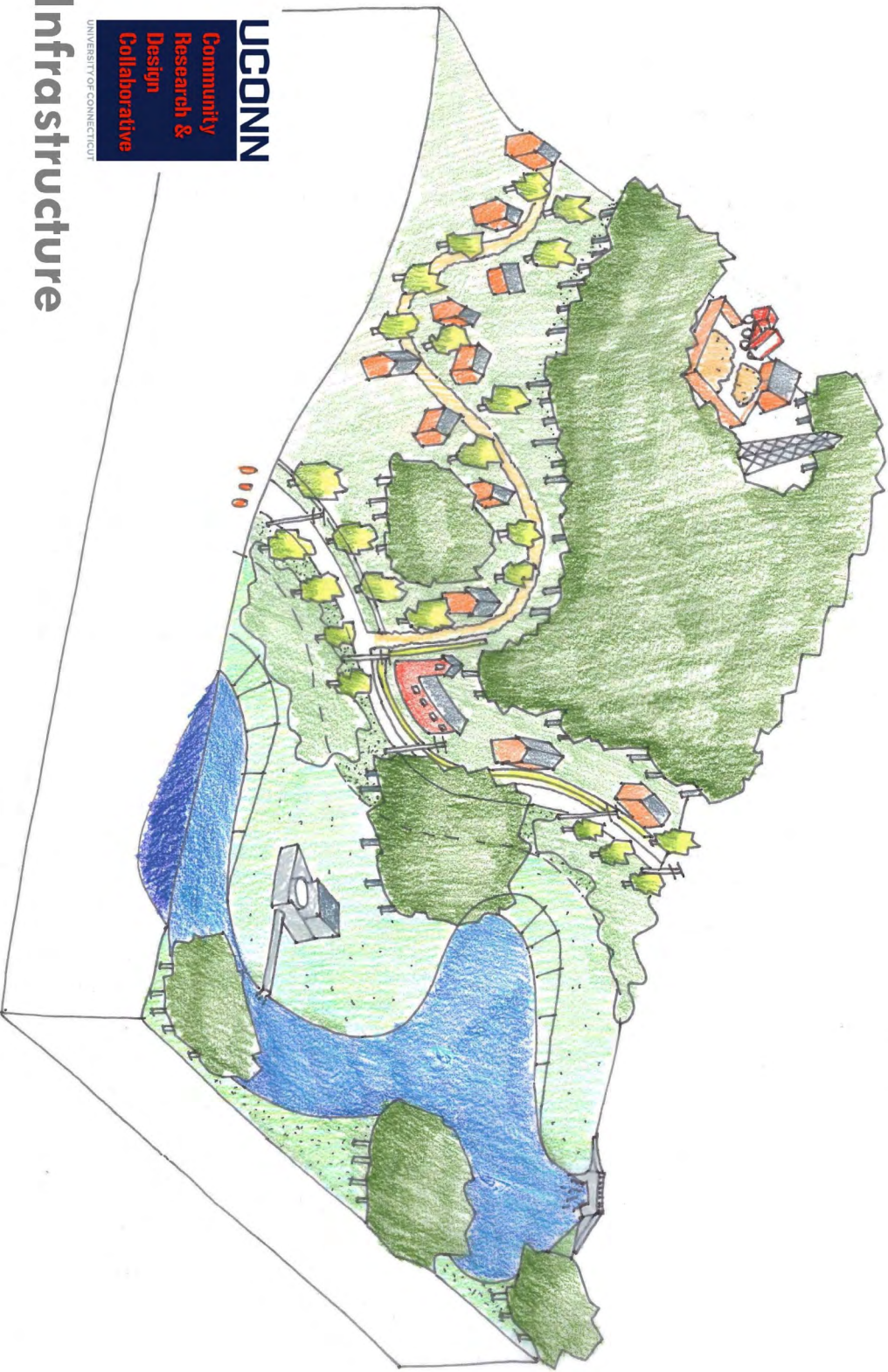
As with the other categories, cultural resources in the rural communities are vulnerable in the face of climate change. Rural cultural resources include a wide range of important additions to the rural social fabric. Unique languages and small ethnic communities are crucial dimensions that enhance the cultural diversity within our small towns. Structural elements of rural communities include buildings, historical sites, stone-walls, cemeteries, barns, etc.





## Infrastructure

Recognizing the significant capital investment and necessary functions associated with infrastructure, a resilient system will be designed and maintained to meet the expectations of a new climate future. Where possible, insufficient infrastructure will be replaced when possible. The replacements and repair should be incorporated into long-range capital planning for municipalities. Infrastructure includes road systems, water treatment facilities, flood control, and critical facilities. Special care should be taken in the maintenance of traditionally rural features such as narrower roads, scenic overlooks/viewsheds, entrances to towns, potable drinking water wells, stonewalls, functioning septic systems/water treatment facilities, etc. Municipal and regional daily and regular actions should consider reducing the impacts that could exacerbate climate impacts such as salination of the groundwater table, destabilizing slopes, and discharging water.



## Infrastructure



## Natural Resources

A resilient natural resource system will be a balance of conservation, thoughtful intervention, and benign neglect. While the destruction of natural resources during natural disaster events is, to a certain extent, unpreventable, care can be taken to protect sensitive species, community assets, and important biological communities. Climate change will bring about inevitable changes to the species composition in the natural communities. Municipalities should undertake efforts to conserve important tracts of land, limit development in flood zones, protect slopes, preserve agricultural soils, manage water usage and disposal responsibly, and intervene on invasive species.



## Natural Resources



## Public Health

For Northwest Hills of Connecticut, the greatest risks posed by climate change include high-heat, intense storm events (winter & summer), drought, increased population of disease-carrying vectors, and more. A resilient public health system will seek to reduce the spread of disease, educate residents on ways to protect themselves from the climate risks, and communicate with the public prior, during, and after significant storm events. Municipalities should review their evacuation procedures, emergency sheltering capacity (including provisioning of heating or cooling), Special attention should be given to the elderly, disabled, and other vulnerable residents who may be disadvantage based on language, race, or economic concerns.



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# Public Health



### Resilient Rural Town Center

While this is not a particular category or sector, it illustrates a rural community where members interact with each other, participate in community functions, and patronize local businesses. The green could act as a community gathering place where residents and visitors may meet or enjoy local events whether it's a farmers' market, historical recreation, or concert as a main event. A resilient village center provides appropriate walking routes, shade for summer events, parking for electric vehicles, access to drinking water, and easy spaces for peer to peer interactions.



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## Resilient Rural Town Center

# Appendix B

**Resiliency Tasks were drawn from the following reports:**

Alliance for Regional Collaboratives for Climate Adaptation; California. <a href="http://arccacalifornia.org/roadmap-to-resilience/">http://arccacalifornia.org/roadmap-to-resilience/</a>
Pennsylvania Climate Adaptation Planning Report: Risks and Practical Recommendations ( <a href="https://drought.unl.edu/archive/plans/Climate/state/PA_2014.pdf">https://drought.unl.edu/archive/plans/Climate/state/PA_2014.pdf</a> )
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Resiliency Actions - Draft 12-10-18

AGRICULTURE

Overall Theme	Adaptation Strategies	Comments/Explanations	Potential Partnerships	Tools
Increased Management of Resources				
1Ag	Provide incentives for energy and water efficiency through technical assistance and grant programs. Promote policies to reduce energy use, conserve water, and encourage sustainability.		Farms, USDA NRCS, CT RC&D, local land use commissions, energy commissions	USDA NRCS Energy Audits, CT Farm Energy Program, NYS Resilient Farms <a href="https://www.nys-soilandwater.org/programs/crf.html">https://www.nys-soilandwater.org/programs/crf.html</a>
2Ag	Conserve/reduce water use/demand among all user groups for example reduce water losses in distribution systems.		Farms, USDA, CT RC&D, land trusts	USDA NRCS
3Ag	Conserve energy use across the farm to reduce and/or greenhouse gas emissions		Farms, USDA, CT RC&D	<a href="http://cometfarm.nrel.colostate.edu/">http://cometfarm.nrel.colostate.edu/</a> ; <a href="https://www.ctfarmenergy.org/">Connecticut Farm Energy Program https://www.ctfarmenergy.org/</a>
4Ag	Increase storage of precipitation among all user groups. Remove regulations that prohibit capture of runoff from roofs, parking lots, etc. Allow storage in ponds, cisterns and tanks for use in greenhouses and horticulture operations.		Farms, local land use commissions, Public Works, CT DOT, Conservation Districts, UConn NEMO	
5Ag	Encourage water re-use including, but not limited to: remove regulations, institute health practices, or educate public on how to reclaim water for irrigation, cooling, washing, processing, etc.		Farms, local land use commissions	
6Ag	Increase soil organic matter and utilize surface cover through cover crops, mulches, crop rotations and tillage practices. Promote good soil/landscape management. Utilize quality land/soil management practices (good drainage, no till agriculture to prevent erosion).	Consider areas of town properties that require periodic cutbacks every few years or suffer from invasive species; these might benefit from cover crops (such as clover to benefit pollinators) or other productive vegetation (fruit/nut trees for the community). Ask Conservation Commission for advice for creating seasonal habitats or appropriate plantings. Consider property's use, i.e., if public access maybe edible ornamentation might be preferable.	Conservation Commission	USDA/RC&D Soil Health workshops and resources <a href="https://ctrcd.org/agriculture/soil-health-initiative/">https://ctrcd.org/agriculture/soil-health-initiative/</a>
7Ag	Identify on-farm adaptations for specialized products such as maple syrup or dairy.		Farms	Maple Syrup adaptations ( <a href="https://resilientrural.com/wp-content/uploads/2018/11/Maple-Syrup-Case-Study-from-NY-ClimAID.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Maple-Syrup-Case-Study-from-NY-ClimAID.pdf</a> )
8Ag	Increase the use of sustainable and organic growing methods and management practices and reduce uses of fertilizers, dyes, pesticides in property management where possible.		Farms, CT NOFA	UCS What is Sustainable Agriculture? <a href="https://www.ucsusa.org/food-agriculture/advance-sustainable-agriculture/what-is-sustainable-agriculture">https://www.ucsusa.org/food-agriculture/advance-sustainable-agriculture/what-is-sustainable-agriculture</a>
9Ag	Develop and promote community garden spaces on municipal land	Sustainable CT Action 4.3.	CEOs, local agricultural commissions. land trusts	
10Ag	Increase crop diversity (including native crops).		Farms	



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Land Use				
11Ag	Consider the need for access to new lands for expansion of maple sugar operations in the near term, to buffer orchards and dairy farms, and to allow for land to grow new varieties of fruit trees and dairy support crops.	Incorporate farmers into discussion for POCD and conservation areas (especially higher elevations). Consider long-term road-side maintenance and replacement of maple trees.	Local agriculture commissions, agriculture advocacy organizations, land use commissions	
12Ag	Continue preservation of prime and important farmland soils in order to secure ecosystem services these lands provide. Include in state and local POCDs, open space management plans, and Natural Resources Inventories.		local land use commissions, Housatonic Valley Association, Connecticut Farmland Trust, USDA/NRCS, CT Dept of Ag., land trusts	CT Environmental Conditions Online (CT ECO) Map Viewer
13Ag	Consider soil-based zoning that directs development away from agricultural soils		local land use commissions	town of Kent CT Soil Based zoning
14Ag	Encourage preservation of small, sustainable, diverse, community-supported farms in order to secure the ecosystem services these lands provide while educating the public about the importance of agriculture systems.		local land use commissions, agricultural advocacy groups, economic development groups, CT NOFA, land trusts	CT Dept of Ag "Community Farms Preservation Program" (former program)
15Ag	Encourage reuse of brownfields for agricultural use (such as aquaponics), as appropriate. Reuse urban buildings for agriculture and promote vertical agriculture, e.g. green roofs, etc.		local land use commissions, agricultural advocacy groups, economic development groups	EPA FAQs on Brownfields and Agriculture <a href="https://www.epa.gov/brownfields/frequent-questions-about-brownfields-and-urban-agriculture">https://www.epa.gov/brownfields/frequent-questions-about-brownfields-and-urban-agriculture</a> ; CT DECD Program
16Ag	Increase the amount of land in organic production systems and promote protection of these lands.		local land use commissions, land trusts, farms, CT NOFA	
17Ag	Identify and protect soil landscapes that are critical for groundwater recharge.		Northwest CT Conservation District, Housatonic Valley Association	
18Ag	Analyze use of marginal agricultural lands to grow sustainable biomass and fuel such as switch grass and willow.		farms, local agricultural commissions	USDA SARE <a href="https://www.sare.org/Learning-Center/Fact-Sheets/The-Sustainability-of-Biofuel-Fact-Sheet-Series">https://www.sare.org/Learning-Center/Fact-Sheets/The-Sustainability-of-Biofuel-Fact-Sheet-Series</a>
Infrastructure Changes				
19Ag	Work with state agencies on infrastructure improvements to sewage treatment plants to minimize or halt combined sewer overflows to reduce runoff onto productive soils.		DOH, DOT, OPM	
20Ag	Renovate or build new dairy barns to maximize passive ventilation and employ active cooling technologies where needed.	Review regulations and procedures to allow for higher roofs in barns and electricity use for fans.	farms	<a href="https://articles.extension.org/pages/32633/ventilation-and-cooling-systems-for-animal-housing">https://articles.extension.org/pages/32633/ventilation-and-cooling-systems-for-animal-housing</a>
21Ag	Increase filtration and pervious surface to handle stormwater runoff.	Incorporate LID into planning and zoning regulations and town operations. Cross reference with Sustainable CT Action 2.8.	Public Works & P&Z Commission	town of Morris LID Manual - <a href="https://circa.uconn.edu/building-municipal-resilience-and-climate-adaptation-through-low-impact-development/">https://circa.uconn.edu/building-municipal-resilience-and-climate-adaptation-through-low-impact-development/</a> ; CT NEMO program <a href="http://nemo.uconn.edu/">http://nemo.uconn.edu/</a>
22Ag	Utilize new hydrologic data for the designs and standards for all agricultural infrastructure and conservation practices.		farms, USGS, USDA, DOT	
Regulatory/Policy Changes				
23Ag	Assess and amend regulations to allow for agriculture processing facilities for value added products, meat slaughter and processing, etc. so that Connecticut farmers can meet market demands for locally grown products and reduce waste of blemished fruit and vegetables and can take advantage of the longer growing season, far-away markets and benefit from hail-damaged and excess fruit not picked by consumers during pick-your-own times.	Review regulations and reduce unnecessary impediments.	local land use & economic development commissions, CT Dept of Ag, UConn, COGs, Chambers of Commerce, Community Foundations	CT Planning for Agriculture Guide; CT Dept. of Ag “Farmer’s Guide to the Rules of Processing and Selling Meat or Poultry in Connecticut” <a href="http://www.ct.gov/doag/lib/doag/marketing_files/farmers_guide_to_processing_and_selling_meat_and_poultry_in_ct.pdf">http://www.ct.gov/doag/lib/doag/marketing_files/farmers_guide_to_processing_and_selling_meat_and_poultry_in_ct.pdf</a> ; UCONN "Starting a Food Processing Facility" <a href="http://cag.uconn.edu/nutsci/nutsci/foodsafety/Food_Processing_landing_page/Start_CT_food_processing_business.php">http://cag.uconn.edu/nutsci/nutsci/foodsafety/Food_Processing_landing_page/Start_CT_food_processing_business.php</a>

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24Ag	Assess and amend regulations to decrease barriers and promote farm practices that address climate adaptation and sustainability, e.g. building codes for greenhouses, misting and irrigation systems, etc. Reduce administrative burdens on farmers for installation of high tunnels, low/caterpillar tunnels, greenhouses, ventilation systems, or structures i.e general use of technologies for passive and active cooling measures in dairy barns, irrigation and other adaptive infrastructure.		local land use commissions, CT Dept of Ag, Uconn, USDA NRCS, Working Lands Alliance, CT Farm Bureau, SCCROG Urban-Rural Agricultural Collaborative, land trusts	NY Climate Smart Communities Webinar "Agriculture & Climate Change Adaptation: A Role for Municipalities" <a href="https://goo.gl/aTQtTP">https://goo.gl/aTQtTP</a>
25Ag	Create regulations or reduce barriers to encourage agriculture, agri-tourism, and use of renewable energy (including anaerobic digestion) on working farms.	Sustainable CT Action 4.3.	local land use commissions, CT Dept of Ag, Uconn	Example of Agricultural Overlay District and promotion of agri-tourism ( <a href="https://co.thurston.wa.us/PLANNING/planning_commission/agenda/2013-08-07/pc-agenda-20130807-attachment-staff-report-agritourism.pdf">https://co.thurston.wa.us/PLANNING/planning_commission/agenda/2013-08-07/pc-agenda-20130807-attachment-staff-report-agritourism.pdf</a> )
26Ag	Encourage local zoning regulations (e.g., concerning lights, noise) that enable agricultural workers to harvest during the cooler parts of the day (e.g.,. Early morning).		local land use commissions, CT Dept of Ag, UConn	CT Planning for Agriculture Guide, Right to Farm ordinances
27Ag	Continue to redevelop the infrastructure needed to grow, process, store, market, sell, and eat local and regional foods.	Consider food hub potential i.e., Northwest Hills Council of Governments Food Hub Viability Study or a Food Action Plan.	COGs, farmers, farm-to-table organizations, CT Dept of Ag.	Link to Food Hub and Food Action plan ( <a href="http://www.seattle.gov/environment/sustainable-communities/food-access/food-action-plan">http://www.seattle.gov/environment/sustainable-communities/food-access/food-action-plan</a> ); CLiCK Willimantic <a href="https://clickwillimantic.com/">https://clickwillimantic.com/</a>
28Ag	Provide regulations for seasonal work-force housing.		local land use commissions, CT Farm Bureau	Kent CT Zoning Regulation 3234 Permitted by Special Permit
29Ag	Identify local and regional sources of agricultural products that can be used in local facilities such as schools.		NHCOG Food Hub; CT Dept of Ag Farm to School Program, local farms	<a href="https://www.ct.gov/doag/cwp/view.asp?a=2225&amp;q=299424">https://www.ct.gov/doag/cwp/view.asp?a=2225&amp;q=299424</a> Dawn Crayco FoodCorps CT/CT Farm to School Collaborative, P: 860-785-3354 ; <a href="http://www.farmtoschool.org/">http://www.farmtoschool.org/</a>
30Ag	Implement general farm-friendly zoning regulations which better define agriculture, provide farmers flexibility for ancillary uses on farms, and allow on-farm sales, adequate signage to farms, and appropriate, small scaled meat processing. Allow maximum flexibility in our policies, rules, regulations, standards, and funding; practicing a philosophy of adaptive management will allow agriculture to be the most successful.	Real estate agents should communicate acceptance of working farms in the town to potential new buyers. Cross-reference with Sustainable CT Action 4.3, and Agriculture category, and NHCOG POCD Goal 3	Partners for Sustainable Healthy Communities, Upper Housatonic Valley National Heritage Area, CT Northeast Organic Farming Association, Agvocate, local agriculture and land use commissions, CT Dept of Ag, agricultural schools	Agvocate “Creating Farm Friendly Communities” <a href="https://agvocatect.org/creating-farm-friendly-communities/">https://agvocatect.org/creating-farm-friendly-communities/</a> ; CT Planning for Agriculture Guide
<b>Education/Outreach/Technical Assistance</b>				
31Ag	Provide outreach, education and networking opportunities needed for both existing and new farmers. Expand course opportunities at CT community colleges and high-schools on topics relevant to farming, agricultural science, and marketing especially for climate change		Conservation organizations, land trusts, NWRWIB, local colleges and universities; New CT Farmers Alliance	
32Ag	Encourage, promote, and support local and/or regional farmers' markets by hosting on town green or promoting in local communications.		CEOs, local agricultural commissions, land trusts	
33Ag	Assist farms in preparing emergency response plans		Conservation organizations, Public Works, private land owners, utilities	C T Farm Bureau Emergency Preparedness for Farmers <a href="http://www.cfba.org/emergency.htm">www.cfba.org/emergency.htm</a> ; USDA Risk Management Agency Insurance Agent Locator <a href="http://www3.rma.usda.gov/apps/agents">www3.rma.usda.gov/apps/agents</a> ; UConn Farm Risk Management and Crop Insurance Program <a href="http://www.ctfarmrisk.uconn.edu">www.ctfarmrisk.uconn.edu</a>
34Ag	Encourage farms to develop Nutrient Management Plans		NWCD, USDA NRCS, CT DEEP	Cornell Dairy Guidance - <a href="http://www.manuremanagement.cornell.edu/Pages/Popular_Pages/Fact_Sheets.html">http://www.manuremanagement.cornell.edu/Pages/Popular_Pages/Fact_Sheets.html</a>



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Bees & Pollinators				
35Ag	Encourage pollinator diversity in open space habitats. Manage open space habitats for a diversity of bee nesting sites such as open grasslands and powerline right- of- ways for ground-nesting bees. Leave dead and downed trees for tree-nesting bees. Conserve riparian buffers which protect bare ground surrounding rivers for ground- nesting bees that prefer bare ground with loose soil.		Conservation organizations, Public Works, private land owners, utilities, local landscaping companies, land trusts, USDA NRCS, UConn Extension, Master Gardeners, land trusts	Pollinator-Friendly Best Management Practices for Federal Lands (https://www.fs.fed.us/wildflowers/pollinators/BMPs/) ; UConn CAES “A Citizen’s Guide to Creating Pollinator Habitat in Connecticut” http://www.ct.gov/caes/lib/caes/documents/publications/pollinators/a_citizen%E2%80%99s_guide_to_creating_pollinator_habitat_in_connecticu t.pdf
36Ag	Educate open space managers about the importance of pollinators and land management techniques to encourage these pollinators. Encourage a diversity of native flowering herbaceous plants and shrubs, especially early and late-blooming plants, and bunch grasses (for bumble bees) to provide pollen.		Conservation organizations, Public Works, private land owners, utilities, local landscaping companies, land trusts	<a href="https://toolkit.climate.gov/case-studies/field-farm-forest-and-city-sustaining-pollinator-health-build-ecosystem-resilience">https://toolkit.climate.gov/case-studies/field-farm-forest-and-city-sustaining-pollinator-health-build-ecosystem-resilience</a>
37Ag	Encourage informed backyard bee rearing of the European honeybee by homeowners that have attended beekeeping information sessions, such as those provided by the CT Beekeeping Association or the Back Yard Beekeepers Association.		local agricultural commissions, conservation organizations, private land owners	
38Ag	Provide education to homeowners through informational talks, such as those offered by the Connecticut Agricultural Experiment Station, and print media on the importance of pollinator diversity, including information to distinguish wasps from bees and evaluate stinging risks. Pollinator education information also should include information to prevent pollinator pests, such as the carpenter bee.		local agricultural commissions, conservation organizations, private land owners, USDA, Uconn, land trusts	
39Ag	Encourage homeowners to maintain their property to support pollinator diversity. Encourage homeowners to plant native plants, such as goldenrod, that are beneficial to pollinators. Encourage homeowner organic lawn care to reduce applications of pesticides that could affect pollinators. Encourage homeowners to better target invasive plant control herbicide applications through spot spray or cut and paint methods instead of broadcast spraying which could kill pollinator-beneficial, native plants.		local agricultural commissions, conservation organizations, private land owners, land trusts	UConn CAES “A Citizen’s Guide to Creating Pollinator Habitat in Connecticut” http://www.ct.gov/caes/lib/caes/documents/publications/pollinators/a_citizen%E2%80%99s_guide_to_creating_pollinator_habitat_in_connecticu t.pdf

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Overall Theme	Adaptation Strategies	Comments/Explanations	Potential partnerships	Tools
Archaeological & Ethnographic Resources				
1Cr	Identify resources and responsible management groups. Identify building/structure resources such as museum collections and their responsible management groups. Inventory historic, iconic or landmark structures (i.e. covered bridges, mills, etc.) and their managers/owners.	Cross reference with Sustainable CT Action 3.1: Map Tourism and Cultural Assets and Action 4.5 Inventory and Assess Historic Resources and with Draft Shared Stewardship: Connecticut State Historic Preservation Office’s 2018-2023 Strategic Plan Goal #4 "Develop a Resiliency Strategy for Historic Resources". Are they in the floodplain? Is there adequate insurance? Can the buildings be retrofited for flooding and climate control? Are there capital improvement plans for historically accurate repairs? Are they located in a safe area? What can the history tell us to prepare for climate change? If site is in an immediately vulnerable area (flood zone), encourage responsible site manager to collect information as soon as possible. Do important historic sites and attractions have continuity plans? Are there plans to adapt to changing heat and precipitation conditions?	OHP, NPS, area university; CT State Historic Preservation Office (SHPO); The Institute for American Indian Studies Museum & Research Center; CT DOT; local museums and historical soceities, Connecticut historical agencies, CT SHPO, land trusts	Mary Dunne at SHPO; review "Hunters and Gatherers, Villages and Farms: A Preservation of the Cultural Resources of the Housatonic River Valley" by Russell Handsman; 1981 Housatonic River Management Plan, 2006 Housatonic River Management Plan.; CT State Archaeologist. Mapping Historic Sites In Rural Manitoba: Development, Themes, And Applications ( <a href="https://youtu.be/PrJvp1S6EHk">https://youtu.be/PrJvp1S6EHk</a> ) Connecticut Freedom Trail. Published with the Amistad Committee, Inc. <a href="http://www.ctfreedomtrail.org/">http://www.ctfreedomtrail.org/</a> Historic Barns of Connecticut. A collaboration with the Connecticut Trust for Historic Preservation. <a href="https://connecticutbarns.org/">https://connecticutbarns.org/</a> Mills: Making Places of Connecticut. A collaboration with the Connecticut Trust for Historic Preservation. <a href="https://connecticutmills.org/">https://connecticutmills.org/</a> National Historic Landmarks in Connecticut, <a href="https://www.nps.gov/nhl/find/statelists/ct.htm">https://www.nps.gov/nhl/find/statelists/ct.htm</a> ; FEMA’s “Floodplain Management Bulletin on Historic Structures; CT SHPO Case Study; Certified Local Government Program
2Cr	Include Native American populations in identification, adaptation, and protection of culturally important resources and traditional ecological knowledge		local tribal communities; The Institute for American Indian Studies Museum & Research Center	
Social & Governance Resilience				
3Cr	Review local and regional land use plans in anticipation of development pressures and shifts in development patterns due to climate change i.e. potential movement away from flood zones. Integrate with emergency and infrastructure planning as well. Consider traditional land uses especially livelihood uses (farming, logging, fishing) in these plans.		local land use commission, COGs, CT OPM, DEHMS	
4Cr	Assess potential social impacts of climate change on incomes, and other measures of well-being in vulnerable communities		CEOs, social service agents, CT DPH	Strengthening Social Resilience to Climate Change, World Bank <a href="http://projects.worldbank.org/P120170/strengthening-social-resilience-climate-change?lang=en">http://projects.worldbank.org/P120170/strengthening-social-resilience-climate-change?lang=en</a> Building Social Resilience: Protecting And Empowering Those Most At Risk <a href="https://www.gfdrr.org/building-social-resilience-protecting-and-empowering-those-most-risk">https://www.gfdrr.org/building-social-resilience-protecting-and-empowering-those-most-risk</a>
5Cr	Create climate communication materials in multiple locations & languages. Establish open communication with various community groups in your municipality including those typically disenfranchised, the elderly, and economically disadvantaged.	Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications, NWCT CEDS Plan Goal 1, and POCD Goal 1.	local municipal departments	Example: NobidadeTV and RIDOH Climate Change Program prepared bilungual program on climate change and health with focus on asthma, air pollution, heat, storms, flooding, and emergency preparedness ( <a href="https://youtu.be/VdComMYFW1E">https://youtu.be/VdComMYFW1E</a> ); <a href="http://www.lgc.org/wordpress/docs/freepub/community_design/guides/Participation_Tools_for_Better_Community_Planning.pdf">http://www.lgc.org/wordpress/docs/freepub/community_design/guides/Participation_Tools_for_Better_Community_Planning.pdf</a>
6Cr	Create Regional Task Force on historic and cultural resources to assist in funding, locating, and protecting important regional sites.		CT SHPO, NW CT Arts Council, Senior centers, municipal social agents, land trusts	

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Local Economy				
7Cr	Encourage business to create business continuity plans for disaster situations.	These plans should consider loss of electricity, flooding, interruptions in supply chain, employee access to work, and employee safety. Cross reference with Sustainable CT Action 1.4.	CT Dept. of Economic & Community Dev. Friends of Main St., NW CT Chamber of Commerce	<a href="https://www.bristolri.us/DocumentCenter/View/157/Disaster-Preparedness-for-Businesses-of-All-Sizes-PDF">https://www.bristolri.us/DocumentCenter/View/157/Disaster-Preparedness-for-Businesses-of-All-Sizes-PDF</a> ; <a href="http://www.sbcsierracamp.org/business-resilience-initiative/">http://www.sbcsierracamp.org/business-resilience-initiative/</a>
8Cr	Install signage to welcome people and direct people to shops, restaurants, historical sites, recreational opportunities. Publicize existing recreational assets.	POCD Goal 4	NHCOG, local economic development commission, Parks & Rec, land trusts	NHCOG Regional Trails Map
9Cr	Integrate climate change and adaptation issues into advanced training in university, community college, and technical training programs. Education and job training programs to re-tool workforce to take advantage of green economy growth. Coordinate with local workforce boards to improve technical skills and to promote traditional skills.	Cross reference with Sustainable CT Action 1.5 , CEDS Goal 3, and POCD Goal 1	NWCC, Uconn, NWRWIB, NWCT Chamber of Commerce, social service agencies	2017 CRRF- Dependency at a Distance: Implications of Workforce Mobility for Community Resilience Video 1 ( <a href="https://www.youtube.com/watch?v=ff8i-6qHndc&amp;t=24s">https://www.youtube.com/watch?v=ff8i-6qHndc&amp;t=24s</a> ) Video 2 ( <a href="https://www.youtube.com/watch?v=Mg6n63zH9-k&amp;t=26s">https://www.youtube.com/watch?v=Mg6n63zH9-k&amp;t=26s</a> )
10Cr	Identify opportunities for businesses to take advantage of climate impacts that may demand new products and services. Work with business and economic development groups poised to take advantage of new resilience-related market opportunities to find out how the local government could help.		local economic development commission, chambers of commerce	"Every climate risk is a business opportunity for your town" Rural Resiliency Sharing Session participant
11Cr	Increase opportunities for seasonal-dependent businesses (e.g. ski slopes, farms, etc.) to make additional revenue during off seasons. Develop tourism policies integrating economic and resource conservation issues in the face of potential and observed consequences of climate change. Assess the effects of climate change on hunting, fishing opportunities , outdoor recreation, and the related tourism industry. Assess the effects of climate change on special designated natural areas that attract tourists such national parks and forests		local land use commissions, local, regional, and state tourism agencies; recreation agencies and advocates, CT DEEP, NPS, USGS, Housatonic River Commission, regional conservation organizations	Recreation's Role in Community Resiliency ( <a href="https://www.brandonu.ca/rdi/files/2014/03/Recreations-Role-in-Community-Resilience_.pdf">https://www.brandonu.ca/rdi/files/2014/03/Recreations-Role-in-Community-Resilience_.pdf</a> ) Climate Change in Park City: An Assessment of Climate, Snowpack, and Economic Impacts, Stratus Consulting Inc. (2009) <a href="http://www.parkcitygreen.org/Documents/2009-Climate-Changein-Park-City-Report.aspx">http://www.parkcitygreen.org/Documents/2009-Climate-Changein-Park-City-Report.aspx</a>
12Cr	Relocate or demolish at-risk municipal facilities that cannot be made resilient, and consider establishing an acquisition or buyout plan for at-risk commercial properties.		CEOs, local land use commissions	
13Cr	Explore opportunities for local and regional collaboration on resilience with regional governmental entities, chambers of commerce, or regional industry associations.		NHCOG	

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Cultural Landscapes				
14Cr	Consider climate impacts to access/public comfort/feasibility etc. of traditional community gatherings and events like country fair, harvest picnic, Memorial Day commemorations.	Are the traditional events located in areas prone to flooding? Are there shade areas? Is the time of day okay for heat?	CEOs, economic development group, event hosts, land trusts	
15Cr	Conduct Scenic Resource Inventory. Review special character areas, priority rural character traits of town, special land use operations, cemeteries, agricultural areas, town green, and other unique attributes in your town. Inventory iron historical sites, scenic roads, stone walls, ridgelines, view-sheds, and legacy trees.	Plan for scenic roads noted in NHCOG Regional Transportation Plan. Develop management plans to account for tree life, flood areas, and surrounding land use	local museums and historical societies, Connecticut historical agencies, local land use commission, CT SHPO, CT National Register Coordinator	local Natural Resources Inventory; Mapping Historic Sites In Rural Manitoba: Development, Themes, And Application ( <a href="https://www.youtube.com/watch?v=PrJvp1S6EHk&amp;feature=youtu.be">https://www.youtube.com/watch?v=PrJvp1S6EHk&amp;feature=youtu.be</a> ) Scenic road ordinances (Canaan, Kent, New Milford, Sharon), state Scenic Road designations like Route 7 from the Kent-New Milford Town line north to the Canaan-North Canaan Town line and Route 4 from the River to Dunbar Road in Sharon. ; Housatonic River Management Plan 2006. ; “Developing Your Community Heritage Inventory” <a href="http://publications.gov.sk.ca/documents/96/97930-InventoryGuide.pdf">http://publications.gov.sk.ca/documents/96/97930-InventoryGuide.pdf</a>
16Cr	Review river and waterway access points for high-erosion zones during low-flow events; also consider sensitivity of waterbodies under temperature changes	Public access may need to be re-designed or reduced to maintain health and scenic quality of water-body	Housatonic River Commission, CT DEEP, USGS, regional conservation organizations	
17Cr	Identify large stands of climate sensitive flora such as conifers. Discuss alternative management strategies for trees with the utilities esp. along scenic character or town entryways	Are these stands vulnerable? If so, is there a potential migration route to appropriate habitat? (for example, conifers to higher altitudes or northern slopes). Dense forests can be most dangerous. Proper management to increase tree crown and trunk may improve tree strength. Cross reference with Infrastructure and management of utility lines.	regional conservation organizations, Conservation Commissions, CT DEEP, CEOs, Public Works, Utilities, land trusts	UConn Stormwise Program, Tom Wordsley

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Buildings & Structures				
18Cr	Include historic resources in POCDs & economic development plans. Address natural hazards to these resources. Include in implementation matrix. Include historic assets and historic districts as critical features that merit protection and/or planning when considering Disaster Mitigation Plans, Emergency Operations plans, and Natural Hazard Mitigation Plans. Include in mutual aid agreements as necessary. Incorporate cultural/historic resources into-post-disaster plans including recovery plans, debris management plans, recovery ordinances	Cross reference with Sustainable CT Action 4.1.	local economic development commission, local museums and historical societies, Connecticut historical agencies, land use commissions, EMDs, CEOs; REPT ESF Chair for Long Term Recovery Planning	<a href="#">The Federal Emergency Management Agency’s (FEMA) “Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning”; The Economics of Historic Preservation: A Community Leader's Guide Washington, D.C.: National Trust for Historic Preservation, 2005</a>
19Cr	Educate owners of historic properties on maintaining and protecting their historic buildings. Assist owners of historic properties to protect their sites.		local museums and historical societies, Connecticut historical agencies	Consider adaptation options in NPS Cultural Resources Climate Change Strategy. (https://resilientrural.com/wp-content/uploads/2018/11/NPS-2016_Cultural-Resoures-Climate-Change-Strategy.pdf) Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings, https://www.nps.gov/tps/standards/treatment-guidelines-2017.pdf
20Cr	Implement a Historic Preservation Ordinance		local land use commission, historic commissions/organizations	Historic Preservation Ordinance examples (https://conservationtools.org/library_items/topic/107-Historic-Preservation-Ordinances)

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Rural Character Components				
21Cr	Foster civic and community pride, promote unique attributes. Continue seasonal communal events. Create events that allow all ages to interact. Encourage neighborhood events like block parties, pot lucks, harvest celebrations, etc.	annual harvest festivals, holiday light parades, Ice Watch, tomato festivals, etc. Encourage oral history collections between students and senior centers.	CEOs, Friends groups, local historic commissions, volunteer groups, parenting groups, local/regional school districts, libraries, senior centers, local land use commissions, neighborhood organizations, affinity groups	
22Cr	Encourage and promote traditional life skills like composting, seed harvesting, clothing repair etc. Promote your community's traditional trades e.g. A skills co-operative where all members share talents		local historical society, gardening club; local economic development commission	
23Cr	Encourage local school to require community service hours especially with local civic organizations to understand how their involvement effects local governance.		local/regional school districts, civic groups/commissions	
24Cr	Create multiple methods of attendance at local meetings. Use social media. Create mechanism for participation by part-time residents in town meetings, town committees, and local leadership positions.		CEOs, town clerks	Rural Knowledge Mobilization and Social Media ( <a href="https://www.youtube.com/watch?v=s2wZzVWcBdM&amp;feature=youtu.be">https://www.youtube.com/watch?v=s2wZzVWcBdM&amp;feature=youtu.be</a> )
25Cr	Reduce tax burdens for volunteers.		CEOs, local volunteer departments	
26Cr	Create mix of housing stock for young families and elderly.	Cross Reference with Sustainable CT Action 8.1 and 8.2 and POCD Goal 1.	NHCOG Regional Housing Council; NHCOG 5th Thursdays events	
27Cr	Direct development away from character areas and towards village centers. Design for flexibility of use i.e. home businesses.	Cross reference with POCD Goal 1.	local land use commissions	
28Cr	Include a diversity of needs and limitations while developing resiliency actions.	Incorporate equity and environmental justice stakeholders (such as associations of elderly, disabled, and health-compromised; low-income groups; farm workers; and small business owners)	social service agents, state-wide advocacy groups, local community leaders	Review Sustainable CT Equity Toolkit. Review Antioch University New England Webinar "Equitable Adaptation: Collaborating for Resilience" ( <a href="http://www.communityresilience-center.org/webinars/equitable-adaptation-collaborating-for-resilience/">http://www.communityresilience-center.org/webinars/equitable-adaptation-collaborating-for-resilience/</a> ); Morello-Frosch et al. 2009. The Climate Gap: Inequalities in How Climate Change Hurts Americans & How to Close the Gap. PERE, USC Program for Environmental and Regional Equity. Retrieved from <a href="http://dornsife.usc.edu/pere/publications/">http://dornsife.usc.edu/pere/publications/</a> ; National Equity Atlas <a href="http://nationalequityatlas.org/">http://nationalequityatlas.org/</a>
Note: Rural Character Components are from the Wozniak-Brown, Joanna, "Understanding Community Character as a Socio-ecological Framework to Enhance Local-scale Adaptation: An Interdisciplinary Case Study from Rural Northwest Connecticut" (2017). <a href="https://aura.antioch.edu/etds/343">https://aura.antioch.edu/etds/343</a>				



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**INFRASTRUCTURE**

Overall Theme	Adaptation Strategies	Comments/Explanations	Potential Partnerships	Tools
<b>Energy</b>				
1In	Purchase or install Class I clean energy sources to power municipal buildings (including Board of Education).	Cross-reference with Sustainable CT Action 6.4.	CT PURA, local/regional school districts, Public Works/Building Manager	2014 Integrated Resources Plan For Connecticut, CT DEEP <a href="http://www.ct.gov/deep/lib/deep/energy/irp/2014_irp_final.pdf">http://www.ct.gov/deep/lib/deep/energy/irp/2014_irp_final.pdf</a>
2In	Inventory the existing fleet and complete and adopt a Municipal Fleet Improvement Strategy. Conduct a study of opportunities to provide electric vehicle charging stations throughout the region.	Cross-reference with Sustainable CT Action 6.6 and NHCOC Regional Transportation Plan	CEOs; CT DEEP, NHCOC	Example: Ridgefield CT Municipal Fleet
3In	Review status of generators for critical facilities, gas stations (especially if long distance between closer station), schools, town halls, etc.	Incorporate with Natural Hazard Mitigation Plan.	EMDs, CEOs	
4In	Consider creating a Microgrid program for critical facilities in your community. Develop municipal-wide renewable energy incentive program	Cross reference with Sustainable CT Action 1.6.	CEOs, local conservation organization, Conservation Commission, CT DEEP, PURA	CT Green Bank (Solarize Connecticut, C-Pace municipalities, Lead by Example) ; CT Microgrid Program ( <a href="https://www.ct.gov/deep/cwp/view.asp?a=4405&amp;Q=508780">https://www.ct.gov/deep/cwp/view.asp?a=4405&amp;Q=508780</a> ) ; NY Climate Smart Webinar "Building Clean and Resilient Local Power: NY Prize Update & Microgrid Case Studies" <a href="http://www.dec.ny.gov/docs/administration_pdf/csnprize.pdf">http://www.dec.ny.gov/docs/administration_pdf/csnprize.pdf</a>
5In	Direct mid and large scale commercial solar installations away from farm fields and core forests and toward brownfields and industrial sites.	Task from POCD Goal 2.	land use commissions, Utilities, NorthwestConneCT, CT PURA, CT DOT, Public Works	
<b>Land Use</b>				
6In	Consider climate change vulnerabilities and adaptation for siting and design of new and redesigned/reconstructed facilities. Avoid flood prone or erosion prone areas for infrastructure, especially if underground or underwater transmission and pipe lines are a preferred alternative. Where practicable, relocate infrastructure outside of coastal and inland flooding zones. Where practicable, relocate cultural resources outside of coastal and inland flood zones; where relocation is infeasible, protect areas around cultural resources from coastal and inland flooding, as allowed by law, using methods that minimize adverse environmental impacts.		land use commissions, utilities, NorthwestConneCT, CT PURA, CT DOT, Public Works, CT DAS	EPA WEPPCAT Water Erosion Prediction Project (WEPP) Model <a href="https://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=153583">https://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=153583</a>
7In	Assess energy and communications infrastructure operations and maintenance plans with respect to changing climate conditions including electricity conduits, electric grid and communication infrastructure (towers, lines, etc.), and communication lines to water, salt intrusion, and more frequent and stronger storm events. Communicate with power/communications/sewer/water utilities about enhancing resiliency of systems prior to significant construction in downtown areas. Require the location of utilities underground in new developments or during redevelopment whenever possible. Discuss alternative management strategies for trees with the utilities esp. along scenic character or town entryways.	Movement of infrastructure underground considered in Kent Natural Hazard Mitigation Plan. Dense forests can be most dangerous. Proper management to increase tree crown and trunk may improve tree strength. Also a Natural Resource action.	Utilities, NorthwestConneCT, CT PURA, CT DOT, Public Works	Tree management - Uconn Stormwise Program, Tom Wordsley
8In	For communications, emergency generators and fuel supplies are often in basements or ground level, and vulnerable to flooding – building codes may have to be revised to allow for positioning this infrastructure at higher levels.		EMDs, building department	

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Facilities and Buildings				
9In	Work with FEMA on building relocation policy after destructive events		CEOs, EMDs, REPT ESF Long-term Recovery, land use commissions	
10In	Monitor changes to forest fire frequency and intensity and consider wildfire retrofitting	Cross reference with Natural Resources	CT DEEP, local land trusts, municipal departments	California Governor’s Office of Planning and Research in a 2015 “Fire Hazard Planning” report from the “General Plan Technical Advice Series.”
11In	Develop vulnerability assessments for the community including public properties,cultural resources, critical facilities, etc. to identify vulnerabilities and prioritize actions. Implement a Tree Hazard Management Program to encourage responsible planting practices and minimize future storm damage to buildings, utilities, and streets.	POCD Goal 2 and Sustainable CT Action 4.4. Also a Cultural Resources & Natural Resources action.	Public Works, Tree Warden, local conservation groups, land use commissions	SECCOG Critical Facilities Vulnerability Assessment( <a href="https://resilientrural.com/wp-content/uploads/2018/11/Infrastructure-SECCOG-Critical-Facilities.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Infrastructure-SECCOG-Critical-Facilities.pdf</a> ); CT NRCS Conservation Technical Assistance; Nature Conservancy Climate Wizard <a href="http://www.climatewizard.org/">http://www.climatewizard.org/</a> ; Conservation Commissions & Climate Change <a href="https://resilientrural.com/wp-content/uploads/2018/11/Conservation-Commissions-and-Climate-Change-NH.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Conservation-Commissions-and-Climate-Change-NH.pdf</a> ; US National Phenology Network <a href="https://www.usanpn.org/">https://www.usanpn.org/</a> ; Resilient Rural Webmap
12In	Manage municipal properties to reduce heat island affect.	Cross-reference with Public Health.	Public Works	<a href="https://resilientrural.com/wp-content/uploads/2018/11/NASA-NHCOG-heat-islands-by-town-Braneon-McConnell.zip">https://resilientrural.com/wp-content/uploads/2018/11/NASA-NHCOG-heat-islands-by-town-Braneon-McConnell.zip</a>
13In	Improve building codes to account for more frequent and stronger storms		local land use commissions and departments	
14In	Change property tax structure to provide incentives for setbacks, rolling easements, and covenants to preclude building and reconstruction in vulnerable areas		CT legislature, local Board of Finance	
15In	Provide support to vulnerable populations (i.e., environmental justice communities, the elderly and disabled) to ensure residence resilience to climate change, including incentives for relocation if re-engineering is not feasible.		Social service agents, EMDs, health providers	
16In	Incentivize residents to weatherize their homes		TAHD, health districts, Conservation Commission, building department	Connecticut’s Weatherization Assistance Program from CT DEEP; Weatherization Assistance Program for low-income and elderly from US DOE
17In	Modify zoning regulations and Plans of Conservation and Development to minimize risks from development of coastal and inland flood zones. Retrofit critical structures to comply with current building codes and develop a reinforced “safe room”. Create incentives for individuals and businesses to reduce risk of losses due to climate through building design codes. Ensure that shelters have appropriate wind protections. Modify buildings to reduce impact on, and vulnerability to climate change including passive cooling and rain water controls such as rain gardens.	Cross link to Public Health - Emergency Response.	EMDs, Public Works, CEOs, building department	CT Building Code

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Solid Waste Management				
18In	New and reconstructed infrastructure, including landfills and transfer stations, should be located in areas less vulnerable to climate change. Evaluate ability and need to armor or relocate transfer station and related solid waste infrastructure located within sea level rise or inland flooding areas. Harden solid waste storage areas against extreme precipitation, wind events, flooding, etc.		Transfer stations, CT DEEP, Public Works, local businesses	
19In	Devise alternative routes or collection locations to service those areas that will be isolated by flooding		Transfer stations, trash collection businesses, Public Works	
20In	Update aging solid waste infrastructure considering green practices that may be more resilient to climate change impacts, especially precipitation and stormwater effects		Transfer stations, CT DEEP, Public Works, resource recovery authorities	
Transportation				
21In	Investigate the impacts of developments on the whole watershed and downstream effects on transportation infrastructure to evaluate effects and determine design criteria, e.g., culvert and drainage system sizing.		Public Works, CT DOT	
22In	Consider hardening airports and/or landing areas against extreme storms.	Coordinate with CEDS Goal 4	FAA, CT DOT, local airports	
23In	Identify portions of railroad at-risk to flooding and erosion. Identify frequently flooded and/or washed out roads. Consider abandonment of roads and bridges when re-engineering would be too costly to adapt to climate change, or when better environmental and resiliency options or alternative routes exist. Adjust road maintenance schedules for changing seasons. Identify at risk areas along roadways that may be at risk of erosion or prone to drifting snow & high winds. Identify at risk areas along roadways that may be at risk of erosion or prone to drifting snow & high winds.	Coordinate with CEDS Goal 4. Review Naugatuck and Housatonic Railroads. If scenic road, take special care to consider how to maintain scenic qualities but maintain safe passage if necessary. Also a Natural Resources concern. from Litchfield Hills NHMP	Public Works, CT DOT, railroad owners, land trusts	Fact sheet on municipality's ability to abandon a road continually threatened by flooding is forthcoming from AdaptCT. https://www.climatehubs.oce.usda.gov/hubs/north-east/topic/future-winter-roads EPA WEPPCAT Water Erosion Prediction Project (WEPP) Model https://cfpub.epa.gov/ncea/global/recordisplay.cfm?deid=153583
24In	Coordinate emergency evacuation and supply transportation routes with emergency preparedness systems to ensure capacity and resilience of escape routes compromised by natural disasters related to climate change		REPT, EMDs, CEOs, CT DOT, Public Works	
25In	Improve sidewalk connectivity and develop Model Sidewalk Ordinance.	Cross referenced with NHCOG Regional Transportation Plan.	Public Works, CEOs	<a href="https://www.walkscore.com/about.shtml">https://www.walkscore.com/about.shtml</a>
26In	Increase trail equity and access throughout the region.	e.g. Housatonic Bike/Walk Trail, Naugatuck River Greenway, Sue Grossman Still River Greenway; Cross reference with Cultural Resources	local land trusts, Parks & Rec, NHCOG, CT DOT, Public Works	

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27In	Request design standards for infrastructure projects that incorporate climate projects like maximum temperatures		ACOE, FEMA, NOAA, USGS, CT DOT, Public Works	
28In	Consider the level of watershed development, and potential LID and green practices that may affect engineering designs and level of development from transportation infrastructure like planned road improvements. Increase communication, collaboration and planning among watershed authorities and the public to decrease stormwater by promoting LID and green BMPs. Promote and require preservation of natural features that treat and infiltrate runoff such as buffers, wetlands and related landscape conditions to reduce runoff by infiltration or detention in biologically active conditions and reduce primary pollutants including organic matter/nutrients. Remove or modify impediments to natural treatment and storage (e.g., impervious cover, culverts, dams) to accommodate LID techniques.	Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications. Cross reference with NHCOG POCD Goal 2 and WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations"	Public Works, municipal departments, land use commissions, CT DOT, NWCD, and Lake Waramaug Task Force	Town of Morris LID Manual; Stormwater Calculator with Climate Assessment Tool, EPA <a href="https://www.epa.gov/water-research/national-stormwater-calculator">https://www.epa.gov/water-research/national-stormwater-calculator</a> , EPA Green Infrastructure website <a href="https://www.epa.gov/green-infrastructure">https://www.epa.gov/green-infrastructure</a> ; Managing Wet Weather with Green Infrastructure Municipal Handbook <a href="https://www.epa.gov/sites/production/files/2015-10/documents/gi_munichandbook_green_streets.pdf">https://www.epa.gov/sites/production/files/2015-10/documents/gi_munichandbook_green_streets.pdf</a> , Enhancing Sustainable Communities With Green Infrastructure: A Guide to Help Communities Better Manage Stormwater While Achieving Other Environmental, Public Health, Social, and Economic Benefits (2014), EPA <a href="https://www.epa.gov/smartgrowth/enhancing-sustainable-communities-green-infrastructure">https://www.epa.gov/smartgrowth/enhancing-sustainable-communities-green-infrastructure</a> ; Green Infrastructure Tools, NOAA <a href="http://oceanservice.noaa.gov/news/sep15/green-infrastructure.html">http://oceanservice.noaa.gov/news/sep15/green-infrastructure.html</a>
29In	Develop joint transportation strategies with adjacent communities, regions and states to accommodate changing conditions and transportation system use. Balance needs of natural resources and human safety for determining which transportation infrastructure to reconstruct or relocate. Communicate regional transit assets and options. Encourage transit-oriented development with residential/commercial areas along bus routes and/or train/bus stations.	Cross reference with Regional Transportation Plan and POCD Goals 1 & 4, Sustainable CT Action 5 and CEDS Goal 4. Related project: NWTD regional transit facility.	REPT ESF Transportation, Public Works, CT DOT, NWCTD, NHCOG, local land use commissions, Councils of Government, local economic development commissions	Climate Change Adaptation Guide for Transportation Systems Management, Operations, and Maintenance <a href="https://ops.fhwa.dot.gov/publications/fhwahop15026/">https://ops.fhwa.dot.gov/publications/fhwahop15026/</a>
30In	During bids for infrastructure projects, request materials designed for higher incidences of heat stress and intense flooding to prevent or reduce buckling or softening. Consider use of "cool pavement" to reduce heat island affect and protect surface water.	Coordinate with CEDS Goal 4	CEOs, Public Works, CT DOT	Hartford’s Green Infrastructure Handbook - <a href="https://circa.uconn.edu/wpcontent/uploads/sites/1618/2018/09/Green-Infrastructure-Handbook.pdf">https://circa.uconn.edu/wpcontent/uploads/sites/1618/2018/09/Green-Infrastructure-Handbook.pdf</a> ; <a href="https://www.pavementinteractive.org/reference-desk/pavement-management/impacts/cool-pavementgeneral/">https://www.pavementinteractive.org/reference-desk/pavement-management/impacts/cool-pavementgeneral/</a>

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31In	Create an Inventory of all road-stream crossing structures (i.e., bridges and culverts) in town and prioritize for replacement, based on conservation benefits, minimizing flood risk, and maintenance need. Re-establish connectivity and more natural flows along our rivers and streams by removing or modifying existing structural impediments, such as dams, and culverts. Work with CT DOT on context dependent adaptation strategies and other tools to expand the adaptive capacity of an at-risk structure. Develop and implement a municipal sediment control plan to prevent clogged drainage systems such as routine street sweeping, curb and gutter cleaning, paving dirt roads, and planting vegetation on bare ground (from Litchfield Hills NHMP)	Cross reference with Natural Resources	local/regional conservation organizations, Public Works, CT DOT	HVA Culvert Assessment Program ( <a href="https://resilientrural.com/wp-content/uploads/2018/11/Natural-Resources-HVA-Culvert.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Natural-Resources-HVA-Culvert.pdf</a> ) ; North Atlantic Aquatic Connectivity Collaborative Database search page ( <a href="https://naacc.org/naacc_search_crossing.cfm">https://naacc.org/naacc_search_crossing.cfm</a> ); US DOT Vulnerability Assessment Scoring Tool <a href="https://toolkit.climate.gov/tool/vulnerability-assessment-scoring-tool-vast">https://toolkit.climate.gov/tool/vulnerability-assessment-scoring-tool-vast</a>
32In	Communicate with USGS to maintain stream gages to monitor peak flow, water volume, temperature, etc.	Cross-reference with Natural Resources	local/regional conservation organizations, Public Works, CT DOT	
33In	Many small communities limited road access. Communities’ access should be reviewed and, where needed, upgraded to ensure resilient ingress and egress. Assess viable options to improve access to these areas and integrate into building, land use, and public works planning documents.		Public Works, CT DOT	
WATER				
	<b><i>Dams and Levees</i></b>			
34In	Consider dams in or up-stream from your municipality. Discuss with the management and with CT DEEP about the dams safety and plans for long-term resiliency. Confirm its ability to handle increasingly intense storms. Don't forget smaller (especially earthen) dams throughout your community. Check municipal records for the required Emergency Action Plans for Class B and C dams as they should be submitted to the town every two years. Include dam failure inundation areas in the CT Alert emergency contact database. For privately owned dams, encourage each dam owner regardless of Class to have a maintenance plan and an Emergency Operations Plan/Emergency Action Plan. Also encourage them to implement recommendations resulting from state inspections (from Litchfield Hills NHMP).	Cross reference with communications suggestions in Cultural Resources and Public Health - Emergency Response	CT DEEP, hydropower facilities, private property owners, EMDs	local or multi-jurisdictional Natural Hazard Mitigation Plans
	<b><i>Regulated Stormwater Point Sources and Nonpoint Source Runoff</i></b>			
35In	Determine new levels of terrestrial stormwater and nonpoint source pollution (e.g., through comprehensive watershed-based planning) related to climate change and determine standards required to address quantity and quality issues.		Public Works, CT DOT, local conservation organizations	Stormwater Calculator with Climate Assessment Tool, EPA <a href="https://www.epa.gov/water-research/national-stormwater-calculator">https://www.epa.gov/water-research/national-stormwater-calculator</a> Storm Water Management Model with Climate Adjustment Tool <a href="https://www.epa.gov/water-research/storm-water-management-model-swmm">https://www.epa.gov/water-research/storm-water-management-model-swmm</a>
36In	Update aging stormwater and nonpoint infrastructure with consideration to sizing and retrofitting LID techniques to accommodate climate change adaptation and minimize runoff and flooding damage. Rehabilitate sewer systems to minimize groundwater infiltration and inflow of stormwater and snowmelt into the sanitary sewer system. Where warranted as the only solution, increase stormwater storage and treatment infrastructure, especially in highly urbanized areas. Implement municipal stormwater maintenance program to clear debris from drainage facilities (Litchfield Hills NHMP). Consider zero net growth in impervious surfaces in the municipality.	Mapping of impervious surfaces may assist in MS4 requirements.	Public Works, CT DOT, local conservation organizations	Antioch University New England Webinar "Where to Put the Water: Assessing the Vulnerability of Urban Stormwater Systems to a Changing Climate" ( <a href="http://www.communityresilience-center.org/webinars/where-to-put-the-water-assessing-the-vulnerability-of-urban-stormwater-systems-to-a-changing-climate/">http://www.communityresilience-center.org/webinars/where-to-put-the-water-assessing-the-vulnerability-of-urban-stormwater-systems-to-a-changing-climate/</a> )

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37In	Include climate change into local emergency operation plans, state Hazard Mitigation Plans, and similar response programs	Cross reference with all other topics	EMDs, REPT, COGs	Cross-reference worksheet (https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-2-Plan-Review-Checklist.docx)
38In	Develop a long-term beaver management plan that includes: control measures to mitigate localized flooding created by beavers; consideration of the use of beaver deterrent devices such as beaver stops or beaver bafflers and consideration replacing culverts frequently impacted by beavers with free span bridges.	from Litchfield Hills NHMP	EMDs. Public Works, CT DOT, local conservation organizations	
	<b><i>Flood Management</i></b>			
39In	Implement Ice Jam Observer Training. Conduct geo-morphic assessment to identify potential causative mechanisms for ice jam formation where ice jams had not historically formed.	Especially town of Kent, long bridge at Pleasant Valley in Barkhamsted	EMDs, local conservation organizations, REPT, River conservation organizations	Shane Csiki (NH DES) Training: https://www.des.nh.gov/organization/commissioner/gsu/fegh/documents/201711-ice-jam-presentation.pdf
40In	Evaluate your community for flood resiliency. Identify critical facilities in flood zones. Ensure adequate barricades are available to block flooded areas in flood prone areas of the town.	(E.g. Relocate the New Hartford Public Works Garage out of the Farmington River Floodplain and Winchester Public Works Garage- Litchfield Hills NHMP)	EMDs, CEOs	local or multi-jurisdictional Natural Hazard Mitigation Plans; SECCOG Critical Facilities Vulnerability Assessment(https://resilientrural.com/wp-content/uploads/2018/11/Infrastructure-SECCOG-Critical-Facilities.pdf); Fall 2019 - “New Hampshire Flood Response Toolkit”; EPA Flood Resilience Checklist https://www.epa.gov/sites/production/files/2014-07/documents/flood-resilience-checklist.pdf ; Maine Flood Resilience Checklist (2017) https://digitalmaine.com/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1520&context=mgs_publications
41In	Coordinate with emergency management to identify sites that store hazardous materials and develop risk management plans for power failures, flooding, heat fluctuations, etc. Create inventory and map of Brownfields sites and identify sites at risk of flooding .	Cross reference with Sustainable CT Action 1.1	Fire department, EPA, local health department, local businesses	
42In	Communicate flood risk to residents and encourage them to purchase flood insurance.		EMDs, health departments	<a href="http://myrainready.cnt.org/">My RainReady (http://myrainready.cnt.org/)</a> offers step-by-step guidance to help you evaluate your flooding risks and find the best means of prevention. ; <a href="https://www.fema.gov/media-library/assets/documents/166428">Federal Insurance: Moonshot Starter Kit https://www.fema.gov/media-library/assets/documents/166428</a>



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Wastewater				
43In	Evaluate and improve emergency power provisions to assure uninterrupted pump station service during heavy storms with associated power outages. Evaluate and improve, where necessary, the capacity of pump stations that are subject to infiltration and inflow.		Utilities, Public Works	
44In	Implement a training program for wastewater treatment facility operators to educate them on how to prepare for climate change, e.g., extreme storms, high temperatures.		Utilities, Public Works	New England Interstate Water Pollution Control Commission website <a href="http://neiwpc.org/our-programs/climate-change/preparing-extreme-weather-wastewater-utilities/">http://neiwpc.org/our-programs/climate-change/preparing-extreme-weather-wastewater-utilities/</a>
45In	Educate municipal inland wetland commissions and water pollution control authorities about emergency permit requirements for temporary equipment needed to protect wastewater treatment facilities located near regulated inland or coastal wetlands. Investigate protection strategies (e.g., berms, dikes) to protect treatment		CT DEEP, CT DPH, Utilities, Public Works, CACIWC	
46In	Reduce policies or regulations that limit use of greywater for non-potable uses like irrigation. Implement wastewater reuse for non-potable uses, such as golf course irrigation, to decrease potable water treatment needs and address water shortages.	Cross reference with WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations"	local land use commissions, health departments	"Requiring new homes to reuse water (Residential Gray Water Stub-out Building Code), 2013, Chula Vista, CA" <a href="https://greencitiesca.squarespace.com/water-1/chula-vista-residential-graywater">https://greencitiesca.squarespace.com/water-1/chula-vista-residential-graywater</a> ; United States Environmental Protection Agency. (2012). Water Recycling and Reuse: The Environmental Benefits. Retrieved from: <a href="http://www.epa.gov/region9/water/recycling/">http://www.epa.gov/region9/water/recycling/</a>
47In	Assess existing on-site (subsurface disposal) systems for effects related to climate change and, where necessary, consider alternative on-site technologies or abandonment in favor of public/community wastewater treatment systems.		Utilities, Public Works	
48In	Consider the potential higher groundwater levels in design standards for separation distances and other relevant standards.		Utilities, Public Works	
Water Supply				
49In	Consider a Water Use Restriction Ordinance to implement conservation during periods of water shortage. Encourage water conservation best management practices for snow making for ski destinations in Connecticut. Provide an incentive to encourage water conservation of public water supply and/or develop local drought ordinances. Develop a drought communications plan to inform residents about voluntary and mandatory drought restrictions and Develop an early warning system to notify the general public about water shortages.	Cross reference with Drought Communications Plan in Natural Resources section and Sustainable CT Action 2.6 and WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations" Cross reference with Litchfield Hills NHMP. Consider as Natural Resources and Public Health Action as well.	CEOs, CT Water Planning Council, local land use commissions, TAHD, local health districts	<a href="https://library.municode.com/ct/greenwich/code/s/code_of_ordinances?nodeId=CH10.SEWA_ART5_WASH_S10-27DRMAPL&amp;showChanges=true">https://library.municode.com/ct/greenwich/code/s/code_of_ordinances?nodeId=CH10.SEWA_ART5_WASH_S10-27DRMAPL&amp;showChanges=true</a> , <a href="#">CT Drought Management Plan</a> ; <a href="#">Northeast Drought Early Warning Center</a> <a href="https://www.drought.gov/drought/dews/northeast">https://www.drought.gov/drought/dews/northeast</a> ; <a href="https://www.drought.gov/drought/resources/reports">https://www.drought.gov/drought/resources/reports</a>
50In	Participate in the Water Utilities Coordinating Committees to assist in developing regional and statewide solutions to water shortages and emergencies including strengthening coordination of regional water supplies to encourage water conservation.		CEOs, Public Works, COGs, utilities	
51In	Incorporate potable water management concerns into local POCDs (e.g. water conservation, water Exclusive Service Areas, water management through zoning regulations, etc. )	Cross reference with WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations"	local land use commissions and departments	
52In	Review regulations for common sense use of rain barrels. Ensure regulations encourage collection strategies that reduce access by mosquitoes.	Cross reference with action under agriculture to increase storage of precipitation.	TAHD, health districts, Conservation Commission, building department	Several communities, including King County, WA, have developed programs to incentivize or give away rain barrels for the sake of stormwater management and drought preparedness."

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Surface Water Sources				
53In	Purchase land around water supplies to increase the surrounding conservation buffer area	Cross-reference with Natural Resources - land acquisition	Water utilities, WUCCs, conservation organizations, land trusts	
54In	Water supply plans pursuant to CGS section 25-32d should include climate change vulnerability analyses and risk assessments for surface supply, including future drinking water availability, competing needs and options for adaptation and mitigation. Incorporate climate resiliency or other green planning practices into waste supply treatment design manuals for water reuse to lessen demand on potable water.		Water utilities, WUCCs	
Groundwater/Potable Water Planning				
55In	Increase public water supply hook-ups for private wells subject to salt intrusion. Use "smart" applications for road treatments during winter storms.		TAHD, CT DPH, CT DOH, Public Works, CT DOT	Dr. Gary Robbins at Uconn
56In	Increase effluent quality of wastewater treatment to allow for water reuse for non- potable uses.		Water Utility Coordinating Committees (WUCC); CT DPH; health departments, CT DEEP	
57In	Identify small community water systems struggling with supply, quality, and management issues. Water systems, especially small systems, should increase technical capacity to anticipate and mitigate impacts from droughts. They should also coordinate water use restrictions with town/state ordinances. Update and repair antiquated and leaking distribution infrastructure.		Water Utility Coordinating Committees (WUCC); CT DPH; health departments	EPA CREAT <a href="https://www.epa.gov/crwu/creat-risk-assessment-application-water-utilities">https://www.epa.gov/crwu/creat-risk-assessment-application-water-utilities</a> ; Ordinance from Connecticut Drought Plan ; USDA Rural Development
58In	Community water systems, besides having a backup emergency generator, should plan for extended power outages with redundant fuel systems or larger fuel capacities. Water systems should coordinate with the utilities and EMDs to ensure the systems are on the priority electrical restoration list even with standby power.		EMDs, community water systems, Utilities, Public Works	local and multi-jurisdictional natural hazard mitigation plans; Creating Resilient Water Utilities (CRWU), EPA <a href="https://www.epa.gov/crwu">https://www.epa.gov/crwu</a> ; See table 5-1, Theme 1-A for current recommendations on generator usage in Drinking Water Vulnerability Assessment and Resilience Plan
59In	Decrease pharmaceutical and other emerging toxic chemical concentration in water supply that might be further spread by climate change effects by strengthening federal rules, and educating homeowners about safer disposal practices		health services, local pharmacies, NHCOG Prescription Assistance network	
Communications				
60In	Map locations of communications infrastructure vulnerable to floods, storm surges, extreme thermal or precipitation events, wildfire, etc.		Utilities, Public Works	
61In	Identify redundancies and re-routing potential in communication infrastructure for emergency switching should primary systems fail. Adequately insure communications infrastructure to ensure that reconstruction can occur in the event of a climate related disaster	Cross link to Public Health - Emergency response	Utilities, Public Works, REPT, Amateur Radio Network	
62In	Work with FirstNet (public safety broadband network) to improve communications coverage	Cross link to Public Health - Emergency response	EMDs, REPT, COGs	FirstNet.gov
63In	Develop sustainability checklists for planning, zoning, building, health department permit applications to incorporate sustainable design elements. Compile a checklist that cross-references the bylaws, regulations, and codes related to flood damage prevention that may be applicable to a proposed project and make this list available to potential applicants.	Cross Reference with Sustainable CT Action 4.2 and WUCC Integrated Report recommendations.	local conservation organizations, building departments	local/multi-jurisdictional Natural Hazard Mitigation Plans

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Natural Resources

Overall Theme	Adaptation Strategies	Comments/Explanations	Potential Partnerships	Tools
Resource Management				
1Nr	Identify, prioritize, and acquire or ease riparian land and wetland properties adjacent to high priority coldwater resources. Prioritize restoration and management activities including; revegetation of stream banks/riparian zones and stocking of resilient strains and species. manage water withdrawals/diversions to maintain characteristic connectivity and hydrology.		local conservation groups, land use commissions, CT DEEP, Housatonic River Commission, HVA, CT DEEP	
2Nr	Create an Inventory of all road-stream crossing structures (i.e., bridges and culverts) in town and prioritize for replacement, based on conservation benefits, minimizing flood risk, and maintenance need. Re-establish connectivity and more natural flows along our rivers and streams by removing or modifying existing structural impediments, such as dams, and culverts. Re-establish connectivity and more natural flows along our rivers and streams by removing or modifying existing structural impediments, such as dams, and culverts. Modify upstream flood control and water management infrastructure and the operation thereof to allow for regular flooding of floodplain forests where feasible.	Cross reference with Infrastructure	HVA, Public Works, CT DOT, Housatonic River Commission	HVA Culvert Assessment Program ( <a href="https://resilientrural.com/wp-content/uploads/2018/11/Natural-Resources-HVA-Culvert.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Natural-Resources-HVA-Culvert.pdf</a> ) ; North Atlantic Aquatic Connectivity Collaborative Database search page ( <a href="https://naacc.org/naacc_search_crossing.cfm">https://naacc.org/naacc_search_crossing.cfm</a> ), Review documents required by FERC for hydropower facilities along regional rivers like Shoreline Management Plan, Critical Habitat Management Plan, Recreation Plan and Programmatic Agreements mentioned in Housatonic River Management Plan 2006.
3Nr	Promote opportunities for warmwater gamefish in rivers where populations of temperature intolerant species decline.		CT DEEP, recreational organizations	
4Nr	Advance land use policy/regulations (riparian buffer zones, stormwater management BMPs and Low Impact Development) that reduce temperature impacts to coldwater streams and throughout watersheds		local land use commissions, Housatonic River Commission, land trusts, Rivers Alliance of Connecticut	Town of Morris LID Manual; green infrastructure
5Nr	Identify and protect critical ground water source/recharge areas in your jurisdiction		CT DEEP (especially Aquifer Protection Program)	
6Nr	Increase expertise at the municipal review level to ensure that infrastructure improvements (e.g., culverts) and development will not alter existing natural hydrology.		local land use commissions and departments	
7Nr	Examine watershed management practices and land acquisition strategies to reduce nutrient and pollutant loading (e.g., water quality conditions, manure management).	Cross reference with Agriculture and Infrastructure	local land use commissions, Public Works, local conservation organizations	
8Nr	Promote comprehensive nutrient and runoff BMPs, regulations and policies (municipal and state) for lakes, pond, and impoundments to reduce eutrophication. Advance land use policy/regulations for vegetative shoreline buffers in developments adjoining lakes and ponds. Maintain vegetative buffers between local roads and waterbodies. Reduce nitrogen runoff through the use of alternative manure technologies (e.g., manure biodigester, composting).	Cross-indicated with Infrastructure -LID	local land use commissions, Public Works, CT DOT, local farms	Town of Morris LID Manual
9Nr	Promote upland forest resilience by increasing the use of fire control techniques through controlled burns and selective regeneration projects (improves diversity in forest age and species composition). Include open patch habitat and closed canopy habitat within overall forest habitat.		CT DEEP, Public Works, land trusts, private land owners	
10Nr	Manage deer population densities to allow for sufficient forest regeneration.	Cross reference with Public Health and tick management	Hunting organizations, CT DEEP, land trusts	

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Natural Resources

11Nr	Promote best management plans and regulations among private landowners and foresters to increase sustainable management for resilient forests.		CT DEEP, Public Works, land trusts, private land owners	NY Watershed Agricultural Council's Forestry Program information <a href="https://mywoodlot.com/">https://mywoodlot.com/</a> Forest Adaptation Resources: climate change tools and approaches for land managers, 2nd edition USDA: Forest Service <a href="https://resilientrural.com/wp-content/uploads/2018/11/Forest-Adaptation-Resources-Climate-Change-Tools-and-Resources-Land-owners-.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Forest-Adaptation-Resources-Climate-Change-Tools-and-Resources-Land-owners-.pdf</a> ; Forestry Management course <a href="https://www.forestadaptation.org/FAPPonline">https://www.forestadaptation.org/FAPPonline</a> ; Forestry Management for land owners <a href="https://forestadaptation.org/sites/default/files/AFF_MassConn_Landowner_FactSheet.pdf">https://forestadaptation.org/sites/default/files/AFF_MassConn_Landowner_FactSheet.pdf</a>
12Nr	Adopt conservation subdivisions and zoning reform to increase forest block size and reduce edge effects.		local land use commissions	
13Nr	Incorporate the impacts of extreme events into forest management practices. Promote increased understanding of such events among land owners and professional foresters.		CT DEEP, Public Works, land trusts, private land owners	Creating and Maintaining Resilient Forests in Vermont: Adapting Forests to Climate Change <a href="http://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/The_Forest_Ecosystem/Library/Climate%20change%20report_final_v6-18-15a.pdf">http://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/The_Forest_Ecosystem/Library/Climate%20change%20report_final_v6-18-15a.pdf</a> ; Climate Change Response Framework, Northern Institute for Applied Climate Science <a href="https://forestadaptation.org/new-england">https://forestadaptation.org/new-england</a>
14Nr	Greatly enhance land protection resources and incentives for private landowners to retain carbon sequestration value of forests.		CT DEEP, CT DRS, local land use commission	
15Nr	Promote principles of “smart growth” to also retain carbon sequestration values of forest and to better facilitate public transportation systems and energy transmission infrastructure, including wide scale distributed generation options for renewable energy.		local land use commission; NWCTD, local buses	
16Nr	Increase community preparedness for the potential of more frequent and intense wildland fires. Educate public on fire ignitors and accelerants. Teach homeowners about removal of fuel during high fire seasons.		EMDs, local emergency response	Firewise Communities Program

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**Natural Resources**

Municipal & Regional Activities				
17Nr	Consider climate change in local natural resource inventories and open space plans		land use commissions	CT NRCS Conservation Technical Assistance, Plan Review Worksheet <a href="https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-2-Plan-Review-Checklist.docx">https://resilientrural.com/wp-content/uploads/2018/11/Worksheet-2-Plan-Review-Checklist.docx</a>
18Nr	Communicate with USGS to maintain stream gages to monitor peak flow, water volume, temperature, etc.	Also noted in "Connecticut Department of Transportation Climate Change and Extreme Weather Vulnerability Pilot Project, Recommendations"and WUCC Integrated Report; cross-reference with Infrastructure	CT DEEP, USGS, EMDs, local conservation organizations	
19Nr	Evaluate land acquisition for adaptation purposes (considering sea level rise, increase in frequency of severe storms, wildfire threat, loss of wildlife and fisheries habitat, etc.)		local land trusts, local land conservation organizations	Nature Conservancy Resilient Landscapes <a href="https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx">https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx</a>
20Nr	Implement Green Grounds and Maintenance Program esp. reduction of use of nitrogen-based fertilizers and indiscriminate pesticides	Cross reference with Sustainable CT Action 2.11.	Public Works, landscaping companies, golf courses, schools	
21Nr	Work with recreational land managers to identify vulnerabilities that could limit or eliminate public access.	Cross reference with infrastructure, public health, and cultural resources	Parks & Rec, Public Works, local conservation organizations	
22Nr	Promote habitat resilience by managing invasive species, in particular exotic insects including woolly adelgid, Asian longhorn beetle, emerald ash borer and gypsy moth. Plan for the impact of vectors like diseases and pests (e.g. avoid Ash trees in landscaping due to the Emerald Ash Borer). Develop invasive species management plan for municipal properties and encourage local nurseries to eliminate sale of invasive plants.	Cross reference with Sustainable CT Action 2.10 and POCD Goal 2.	Public Works, Parks & Rec, local conservation organizations, CT DEEP, land trusts, private property owners	CT NRCS Conservation Technical Assistance; Regulations on Movement of Firewood ( <a href="https://www.ct.gov/deep/cwp/view.asp?A=2697&amp;Q=508886">https://www.ct.gov/deep/cwp/view.asp?A=2697&amp;Q=508886</a> )
23Nr	Link forest thinning projects to biomass reuse opportunities. This will support forest restoration/mitigation projects, which in turn will reduce the potential for catastrophic fires while providing economic benefits, such as alternative energy sources and workforce development.		CT DEEP, local land trusts, Public Works, schools, NWRWIB	Case Studies in Forest Health and Woody Biomass Utilization Webinar - <a href="https://www.youtube.com/watch?v=kyEvvcIbxAQ">https://www.youtube.com/watch?v=kyEvvcIbxAQ</a>
24Nr	Coordinate with local conservation groups to identify areas of cultural importance, priority conservation areas and environmentally sensitive habitats.		local conservation groups, land use commissions	Land Trust Alliance Land and Climate Program <a href="http://www.landtrustalliance.org/topics/climate-change">http://www.landtrustalliance.org/topics/climate-change</a> ; The Nature Conservancy Northeast Resilience Alliance <a href="https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/ne/Pages/default.aspx">https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/ne/Pages/default.aspx</a>
25Nr	Conduct a Natural Resources Inventory.		Conservation Commissions	CT NRCS Conservation Technical Assistance; Eco-Assets for Rural Municipalities ( <a href="https://www.youtube.com/watch?v=LvX7wee7JDw&amp;feature=youtu.be">https://www.youtube.com/watch?v=LvX7wee7JDw&amp;feature=youtu.be</a> ); Town of Kent Natural Resources Inventory
26Nr	Identify and construct a robust and resilient habitat corridor through the region. Consider use of purchase of development rights or conservation easements to protect climate vulnerable habitats. Coordinate with bordering towns and states on shared ecological challenges especially on invasive pests and shoring infrastructure.		HVA, The Nature Conservancy, EPA, Housatonic River Commission, CT DEEP, NHCOC, regional conservation organizations	Housatonic River Management Plan; Byers, E and K. Marchetti. 2005. The Conservation Easement Handbook. Trust for Public Land and Land Trust Alliance. Retrieved from <a href="http://learningcenter.lta.org/attached-files/0/57/5752/CEH_preview.pdf">http://learningcenter.lta.org/attached-files/0/57/5752/CEH_preview.pdf</a> ; Western Governors' Association, Trust for Public Land, and National Cattlemen's Beef Association. 2001. Purchase of Development Rights. <a href="http://www.westgov.org/wga/publicat/pdr.pdf">http://www.westgov.org/wga/publicat/pdr.pdf</a>



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Public Health

Overall Theme	Adaptation Strategies	Comments/Explanations	Potential Partnerships	Tools
Best Management Practices				
1Ph	Incorporate climate change into local and regional public health programs. Coordinate among local, regional, and state health departments to monitor impacts and identify climate change adaptation strategies.		Health departments, sanitarians, health districts, CT DPH	NACCHO Essential Actions for Resilience <a href="https://www.naccho.org/uploads/downloadable-resources/Essential-Actions-for-Climate-Resilience-Fact-Sheet.pdf">https://www.naccho.org/uploads/downloadable-resources/Essential-Actions-for-Climate-Resilience-Fact-Sheet.pdf</a> ; NACCHO 12 Steps to Operationalize Climate Change in a Local Health Department <a href="https://www.naccho.org/uploads/downloadable-resources/NA634PDF-12Steps.pdf">https://www.naccho.org/uploads/downloadable-resources/NA634PDF-12Steps.pdf</a> ; Minnesota Climate & Health Case Study <a href="https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Minnesota-Climate-and-Health.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Minnesota-Climate-and-Health.pdf</a>
2Ph	Conduct public health vulnerability studies. Identify populations, communities, and geographic areas most at risk for the identified health risks. Consider the public health needs of vulnerable populations in climate change adaptation planning. Identify locations of vulnerable residents. Coordinate with utilities to reduce shut-offs during high heat or extreme cold events.		Health departments, sanitarians, emergency managers, REPT, CT PURA, electrical utilities	<a href="https://www.cdc.gov/climateandhealth/pubs/AssessingHealthVulnerabilitytoClimateChange.pdf">https://www.cdc.gov/climateandhealth/pubs/AssessingHealthVulnerabilitytoClimateChange.pdf</a> ; Appendix G: G. Mapping 101: Joining census data for beginning GIS users from Minnesota Extreme Heat Toolkit.; Antioch University New England Webinar Enhancing the Resilience of Seniors ( <a href="http://www.communityresilience-center.org/webinars/enhancing-the-resilience-of-seniors-in-your-community/">http://www.communityresilience-center.org/webinars/enhancing-the-resilience-of-seniors-in-your-community/</a> ) ; Climate Change, Health, and Populations of Concern <a href="https://archive.epa.gov/epa/climate-impacts/climate-change-and-health-factsheets.html">https://archive.epa.gov/epa/climate-impacts/climate-change-and-health-factsheets.html</a>
3Ph	Continue to develop and update all municipal emergency preparedness plans for extreme weather events. Evaluate current early extreme weather events warning system and emergency response plans. Develop or strengthen joint protocols for multi-jurisdictional response to a broad spectrum of climate-related emergencies and disasters. Establish communication mechanism to coordinate efforts between disaster relief and public health agencies. Partner with health districts/departments to exercise pandemic response plans.	Coordinate with regional NWS offices for correct coverage locations. Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications.	CEOs, EMDs, CT DPH, CT DESPP, REPT, DEHMS	
4Ph	Manage municipal properties to reduce heat island affect. Provide potable water and shaded areas in public spaces during community events. Consider adding lighting to allow for use of recreational facilities at cooler points of the day. Seek state criteria for school closings and outdoor play during extreme heat events. Research and follow cooling station best management practices. Develop a strategy for providing and communicating heat wave behavioral adaptations such as air conditioning availability and increased fluid intake. Develop communications plan for extreme heat for the public and vulnerable populations through schools, daycares, landscape/construction businesses, sports teams/camps, and senior living facilities, etc.	Cross-reference with Infrastructure.	Public Works, CEOs, School districts, health departments	Potential Heat Island areas in NHCOG Region: <a href="https://resilientrural.com/wp-content/uploads/2018/11/NASA-NHCOG-heat-islands-by-town-Braneon-McConnell.zip">https://resilientrural.com/wp-content/uploads/2018/11/NASA-NHCOG-heat-islands-by-town-Braneon-McConnell.zip</a> ; EPA Heat Island Effect <a href="https://www.epa.gov/heat-islands">https://www.epa.gov/heat-islands</a> ; Excessive Heat Events Guidebook helps officials plan for and respond to excessive heat events by highlighting best practices that have been employed to save lives during excessive heat events in different urban areas and providing a menu of options that officials can use to respond to these events in their communities. ( <a href="https://www.epa.gov/sites/production/files/2016-03/documents/ehguide_final.pdf">https://www.epa.gov/sites/production/files/2016-03/documents/ehguide_final.pdf</a> ); <a href="http://www.riema.ri.gov//resources/citizens/prepare/threats/documents/Heat%20Safety.pdf">http://www.riema.ri.gov//resources/citizens/prepare/threats/documents/Heat%20Safety.pdf</a> ; Minnesota Extreme Heat Toolkit: "Messages should include information on what to do (e.g., how to prevent illnesses from extreme heat) (see Appendix E for a tip sheet), symptoms of heat-related illnesses (see Table 2 on page 2-3), characteristics of persons more vulnerable to extreme heat (see Table 3 on page 2-5), and where to go for more information." and Appendix J for sample media release



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### Public Health

5Ph	Manage municipal properties to eliminate or reduce vector habitat (e.g. standing stagnant water). Implement management strategies in public spaces to reduce disease-carrying pests such as ticks and mosquitoes. Enhance preparedness for disease prevention of vector-borne and water-borne diseases following floods and storms. Develop communication plan for residents about on-property tick and mosquito management.	Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications	DOT, Public Works, health districts, local health depts	Case Study - Brookfield CT Health Department Tick Outreach <a href="https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Tick-Communication.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Tick-Communication.pdf</a> ; Vermont Tick Tracker <a href="http://healthvermont.gov/tracking/tick-tracker">http://healthvermont.gov/tracking/tick-tracker</a>
6Ph	Reduce public exposure to algal blooms in recreational swimming areas		DOT, Public Works, health districts, local health depts., local land use commissions	Health districts' Sanitarians perform water sampling and visual assessments for algal blooms and advise as necessary. Management of storm-water run-off through Low-Impact Development Practices reduce their occurrences.
7Ph	Develop communications for visitors and seasonal/permanent residents about evacuation routes and heating/cooling/emergency shelter locations esp. if animal-friendly. Provide information to pet owners on protecting their pets from extreme heat. If possible, identify a local cool place that may be willing to accept people and their pets. Encourage residents and businesses to use Town social media/web sites for information sharing. Ensure senior centers and shelters have cooling systems. Consider extending hours at municipal buildings, public spaces, and commercial areas like movie theaters and shopping malls where air conditioning is available. Also consider free public transportation to shelters.	Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications	health districts, local health depts, EMDs, CEOs, Parks & Rec, Public Works	Improving ADA access to cooling centers: Chapter 7 of the ADA Best Practices Tool Kit for State and Local Governments, available online at: <a href="http://www.ada.gov/pcatoolkit/toolkitmain.htm">http://www.ada.gov/pcatoolkit/toolkitmain.htm</a> . Minnesota Climate & Health case study <a href="https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Minnesota-Climate-and-Health.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Minnesota-Climate-and-Health.pdf</a>
8Ph	In the aftermath of extreme events, prepare for additional trauma due to dispossession, mental health challenges and post-traumatic stress disorder.		DESPP, DEHMS, health depts./districts	
9Ph	Assess food security for all sectors of society in the state/region.	Support local sustainable agriculture to improve food security; cross-reference with agriculture	CT DPH, CT Dept of Ag	USDA Food Security Assessment Toolkit <a href="https://www.ers.usda.gov/webdocs/publications/43164/15810_efan02013a_1_.pdf?v=0">https://www.ers.usda.gov/webdocs/publications/43164/15810_efan02013a_1_.pdf?v=0</a>
10Ph	Develop partnerships and/or policies to prevent power and water companies from shutting off services to their customers due to nonpayment of bills during extreme heat events.		CEOs, social service agents, PURA	
11Ph	Institute extreme weather protocols for municipal employees especially for high-heat and low air quality days. Develop communication plan for residents about poor air quality and high ozone days. Coordinate with CT DEEP about maintaining regional air quality.	CT DEEP and Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications	EMDs, health departments, CEOs, Public Works	EPA EnviroFlash Air Quality Alert Program. <a href="http://www.enviroflash.info/">http://www.enviroflash.info/</a>
<b>Research, Monitoring, and Education</b>				
12Ph	Develop an education campaign for students, residents, and visitors on natural hazards and preparedness. Provide outreach to seasonal home-owners on how to protect against frozen pipes and water damage during the winter with the loss of electricity, including information on automatic shut-off switches or alarms (LHNNHMP). Distribute resources through town hall, community events, local/regional websites, social media. September is National Preparedness Month.	from Litchfield Hills NHMP & Burlington Annex of Hazard Mitigation Plan for the Former Central Connecticut Region	NHCOG, health districts, CT DPH, CEOs, EMDs, Public Works, Building Department, local/regional schools	Litchfield Hills NHMP; <a href="http://www.riema.ri.gov//resources/citizens/prepare/documents/Flood%20Safety.pdf">http://www.riema.ri.gov//resources/citizens/prepare/documents/Flood%20Safety.pdf</a> ; <a href="http://www.riema.ri.gov//resources/citizens/prepare/threats/documents/Hurricane%20Preparedness.pdf">http://www.riema.ri.gov//resources/citizens/prepare/threats/documents/Hurricane%20Preparedness.pdf</a> ; <a href="https://training.fema.gov/is/courseoverview.aspx?code=IS-909">https://training.fema.gov/is/courseoverview.aspx?code=IS-909</a> <a href="https://www.ready.gov/">https://www.ready.gov/</a> ; <a href="https://resilientrural.com/wp-content/uploads/2018/11/CT-DPH-Before-Hurricane.pdf">https://resilientrural.com/wp-content/uploads/2018/11/CT-DPH-Before-Hurricane.pdf</a> ; <a href="https://resilientrural.com/wp-content/uploads/2018/11/Red-Cross-thunderstorm.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Red-Cross-thunderstorm.pdf</a> ; <a href="https://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/power-outage/safe-generator-use.html">https://www.redcross.org/get-help/how-to-prepare-for-emergencies/types-of-emergencies/power-outage/safe-generator-use.html</a> ; Ready.gov ; FEMA Avoiding Hurricane Damage: A Checklist for Homeowners <a href="https://www.fema.gov/media-library/assets/documents/13737?id=3340">https://www.fema.gov/media-library/assets/documents/13737?id=3340</a>
13Ph	Increase public awareness and education on opioid abuse and misuse.		health districts & depts., NHCOG Prescription assistance network	TAHD is currently administering a DEMHS grant entitled SPF-Rx which is designed to help combat the opioid crisis and an ad campaign called “Change the Script”.
14Ph	Develop plans to deal with vector-born diseases from ticks and mosquitoes especially in case of need for rapid response. Implement educational programs for schools and the public on how to help control vector (e.g. ticks and mosquitoes) breeding sites.		REPT, health districts, local health depts	Vermont Tick Tracking Program <a href="http://www.healthvermont.gov/tracking/tick-tracker">http://www.healthvermont.gov/tracking/tick-tracker</a> ; Brookfield CT Tick Communication Program ( <a href="https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Tick-Communication.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Public-Health-Tick-Communication.pdf</a> )

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Public Health

15Ph	Review potable water vulnerabilities in both private well and public water supply systems across community. Encourage private well owners with vulnerable well locations to seal well and to grout the space between the casing and bore hole and/or relocate the well on the property. Develop GIS database of private wells or parcels with wells. Track and communicate incidences of private water well failures with health departments especially in drought conditions. Encourage residents to sample their wells on an annual basis, especially following significant storm events. Encourage private well owners extend well casing above flood level if in a delineated FEMA flood zone or commonly known flooding area even if above 1ft above grade. Research possibility of solar-powered or hand-powered pumps for residents/facilities dependent on potable well water. Well depth will determine feasibility of different technologies.	Cross reference with Sustainable CT Action 2.6	Dept of Consumer Protection, DPH Private well program, local health departments and districts, building departments	Review "Drinking Water Vulnerability Assessment and Resilience Plan" by Milone and MacBroom; Example: Fairfield CT GIS private well parcel database; <a href="https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/drinking_water/pdf/wellcasingextensionpdf.pdf?la=en">https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/drinking_water/pdf/wellcasingextensionpdf.pdf?la=en</a>
16Ph	Coordinate with water utilities to protect reservoirs and aquifer protection areas.		WUCC, CT DPH, local water utilities	
17Ph	Develop a database of morbidity and mortality caused by climate change.		health districts, CT DPH	
18Ph	Intensify vector associated disease monitoring from vectors such as ticks and mosquitoes		health districts, local health depts	
19Ph	Develop GIS StoryMap that communicates the multiple ways that climate change intersects with public health.		CT DPH	<a href="https://rihealth.maps.arcgis.com/apps/MapJournal/index.html?appid=1d57fba5e14c4b86b27f329a733d679d&amp;mc_cid=5ba8ef4c5c&amp;mc_eid=4d705d84f4">https://rihealth.maps.arcgis.com/apps/MapJournal/index.html?appid=1d57fba5e14c4b86b27f329a733d679d&amp;mc_cid=5ba8ef4c5c&amp;mc_eid=4d705d84f4</a>
Policy, Legislation, Regulation & Funding				
20Ph	Seek funding to provide for adequate updates to municipal water & sewage infrastructure.		CT DAS, DPH, USDA, Local Public Works	
21Ph	Review existing septic system regulations for capacity from increased soil saturation from storm events.		CT DPH, health districts, local health depts	CT Public Health Code
Emergency Management				
22Ph	Work with FirstNet (public safety broadband network) to improve communications coverage. Communicate with vulnerable populations on cooling centers, emergency shelters, and transportation options to avoid exertion in heat. Expand use of existing communication tools and develop a comprehensive contact list of organizations representing vulnerable populations as a resource for preparedness and response to extreme events. Encourage all businesses and residents, particularly older adults, to sign up for emergency information systems in your community (Nixel, Everbridge, etc.).	Cross Reference with Sustainable CT Action 7.2 Provide Effective Community Communications and POCD Goal 2.	CEOs, social service agents, local health departments, EMDs, volunteer emergency responders, senior centers	CA DOH Climate change & Health Equity Program <a href="https://www.cdph.ca.gov/Programs/OHE/Pages/CCHEP.aspx">https://www.cdph.ca.gov/Programs/OHE/Pages/CCHEP.aspx</a> , Kern County California is an example partnership between utility and county government to sponsor cooling centers. Building Older Adults' Resilience <a href="https://resilientrural.com/wp-content/uploads/2018/11/Building-Older-Adults-Resilience-Toolkit-RAND.pdf">https://resilientrural.com/wp-content/uploads/2018/11/Building-Older-Adults-Resilience-Toolkit-RAND.pdf</a> ; firstnet.gov
23Ph	Consider developing a Memorandum of Understanding with schools or school bus company to utilize school buses for mass transportation during an emergency. Ensure regional evacuation plans include health care facilities, senior housing, disabled residents, and those without transportation.		REPT ESF-1 Transportation working group, EMDs, school bus companies, Transit Districts	
24Ph	Partner with health departments/districts to promote health services like flu shots, inspections for issues that exacerbate respiratory illnesses.		health districts, local health districts, pharmacies	TAHD's "Healthy Home" Program
25Ph	Develop plan to insure uninterrupted prescription refills for residents with chronic medical conditions.		Pharmacies, NHCOG Prescription Assistance network	

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**Public Health**

26Ph	Create and assist community-supported neighbor-to-neighbor networks across the community that are accessible to all income levels (e.g., villages, fraternal organizations, faith-based communities, neighborhood associations).		EMDs, volunteer emergency responders, senior centers, Community Foundations	
27Ph	Develop redundant back-up power systems, possibly via renewable energy (solar, wind) for critical facilities to keep those facilities operational and avoid outcomes of displaced or decreased workforce and increased social/health stress for extended power outages. Develop redundant infrastructure, backup power, and increase system storage and conduct more comprehensive emergency response planning to improve resiliency. Reach out to buildings where vulnerable populations reside, such as hospitals, nursing homes, etc. to evaluate back up power generation during extreme heat or cold events and extended power outages.	Cross reference with Microgrid Action in Infrastructure and WUCC "Prioritization and Implementation for Non-Capital Improvement Recommendations"	CEO, EMDs, volunteer emergency responders, senior centers, REPT	local and regional Natural Hazard Mitigation plans, Emergency Operations Plans, etc.
28Ph	Encourage residents over 18 to join community emergency response teams or medical reserve corps.	Cross reference with health districts Medical Reserve Corps outreach efforts.	CERT, REPT, senior centers	
29Ph	Increase frequency and expand topic coverage of Community Emergency Response Team (CERT) trainings to better respond to natural hazard events.		EMDs, CEOs, REPT	
30Ph	Create a Community Hub to assist in relay of critical information, especially during disaster. Community Hub identifies needed equipment such as generator, storage space, amateur radio network, etc.		Regional Emergency Planning Team ESF -2 Communications Chair Steve Savage; CT ARES (Amateur Radio Emergency Service)	Larimer Community Hub - <a href="https://www.larimer.org/emergency/larimer-connects/community-hubs-0">https://www.larimer.org/emergency/larimer-connects/community-hubs-0</a>
31Ph	Develop Time to Recovery Goals Matrix with minimal, operational, and functional time goals to identify priority restoration locations.		REPT, DESPP, DEHMS	Resilient Design Performance Standard <a href="http://www.bccollaborative.org/uploads/6/6/0/6/66068141/resilientdesignperformancestandard_adopted_05.13.2016.pdf">http://www.bccollaborative.org/uploads/6/6/0/6/66068141/resilientdesignperformancestandard_adopted_05.13.2016.pdf</a>
32Ph	The Town should continue to require the installation of fire protection water in new developments. Establish a maintenance and testing schedule for dry hydrants/fire ponds and require an annual budget funding for maintenance and repairs. Towns should also consider mutual aid tankers and properly maintain key waterholes for refilling emptied tankers.	from Litchfield Hills NHMP	CEOs, local fire departments, land use commissions	
33Ph	Establish a designated area for brush disposal following storm related events that generate debris and/or storage of snow. Identify methodology for tracking cost of debris management for potential FEMA reimbursement.	from Litchfield Hills NHMP	Local Public Works	CT DEEP - <a href="https://www.ct.gov/Deep/cwp/view.asp?a=2718&amp;Q=410492&amp;deepNav_GID=1646">https://www.ct.gov/Deep/cwp/view.asp?a=2718&amp;Q=410492&amp;deepNav_GID=1646</a>
34Ph	Provide public information on safe fire practices (check with DEEP fire rating, fire extinguisher availability, etc.)	from Litchfield Hills NHMP	Local fire departments	

# Appendix C

# CASE STUDY: AGRICULTURE

## Interlace Agroforestry Farm

**Lead Agency:** Meghan Giroux, Interlace Agroforestry Farm

**Funding:** NYS Climate Resilient Farming Program and USDA EQUIP Grant

**Website:** Vermont Edible Landscapes and Interlace Agroforestry Farm and Consultancy

### Project Overview:

Meghan Giroux is the owner of Vermont Edible Landscapes and Interlace Agroforestry Farm, Consultancy & Commons. At Interlace Agroforestry Farm, she is implementing resiliency actions across her 60 acre farm in Essex, New York. The farm is primarily for production of forestry products to be sold through her forestry nursery business. The farm incorporates the five agroforestry systems identified by the USDA: alley cropping, multistory cropping, riparian forest buffers, silvopasture establishment, windbreak establishment, and windbreak renovation.

She is utilizing a USDA EQUIP and a Climate Resiliency Farming Grant from the state of New York to create water storage opportunities, manage significant precipitation events, and efficiently conduct water irrigation. To create a farm-wide plan, she worked with Darren Doherty, an Australian land planner, on the concept plan for the farm, and Darren Doherty, Georgi Pavlov and local Engineer Mark Buckley Pond on the pond infrastructure design. Essex Soil and Water Conservation District and the Agency of Agriculture were involved with the water infrastructure project. In addition to the farming practices, she also serves as an educational consultant for those interested in cultivation agroforestry through Interlace Agroforestry Farm & Consultancy. She is currently creating curriculum to support a summer agroforestry field school for interested college students.

### How Project Contributes to Rural Resiliency:

Agriculture is an integral part to many rural communities yet farms are increasingly stressed by larger scale stresses in the form of climate change and international trade policies. Farms can serve as incubators for landscape-scale actions for both climate change mitigation (especially through agroforestry) and adaptation. By implementing resiliency actions and incorporating an educational consultancy, Ms. Giroux is making her farm and her livelihood more resilient to local and large-scale changes.

### Suggestions for towns and/or COGs to assist in this type of project:

Agricultural and Conservation Commissions should include multiple types of farming in their regulator definitions of farming. They should also strive to educate the public on these different types of agriculture and educate farmers about agroforestry practices.

### Contact for Questions:

Meghan Giroux

[meghan@vermontediblelandscapes.com](mailto:meghan@vermontediblelandscapes.com)

802-578-0829



*Interlace Farm Credit: Meghan Giroux*



# CASE STUDY: AGRICULTURE

## Freund's Farm, East Canaan, CT

**Lead Agency:** Matt Freund, Freund's Farm

**Funding:** [NE Sustainable Agriculture Research and Education](#), [USDA Small Business Innovation and Research Phase 1 and 2](#), [USDA Rural Development](#), CT Dept of Ag: Ag Viability, [NRCS EQIP](#), CT DEEP

**Website:** [Freund's Farm Market & Bakery](#)

### Project Overview:

Matthew Freund is part of the family farming team at Freund's Farm in East Canaan, Connecticut. They have noticed changes to the growing season with later frost days and increasing storm severity. Small dairy farms are increasingly at risk in New England due to market changes. As Freund noted, there are about 100 dairy farms left in Connecticut, down from over 6,000 dairy farms in the state 70 years ago. Freund's Farm relies on multiple streams of income beyond selling their milk to their dairy cooperative, [Cabot Cooperative](#), including selling [CowPots](#) built from cow manure and operating Freund's Farm Market, a retail market offering local products, plants, produce and catering services.

To mitigate the impacts of national policy and climate change, the farm has implemented numerous strategies to increase efficiency, manage waste, and increase resiliency. Here are a number of the strategies implemented at Freund's Farm:

- Choosing plant varieties that are drought tolerant;
- Studying potential movement of silos, barns, and feed away from the flood plain;
- Installing 1,200 solar panels for on-farm activities;
- Using soil management techniques to reduce erosion and build soil health;
- Reusing manure to remove excess nutrients by re-producing into a value-added product;
- Implementing a Nutrient Management Plan that accounts for significant precipitation events.

### How Project Contributes to Rural Resiliency:

Agriculture and family farms are an integral part to many rural communities but face significant challenges.

Farms that integrate climate change mitigation, adaptation techniques, and holistic landscape planning increase local economic, food, and cultural resiliency.



*New Dairy Barn at Freund's Farm built in 2016. Credit: Cabot Creamery*

### Suggestions for towns and/or COGs to assist in this type of project:

Local commissions should support farming with supportive regulations, farm-friendly policies, and local business coordination. Town officials and state legislators can work to influence policy at a larger scale and serve as grant administrators to help farms implement resiliency strategies or infrastructure.

### Contact for Questions:

Matt Freund [matt@cowpots.com](mailto:matt@cowpots.com) 860-824-7520



# CASE STUDY: CULTURAL RESOURCES

## Mapping Historic Sites in Rural Manitoba

**Lead Agency:** Manitoba Historical Society

**Consultants/Partners:**

**Funding:** [Manitoba Heritage Grants Program](#)

**Report:** [Mapping Historic sites in Rural Manitoba: development, themes, and applications](#)

### Project Overview:

The [Manitoba Historical Society](#) compiled an inventory of historic sites around Manitoba to assist tourism and management. The sites are historic based on the following criteria: noteworthy object, event, or person. The society researched sites through local history books, local knowledge (including social media), driving around the province, and Google Earth to show human disturbances (e.g., shelterbelts, foundations, roads, rights of way, and other straight or curved lines). During site reconnaissance, the investigators used drones to enhance their exploration and to provide interactive views. Each location was inventoried and mapped then had a sign installed with a title, website, and QR code for more information. Metadata for each location included: alternative/common spellings, building materials/architect, type of site (agricultural, military, education etc.), project name, ethnicity, neighborhood descriptions, photo available, municipality, local/state/national recognition. The information is searchable and also available by pop-ups on a Google maps base. A [webinar](#) is also available for the project through the Rural Policy Learning Commons.

### How Project Contributes to Rural Resiliency:

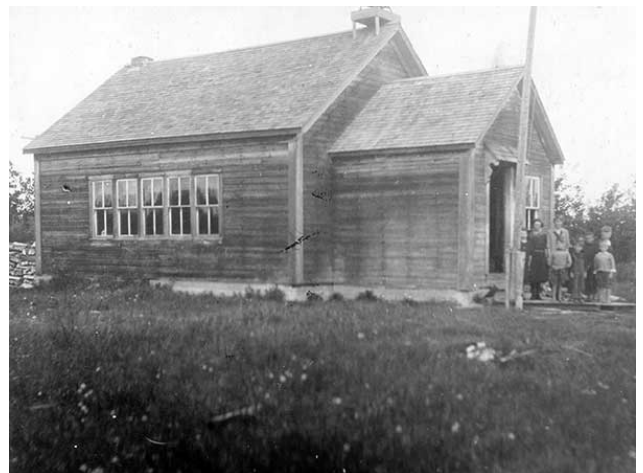
This type of inventory can assist in improving regional resiliency by identifying sites, site managers, and sites of local/regional significance. It can also be used to enhance historical/genealogical research, education, and tourism. Collecting the sites into an easy to navigate database and map may assist relatively obscure sites to find supportive funding or public awareness. These sites may also develop a “rural story” and help towns and regional planning agencies identify historical trends to protect, mitigate, or enhance.

### Suggestions for towns and/or COGs to assist in this type of project:

Historical commissions and districts likely have a wealth of knowledge to start, complete, and maintain this type of inventory. Partnering historical societies with regional planners and economic development groups could propel the project forward.

### Contact for Questions:

Gordon Goldsborough  
[gordon@mhs.mb.ca](mailto:gordon@mhs.mb.ca)



*Shergrove School (no date) by [R. M. Stevenson](#)*

Source: [Archives of Manitoba](#), School Inspectors Photographs, GR8461, A0233, C131-3, page 31. Retrieved from <http://www.mhs.mb.ca/docs/sites/shergroveschool.shtml>

## CASE STUDY: CULTURAL RESOURCES

### Historic Resource Resiliency Planning in Connecticut

**Lead Agency:** Connecticut State Historic Preservation Office

**Consultants/Partners:** R. Christopher Goodwin & Associates, Inc.; Dewberry; Milone & MacBroom;

**Funding:** National Park Service, Emergency Supplemental Historic Restoration Fund (Hurricane Sandy grant)

**Report:** “Historic Resource Resiliency Planning in Connecticut”

#### Project Overview:

As part of the State Historic Preservation Office’s Hurricane Sandy program, funded by a grant from the National Park Service, the CT State Historic Preservation Office worked with R. Christopher Goodwin & Associates, Inc., Dewberry, and Milone & MacBroom on a climate vulnerability study of historic resources in Fairfield and New Haven Counties. The SHPO’s team of planning and engineering consultants analyzed plans in 91 towns; held charrettes with five regional Councils of Government; and met with planners and local stakeholders in 28 direct-shoreline towns. Upon completion of the project, SHPO will provide towns with technical assistance packages that includes maps and data on vulnerable historic resources; individually tailored reports on preservation planning for resiliency; and a best practices guide for planners. While this project had a significant focus on sea level rise as the project area was coastal counties, the report noted significant threats from the increased number, severity, and frequency of storm events with the potential to result in substantial damage to and/or loss of historic properties as well as other climate-induced environmental changes: “increased temperatures resulting in increased thermal movement; changes in expansion and contraction rates associated with altered seasonal cycles; and invasive species, including vegetation, insects, biological, and microbiological agents, that are anticipated to become more common and to pose increasing threats through infestation or decay.”



*Sloane Museum credit: CT DECD*

#### How Project Contributes to Rural Resiliency:

Historic sites and other cultural resources contribute greatly to the community character of a community. Protecting these vulnerable assets are integral to protecting and encouraging that character.

#### Suggestions for towns and/or COGs to assist in this type of project:

While not available yet, CT SHPO intends to develop its resiliency efforts as noted in the [draft Shared Stewardship: Connecticut State Historic Preservation Office’s 2018-2023 Strategic Plan](#). There will be additional resources on the SHPO website and staff will be working with municipalities and local preservation organizations to enhance resiliency.

**Contact for Questions:** Douglas Royalty, [Douglas.Royalty@ct.gov](mailto:Douglas.Royalty@ct.gov), 860-500-2347

## CASE STUDY: INFRASTRUCTURE

# Town of Morris Low Impact Development Design Manual

**Lead Agency:** Northwest Conservation District and Northwest Hills Council of Governments

**Consultant:** Steven Trinkaus, P.E., Northwest Conservation District, and Tom McGown

**Funding:** [The Connecticut Institute for Resilience and Climate Adaptation](#)

**Report:** [Building Municipal Resiliency and Climate Adaptation through LID](#) and [LID Design Manual](#)

### Project Overview:

The LID Design Manual includes specific information needed by engineers and project designers to successfully construct projects.

Trinkaus Engineering in cooperation with Morris' town planner reviewed the municipal planning and zoning regulations, town ordinances, and inland wetlands and watercourses regulations for changes needed to implement the manual. While the manual contains the majority of the LID strategy, the municipal regulations and ordinances will require changes to definitions, impervious surface coverage allowances, and approval procedures to implement the manual completely.

Additionally, Northwest Conservation District worked with several regional stakeholders including members of the 'design/build' community, land use commission members, and environmental conservation groups to increase their familiarity with LID techniques and the manual's contents.

### How Project Contributes to Rural Resiliency:

The LID practices described in the manual serve to increase the resilience of Connecticut's small towns by protecting their drinking water supplies and other water resources, improving their water quality within watersheds, protecting agricultural resources, and protecting the built human environment from flooding. Thus, this product serves as a model for other small towns in the region and statewide looking to tackle similar strategies.

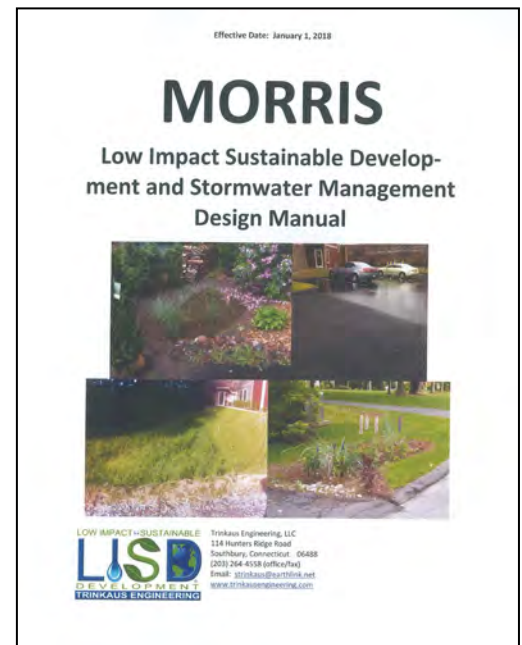
### Suggestions for towns and/or COGs to assist in this type of project:

Hiring an engineer for this process was important for many reasons: communicating pollution reduction loading, critical upland zones, and reviewing town regulations to incorporate the new requirements. Towns will likely need ongoing support during implementation of the design manual.

### Contact for Questions:

Karen Nelson  
Northwest Conservation District  
[karengnelson@nwcd.org](mailto:karengnelson@nwcd.org)

Steve Trinkaus, P.E.  
Trinkaus Engineering, LLC  
[strinkaus@earthlink.net](mailto:strinkaus@earthlink.net)



## CASE STUDY: INFRASTRUCTURE

# Southeastern Connecticut Critical Facilities Assessment

**Lead Agency:** The Southeastern Connecticut Council of Governments (SCCOG)

**Consultant:** Milone & MacBroom, Inc.

**Funding:** The Connecticut Institute for Resilience and Climate Adaptation

**Report:** [SCCOG Critical Facilities Final Report](#)

### Project Overview:

SCCOG, with assistance from Milone & MacBroom, conducted an assessment of 18 of the region's critical facilities that lie within storm surge or flood zones in order to identify actions that can make facilities more resistant to damage and service interruptions. The project was called for in the 2012 Multi-Jurisdictional Hazard Mitigation Plan. The assessment will allow municipalities and fire districts to take proper steps in keeping their facilities on-line during and after hazardous weather events.

The Consultant visited 16 properties, including town halls, fire stations, and police stations, to assess flood, wind, and snow load risks. They developed a memo for each site outlining the potential risks and appropriate recommendations.

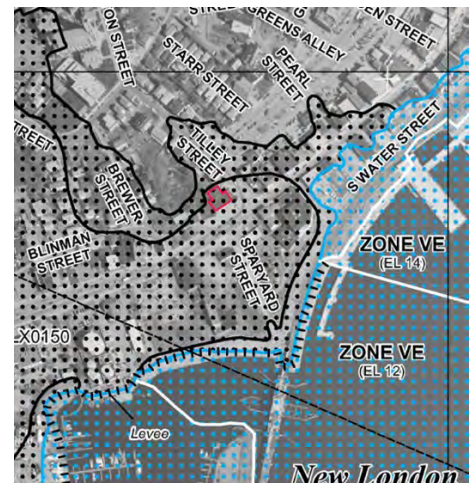
Site assessments included recommendations for both short-term improvements to serve the site over the next 20 years, and long-term actions of value beyond 20 years. Five of the properties were recommended for relocation of services to less vulnerable sites in the long term (20+ years). Flood proofing measures were recommended for the other sites to enable the provision of services despite ongoing flood risks.

### How Project Contributes to Rural Resiliency:

Critical facilities are vital to preparation and response to emergencies. Making these facilities more resilient requires vulnerability identification and then developing appropriate responses ranging from simple flood-proofing to re-locating the facility. This project provided clear steps to conducting such an assessment and identifying appropriate responses.

### Suggestions for towns and/or COGs to assist in this type of project:

FEMA elevation certificates, prepared for sites where none had existed, were very important in the vulnerability assessment.



*Photo Credit: SCCOG GIS/FEMA*

### Contact for Questions:

Dave Murphy, P.E. CFM  
Milone & MacBroom, Inc.  
[davem@miloneandmacbroom.com](mailto:davem@miloneandmacbroom.com)

Amanda Kennedy, AICP  
Southeastern Connecticut Council of Governments  
[akennedy@seccog.org](mailto:akennedy@seccog.org)



## CASE STUDY: INFRASTRUCTURE

### Flood-Resilient and Fish-Friendly Road-Stream Crossings

**Lead Agency:** Housatonic Valley Association (HVA)

**Partners:** Princeton Hydro, UConn Civil & Environmental Engineering, CT DEEP Division of Inland Fisheries, Civil Engineer, municipalities

**Funding:** [NFWF New England Forests and Rivers Fund](#), [Long Island Sound Futures Fund](#), [Bring Back the Natives Fund](#), UConn CIRCA

**Website:** [HVA](#), [North Atlantic Aquatic Connectivity Collaborative Database search page](#)

#### Project Overview:

From 2014 to 2017, HVA conducted a region-wide assessment of road-stream crossings in the Northwest Hills region, including 1,300 bridges and culverts using protocol from the [North Atlantic Aquatic Connectivity Collaborative](#). HVA's research indicates that about 56% of non-bridge road-stream crossings are moderate or worse barriers to fish and wildlife movement. Through partnership with the University of Connecticut, they've used flood modelling to evaluate water flow over roads. That modelling showed about 29% of non-bridge structures do not have the capacity to deal with a 25-year recurring flood interval. HVA worked with experts in biology, landscape-scale conservation, and watershed protection and officials in the municipalities to prioritize culvert replacement. By identifying the problem structures, it is possible to restore habitat connectivity *and* reduce flooding risk at these crossings. HVA also worked with the towns of Oxford and Seymour through a [CIRCA grant-funded project](#). HVA has been applying for infrastructure funding from various sources like the National Fish and Wildlife Foundation's [Long Island Sound Futures Fund](#) and the [Bring Back the Natives Fund](#) to couple with local and state investment to replace priority culverts like those on Pound Mountain Brook in Kent and Guinea Brook in Sharon. Each of these priority structures are barriers to fish and wildlife movement through high-quality cold-water habitat, a risk that will be exacerbated by climate change.

#### How Project Contributes to Rural Resiliency:

A community with a limited budget for large-scale infrastructure can maximize their investment in both natural resource conservation and flood management, using a reliable protocol coupled with scientific and local knowledge. The interaction between climate change risks, infrastructure, and natural resources is significant. This case study not only improves the existing infrastructure but can inform future infrastructure investments with new design standards.



*Barrier Culvert in Kent, CT photo by HVA*

**Suggestions for towns and/or COGs to assist in this type of project:** Partnering with a watershed organization that can help with prioritizing areas of conservation and/or infrastructure improvements will benefit the larger landscape while maximizing the capital investments.

#### Contact for Questions:

Michael Jastremski (mj.hva@outlook.com) & Lindsay Keener-Eck (lkeenereck.hva@gmail.com)  
Housatonic Valley Association

Wozniak-Brown, Joanna. "Rural Resiliency Vision and Toolkit." Northwest Hills Council of Governments. December 2018. Available at <https://resilientrural.com>

# CASE STUDY: NATURAL RESOURCES

## South Kingstown Land Trust Pilot Project

**Lead Agency:** [South Kingstown Land Trust](#)

**Partners:** RI Sea Grant, URI Coastal Resource Center (CRC), The Nature Conservancy, & URI's Environmental Data Center

**Funding:** Rhode Island Coastal Resources Management Council

**Website:** [SKLT Climate Change Pilot Project](#)

### Project Overview:

South Kingstown has a number of stewardship projects including: Wildlife Habitat Improvements, Productive Farmland, Health Forests, Historic and Cultural Resource Protection, and a Climate Change Pilot Project. The report, "[Building Capacity to Adapt to Climate Change through Local Conservation Efforts](#)," discusses the project in detail. The report also references the [Land Trust Alliance's Climate Change Toolkit](#). The five primary steps in adaptation for a local conservation organization are: Understand the Context and Priorities of the Organization, Identify and Map Assets, Determine the Vulnerability of Important Resources and Assets, Craft Adaptation Strategies, and Monitor, Review, Revise. As noted in the report, this local-scale guidance is less common than state or multi-state advice. The report also provides important advice about mapping climate impacts and non-climate stressors: "Mapping sensitivity of habitats, sea level rise inundation projections or migrating wetlands is often helpful, while non-climate stressor data might include impervious surface cover. Avoid the temptation of mapping all the data you can find. A lot of information or data layers can be displayed on a map, but for clarity data displayed must be done so strategically. This will also depend on the type of display. Much more data can be made available if the maps are viewed in an interactive electronic format where data layers can be turned off and on by users" (page 11).

### How Project Contributes to Rural Resiliency:

Land trusts, especially in Connecticut serve critical functions for habitat protection, land conservation, and rural character preservation. Incorporating climate change into conservation planning increases landscape-scale resiliency. Since lack of GIS capacity or mapping data is common, the mapping advice in this project may also help guide local vulnerability assessments.

### Suggestions for towns and/or COGs to assist in this type of project:

Partnerships with local/regional land trusts and conversation organizations is essential to effect planning for natural resources and the ecosystem services they provide. Sharing of technical skills and knowledge can benefit all partners.

### Contact for Questions:

Julia Fry Landstreet

Executive Director

[Julia.landstreet@sklt.org](mailto:Julia.landstreet@sklt.org)

401-789-0962



*SKLT Photo of Carpenter Farm in Perryville*



# CASE STUDY: PUBLIC HEALTH

## Minnesota Climate and Health

**Lead Agency:** Minnesota Department of Health

**Partners:** Extreme Heat Training Module Technical Team & the Extreme Heat Toolkit Steering Committee

**Funding:** US Centers for Disease Control and Prevention

**Website:** [Minnesota Climate and Health Program](#)

### Project Overview:

The Minnesota Department of Health has a robust [website](#) presenting on the intersections of health and climate change. The main topic areas are: climate change overview, water changes, vector-borne diseases, wellbeing, extreme heat events, air quality, agriculture & food security, and planning tools & data. There is an [Minnesota Extreme Heat Toolkit](#). They also have multimedia outreach tools like a YouTube [climate and health playlist](#), a website and [webinar](#) for “Planning for Climate & Health Impacts: Emergency Management Considerations”, and a Climate and Health e-newsletter. There are also [educational materials for Middle School Teachers](#) that aligns with Minnesota Academic Standards including a vocabulary list, study guide, computer lab lesson plan, and trivia game.

The Department also created a [Climate Data Community of Practice](#) to “build capacity for using climate data to increase climate resiliency for Minnesotans. They invite members from other departments like transportation, and pollution control. The community of practice will:

- Share insights for obtaining, selecting, preparing, and applying available climate datasets specific to Minnesota
- Support public sector adaptation efforts aimed at increasing climate resiliency for Minnesotans
- Foster a community of climate data users to share knowledge and resources

### How Project Contributes to Rural Resiliency:

This project robust projects combines educational materials and climate resiliency actions through various media presentations and ongoing learning opportunities. It also works across several responsibility areas in the state, amplifying the resiliency work.

### Suggestions for towns and/or COGs to assist in this type of project:

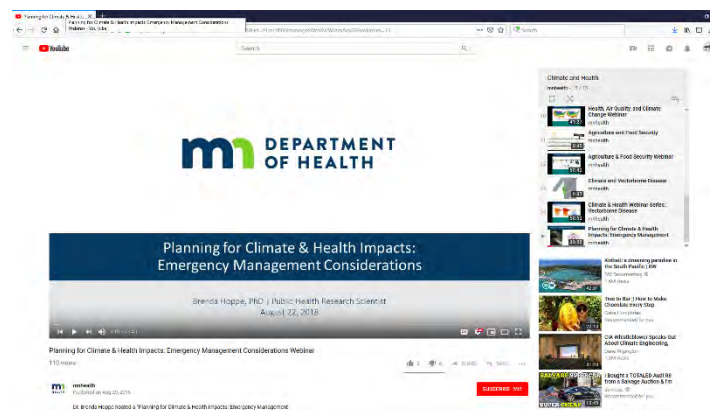
Regional entities and the state should consider this type of educational outreach and cross-sector actions. Similar information could be re-used (where appropriate) or re-created with the right participation.

### Contact for Questions:

Minnesota Climate and Health Program

Minnesota Department of Health

[health.climatechange@state.mn.us](mailto:health.climatechange@state.mn.us)



Wozniak-Brown, Joanna. “Rural Resiliency Vision and Toolkit.” Northwest Hills Council of Governments. December 2018. Available at <https://resilientrural.com>

## CASE STUDY: PUBLIC HEALTH

# Town of Brookfield Tick Communications Program

**Lead Agency:** Town of Brookfield Health Department

**Funding:** annual local Department of Health budget

**Report:** [Tick Borne Diseases in Connecticut](#)

### Project Overview:

The town of Brookfield Health Department created a communications program for the public about ticks and tick-borne diseases in Connecticut, including websites dedicated to [tick-borne diseases](#) and [mosquito-borne diseases](#), a PowerPoint presentation on tick-spread diseases, and an information table in the Brookfield Town Hall with a variety of handouts on managing ticks. They also work with the [local BLAST organization](#) and track trends in the occurrence of tick-borne diseases. BLAST is a co-operative organization between the Housatonic Valley towns run out of Ridgefield. Ridgefield also has a [Ridgefield Lyme Disease Task Force](#).

As a result, they have seen a significant increase in Babesiosis and Anaplasmosis with a clear regression in Lyme Disease numbers. The BLAST organization has a variety of [educational materials](#) for teachers, medical professionals, and community groups.

They coordinate with the CT Agricultural Experiment Station in New Haven for free testing of ticks for Babesia, Anaplasma, and Lyme. Depending on the results, they will promote referrals to the resident's physician for further treatment. They also receive HIPAA protected reports from healthcare providers and encourage patients with documented Lyme Disease to join the [Lyme Registry at Danbury Hospital](#). Although they do not provide the service, they do oversee and advise the Public Works and Parks & Rec Departments about spraying.

### How Project Contributes to Rural Resiliency:

Ticks and other disease-carrying pests are a significant concern, especially in rural areas. Residents in rural areas have a greater risk of exposure because of the increased habitat for these pests, higher exposure risk from recreation/employment/wildlife, and higher prevalence of animal hosts for the insects.

### Suggestions for towns and/or COGs to assist in this type of project:

This public information campaign illustrates the benefits of inter-town and cross-departmental coordination for education and science-based recommendations that help reduce the exposure risk for residents.

### Contact for Questions:

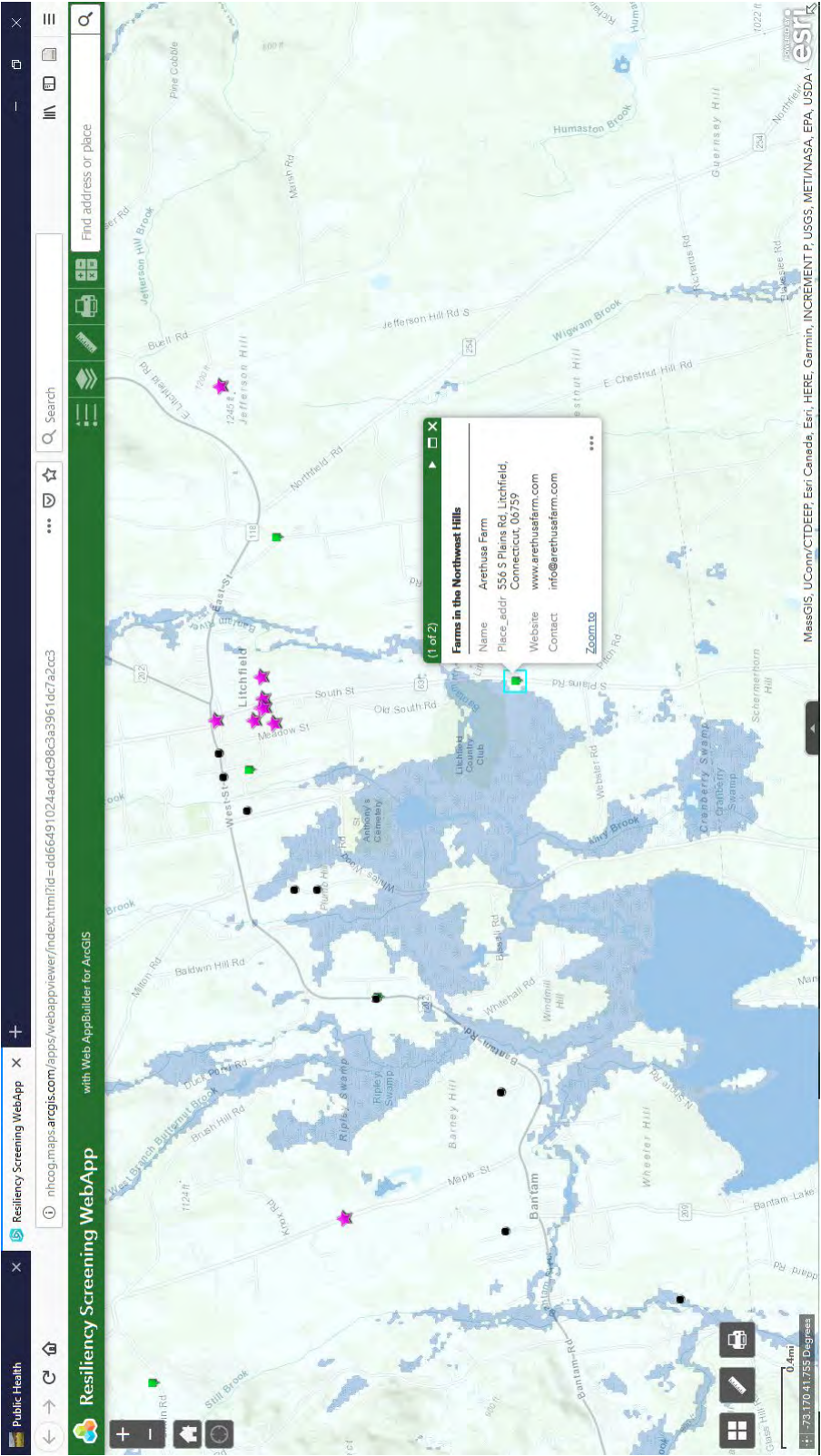
Dr. Raymond Sullivan  
FACS Director of Health  
(203) 775-7315



## **APPENDIX B**

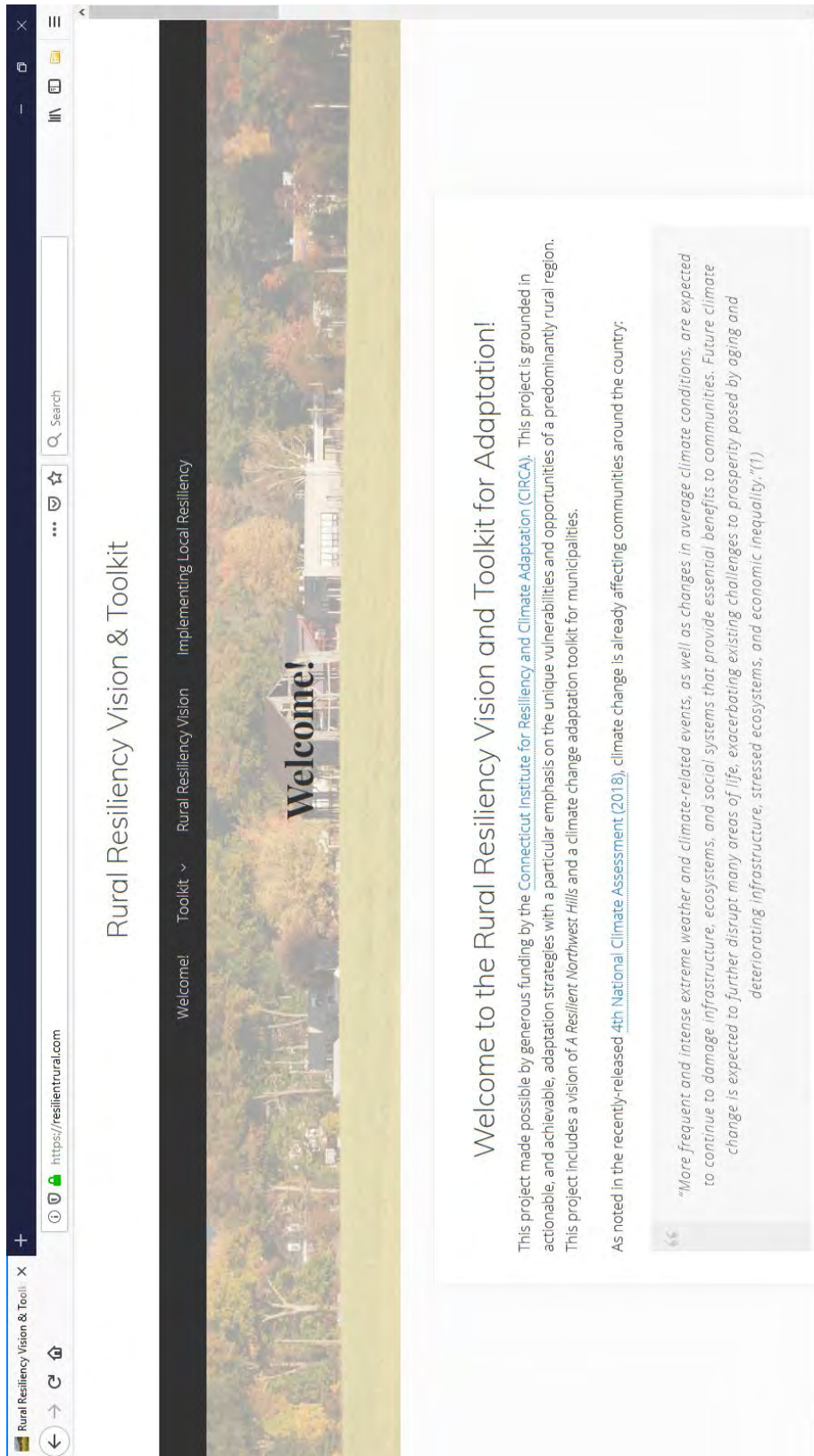
### **WEBSITE SCREENSHOTS**

Resiliency Screening Web Map





## Resilient Rural Welcome Webpage



Resilient Rural Tools

Natural Resources

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https://resilientrural.com/toolkit/natural-resources/

90% 🔖 ⌵ ⌵ ⌵ 🔍 Search

# Actions

The section is divided into the following major categories:

- Resource Management
- Municipal & Regional Activities

\*The CT Climate Preparedness Plan divides this section into the various habitats. Since this toolkit is for municipalities, the habitat actions have been combined. Land trusts and conservation organizations may wish to see some actions by habitat and can review the state plan.

A tabular version of the actions is also available.

## Resource Management

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1Nr Identify, prioritize, and acquire or ease riparian land and wetland properties adjacent to high priority coldwater resources. Prioritize restoration and management activities including: revegetation of stream banks/riparian zones and stocking of resilient strains and species, manage water withdrawals/diversions to maintain characteristic connectivity and hydrology.

-

2Nr Create an Inventory of all road-stream crossing structures (i.e., bridges and culverts) in town and prioritize for replacement, based on conservation benefits, minimizing flood risk, and maintenance need. Re-establish connectivity and more natural flows along our rivers and streams by removing or modifying existing structural impediments, such as dams, and culverts. Modify upstream flood control and water management infrastructure and the operation thereof to allow for regular flooding of floodplain forests where feasible.

Comments/Descriptions: Cross link to Infrastructure Partners: HVA, Public Works, CT DOT, Housatonic River Commission

Tools: HVA Culvert Assessment Program

North Atlantic Aquatic Connectivity Collaborative Database search page

Documents required by FERC for hydropower facilities along regional rivers like Shoreline Management Plan, Critical Habitat Management Plan, Recreation Plan and Programmatic Agreements mentioned in Housatonic River Management Plan 2006.

+

3Nr Promote opportunities for warmwater gamefish in rivers where populations of temperature intolerant species decline.

...

...e land use policy/regulations (riparian buffer zones, stormwater management BMPs and Low Impact Development) that