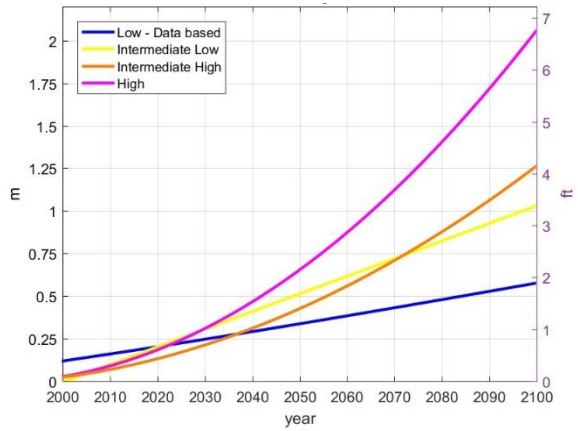
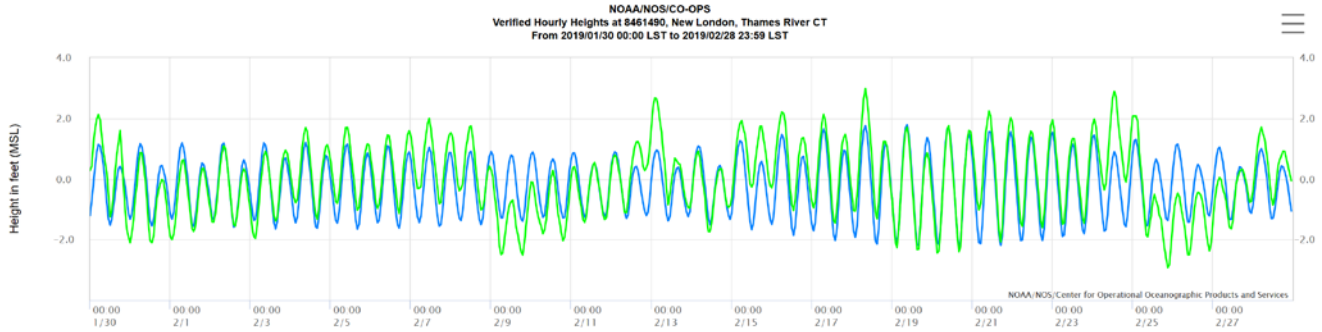
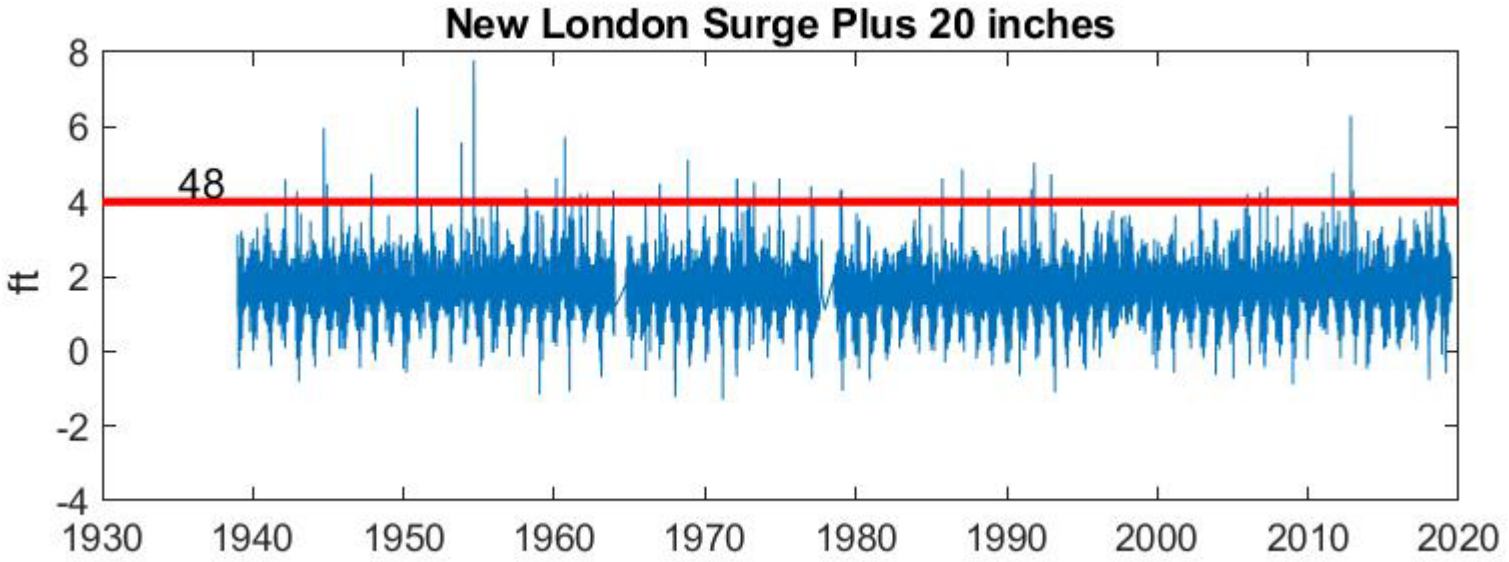
Anticipated Changes in the Environment

1. To track the effectiveness of emissions reductions and the impact of new science discoveries we recommend that recommend a comprehensive review of projections be undertaken by the State at five-year intervals.
2. By 2050 the mean sea level in Long Island Sound could be up to 20 inches above the mean of 1983-2001. This projection is not sensitive to future trends in CO2 emissions.
3. Changes in mean sea level will have a significant impact on the frequency and extent of flooding along the Connecticut coast.



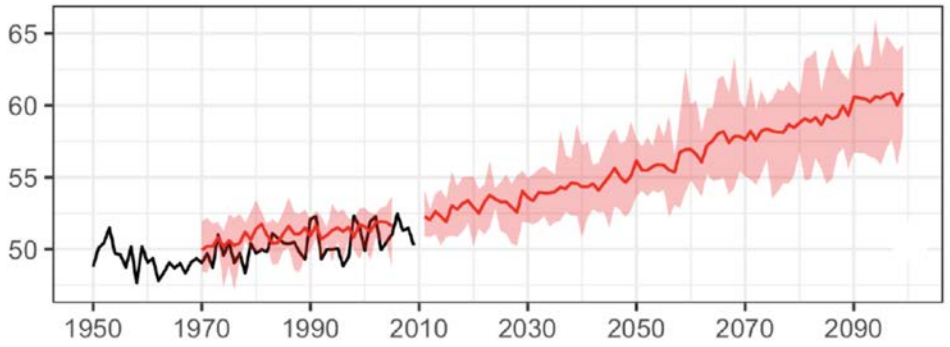
Modest changes in mean sea level have a big impact on flood risk

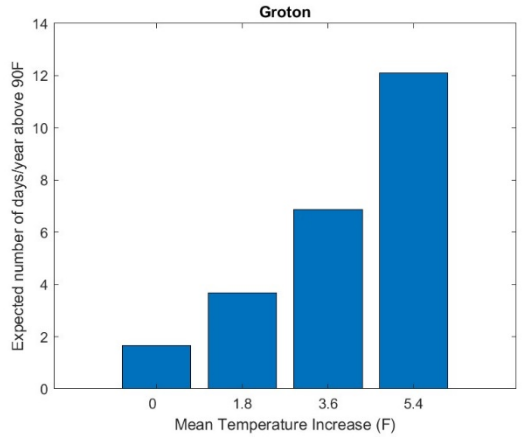




NOAA's New London Tide Gage

- Places that flood now when the surge is 4 ft have a 5/80 risk per year.
- With a 20 inch mean SLR, that risk increases to 48/80.
- The details are important here but the point is the change in risk is large.





4. Sea level rise will continue after 2050. 80 inches is possible by 2100 if CO2 emissions are not reduced soon.
5. Average temperatures could increase by 5 ^{o}F (2.7^{o} C) by 2050. Connecticut's temperature is rising faster than the global average.
6. The number of days above 90 ^{o}F will increase. It has been 5. It is likely to increase to an average of 25 days between 2040-2069.
7. Coordinated mitigation now means it is more likely that the temperature will stabilize after 2050. If not, warming is likely to accelerate

8. Drought risk is also expected to increase.

9. Storms are likely bring more precipitation. There will be less snow and more rain, but high snowfall events will be more probable.

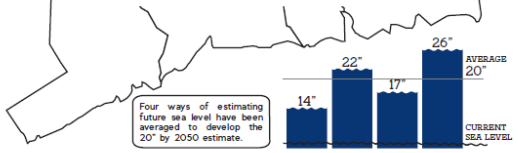
10. Hurricanes are likely to have higher winds and more rain. Since 1980 there has been an increase in the frequency of hurricanes in category 3 or greater.

These changes could be costly.
Need further work to refine the impacts and inform the public

SEA LEVEL RISE & COASTAL FLOODING IN CONNECTICUT

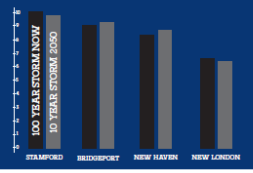
Factsheet from the Governor's Council on Climate Change

1. Sea level is expected to rise by up to 20 inches by 2050, and to continue increasing after that.
2. Small changes in mean sea level have a big impact on the frequency of flooding.
3. Areas that experience flooding every few years now should expect flooding multiple times a year by 2050.



Return intervals describe the frequency and severity of a storm. For instance, in Stamford a storm with 10' storm surge has a return interval of 100 years.

With up to 20" of sea level rise, storms with an 100 year return interval now will have a 10 year return interval in 2050. Scale is in feet.



Sea Level Rise Predictions:

Connecticut is expected to experience up to 20 inches of sea level rise by 2050, leading to greater frequency of flooding from tides and storms. Small changes in mean sea level have a big impact on the frequency and severity of flooding along the Connecticut coast.

With 20 inches of sea level rise, what we experience today as a 4.5-foot storm surge will occur up to ten times more often in 2050. Some areas that flood once every 10 years will likely flood every 2 years. Chronic flooding will be a challenge for neighborhoods, roads, and areas that have flooded in the past.

Consequences & Flood Risk:

Coastal residents can potentially expect:

- Higher cost of living on the coast
- Greater risk of property damage
- More highway and road closures
- Inaccessibility to and higher maintenance costs for critical infrastructure

Individual towns are beginning to plan for coastal and inland impacts of climate change, as well as coordinated regional efforts are underway. Some current actions include the Governor's Council on Climate Change; Multi-jurisdictional Hazard Mitigation Planning by Regional Councils of Governments; and Resilient Connecticut.

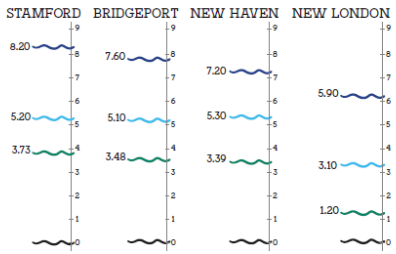
Resilient Connecticut is an initiative charged with creating a regional adaptation plan for Fairfield and New Haven counties by coordinating actions between local and regional stakeholders. Geographic scales include local communities, municipalities, counties, and statewide. Time scales range from daily, monthly, annual, decadal, and century. The most up-to-date monitoring and scientific data inform all mitigation, adaptation, and implementation decisions.

Long term planning for communities, infrastructure, and human health should consider the time horizon, acceptable levels of risk, and no-regrets strategies that do not increase the exposure of public investment to flooding. Future development and planning should consider high ground that will be inherently resilient to future sea level rise, or "resilient corridors."

LEGEND

- MAJOR FLOODING
- MINOR FLOODING
- MEAN HIGHER-HIGH WATER
- CURRENT SEA LEVEL

Current water level benchmarks at Long Island Sound (LIS) tide gages. Values are referenced to the North Atlantic Vertical Datum of 1988 and are in feet. More extreme water levels are located further west in LIS. **To estimate values in 2050 add 20" (1.66').**



CIRCA
Connecticut Institute for Resilience and Climate Adaptation

www.resilientconnecticut.uconn.edu

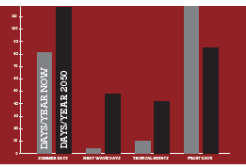
RISING TEMPERATURES & PRECIPITATION IN CONNECTICUT

Information from the Governor's Council on Climate Change

1. By 2050, average temperatures are expected to increase about 5°F, with increases thereafter dependent on emissions choices now.
2. Average precipitation is expected to increase about 8% (4 inches/year).
3. Indices of extreme precipitation, summer drought, and hot weather are expected to increase.

Extreme Indices help quantify impacts of a warming climate on weather measurements. Many of these common indices have been increasing due to climate change.

Annual counts of specified indices in Connecticut are to the right. Gray bars indicate today's and black 2050 values.



Current Trends:

Since 1895, Connecticut's annual average temperature has been increasing by 0.3°F per decade, totaling 3°F warmer as of now. Seasonal averages have also been increasing, with winter experiencing the greatest increase. Observations show more warming along the southern coast and eastern half of the state.

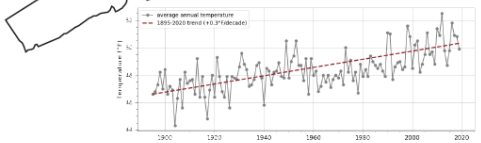
Precipitation across Connecticut has been increasing by 0.17 inches per decade since 1985, with the largest increases in fall.

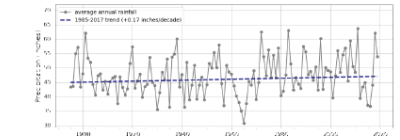
Predictions:

According to high CO_2 emission scenarios (RCP 8.5) for the future, average temperatures in Connecticut are predicted to rise 5°F (± 1°F) by 2050 and continue rising thereafter. The most seasonal increase will likely be in summer.

In the same scenario, average annual precipitation is expected to increase about 8% (4 inches per year), with much occurring in winter and spring.

In a warmer Connecticut, precipitation will increase because of evaporation and the water cycle.





Heat/Cold & Wet/Dry Indices:

Heat Wave days are 6 or more consecutive days with daily maximum temperature above the 90th percentile.

Number of Days above 90°F and 100°F are the number of days per year with maximum temperatures above the threshold value.

Summer days refer to the number of days per year when the daily maximum temperature is above 77°F. Statewide, summer days have increased and significantly in southwestern Connecticut.

Tropical nights refer to the number of days per year when the daily minimum is above 68°F. Along the southern coast, tropical nights have significantly increased.

Frost days refer to the number of days per year when the daily minimum is below 32°F. In most of the state, frost days have significantly decreased.

Future Extreme Indices:

By 2050, heatwave days will like rise to 48 from 4; summer days 118 from 81; Tropical nights 40 days per year from 10; frost days will likely drop to 85 per year from 124; days above 90°F from 5 to 25; and days above 100°F from less than 1 to 4.

Indices of precipitation are expected to increase, including number of days with more than 1 inch of precipitation [from 12 to 14 days]; number of heavy precipitation days [from 3 to 5 days]; fraction of total precipitation accounted for by heavy precipitation [from 15% to 20 %]; the maximum 1-day precipitation [+27%, from 2.8 to 3.5 inches]; and maximum 5-day precipitation [+20%, from 4.5 to 5.4 inches].

CIRCA
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More detailed information is available in the Connecticut Physical Climate Science Assessment Report. The full report is available here: https://circa.uconn.edu/ct-climate-science. Over the coming years, future assessment reports will be written and informed by the most up-to-date data and models.

“Right Relationships”

- What’s happening?
- How did we get here?
  - Stan Rushworth, Native Elder
- What kind of a future do we want?

  Gina McCarthy, NRDC

  Formerly EPA, CT DEEP

- ***Health*** ***(people <u>and</u> the environment)***
- ***Rural, suburban and urban communities***

“essentials”

“Right Relationships”

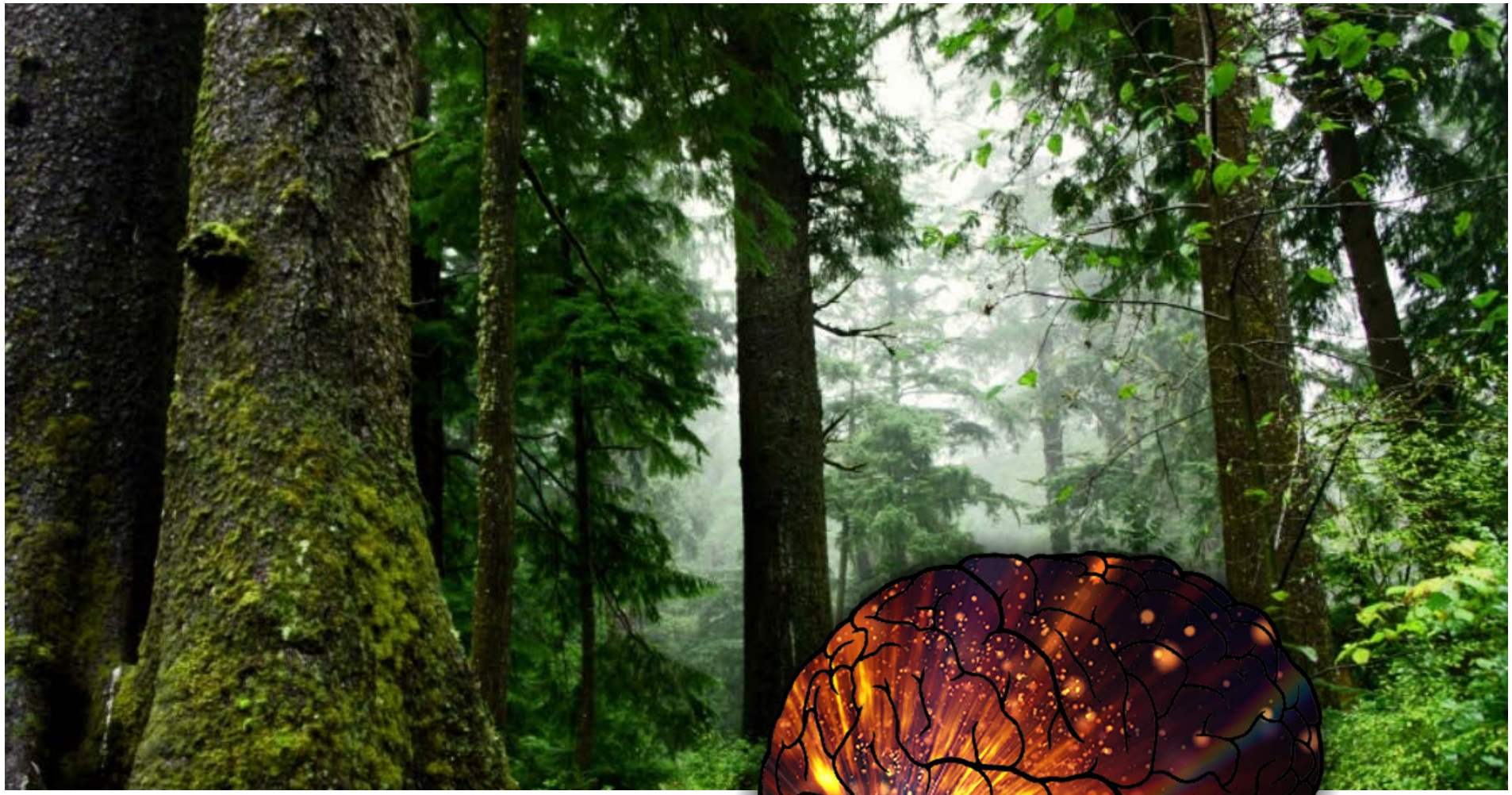
- What’s happening?
- How did we get here?
  - Stan Rushworth, Native Elder

- What kind of a future do we want?

  Gina McCarthy, NRDC

  Formerly EPA, CT DEEP

- **What are the *impacts* so we can apply:**
- **Unbiased, interdisciplinary science**
- **Evidence-based actions**
- **. . . . to our common goal of a *just* and *healthy* future?**
  - **Science and Technology Working Group, GC3 in CT**



Health, ecosystems/biodiversity

culture, recreation, education, communication

community resilience

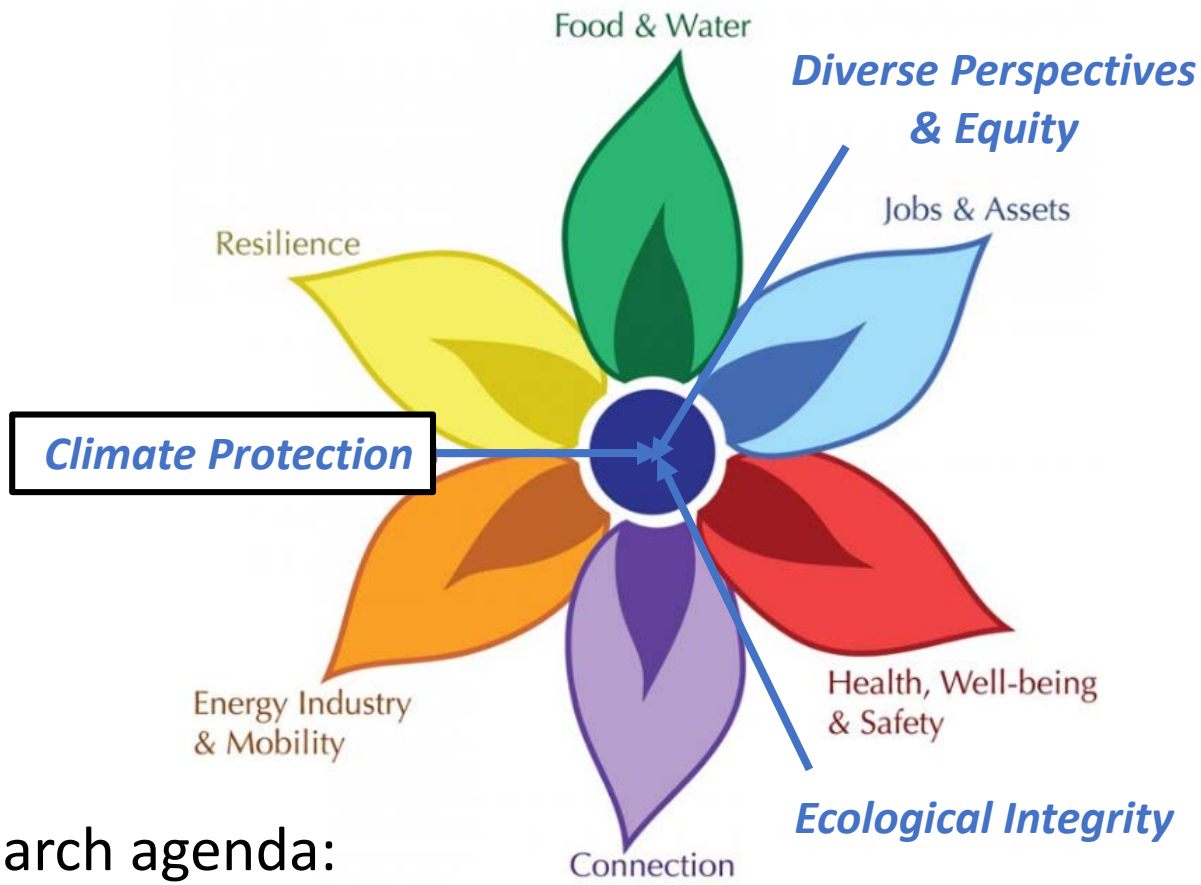
“Science and everyday life cannot and should not be separated.”

Rosalind Franklin, PhD (1920-1958)

"Science and everyday life cannot and should not be separated."

Rosalind Franklin, PhD (1920-1958)

Multisolving is essential.



Align and re-align policies, actions and research agenda:
science/public good, public opinion and harm reduction.

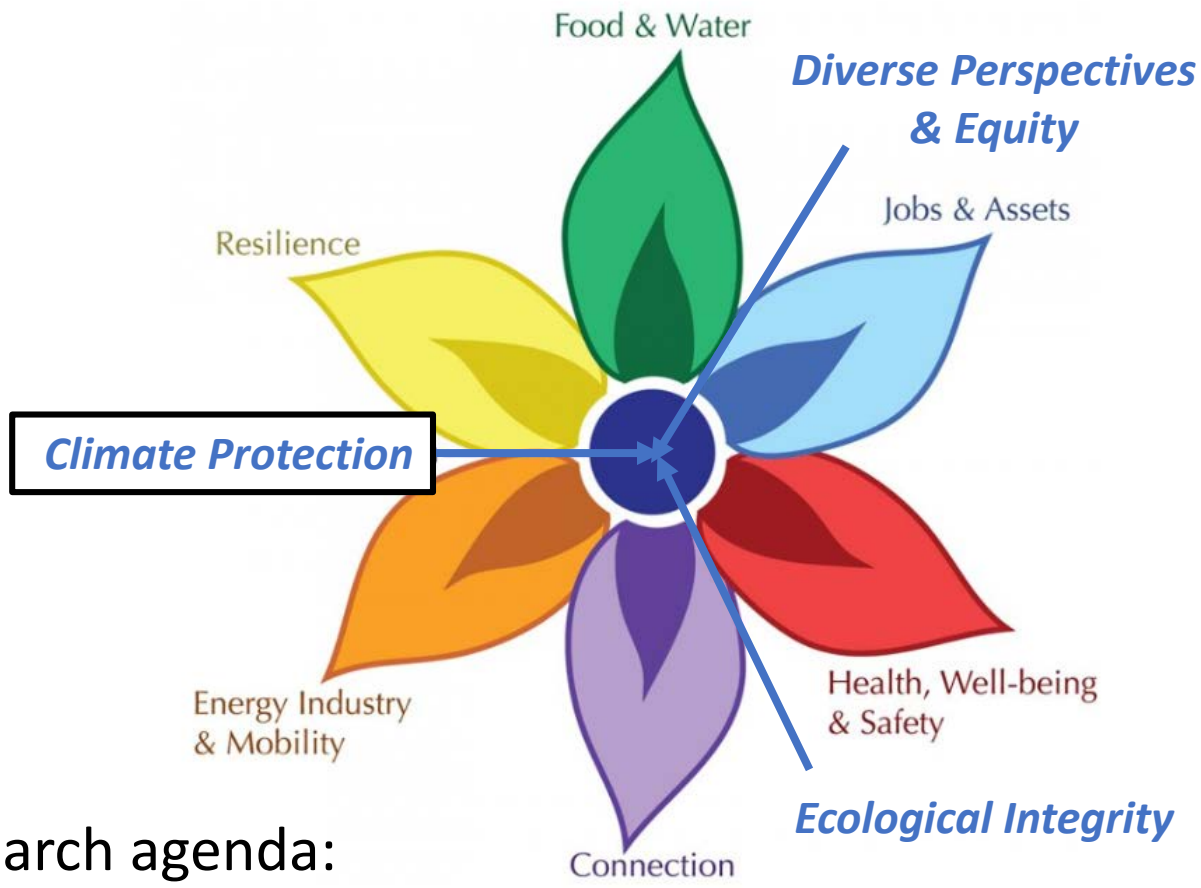
"Science and everyday life cannot and should not be separated."

Rosalind Franklin, PhD (1920-1958)

Multisolving is essential.

Examples:

- Green infrastructure
- Public transportation
- Energy efficiency / clean energy
- Land management and stewardship
- Local systems, local resource use / reuse



Align and re-align policies, actions and research agenda:
science/public good, public opinion and harm reduction.

Green Infrastructure is Multisolving:

store more carbon
clean air/water
food . . .
biodiversity
flood mitigation
health / equity
natural solution . . .
jobs and education

People-powered and Public Transportation is Multisolving:

reduce emissions
health
community lifeline
jobs and equity

need to reevaluate in the context of multiple impacts

Aligning energy use with the right choice(s) is multisolving

- Reduce energy use, improve health
- Support resilient, local, clean energy
- Provide jobs, equity and education

Warm Up New Zealand

Residential energy program providing grants for insulation or clea heating costs for low-income or residents with health needs

Goals

- Increase job opportunities
- Warmer, drier, healthier homes
- Improve energy efficiency

Collaborators

- NZ government, insulation companies, energy trusts, physicians

Land conservation and stewardship is multisolving:

Maximize natural solutions ***in parallel*** with responsible resource use:

- ***FOOD and WATER***
- ***Keep Carbon Stored***, continue sequestering, protect native species
- ***Proforestation*** – grow existing forests where suitable and possible
- ***Green Infrastructure*** (all the reasons)
- ***Mental and Physical Health – essential in a densely populated region***
- ***Equity, Science and Education***
- ***Protect Natural and Cultural Heritage; species migration and genetic diversity***
- ***Many types of jobs across the state***
- ***Connecticut is <u>Exceptional</u>***

When It Comes to the Climate, Older Trees Do It Better

Scientists long assumed that as trees got older, they grew slower—just like us. But a new study underscores the climate benefits of the oldest, biggest trees

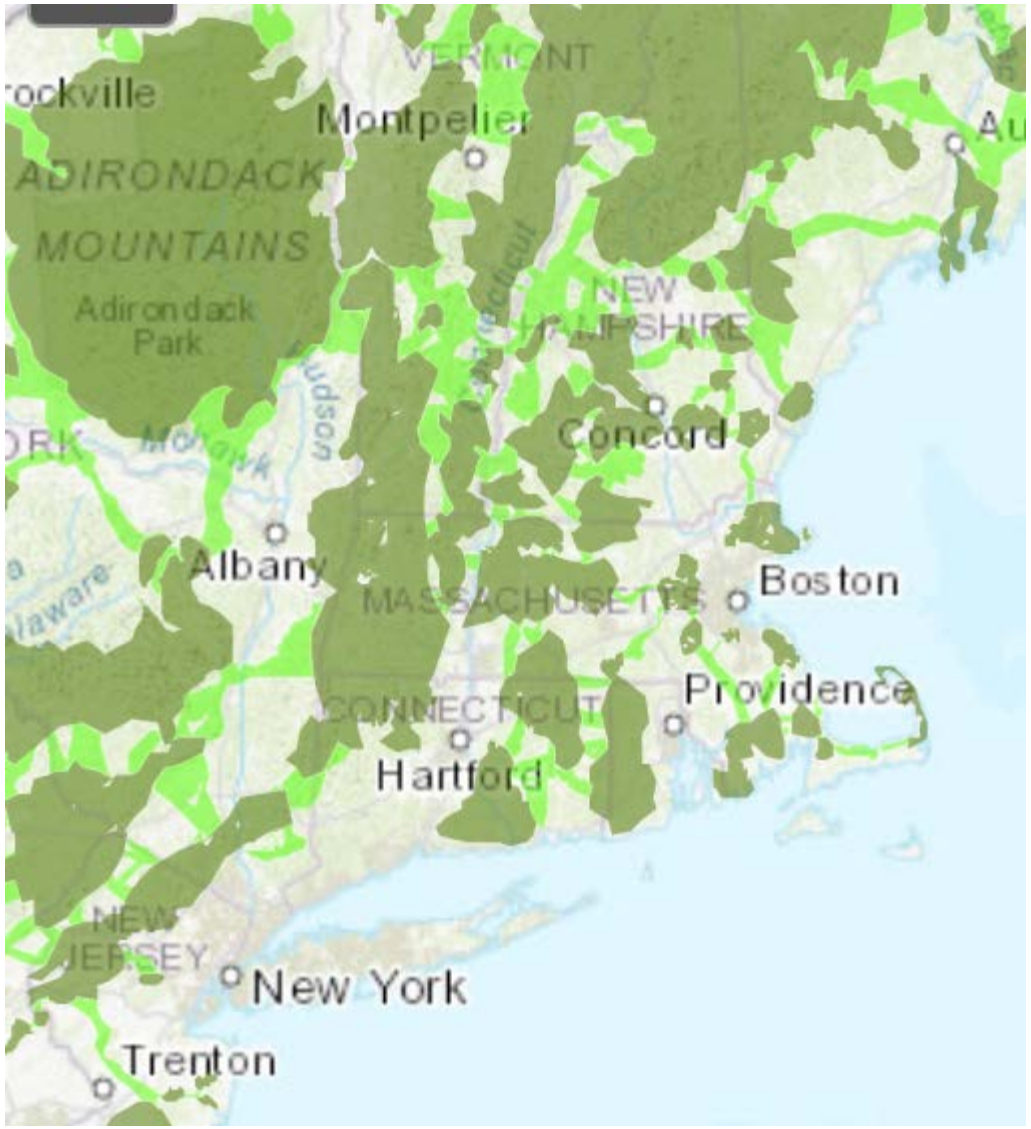
In a warming world, New England's trees are storing more carbon

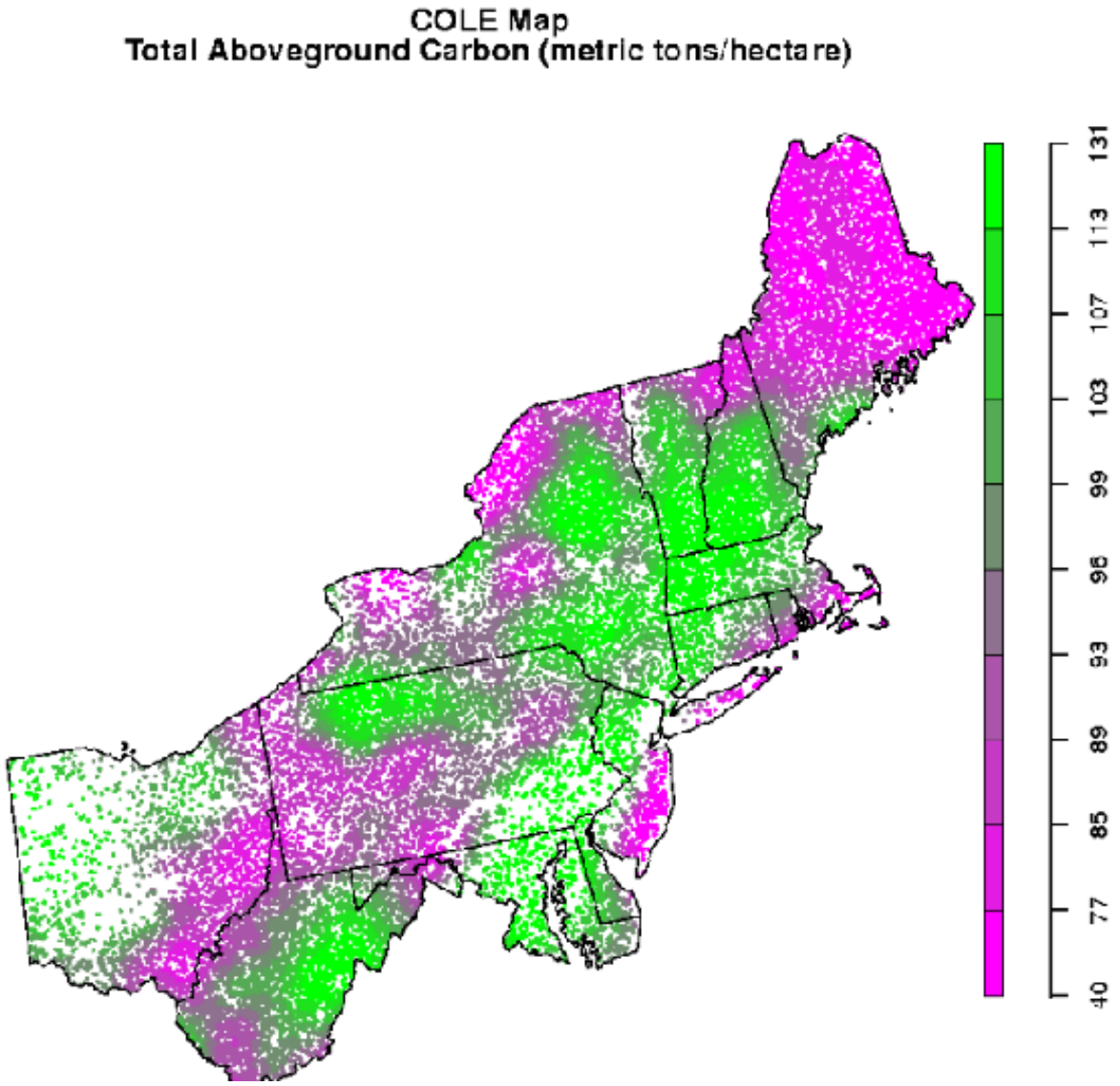
25-year study traced forest carbon through air, trees, soil and water

Wilderness areas halve the extinction risk of terrestrial biodiversity

Moreno Di Marco[1,2]*, Simon Ferrier[3], Tom D. Harwood[3], Andrew J. Hoskins[4] & James E. M. Watson[5,6]

Connecticut is a region with high stored carbon and critical for biodiversity and climate migration





Eastern Wildway, 2019

Local systems, resource use / reuse is multisolving

Equipment co-ops can expand products and access

WORKING LANDS – INVEST IN LOCAL:

Prioritize local farms with SNAP benefits ($2 for $1)

Support local farms and farmers in their *primary mission*.

Invest in local supply chains for money, jobs and resources.

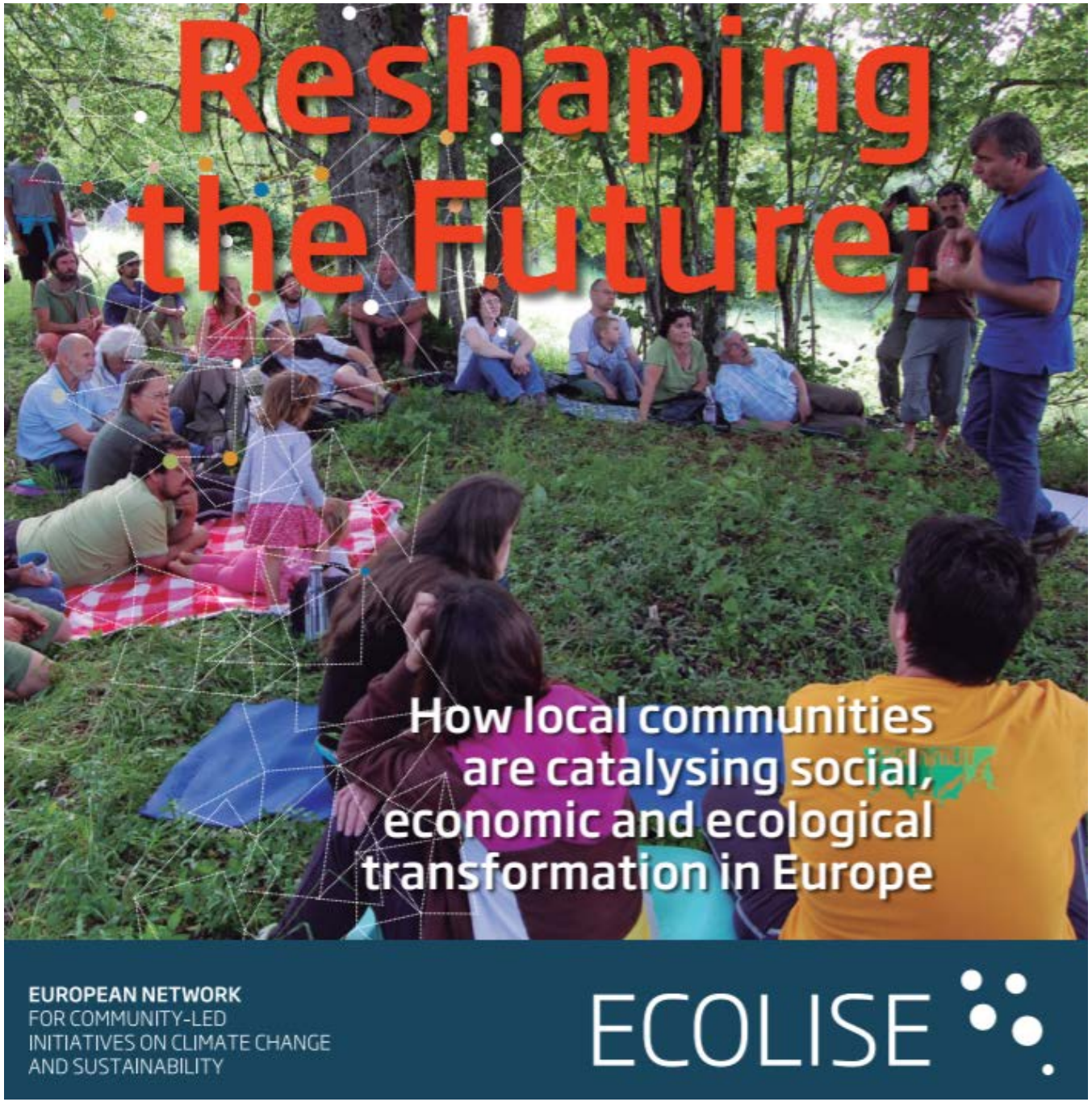
Natural land supports working land – we need BOTH, and a strategic balance among active management, monitoring and stewardship.

Community education and action leverages multisolving and is ***essential for change.***

An increased sense of ***fairness and compassion*** increases action on climate.

Demonstrate and quantify multiple benefits in pilot regions, centered on ***essentials***:

- *natural infrastructure*
- *clean water*
- *community resilience*



- **“Right relationships”** means with ourselves, each other and the planet.

“Our relationship with nature is broken.”

- Protecting nature ***and*** climate is urgent. Landscape-level strategic decisions can prioritize actions and improve equity and environmental justice.

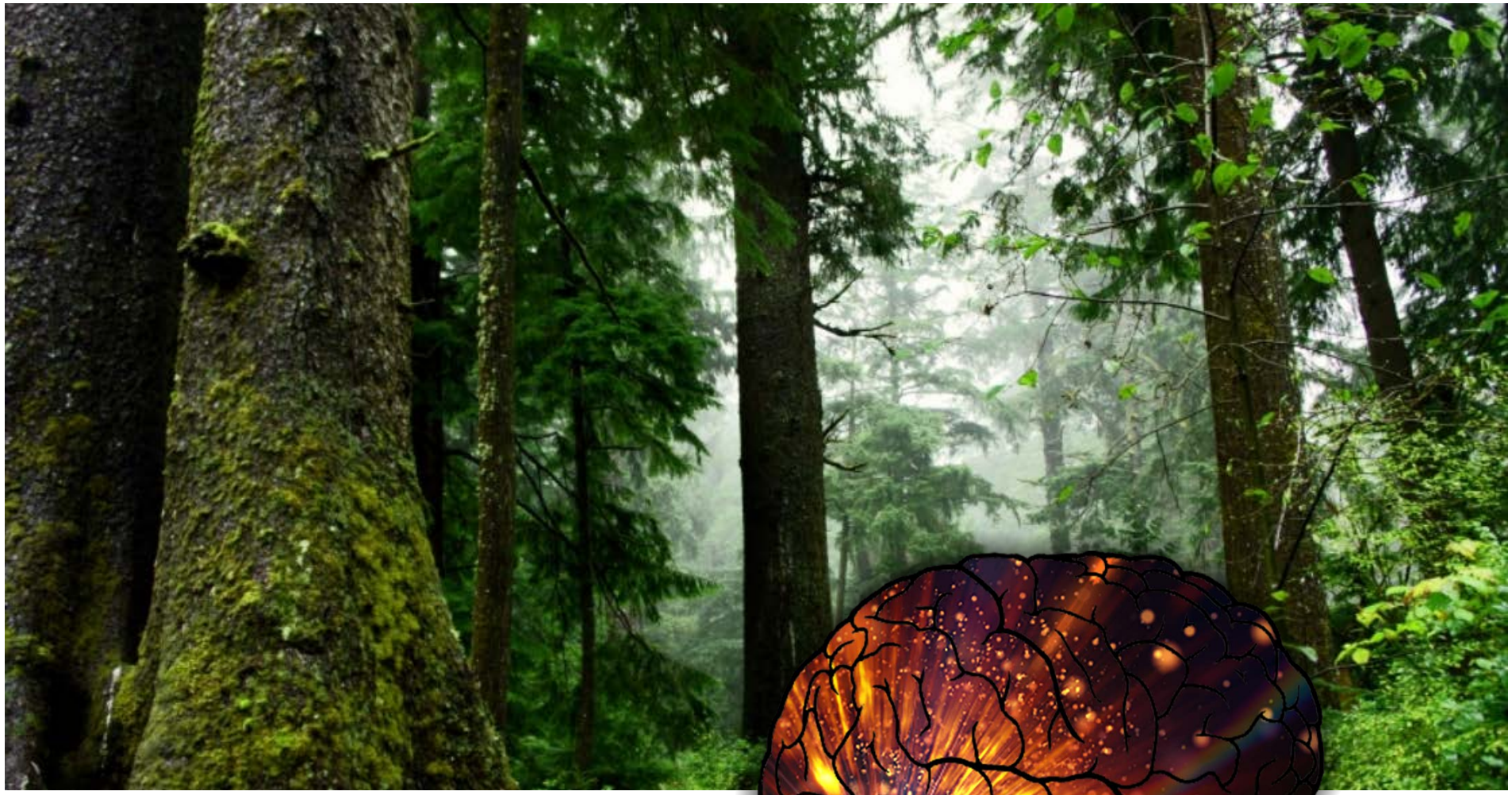
“Protect the best, restore the rest”

- Impacts on ecosystems, public health, community resilience and more . . .

Science-based policies can make CT a great state long into the future!

Our world is “**too dangerous for anything but truth** and **too small for anything but love.**”

William Sloane Coffin



Impacts and research/data gaps
Multisolving and community lifelines
Science and equity for a just and healthy future