

Community-Scale Climate Resilience

Jeff Hicks, CEO
FernLeaf Interactive

Jim Fox, Director
UNC Asheville's NEMAC



Public-Private Partnership for Resilience Solutions

Accelerating adaptation + maximizing resilience



Private solutions firm

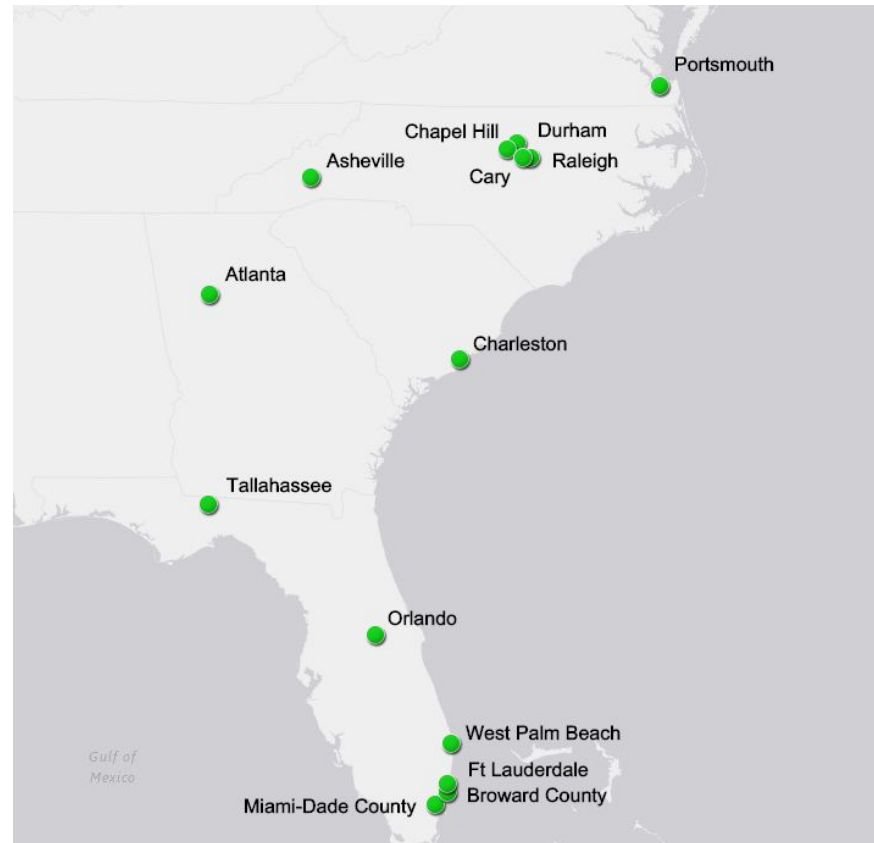
Analysis and tools



Applied research center

Decision support

Where we're active

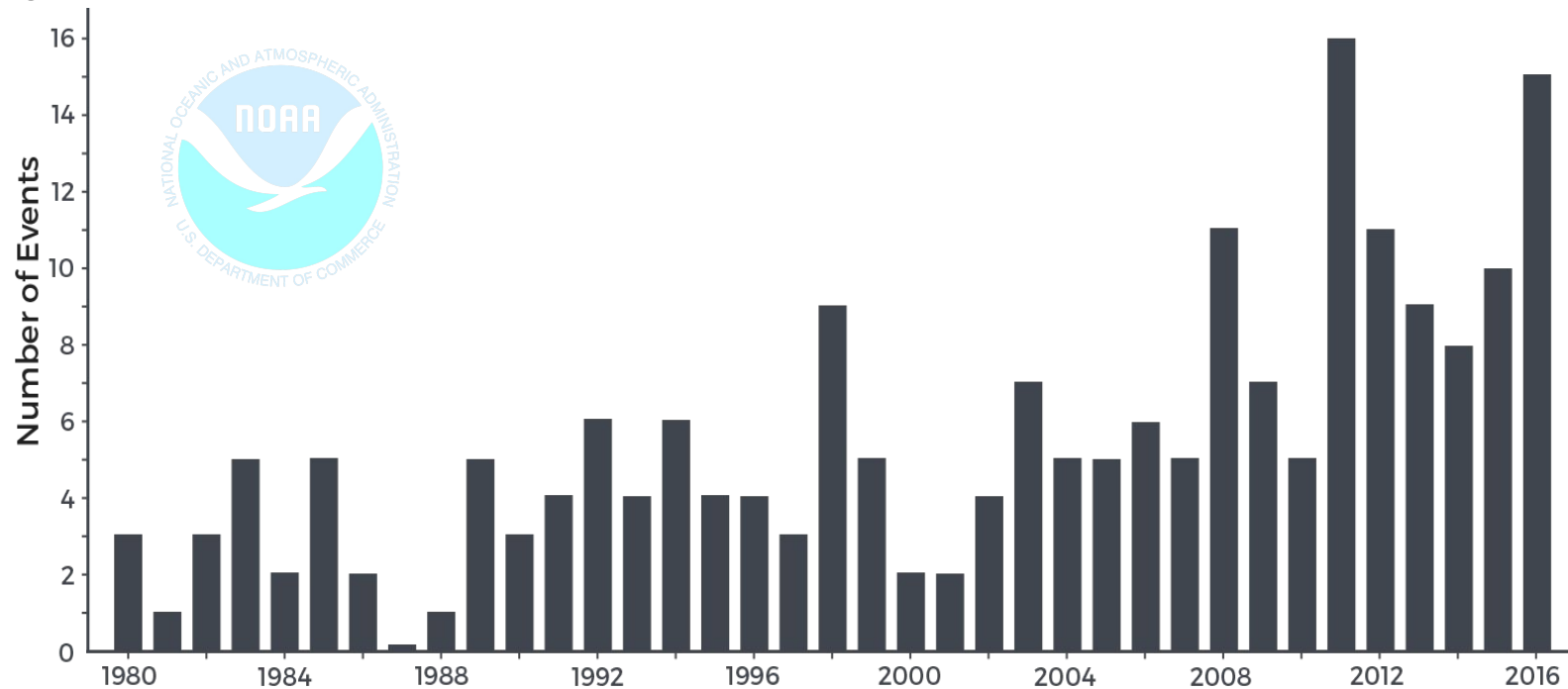


Changes in wildfire, flooding, climate, energy, population, economy, and other realities are stressing our communities, landscapes, and livelihoods.

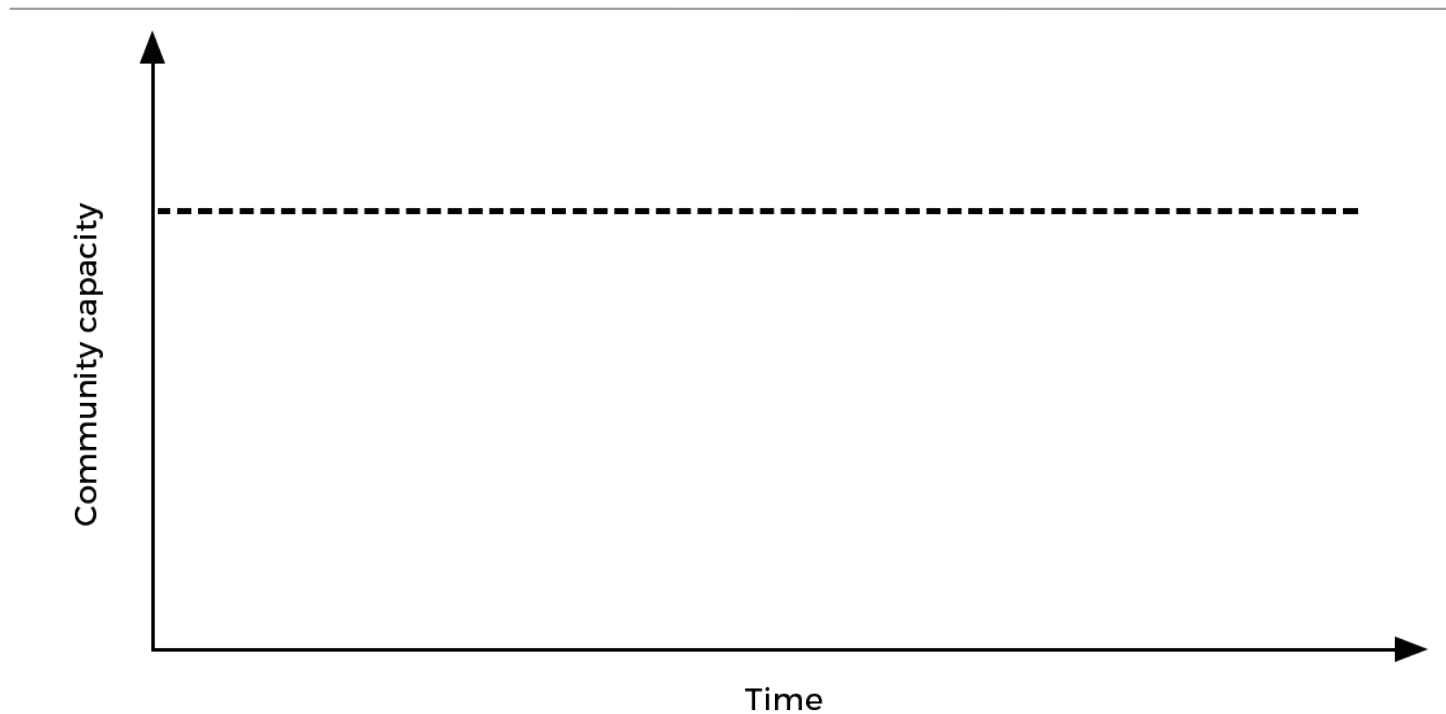


Billion-dollar disaster events per year

Our risk is increasing, and we must own this problem at a local scale.

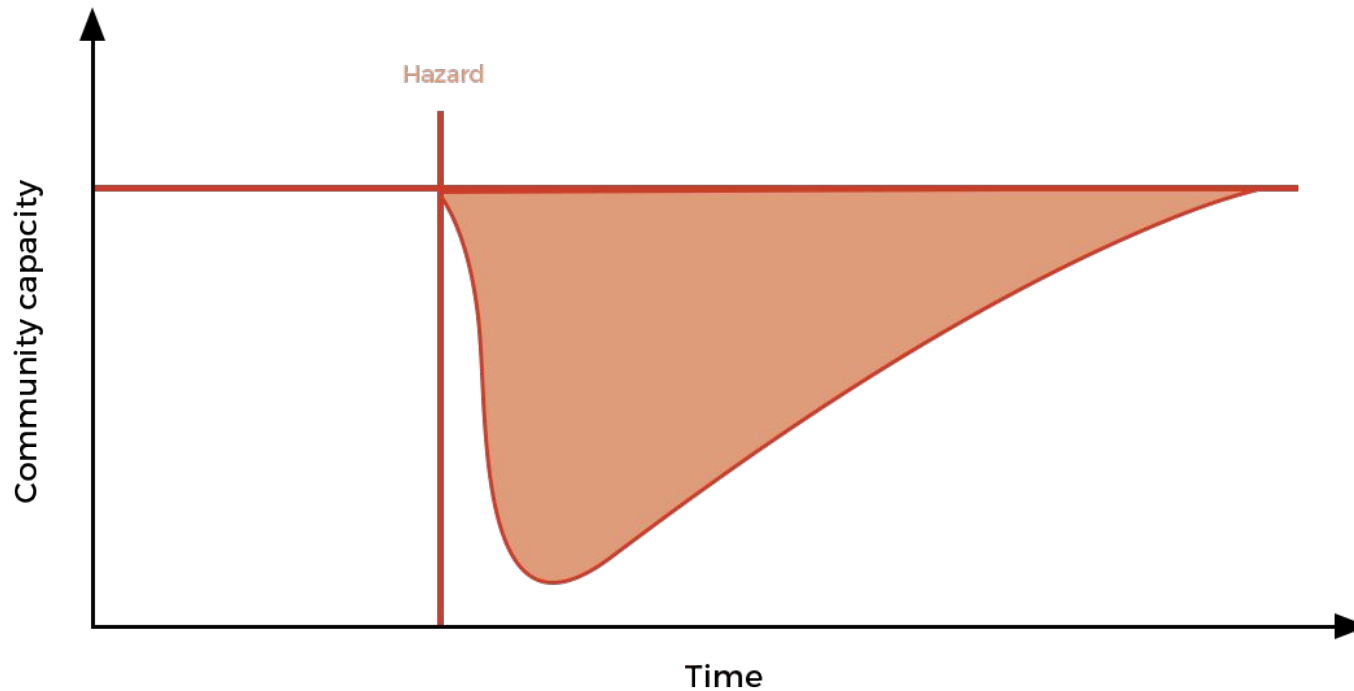


What is resilience?



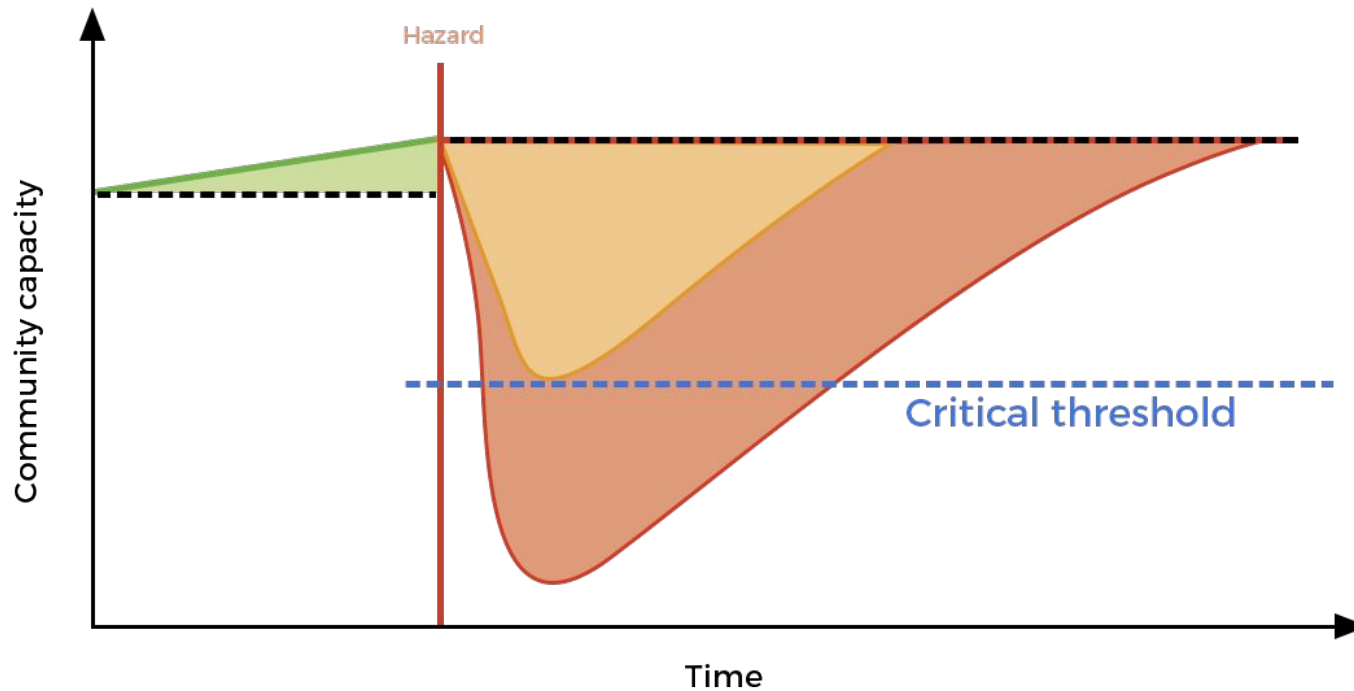
Modified from Resilience Loss Recovery Curve, Source: White et al. (2015), p. 203, Adapted from model derived by M.E. Hynes, b. Ross and CARRI (2008), presented at the DHS University Summit, Washington, DC

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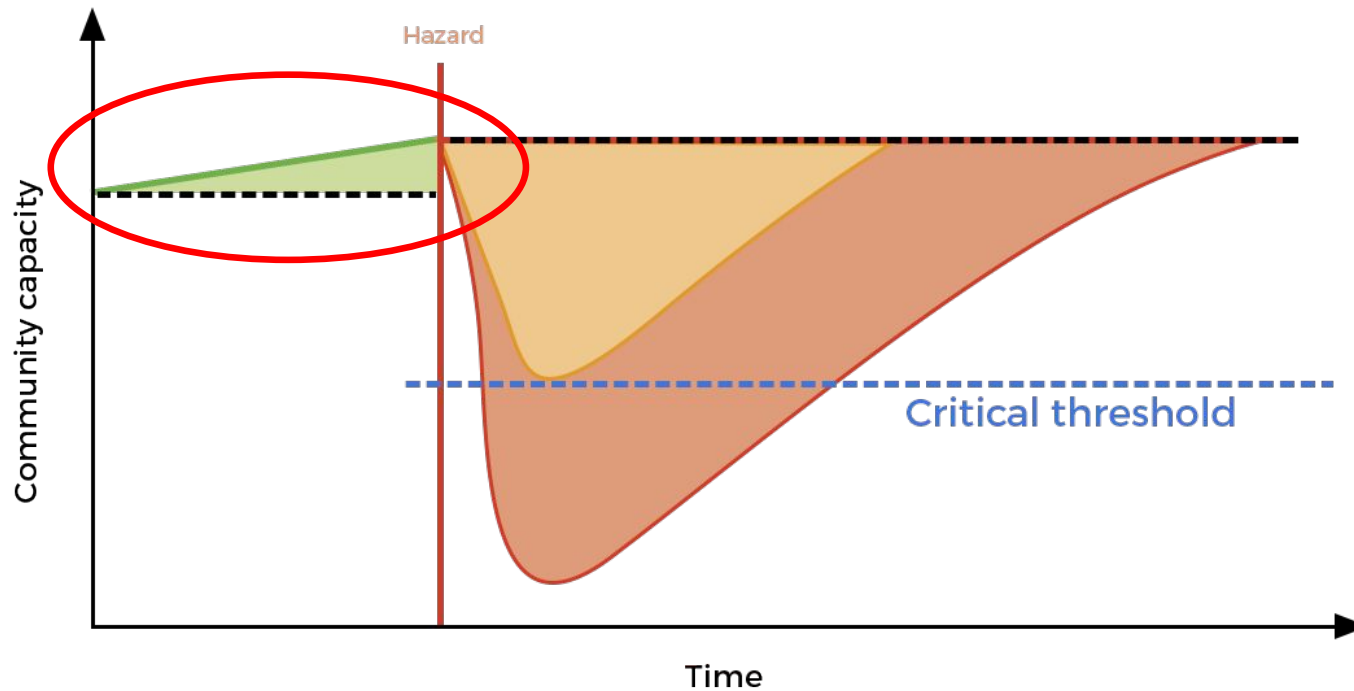
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[Steps to Resilience](#) [Case Studies](#) [Tools](#) [Expertise](#) [Regions](#) [Topics](#)

Meet the Challenges of a Changing Climate

Find information and tools to help you understand and address your climate risks.

[BUILD YOUR CLIMATE RESILIENCE >](#)

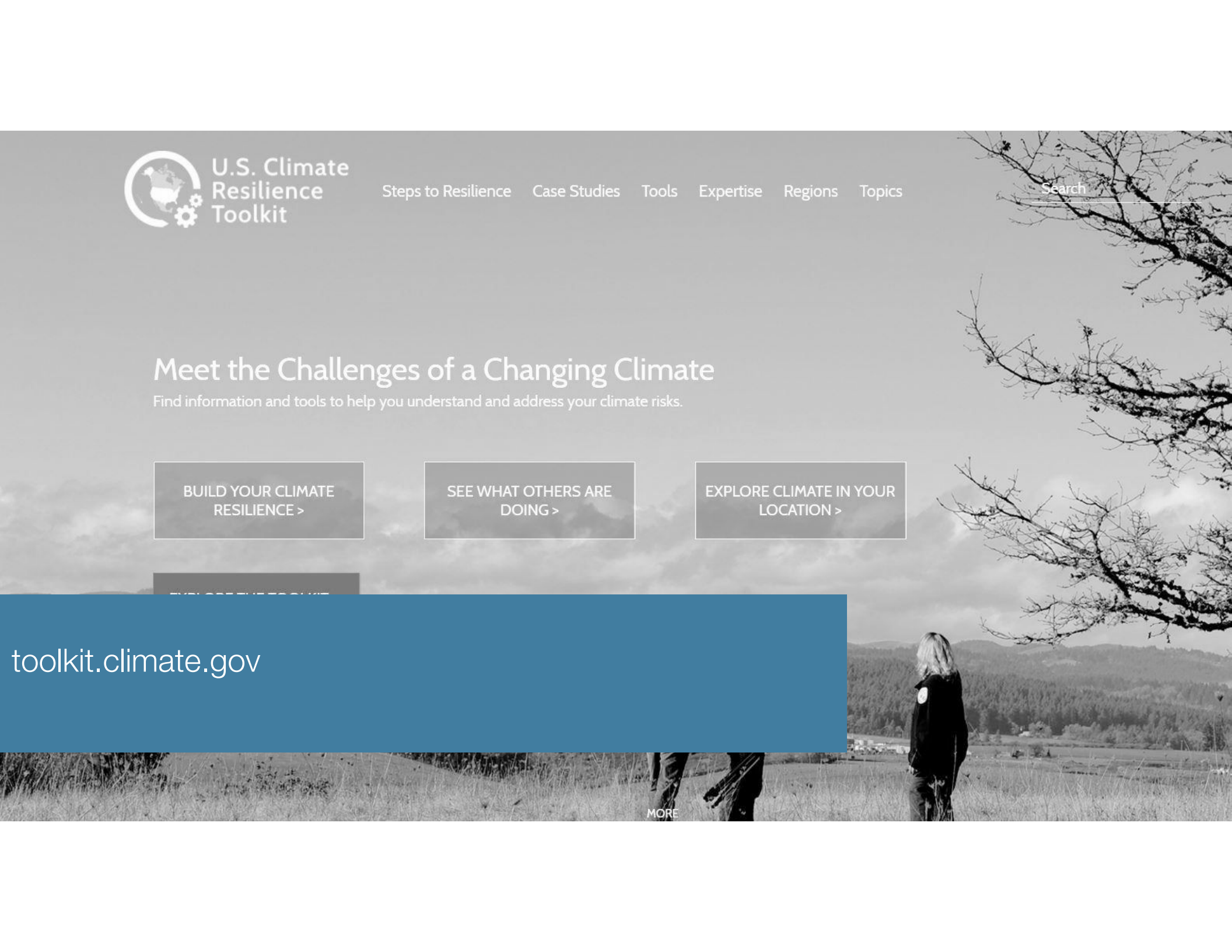
[SEE WHAT OTHERS ARE DOING >](#)

[EXPLORE CLIMATE IN YOUR LOCATION >](#)

[EXPLORE RESOURCES](#)

toolkit.climate.gov

[MORE](#)





U.S. Climate
Resilience
Toolkit

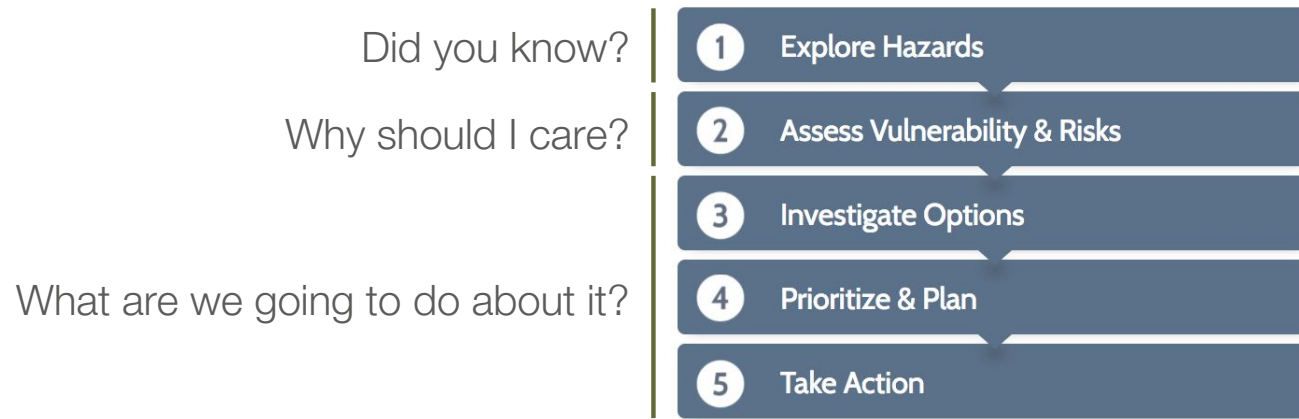
To improve people's ability to understand hazards, manage risks, and develop opportunities.

Help make landscapes, communities, and businesses more resilient to extreme events.

A photograph showing a firefighter in silhouette, walking through a field of tall grasses. The scene is illuminated by a bright, warm light source, possibly a fire, creating a dramatic, high-contrast effect. The firefighter is wearing a helmet and carrying a tank on their back.

Our Approach

US Climate Resilience Toolkit: Steps to Resilience



**U.S. Climate
Resilience Toolkit**

toolkit.climate.gov

Step 1: Explore hazards, identify assets

Example climate-driven hazards

Heavy Precipitation → Increased Flooding

Sea Level Rise → Compounding Hurricanes and Storm Surge

Drought → Water Shortage and Wildfires


Increasing minimum temperatures → Extreme Heat Events



THE CLIMATE EXPLORER

Explore maps and graphs of historical and projected climate trends in your local area. View data by topics to see how climate change will impact things you care about.

 [Search by location](#)

 [View by variable](#)

 [View by topic](#)

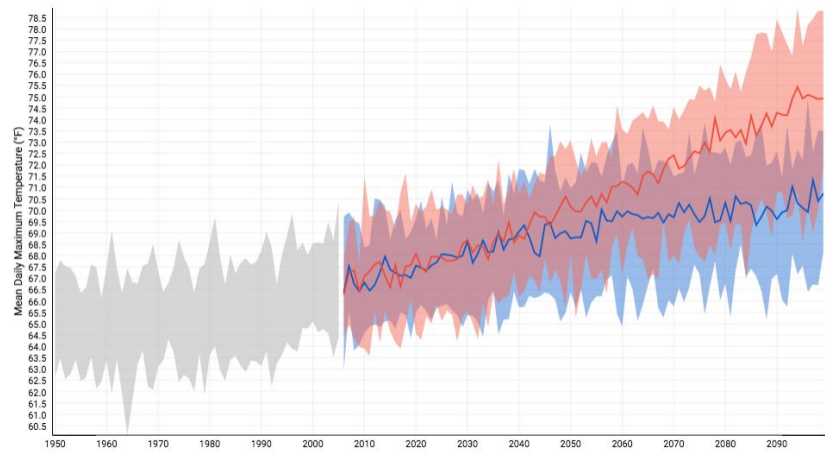
 [New here? Take the tour](#)

Localized climate projections

Daily max temp

Chart: Buncombe County
Mean Daily Maximum Temperature

How to read this Image Data



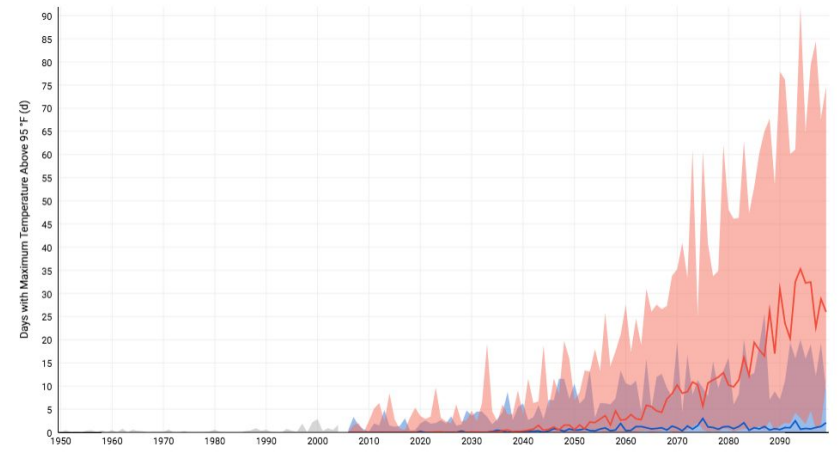
Observations Historical (Modeled) Lower Emissions Higher Emissions Medians



Days over 95 °F

Chart: Buncombe County
Days with Maximum Above 95°F

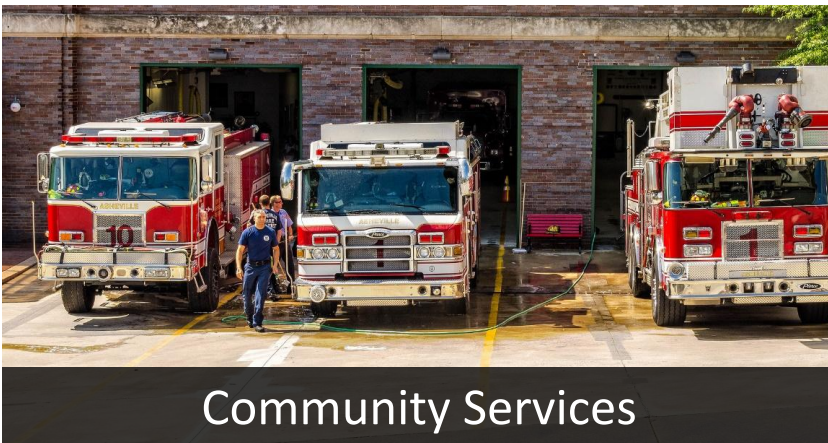
How to read this Image Data



Observations Historical (Modeled) Lower Emissions Higher Emissions Medians



Social Assets and Services



-
- Where do I live?
 - Where do I work?
 - How do I get between the two?

-
- Where do I live?
 - Where do I work?
 - How do I get between the two?
 - And how are these impacted by changing realities?

Step 2: Assess Vulnerability and Risks

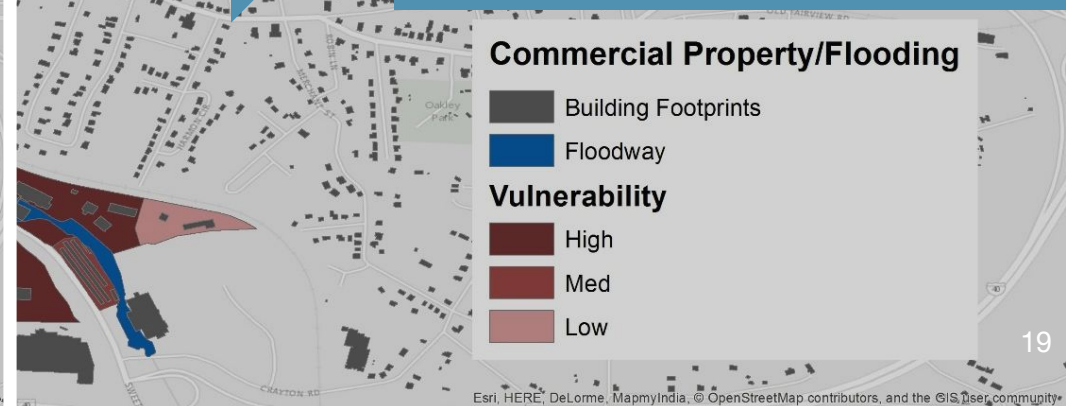
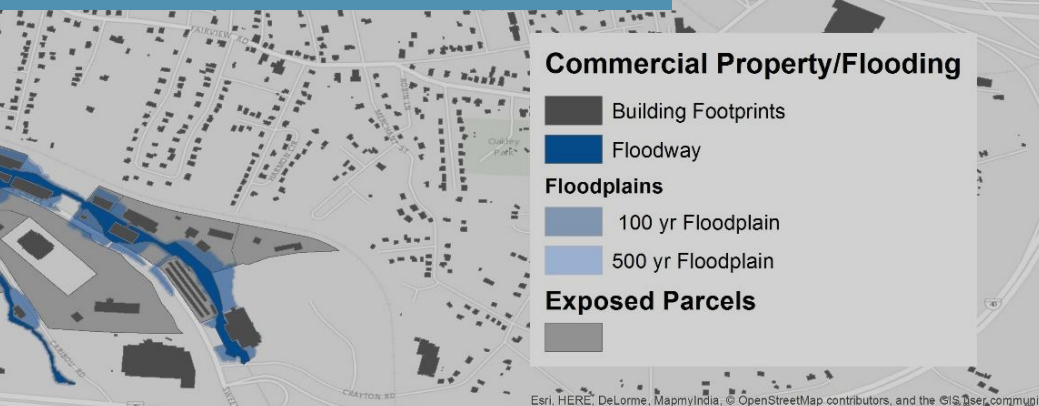


Exposure

to



Vulnerability



Same exposure to flooding...



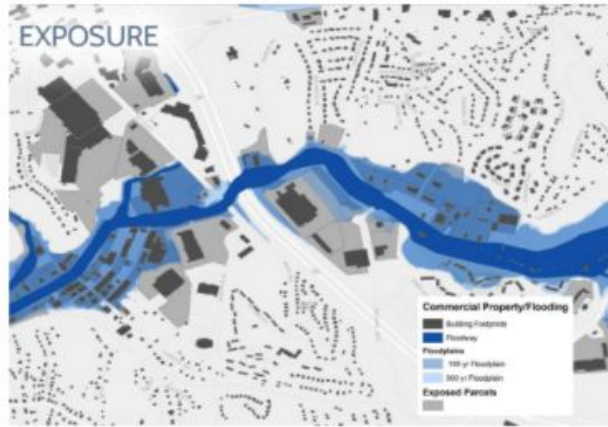
...different sensitivity and adaptive capacity.



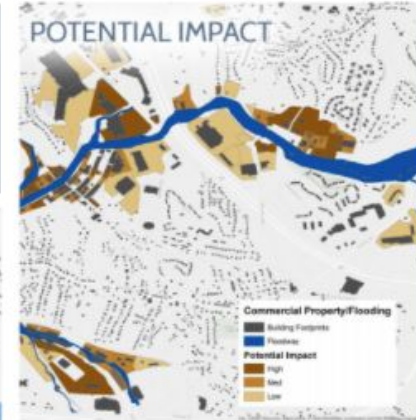
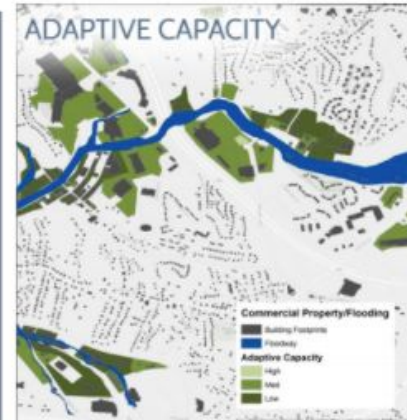
Benjamin Lowy for The New York Times

A quantifiable assessment of exposure, potential impact, adaptive capacity, vulnerability, and risk.

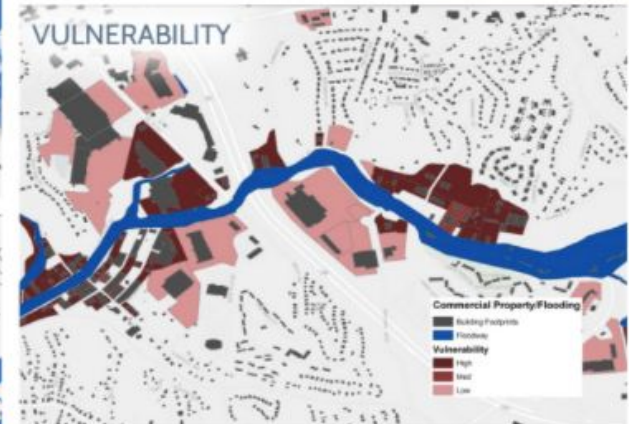
EXPOSURE:
The presence of societal assets, including people, infrastructure, property, or services, that are adversely impacted by a potential threat.



ADAPTIVE CAPACITY:
The ability that people, assets, or services have to cope with a climate-related impact.



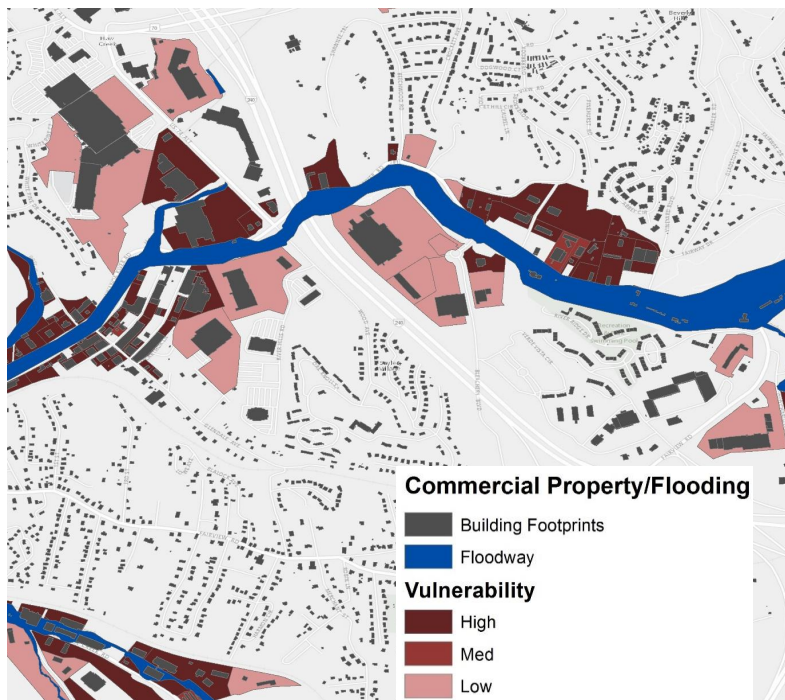
POTENTIAL IMPACT:
The degree to which societal assets are adversely impacted by a potential threat.



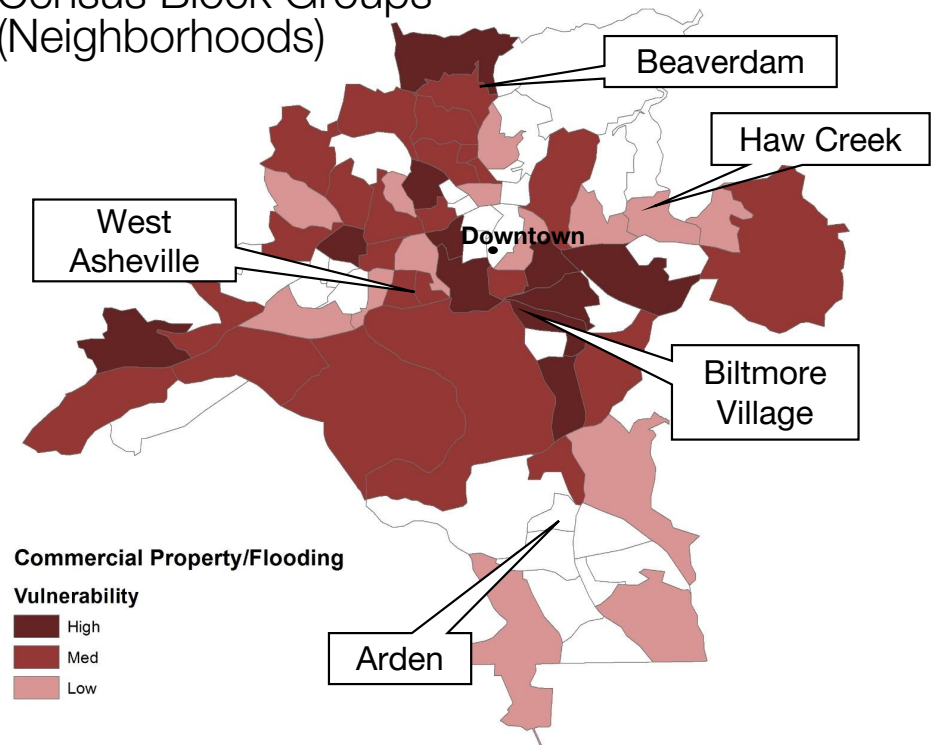
VULNERABILITY:
The susceptibility of assets based on their level of potential impact and adaptive capacity.

Areas of vulnerability (two scales)

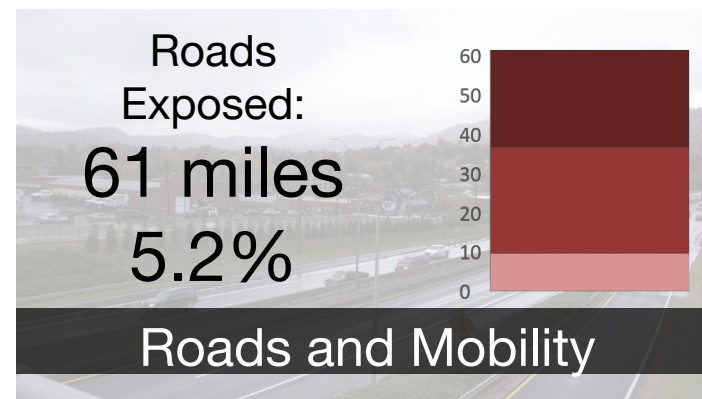
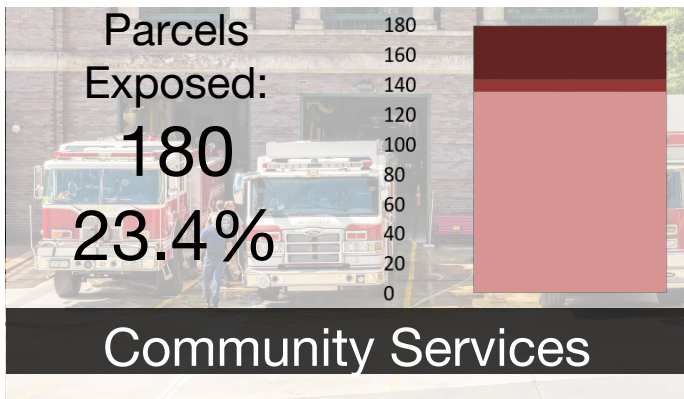
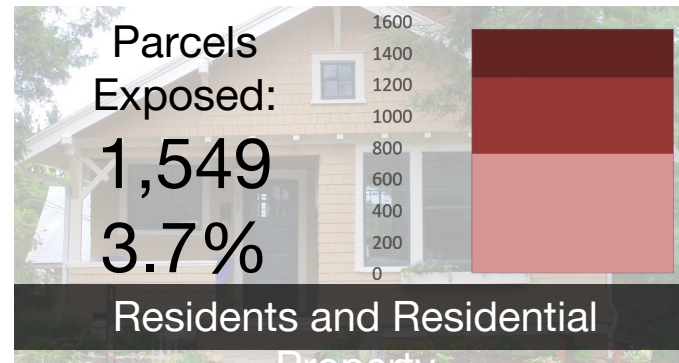
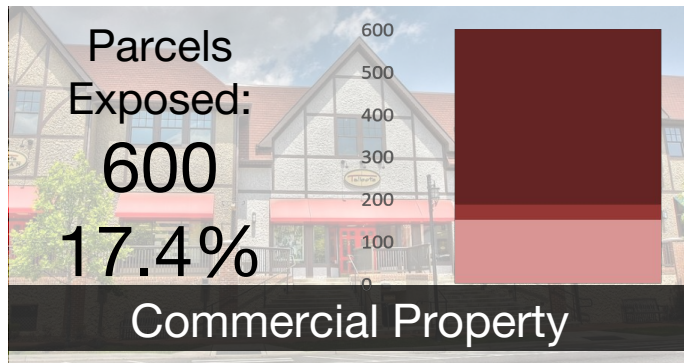
Individual Parcels



Census Block Groups (Neighborhoods)



Vulnerability at city scale: flooding hazard



Step 3 : Identify options to reduce vulnerability



See CRT Case Studies

The screenshot shows the 'U.S. Climate Resilience Toolkit' website. The header includes the logo and navigation links: 'Steps to Resilience', 'Case Studies', 'Tools', 'Expertise', 'Regions', and 'Topics'. A search bar is located on the right. The main section is titled 'Case Studies' and features four filter buttons: 'Filter by climate threat/stressor:', 'Filter by topic:', 'Filter by steps to resilience:', and 'Filter by region:'. Below the filters is a paragraph explaining that communities, businesses, and individuals are taking action to document vulnerabilities and build resilience to climate-related impacts. It instructs users to click dots on the map to preview case studies or browse stories below the map, and to use the drop-down menus to find stories of interest. A 'Clear Filters' link is also mentioned. The map shows a large number of blue location pins across the United States, with a high concentration in the Northeast and Midwest. Below the map are four small thumbnail images: a person walking on a path, a coral reef, a coastal landscape with a lighthouse, and a wide river valley.

U.S. Climate Resilience Toolkit

Steps to Resilience Case Studies Tools Expertise Regions Topics

Search

Case Studies

Filter by climate threat/stressor: Filter by topic: Filter by steps to resilience: Filter by region:

Communities, businesses, and individuals are taking action to document their vulnerabilities and build resilience to climate-related impacts. Click dots on the map to preview case studies, or browse stories below the map. Use the drop-down menus above to find stories of interest. To expand your results, click the Clear Filters link.

Leaflet | Tiles © Esri — Esri, DeLorme, NAVTEQ

Filter relevant case studies

U.S. Climate Resilience Toolkit

Steps to Resilience Case Studies Tools Expertise Regions Topics

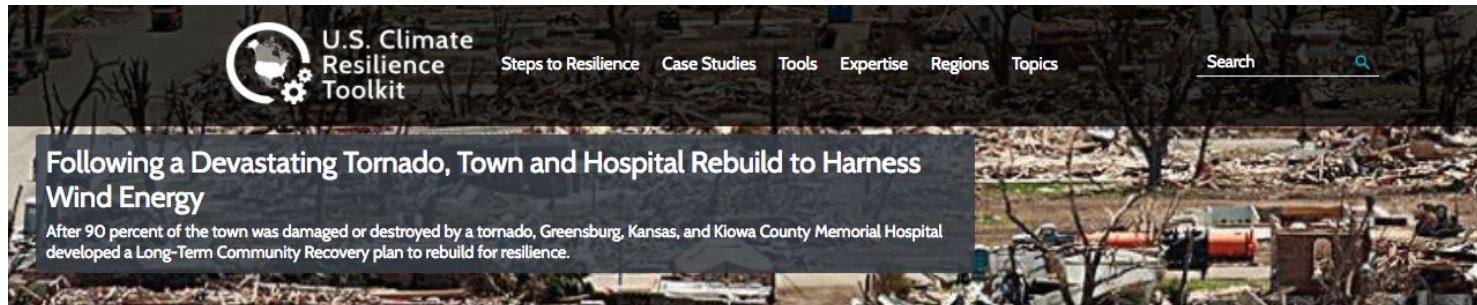
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See how others have responded



SHARE



TWEET



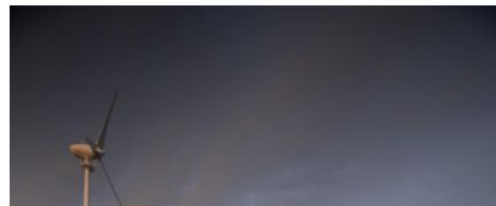
PRINT

Climate stressors and impacts

Because climate change is projected to increase the frequency of severe weather, communities located in regions that have traditionally experienced severe storms need to be particularly well prepared for extreme events. The city of Greensburg, Kansas, and its hospital—Kiowa County Memorial—have been rebuilding for precisely this sort of resilience after experiencing a catastrophic tornado. On May 4, 2007, an EF-5 tornado estimated to be 1.7 miles wide with 205 mph winds struck Greensburg. Damage to the city was immense: over 90 percent of the structures in the community were severely damaged or destroyed.

The power of wind

In the aftermath of the tornado, the Federal Emergency Management Agency (FEMA) activated the Long-Term Community Recovery (LTCR) program, which integrated assistance from the State of Kansas and



Steps to Resilience

This content supports the highlighted step.

- 1 Explore Hazards
- 2 Assess Vulnerability & Risks
- 3 Investigate Options
- 4 Prioritize & Plan
- 5 Take Action

Tools

[Sustainable and Climate-Resilient Health Care Facilities Toolkit >](#)

Topics

[Energy > Building Resilience in the Energy Sector >](#)

[Health > Extreme Events >](#)

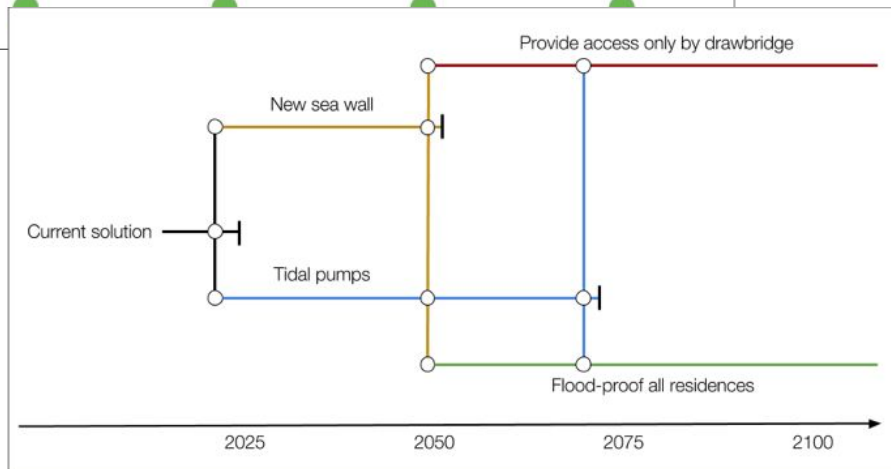
[Health > Building Health Care Sector](#)

[Resilience >](#)

[Element 3: Infrastructure Protection and Resilience >](#)

Step 4 : Prioritize and Plan

	Ability to increase resilience	Economic feasibility	Low environmental impact	Ability to implement
LSE-2	●	● ●	● ●	●
MD-1	●	●	● ●	● ●
MD-7	●	●	●	●
MD-4	●	●	●	●
MD-4 / MD-7	●	●	●	●





FERNLEAF
INTERACTIVE



NEMAC
NATIONAL ENVIRONMENTAL
MODELING & ANALYSIS CENTER