

Climate Impacts in Connecticut and Adaptation Solutions

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CT Sea Grant/University of Connecticut

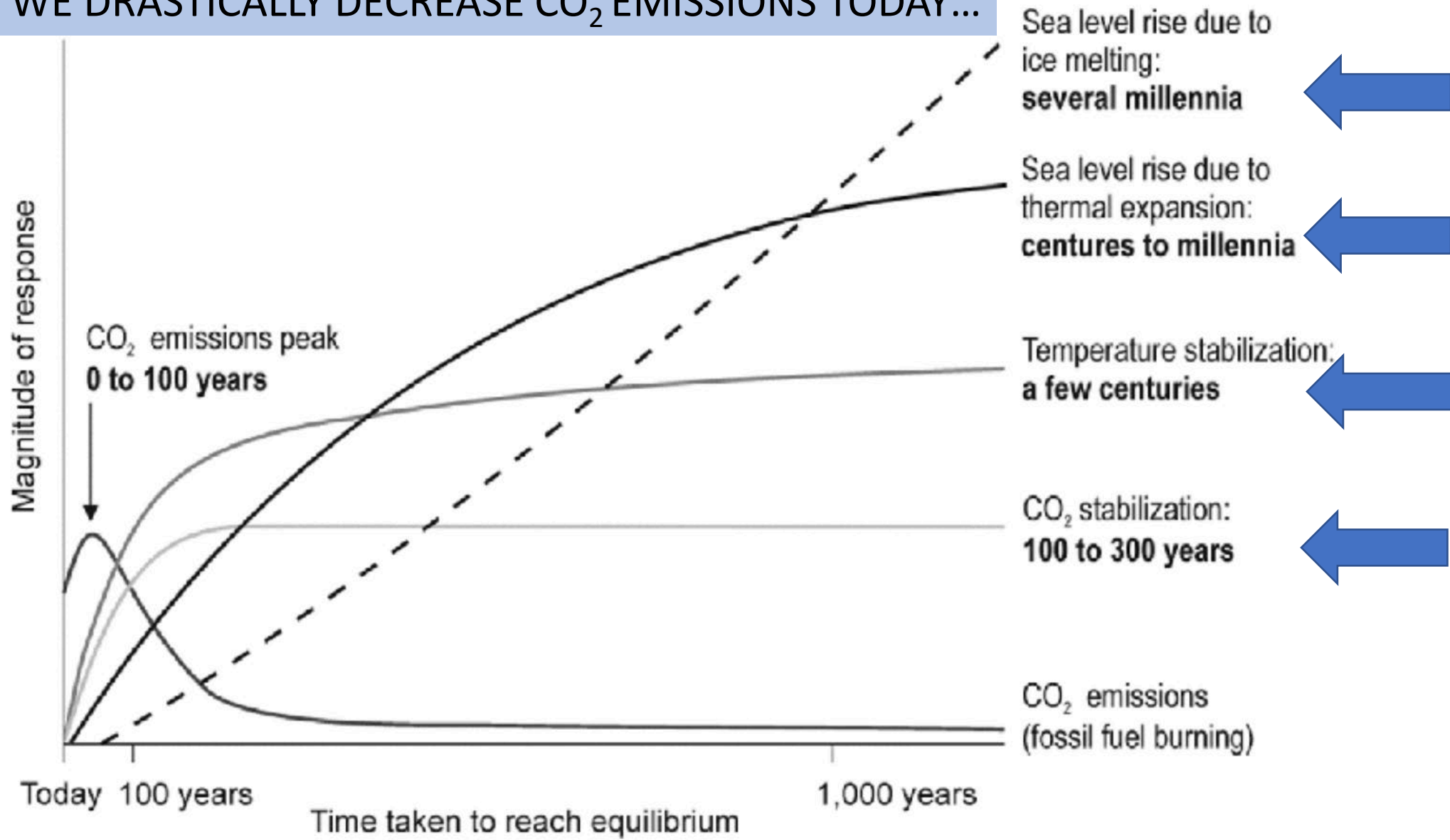
March 5, 2025



UConn
COLLEGE OF AGRICULTURE,
HEALTH AND NATURAL
RESOURCES

EXTENSION

EVEN IF WE DRASTICALLY DECREASE CO₂ EMISSIONS TODAY...



Continuing rise of CO₂ concentration, temperature, and sea level long after emissions have been reduced.
Adapted from: IPCC 2001 Climate Change Report [2]. Mander et al (2016)

Connecticut and Long Island Sound Climate Projections

- Sea level rise and flooding impacts
- Increased average annual air temperature/warmer water temperatures
- Temperature of Long Island Sound waters is increasing
- Intense precipitation events are increasing
- Increase in the frequency, intensity and duration of heat waves
- There is the potential for higher intensity storms like SuperStorm Sandy.
- Seasonal drought risk projected to increase in summer and fall
- Frost free season and growing season are longer.

Municipal Issues & Needs for Addressing Climate Adaptation in Superstorm Sandy impacted Communities (2015 - 2016)

- Flooding
 - Stormwater management/Extreme Precipitation events
 - Coastal Erosion
- Emergency Operations and Storm Events – how to better manage/communicate events
 - Post storm regulations and EA's/CT DEEP/ACOE
 - Policy/Planning/Zoning
 - Communications (climate challenges and adaptation actions)
 - Septic System Failure
- Environment
 - Human Health
 - Water Quantity and Quality



LISS SRC Extension Professionals conducted an information needs assessment in 2022

Stormwater and associated flooding was the primary environmental threat faced by communities region-wide.

- Sea level rise/coastal flooding
- Extreme weather and storms
- Water quality
- Coastal erosion
- Habitat loss and/or degradation
- Invasive species
- Tree loss
- Impacts from development



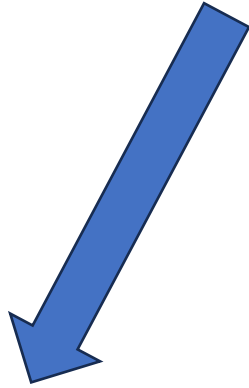
Flood damage to a road in Norfolk | Photo courtesy Norfolk Fire Department July 2023

The Future of Adaption and Resilience

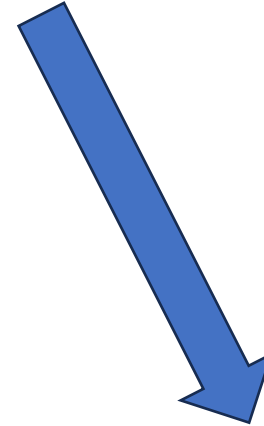
- Tremendous progress at the national, state, university, NGO, local levels
- Issue is not that work on adaptation and resilience is not happening – it is that the impacts are changing.
- As we refine climate projections, we need to think through what and how impacts will change beyond, for example, SLR reaching further inland.



ADAPTATION – to moderate harm or exploit beneficial opportunities

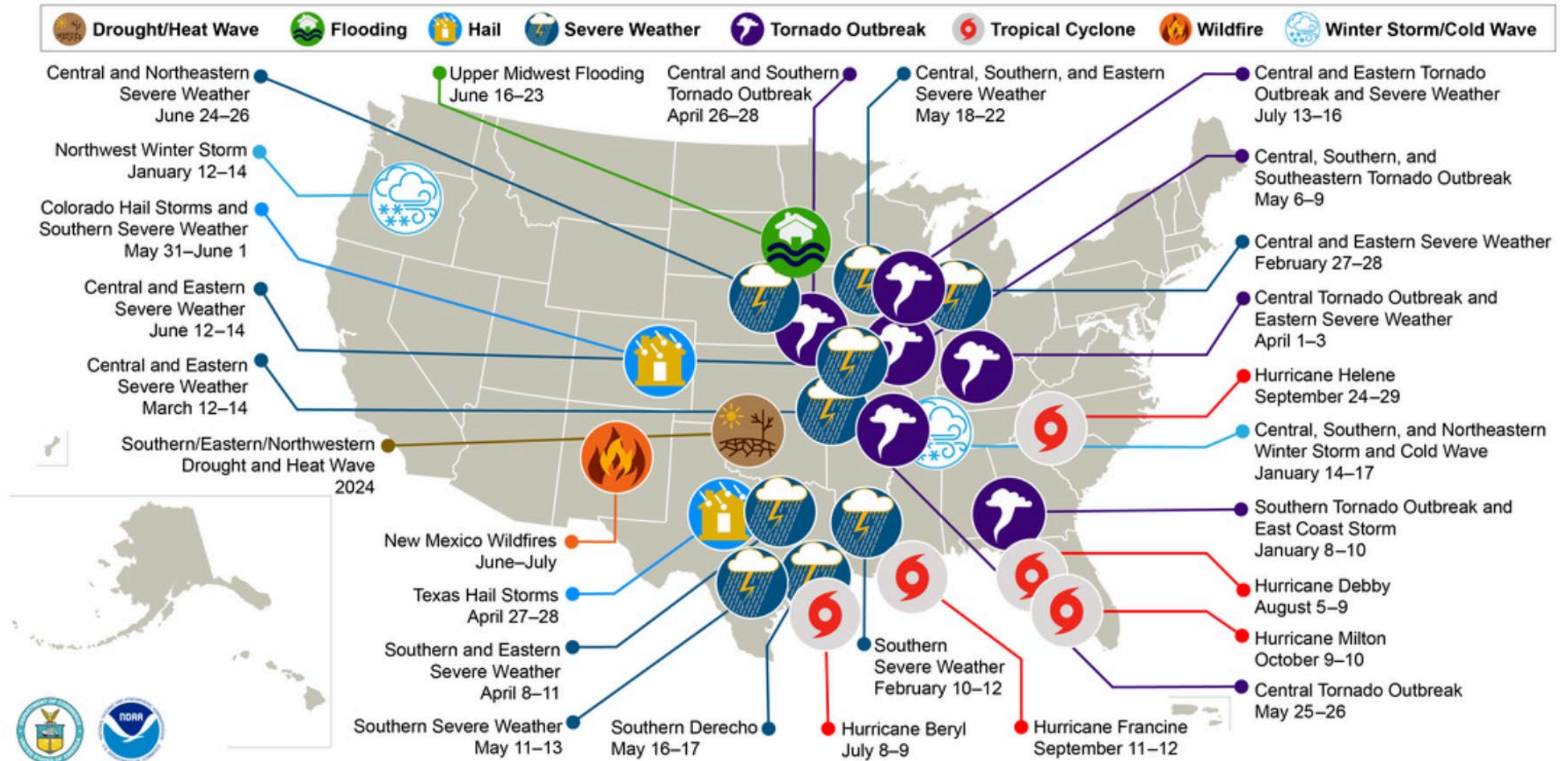


**Geographic scale:
Local and regional solutions**



**Time frame:
Short term and long-term solutions**

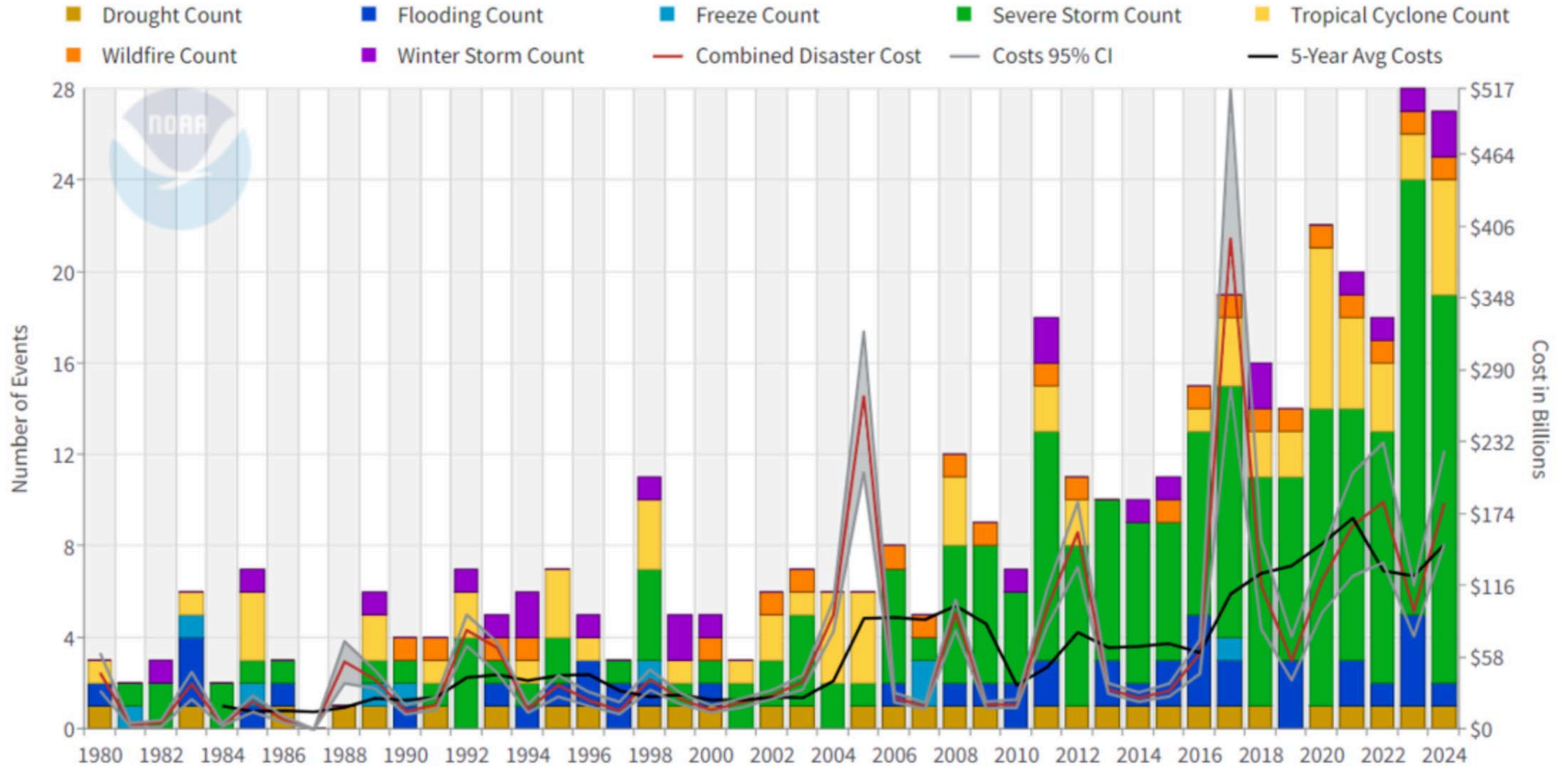
U.S. 2024 Billion-Dollar Weather and Climate Disasters



This map denotes the approximate location for each of the 27 separate billion-dollar weather and climate disasters that impacted the United States in 2024.

In 2024, the United States experienced 27 separate weather or climate disasters that each resulted in at least \$1 billion in damages. NOAA map by NCEI.

United States Billion-Dollar Disaster Events 1980-2024 (CPI-Adjusted)



The history of billion-dollar disasters in the United States each year from 1980 to 2024, showing event type (colors), frequency (left-hand vertical axis), and cost (right-hand vertical axis) adjusted for inflation to 2024 dollars. NOAA NCEI Billion-dollar Disasters [webpage](#).

Look at priorities in Connecticut



FLOODING – SEA LEVEL RISE



Connecticut SLR projections are 20 inches by 2050 (CIRCA)

FLOODING – SEA LEVEL RISE

Storm Surge and High Tides Magnify the Risks of Local Sea Level Rise

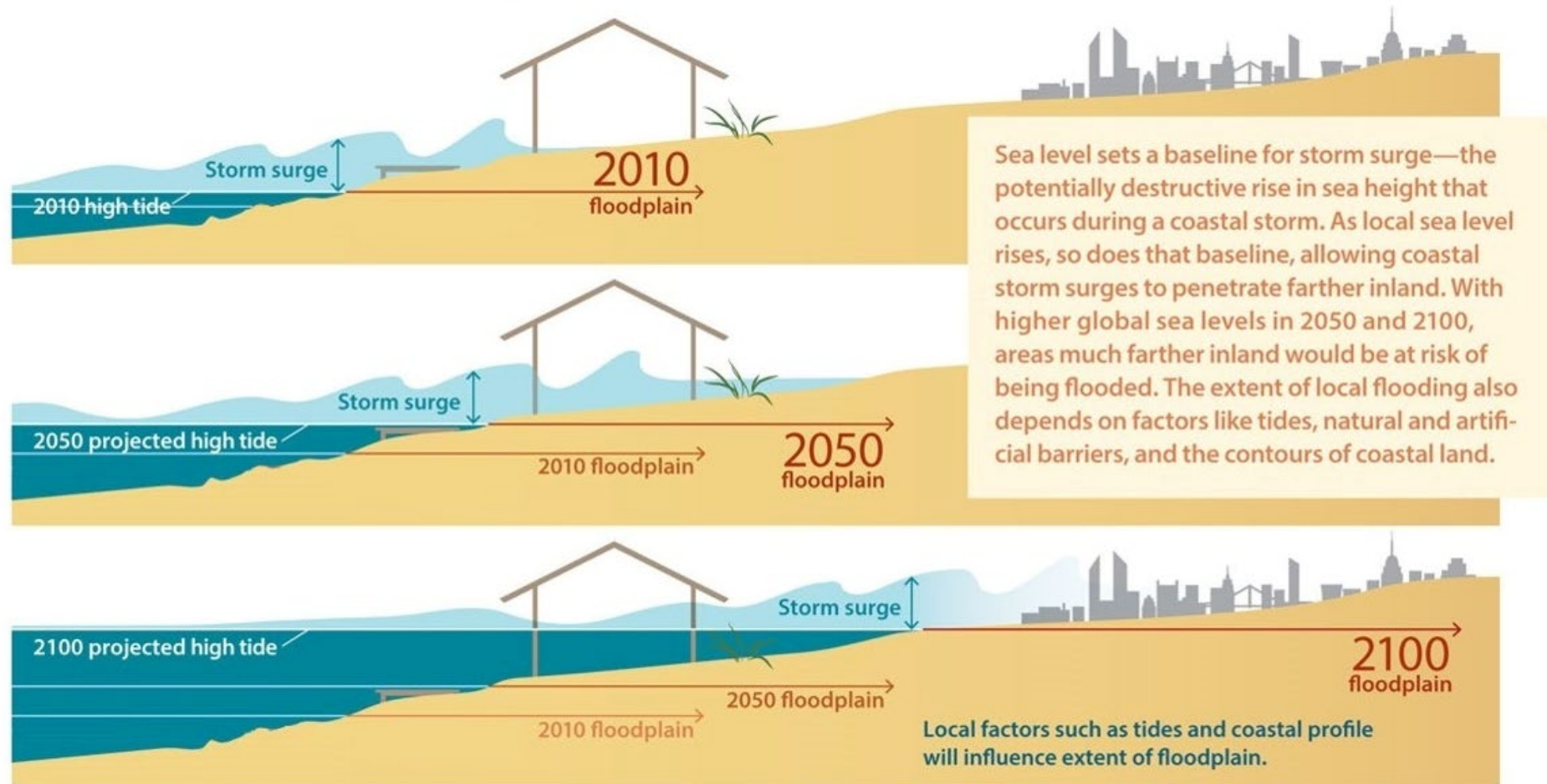


Image adapted from Union of Concerned Scientists 2013; www.ucsusa.org/sealevelrisescience



Dodge Paddock
/ Beal Preserve

Wall St

Google

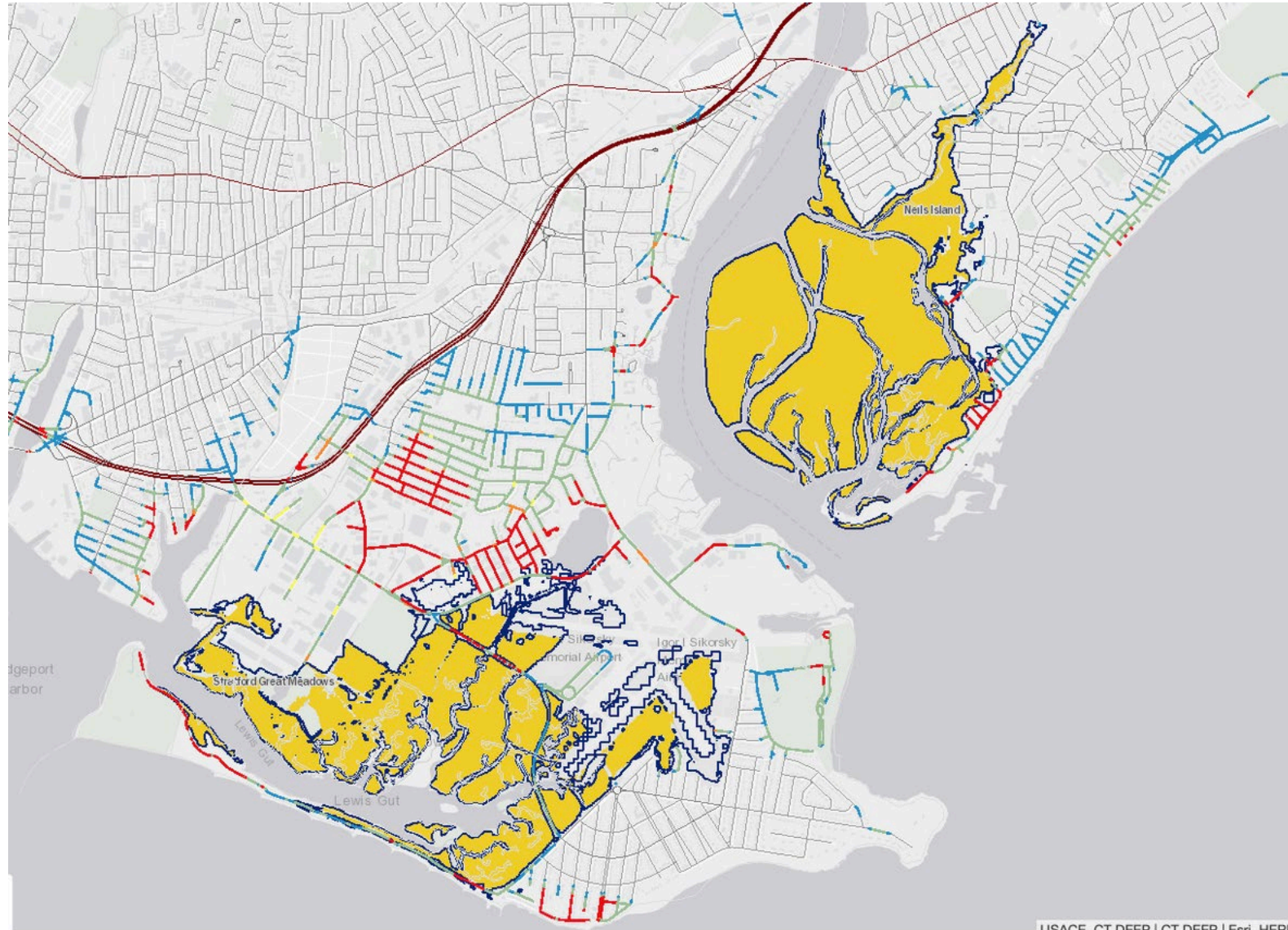


Dodge Paddock Beal Preserve, Marsh migration buffer project



NRCS soil sampling 2018

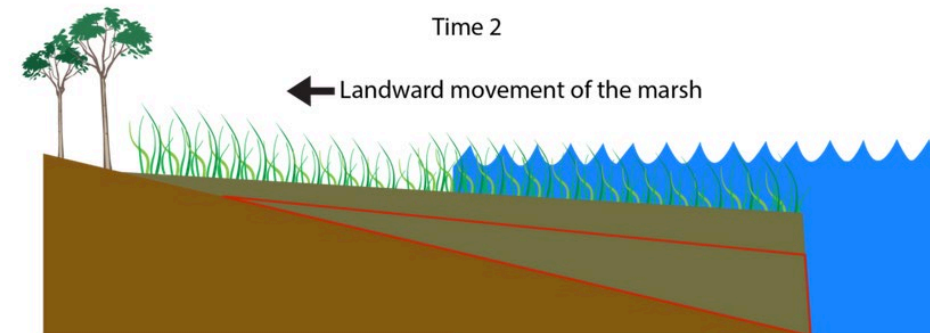
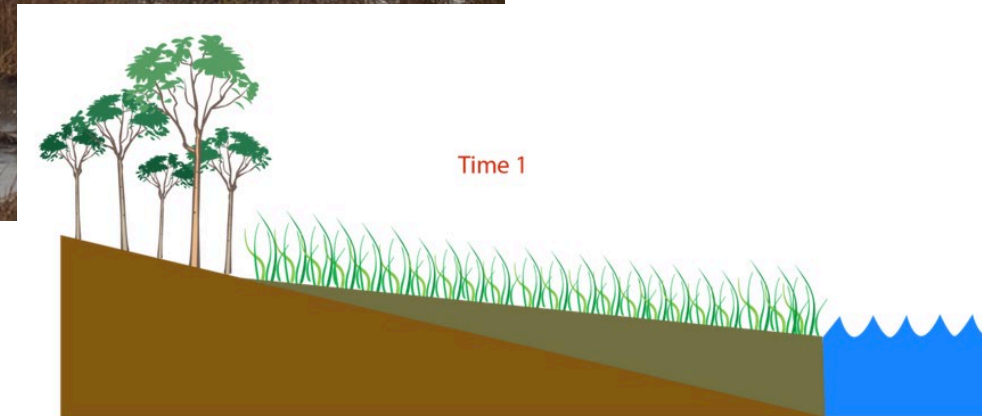
Many coastal wetlands are getting wetter.



Marsh migration



Thin layer deposition for tidal wetlands



Nuisance (sunny day) flooding occurring in many coastal areas during high tides.

In many locations along the U.S. coastline, nuisance flooding is now 300% to more than 900% more frequent than it was 50 years ago.



Do people who live in areas prone to flooding need a “new normal?” e.g., school bus routes, parking lots

FLOODING

U.S. News

90TH

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COMMENTARY

Fill, Build and Flood: Dangerous Development in Flood-Prone Areas

Building in areas vulnerable to flooding is a recipe for disaster, but communities can break the cycle.

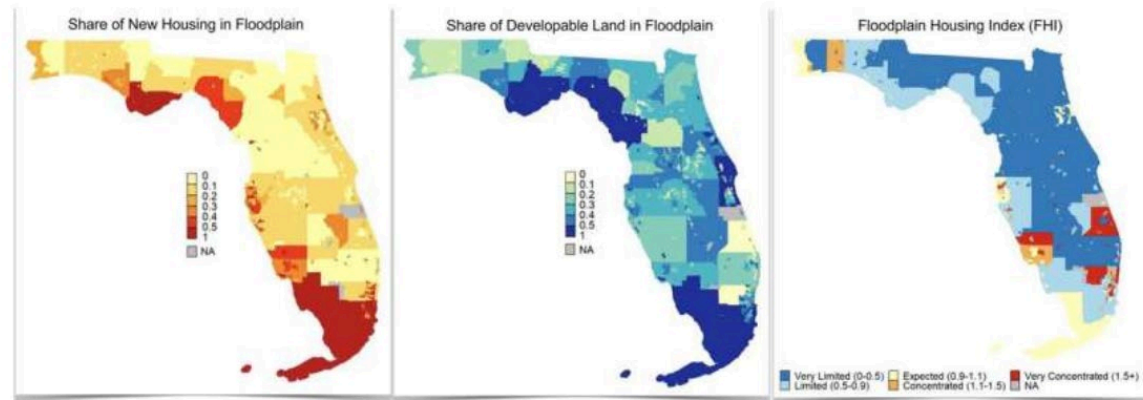
By Laurie Mazur Opinion Contributor Oct. 8, 2019, at 12:44 p.m.

SEPTEMBER 12, 2024

✓ Editors' notes

Over 2 million acres of floodplain development occurred in US in last two decades, study finds

by Rosenstiel School of Marine, Atmospheric, and Earth Science



FLOODING

Is this a sustainable future?



Are floating buildings the answer to sea level rise?

After two years and \$50 million the San Francisco Fireboat Department has opened floating Fire Station 35 for operations.



Coastal and Inland Erosion



So what can we do?

Beach nourishment

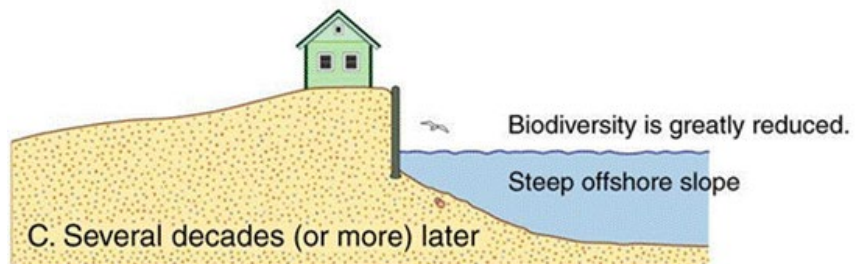
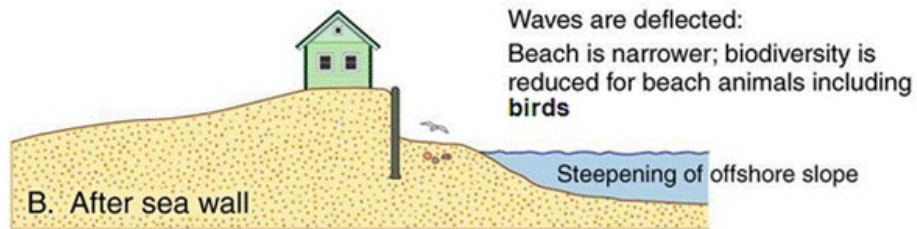
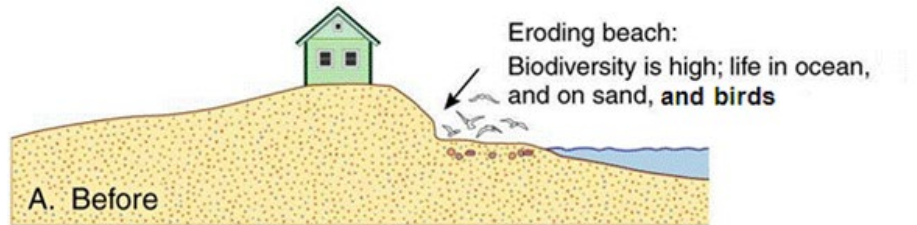


New Haven Register

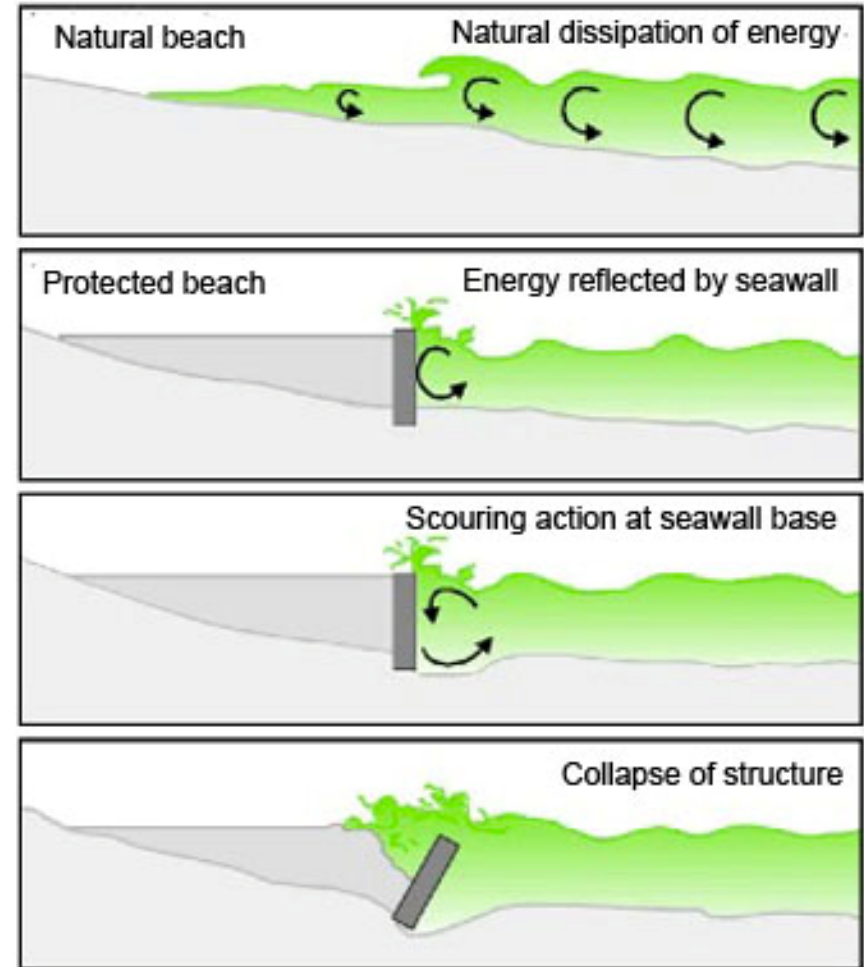
Engineered solutions (hard solutions)

- Sea walls, dikes, levees
- Hurricane/surge barriers





Source: Pilkey, O.H. and Dixon, K. L. 1996
(modified) *The Corps and the Shore*. Island Press, Washington, D.C.





Environmentally Friendly Seawalls

A Guide to Improving the Environmental Value of
Seawalls and Seawall-lined Foreshores in Estuaries

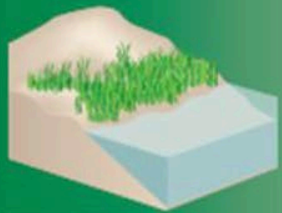
Natural and Nature Based Features

GREEN - SOFTER TECHNIQUES

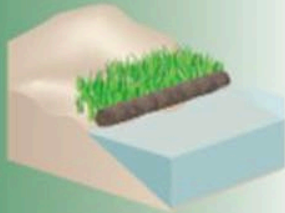
GRAY - HARDER TECHNIQUES

Living Shorelines

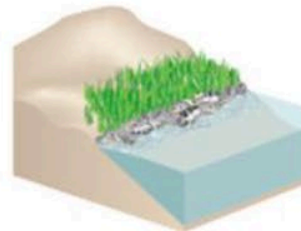
Coastal Structures



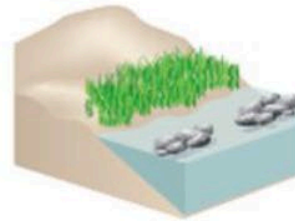
VEGETATION ONLY -
Provides a buffer to upland areas and breaks small waves. Suitable for low wave energy environments.



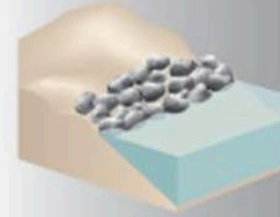
EDGING -
Added structure holds the toe of existing or vegetated slope in place. Suitable for most areas except high wave energy environments.



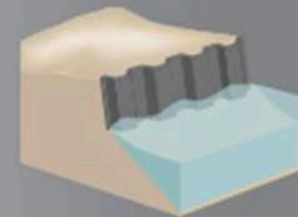
SILLS -
Parallel to vegetated shoreline, reduces wave energy, and prevents erosion. Suitable for most areas except high wave energy environments.



BREAKWATER -
(vegetation optional) - Offshore structures intended to break waves, reducing the force of wave action, and encourage sediment accretion. Suitable for most areas.



REVETMENT -
Lays over the slope of the shoreline and protects it from erosion and waves. Suitable for sites with existing hardened shoreline structures.



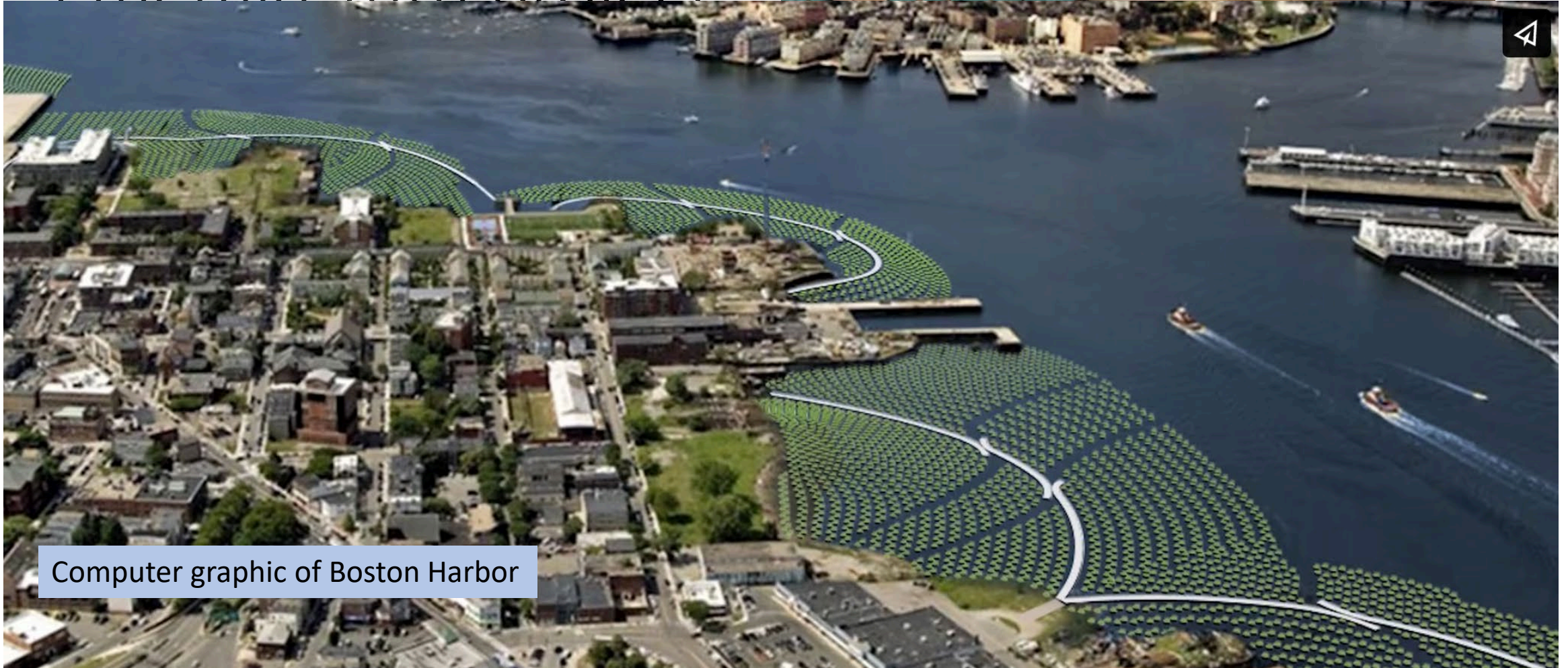
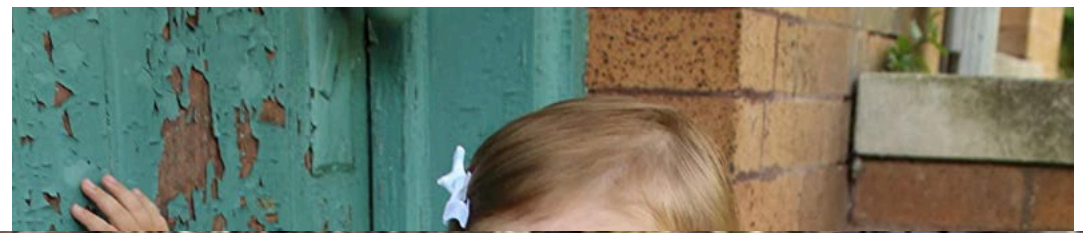
BULKHEAD -
Vertical wall parallel to the shoreline intended to hold soil in place. Suitable for high energy settings and sites with existing hard shoreline structures.

Source: This continuum is based on the more detailed continuum in the Systems Approach to Geomorphic Engineering (SAGE) Natural and Structural Measures for Shoreline Stabilization brochure (SAGE 2015).

Natural and Hybrid Living Shorelines



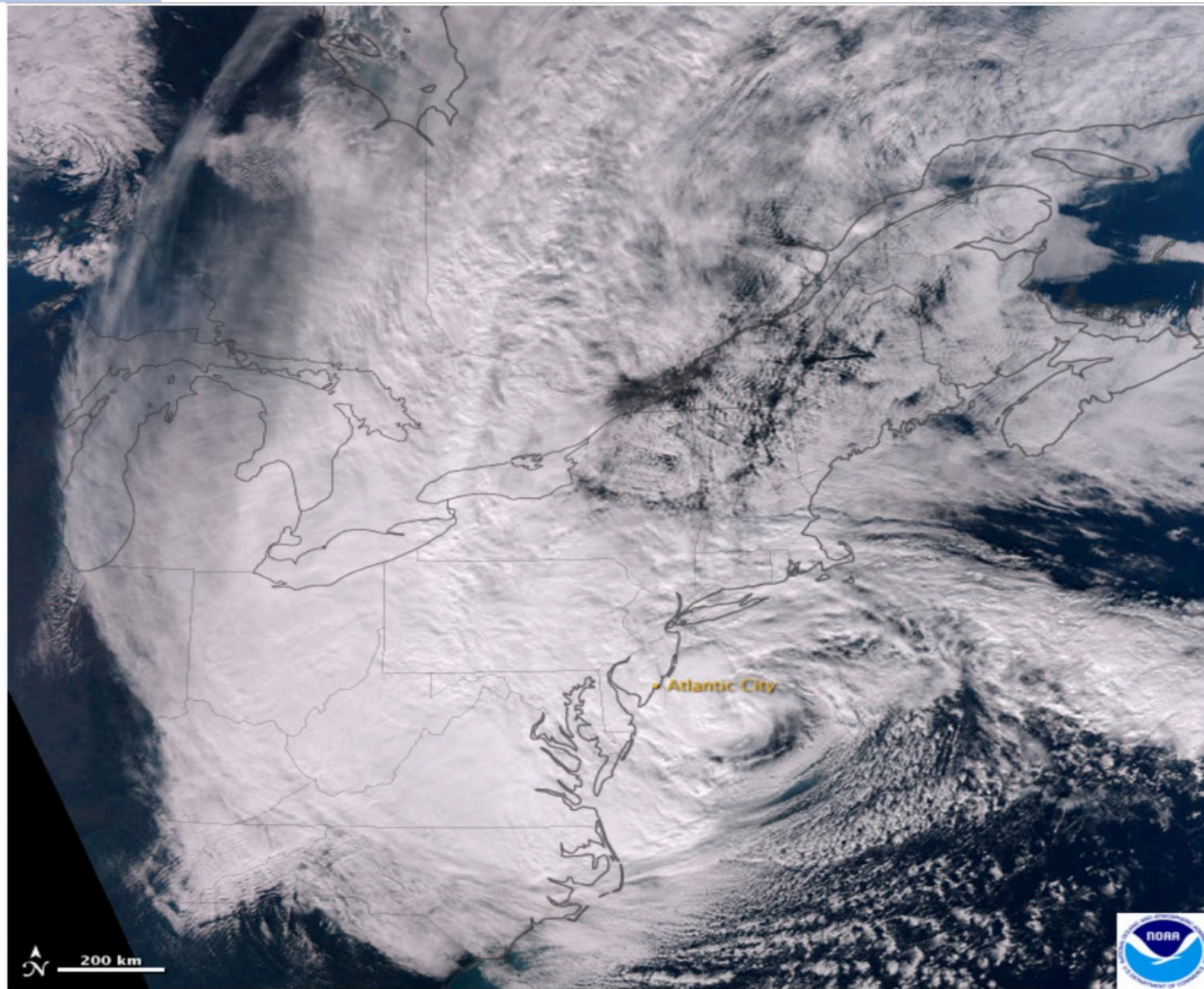
Emerald Tutu project



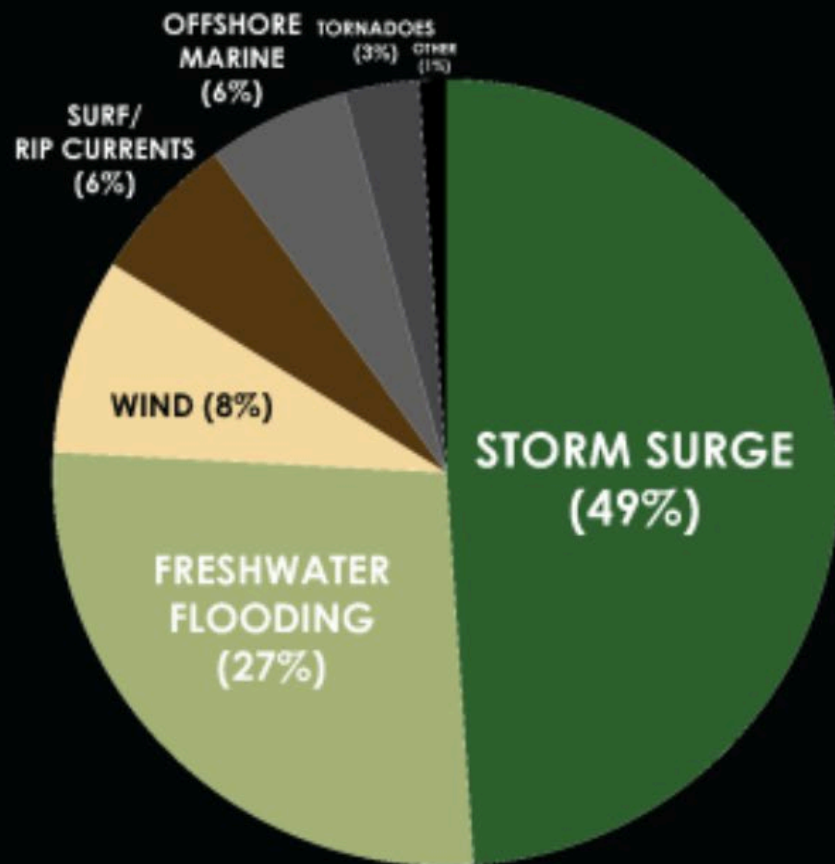
Computer graphic of Boston Harbor



MAJOR STORM EVENTS



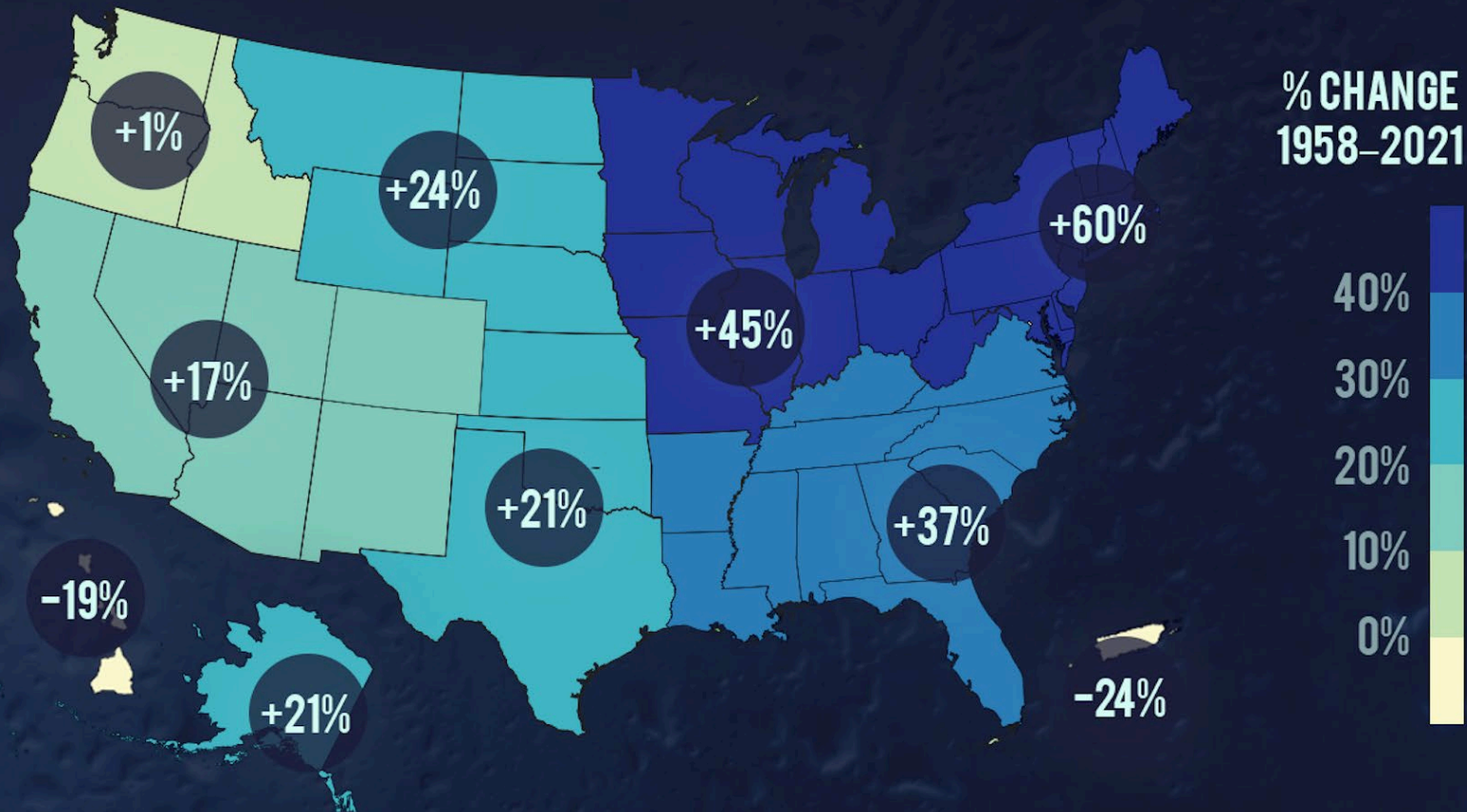
Direct Deaths from U.S. Tropical Cyclones



1963-2012

HEAVIER DOWNPOURS

Change in precipitation on heaviest 1% of days



Change in total precipitation falling on the heaviest 1% of days, 1958–2021.
Source: USGCRP, 2023: Fifth National Climate Assessment.

STORMWATER FLOODING

Storm totals as of 5pm #abc7ny



5:08 PM · Sep 29, 2023 · 6,111 Views



STORMWATER FLOODING

Road washouts July 17, 2023



Stormwater management and vegetated buffers along wetlands and streams



Vegetated buffer strips are an efficient barrier against waterway pollution. Photo: Bengt Oberger Attribution-ShareAlike 4.0 International (CC BY-SA 4.0)

Seasonal drought risk projected to increase in summer and fall

U.S. Drought Monitor

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[Maps](#)

[Data](#)

[Summary](#)

[About](#)

[Conditions & Outlooks](#)

[Ag in Drought](#)

[En Español](#)

[NADM](#)

Firefighters continue to battle brush fires across Connecticut

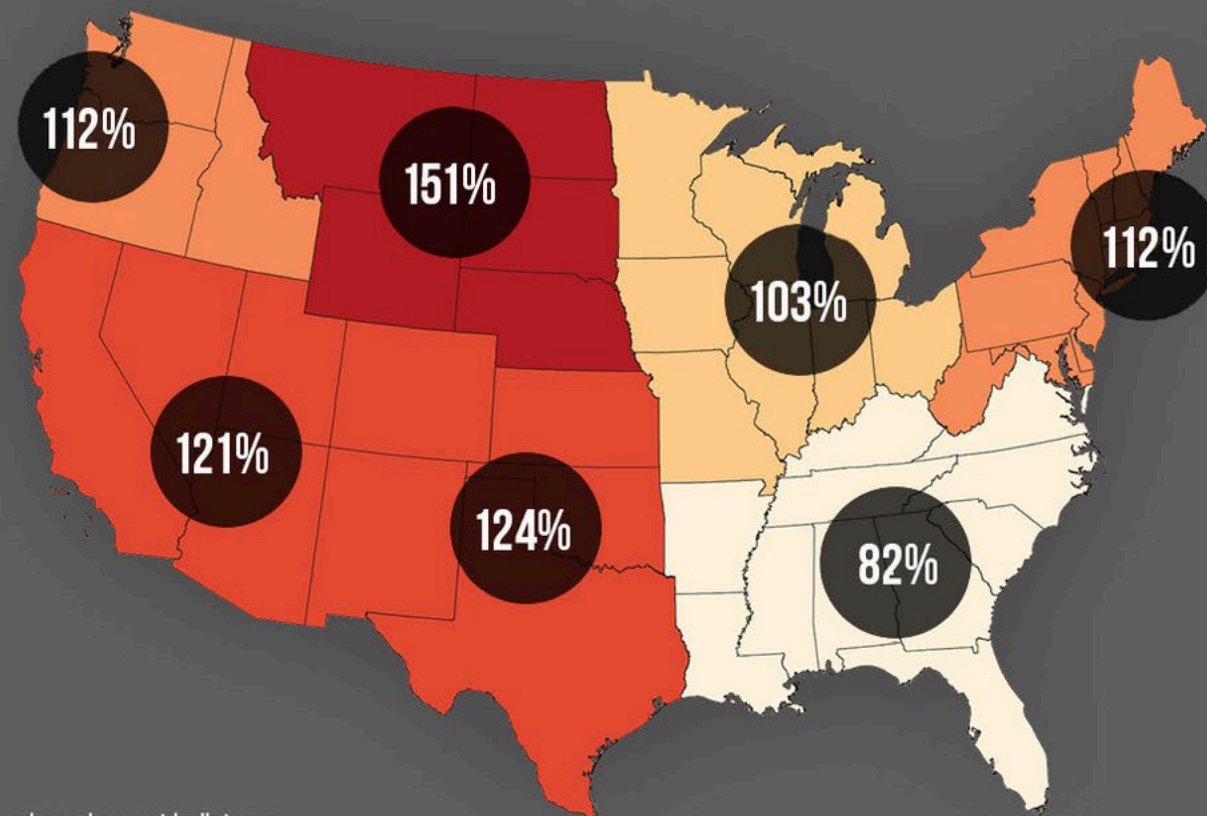
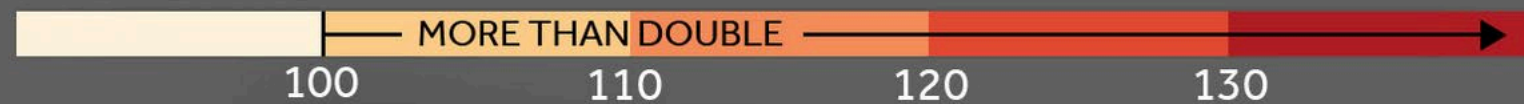
By **Jennifer Joas** • Published November 18, 2024 • Updated on November 18, 2024 at

11:24 pm



HIGH HUMID HEAT DAYS

% INCREASE



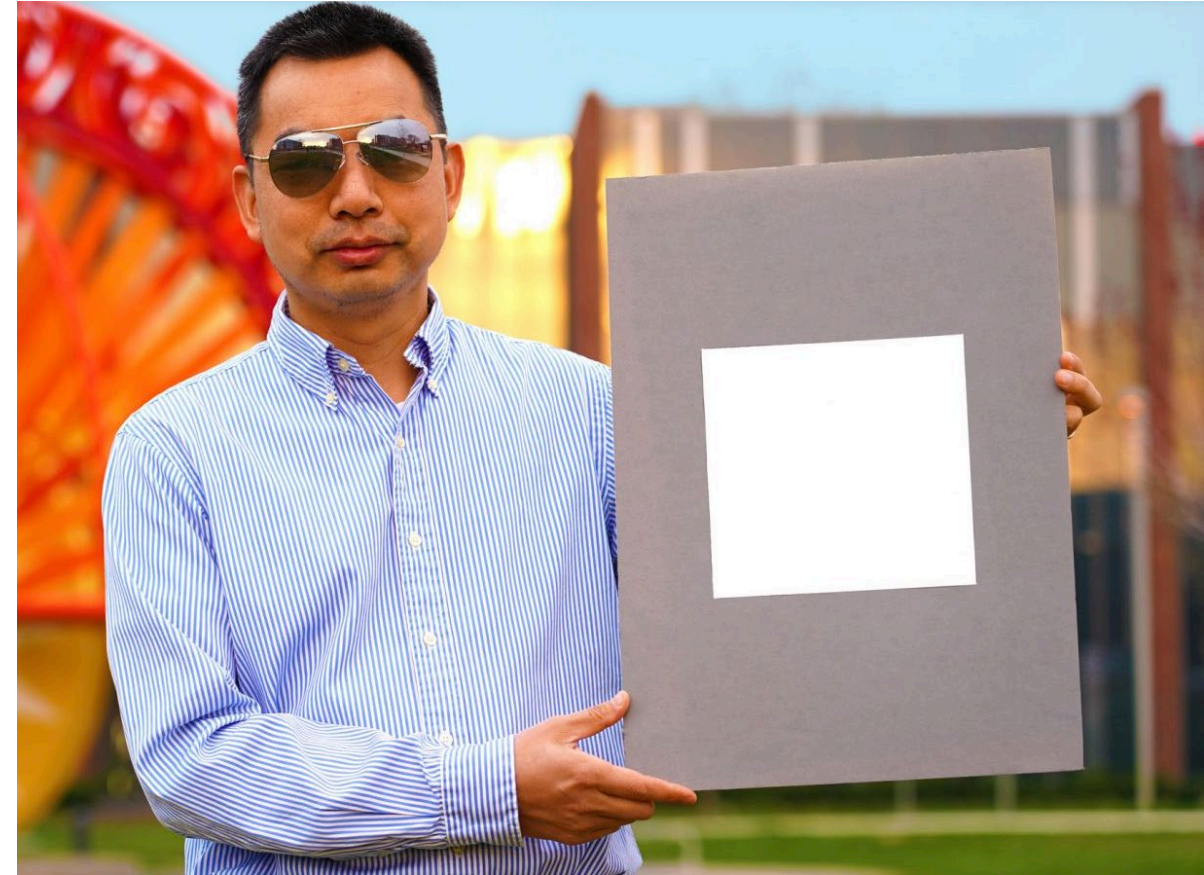
Humid heat days based on wet bulb temp.
% change measures frequency of 95th percentile in 1980-1999 vs. in 2000-2019.
Source: Raymond et al. (2020)

KEY CONCEPTS

- Heat is the **deadliest** form of extreme weather, and it's especially dangerous with high humidity. Recent **research** from Columbia University shows that humid heat extremes are becoming more frequent.
- The researchers later analyzed the most extreme (top 5% of) days by U.S. location, based on wet bulb temperatures. In most places, these humid heat extremes doubled in frequency from 1980-1999 to 2000-2019.
- Disproportionate impacts fall on **senior citizens** and **communities of color**, as well as outdoor workers in **agriculture** and **the military**. Continued climate change would lead to **declines in labor productivity**, while worsening social and economic inequities.

Whitest paint on record

- Researchers at Purdue University have developed an "ultra-white" paint that **reflects 98% of sunlight and deflects infrared heat**, allowing buildings to cool below the surrounding air temperature.
- The paint, which the university describes as the "whitest paint on record", owes its cooling power to barium sulphate – a pigment derived from the mineral barite.



Two researchers at the University of Notre Dame in collaboration with South Korea's Kyung Hee University recently utilized quantum computing to help develop a new transparent window coating capable of blocking solar heat.

The transparent radiative cooler (TRC) layer, only permits external visible light through that doesn't raise indoor temperatures, thus cutting buildings' cooling costs by as much as a third of current rates.

Scientists use quantum computing to create glass that cuts the need for AC by a third



Other human health issues



Press Releases



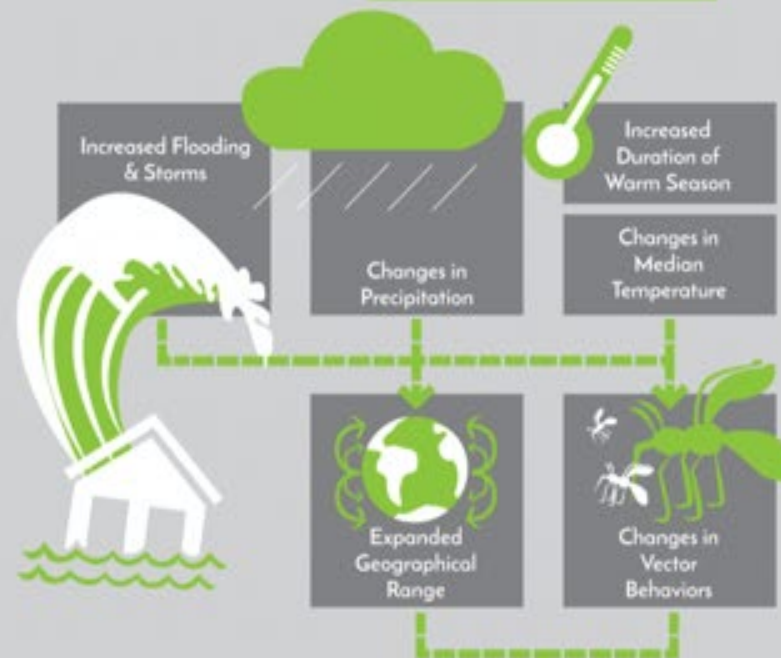
News Release
Department of Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106

06/28/2017

DEEP and CAES Discover an Established Population of Lone Star Ticks Along Coastal Connecticut

HOW CLIMATE CHANGE AFFECTS YOUR HEALTH

VECTOR-BORNE DISEASES



42,000 CASES OF WEST NILE VIRUS
in the U.S. since 1999,
of which
more than 1,700
people have died¹

ABOUT 68%
of California will have
increased probability for
West Nile virus by 2050²

As temperature rises,
the range of
TICKS CARRYING LYME DISEASE
will expand³

Incidences of
LYME DISEASE DOUBLED
from 1991 to 2013⁴

Increased Cases
of Vector-Borne
Diseases such as,
Lyme Disease,
Malaria, Zika
Virus, and West
Nile Virus

1. <http://www.cdc.gov/presidentspeeches/2014/04/20140420.html>
2. <http://www.cdpr.ca.gov/Programs/OPA/Pages/NR140001.aspx>
3. <http://www.epa.gov/climatechange/effects/health/03-01-2014.html>
4. <http://www.cdc.gov/nczod/cd/diseases/zika-virus/2016-s01-01-2016.html>

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Ghosts of the Coast

🤍 35

Add to my lists

GOAL:

Document the formation of ghost forests.

TASK:

Record ghost forest observations through Survey123 form.

WHERE:

[View map...](#)

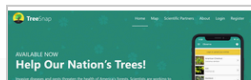
DESCRIPTION:

The formation of ghost forests in response to sea level rise, land subsidence, and saltwater intrusion is a striking visual indicator of climate change. Ghost forests are characterized by lingering stands of dead trees that were recently killed by salt stress. Ghost forests can form in any type of forest, but the formation of ghost forests in the maritime forests of the Mid-Atlantic sea level rise hotspot has been rapid and conspicuous.

We are engaging citizen scientists to help document the formation of ghost forests at a larger scale. The goal of this initiative is to raise awareness about the pace of change in coastal landscapes, while also collecting data that can inform ghost forest research.

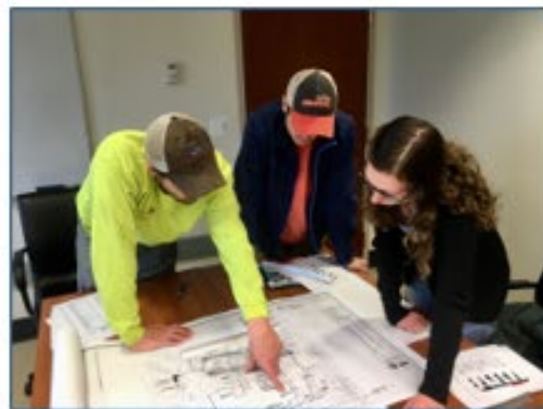
Help us document ghost forest formation! Your recorded observations will populate a public collaborative ghost forest map as part of a larger ghost forest website.

Projects You May Like



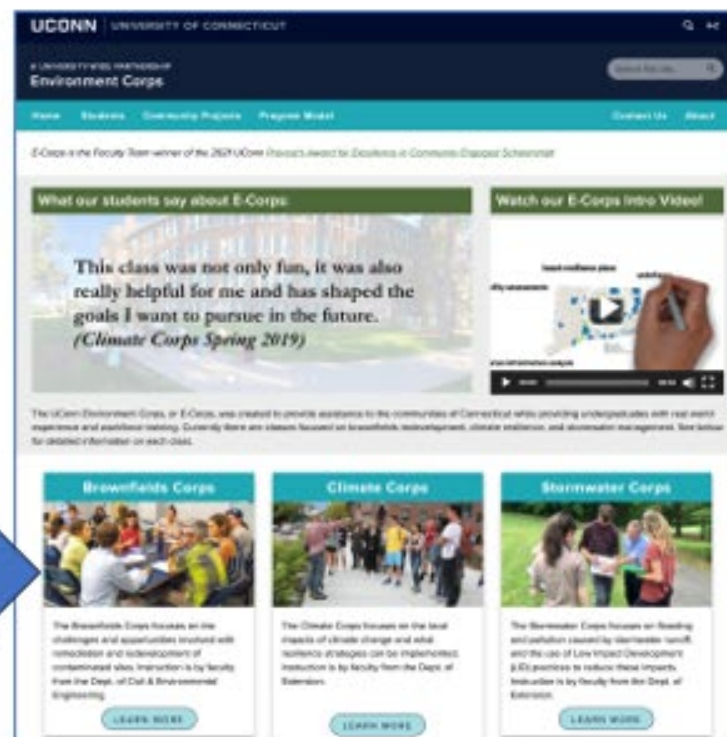
TreeSnap

EDUCATING THE NEXT GENERATION



The UConn Climate Corps has been operating since AY 2017-18. Students have completed 38 projects in cooperation with 29 CT towns and nonprofits.

E-Corps has enrolled over 500 students, who have completed 140 local projects.



A photograph of a forest floor in autumn. The ground is covered with a thick layer of dry, brown leaves. Several large, weathered logs are scattered across the scene. In the center, a small, young pine tree with green needles and a small, developing cone is growing out of the leaf litter.

QUESTIONS OR COMMENTS?

**"The true meaning
of life is to plant
trees, under whose
shade you do not
expect to sit."**

- Nelson Henderson

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