



Photo by Ryan Hall via Flickr(CC BY 2.0)



Climate Change Projections & Vulnerability CHATTANOOGA, TENNESSEE

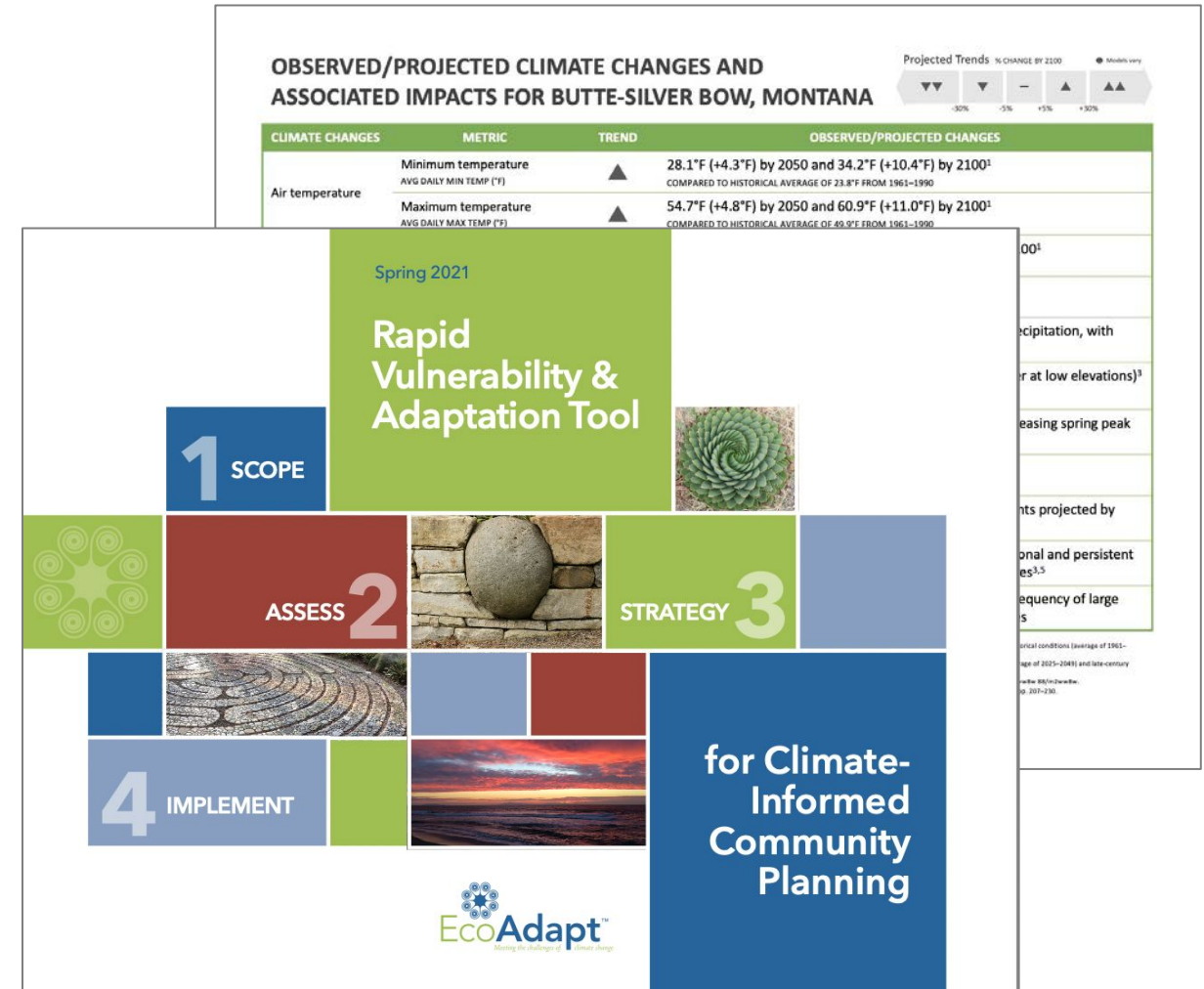


★ Climate Projections

What future changes do scientists expect to occur?

★ Community Vulnerability

How susceptible to harm is the community as a result of those changes?



Likely Climate Stressors



Higher average temperatures and more extreme heat



Increased spring and fall precipitation



Increased frequency/intensity of extreme precipitation and flooding

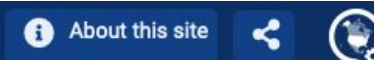


More frequent and/or more severe droughts



Increased wildfire risk and a longer fire season

Climate Explorer Projections



The Climate Explorer

Explore graphs and maps of historical and projected climate variables for any county in the contiguous United States.

New!
Climate projection charts are now available for boroughs in Alaska.

To get started, enter a county, city, or zip code



or choose from the following suggested cities:

New York City, NY

Los Angeles, CA

Chicago, IL

Phoenix, AZ

Houston, TX

Anchorage, AK



Climate Explorer Projections



The Climate Explorer

About this site



Chattanooga, TN



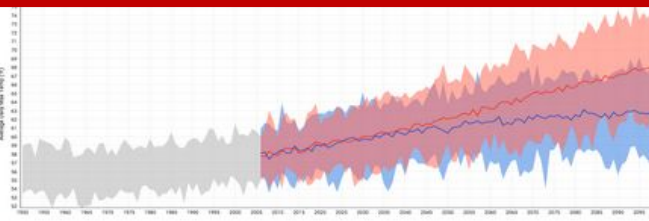
Select one of the following for Chattanooga, TN



Climate Maps



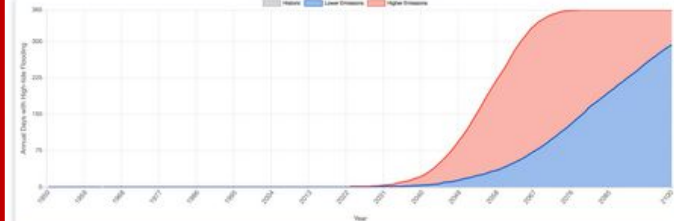
Compare past and projected future conditions in your county.



Climate Charts



Check past and projected values for climate variables.



High-Tide Flooding



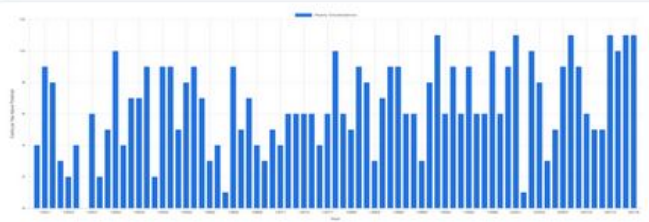
View the number of high-tide floods in the past and projected for the future.



Historical Weather Data



Compare daily weather at local observing stations to long-term climate.



Historical Thresholds



Check how often temperature or precipitation has exceeded user-defined values.

Ready to plan for resilience?



Resources from our partners can help you identify what matters to your community and evaluate how climate change could affect it:

- Check your exposure to extreme events such as wildfires and flooding
- Identify social vulnerabilities across urban areas
- Get step-by-step guidance for completing a vulnerability assessment or crafting an action plan.

[Explore planning tools →](#)

Region Based



Cards Home



Take action



Climate Charts



Climate Maps



Historical Weather Data



Historical Thresholds



High-Tide Flooding



Climate Explorer Projections



The Climate Explorer

About the data



Chattanooga, TN

Stations

Hamilton County - Average Daily Maximum Temp (°F)

Average Daily Maximum Temperature (°F)

Graph

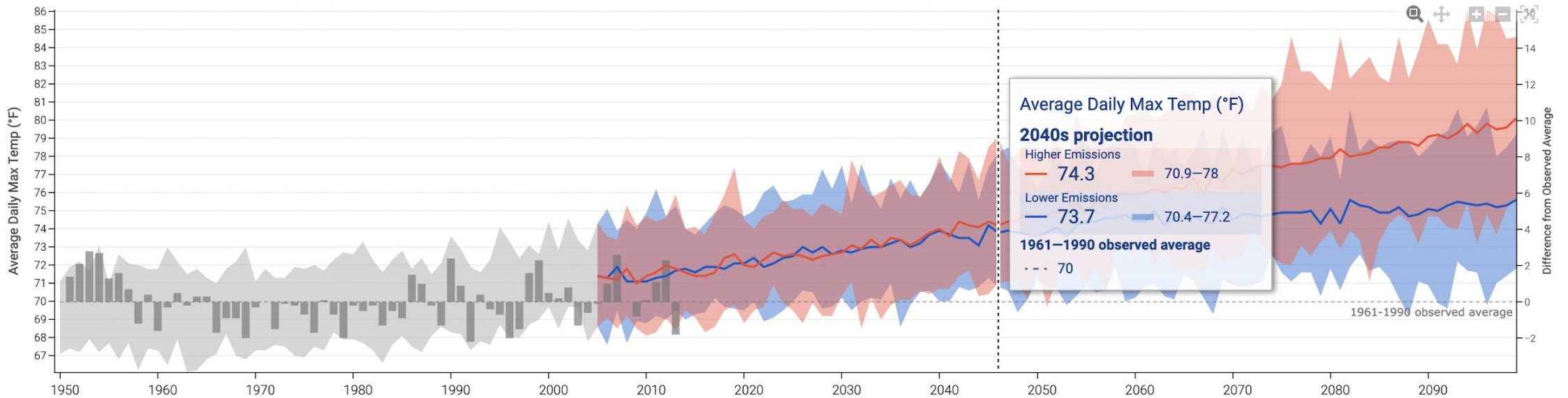
Map

Annual

Monthly

Downloads

About



Observations

Modeled History

Lower Emissions

Higher Emissions

Cards Home

Climate Maps

Climate Graphs

Extreme Events

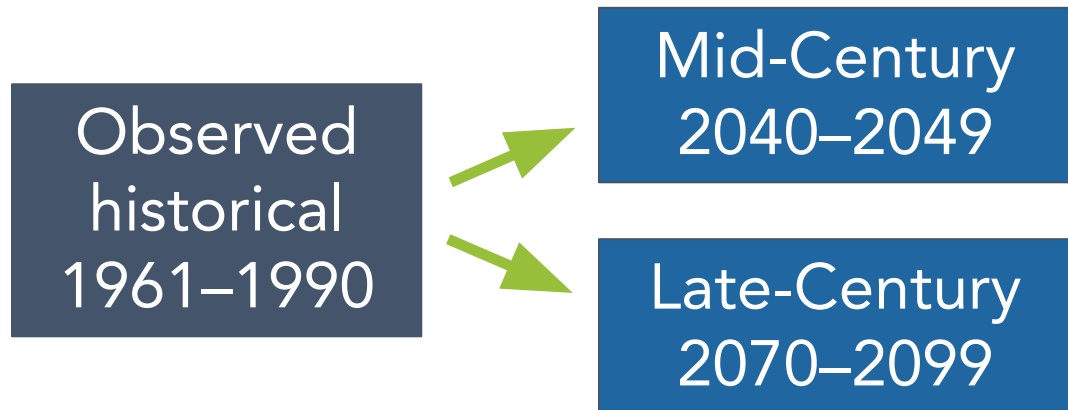
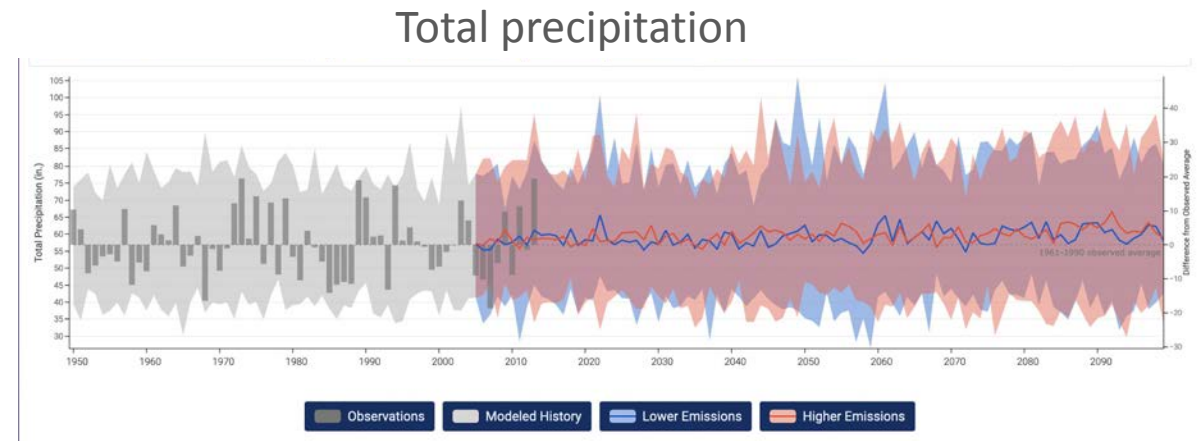
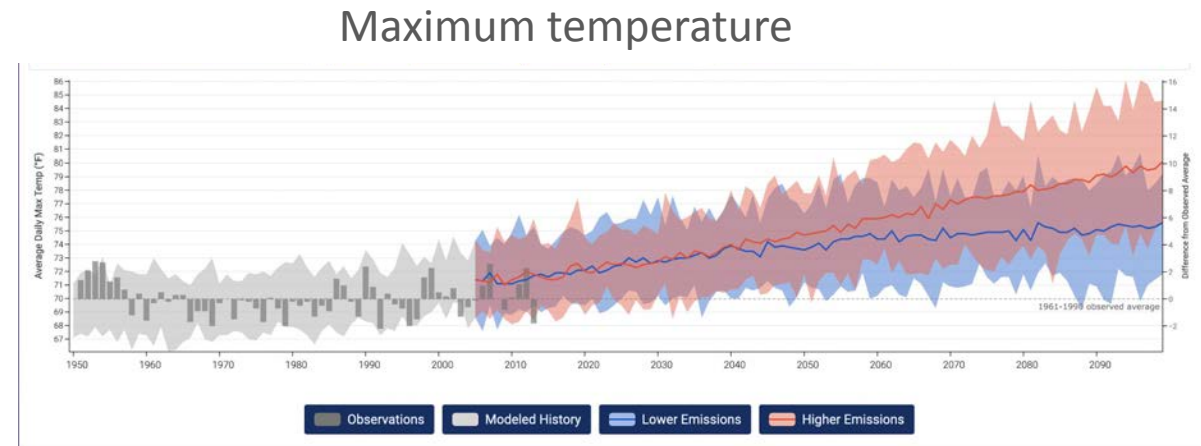
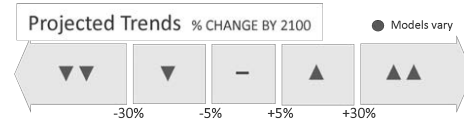
High-Tide Flooding

Take Action

Important Considerations



- Trend direction
- Magnitude of change
- Shifts in timing/variability
- Scientific uncertainty



Air Temperature



HIGHER AVERAGE TEMPERATURES

- ▲ Minimum temperature
+3.9°F by 2050; +8.9 °F by 2100
(historical: 47.5°F)
- ▲ Maximum temperature
+4.3°F by 2050; +9.5°F by 2100
(historical: 70.0°F)

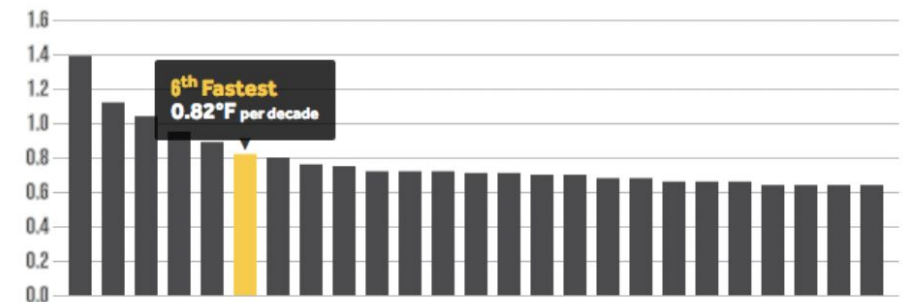
MORE EXTREME HEAT

- ▲ ▲ Days over 95°F
34.8 days by 2050; 84.3 days by 2100
(historical: 6.1 days)

Hot and Getting Hotter

The top 25 hottest and fastest-warming cities

Which are the hottest? Fastest-warming



Get the embed code >>

CLIMATE CENTRAL

Precipitation



SHIFTS IN AMOUNT/TIMING OF RAINFALL

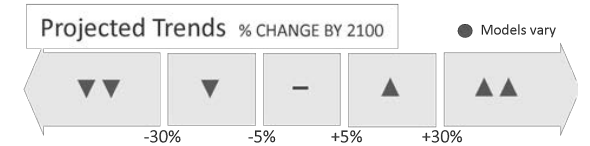
▲ Annual precipitation

+5.4% by 2050; +8.8% by 2100 (*historical: 56.9 in*)

▲ ▼ Changes in seasonality

Increase in spring (+7% by 2100) and fall rainfall (+6%)

Little to no change in winter or summer precipitation



Climate Analogues



What will climate feel like in 60 years?

Map

Learn more

Support this project

Donate

Select a city or click map

Chattanooga, TN

Select a map type

- Line to the most similar climate
- Line & climate similarity map

Select an emissions level

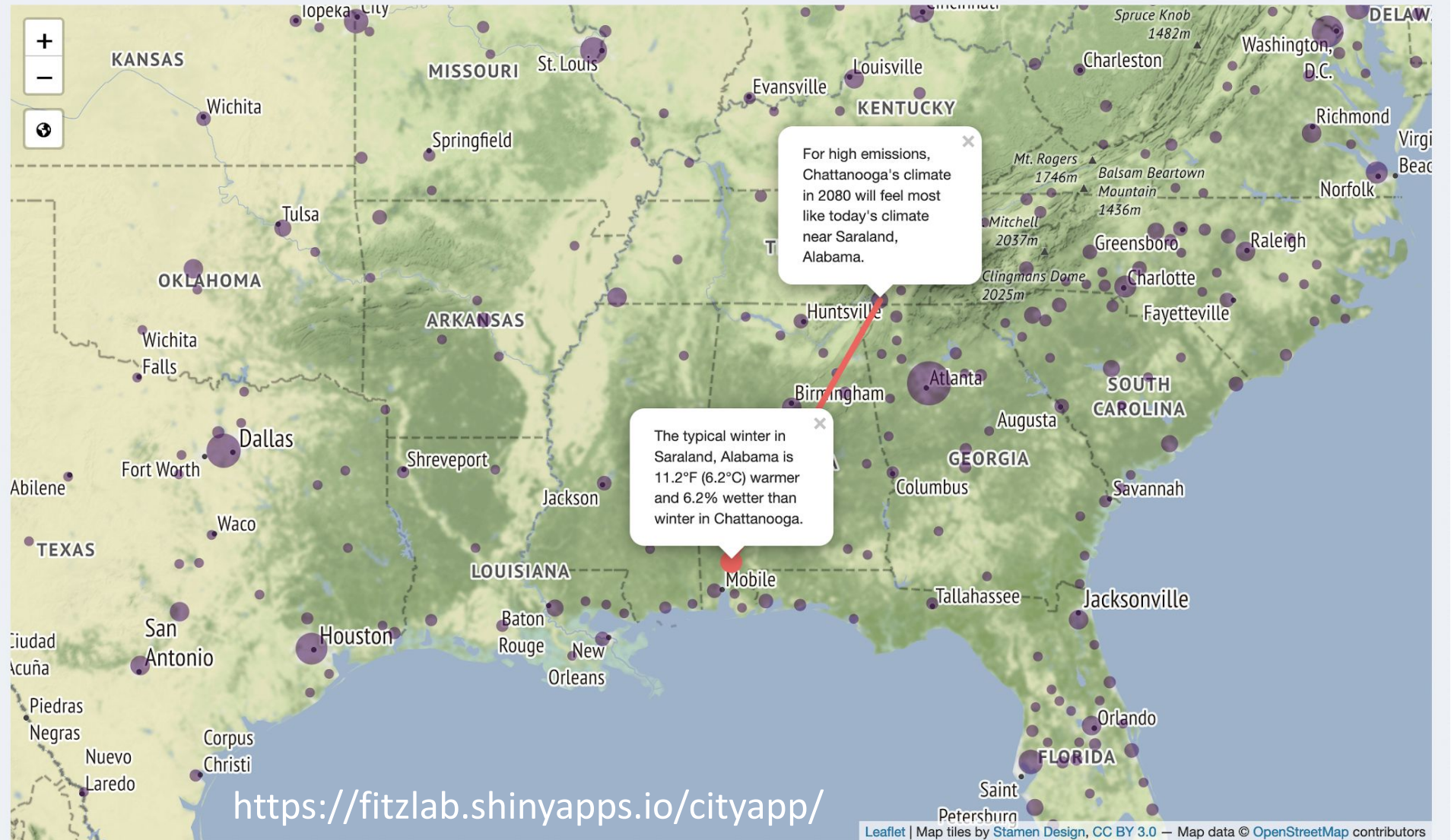
- Current high emissions
- What if we reduce emissions?

Select level of detail

- Average of 27 forecasts
- Average & 27 individual forecasts

Refresh Map

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE



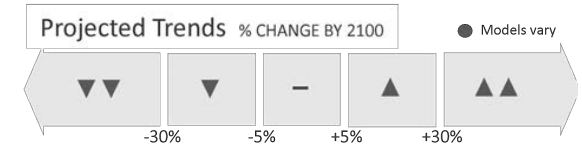
<https://fitzlab.shinyapps.io/cityapp/>

Extreme Precipitation, Storms, & Flooding



MORE EXTREME PRECIPITATION

- ▲ Days with at least 2 inches of rain in 24 hours
+10% by 2050; +33% by 2100 (*historical: 2.1 days per year*)
- ▲ Precipitation total for 20-year storm event
+21% in the Southeast US by 2100



INCREASED STORM AND FLOOD IMPACTS

- ▲ Increase in occurrence of severe thunderstorms, including tornadoes
- ▲ Increase in flood frequency & severity, as well as area vulnerable to flooding





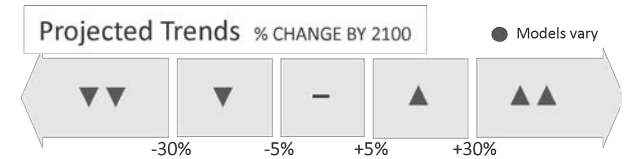
INCREASED DROUGHT RISK

- ▲ Likely increase in both seasonal and more prolonged periods of drought

INCREASED WILDFIRE RISK

- ▲ Increased fire potential in the summer and fall due to drier conditions

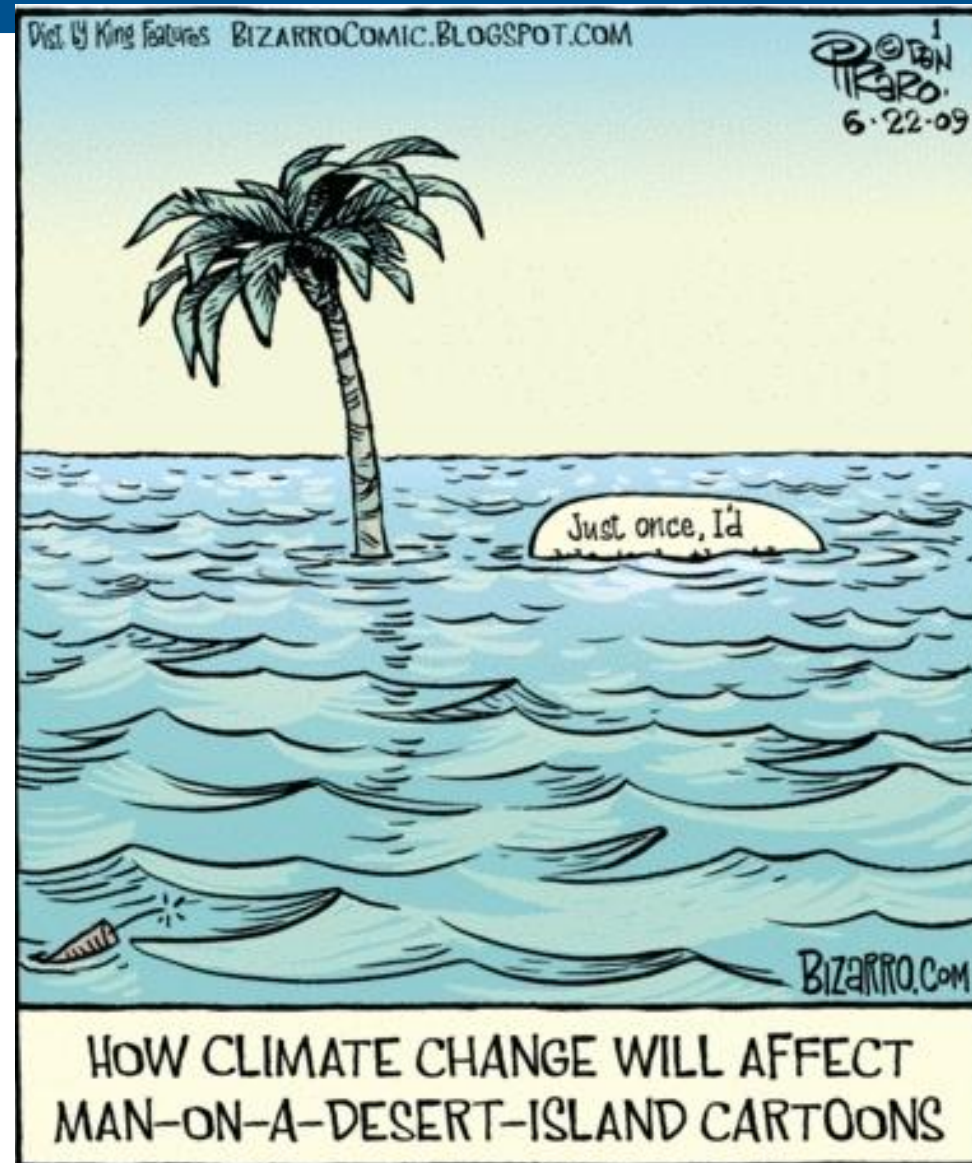
- ▲ Increased length of the fire season from 1 month to 2 months by 2070



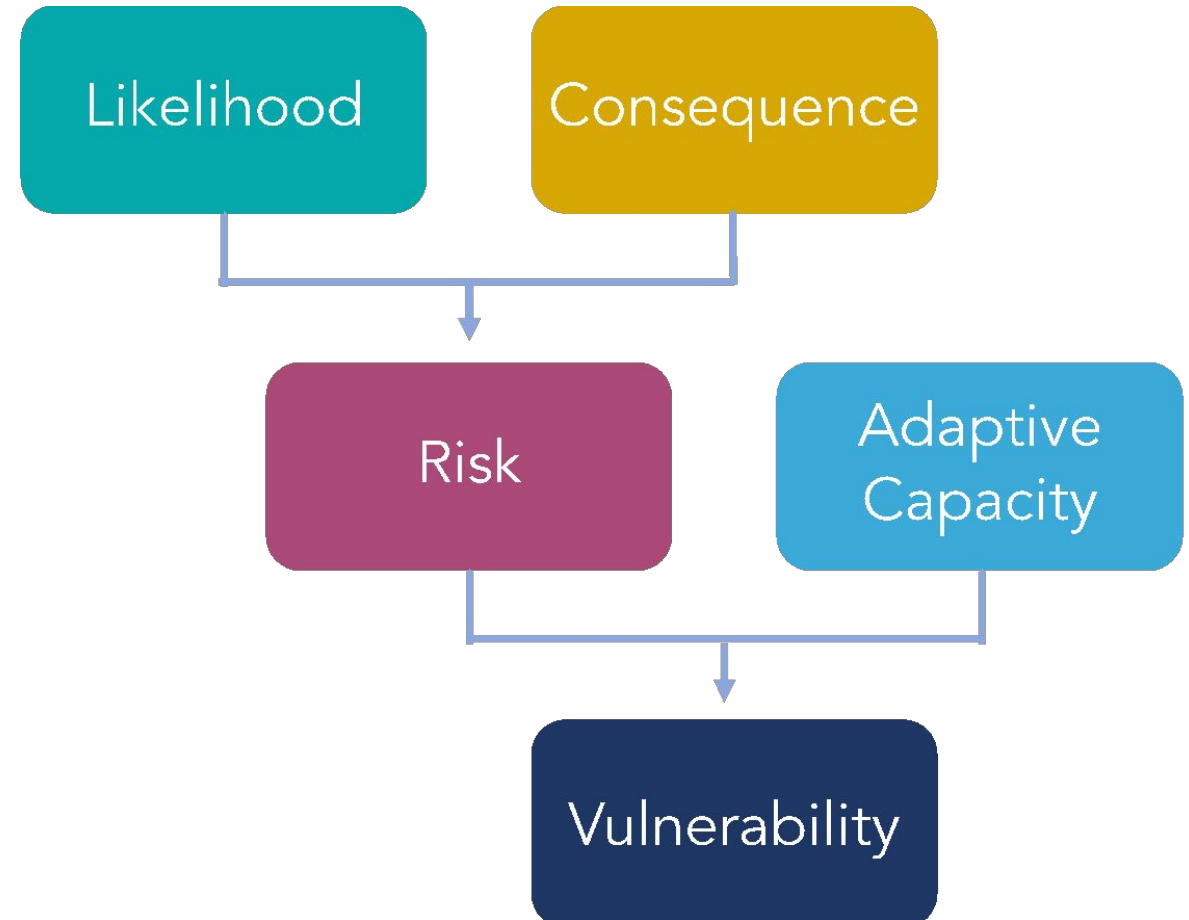
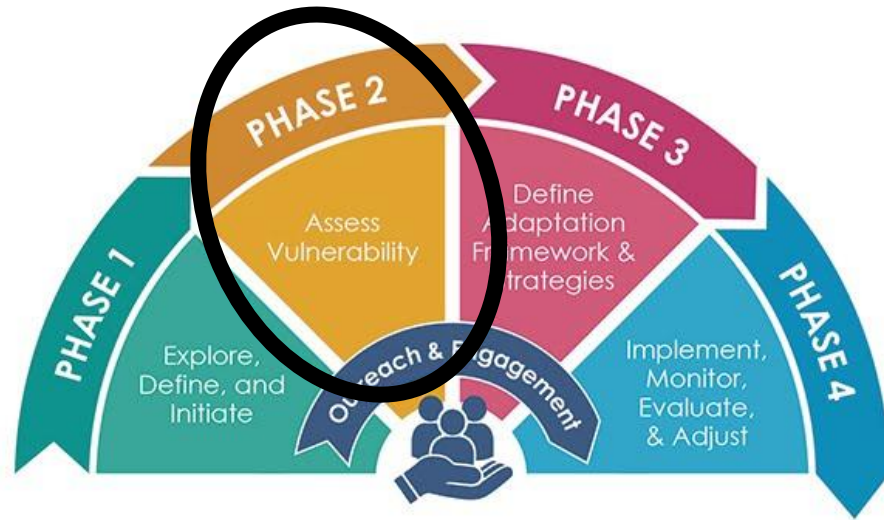
Questions?



NEXT UP:
What kind of impacts will these climate changes have on Chattanooga?



Community Vulnerability

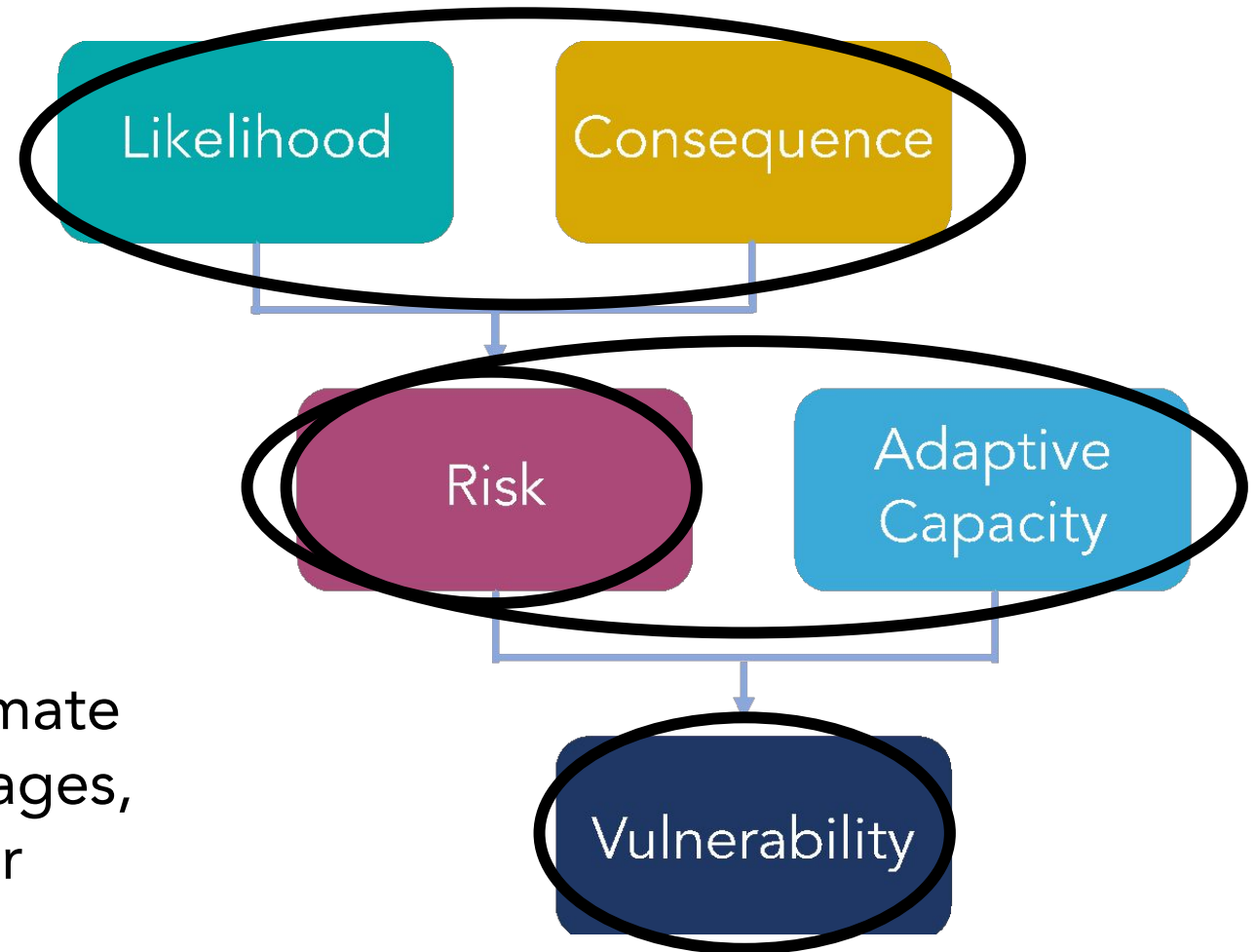


VULNERABILITY is the degree to which natural, built, and human systems are susceptible to harm

Community Vulnerability



- LIKELIHOOD is the degree to which a community is exposed to significant changes in climate
- CONSEQUENCE is the degree to which a community is affected by exposure to a changing climate
- ADAPTIVE CAPACITY is the community's ability to adjust to climate change to minimize potential damages, take advantage of opportunities, or cope with consequences

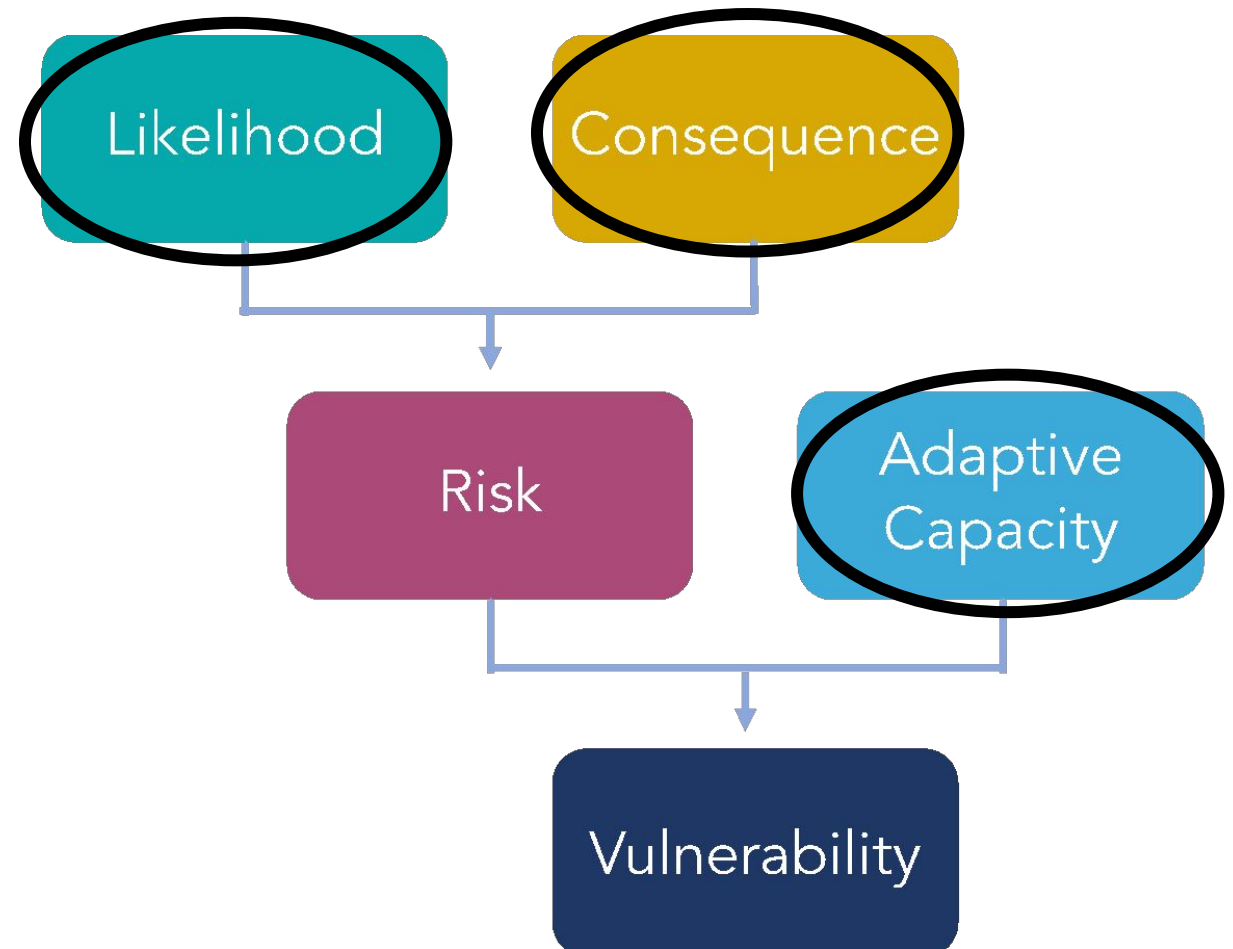


Community Vulnerability



Climate change vulnerability is not evenly distributed across communities!

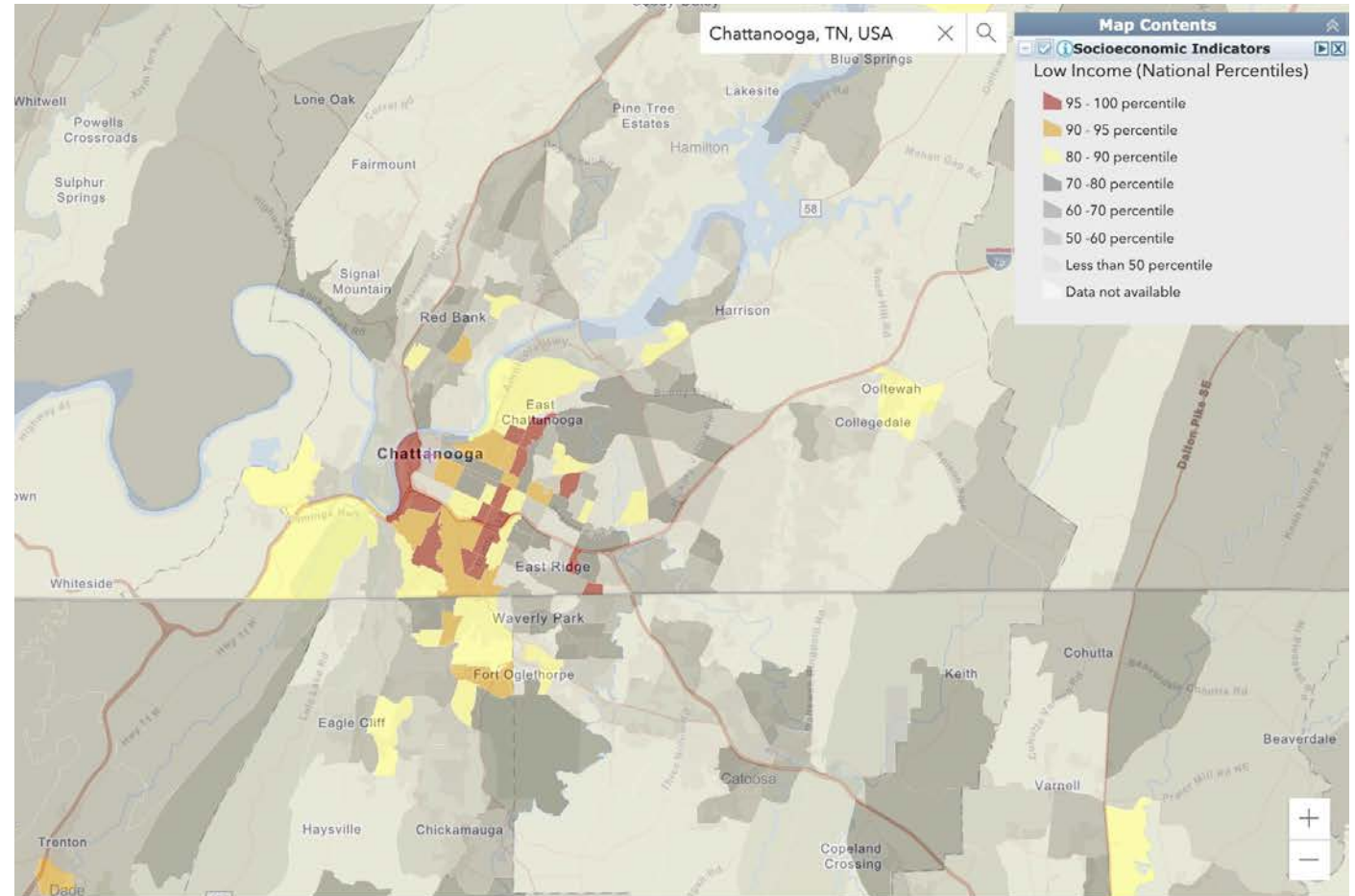
Understanding disproportionate impacts is critical to ensuring just distribution of adaptation benefits



Community Vulnerability



- People of Color
- Low-Income Residents
- Children under 5
- Seniors over 65
- Individuals with Disabilities
- Individuals with Limited English Skills
- At-Risk Workers
- Individuals with No Vehicle Access



EPA EJ Screen

<https://ejscreen.epa.gov/mapper/>

Community Vulnerability



Examples:

- Low-income individuals: Lack of financial resources/insurance to respond to extreme events
- Children, elderly, people with chronic health conditions: Difficulty regulating body temperature or increased vulnerability to severe illness/disease
- Individuals with limited mobility: Reduced ability to evacuate during emergencies or access shelters





Examples:

- People with limited English: Less able to benefit from community resources or access information and receive alerts
- People of color, individuals with disabilities: Less able to utilize emergency shelters or other community spaces
- At-risk workers: Increased exposure to hazards, often without adequate precautions or paid time off



Transportation

DIRECT IMPACTS
OF CLIMATE
STRESSORS



Housing

INTERACTIONS WITH
PRE-EXISTING
CONDITIONS



Natural Resources



Public Health:

- Increase in respiratory illnesses and other health concerns due to heat stress, reduced air quality, and increased allergens
- Increased incidence of vector-borne diseases due to increasingly suitable conditions for mosquitoes
- Overwhelm of emergency systems, blocked evacuation routes, or damage/disruption to shelters
- Increased vulnerability among those with existing chronic health conditions and people lacking access to health services





Photo by mSeattle via Flickr (CC BY 2.0)

Transportation:

- Damage to transportation infrastructure (e.g., roads, bridges, culverts) following storms, floods, and extreme heat events
- Road blockages and loss of access following extreme events, impacting evacuation routes and emergency access
- Loss of electricity due to flooding or heat waves, limiting use of electric vehicles and impacting public transit
- Slower travel or road closures due to melting asphalt, overheating engines, and other impacts associated with extreme heat



Housing:

- Increased risk of damage to housing and critical infrastructure (e.g., utilities) following storms, floods, and extreme heat
- Increased heat stress in developed areas, exacerbated by large areas of impervious surfaces and lack of vegetation
- Increased energy demand during heat waves, straining electrical grids
- Exacerbation of existing patterns of inequity for vulnerable communities more likely to experience heat island effects and poor drainage





Natural Resources:

- Reduced growth and productivity of native vegetation due to heat stress and increases in evapotranspiration
- Expansion of non-native invasive plants and insect pests as temperatures increase
- Increased flooding and erosion, impacting native plants as well as public and management access
- Likely increases in the demand for groundwater and decreases in water quality
- Increased risk of wildfire during severe droughts
- Altered or decreased ecosystem functioning on conservation lands due to changes in hydrology, thermal regime, and plant composition & distribution

Impacts of Climate Change



What additional climate change impacts are you concerned about?



Important Tools and Resources



OBSERVED/PROJECTED CLIMATE CHANGES AND ASSOCIATED IMPACTS FOR CHATTANOOGA, TENNESSEE



CLIMATE CHANGES	METRIC	TREND	OBSERVED/PROJECTED CHANGES
Air temperature	Minimum temperature AVG DAILY MIN TEMP (°F)	▲	51.4°F (+3.9°F) by 2050 and 56.4°F (+8.9°F) by 2100 ¹ COMPARED TO HISTORICAL AVERAGE OF 47.5°F FROM 1961-1990
	Maximum temperature	▲	74.3°F (+4.3°F) by 2050 and 79.5°F (+9.5°F) by 2100 ¹

- Extreme heat
- Precipitation
- Extreme precipitation
- Storms & flooding
- Drought
- Wildfire

LIKELY IMPACTS ASSOCIATED WITH PROJECTED CLIMATE CHANGES*

- Public Health**
 - Increased occurrence of respiratory illnesses and other health concerns due to heat stress, reduced air quality, and increased allergens
 - Likely increase in the incidence of Zika and other vector-borne diseases due to increasingly suitable conditions for mosquitoes
 - Increased risk of water-borne or mold-related problems due to flooding
 - Increases in the intensity/frequency of extreme events (e.g., flooding) may overwhelm emergency systems, block emergency access or evacuation routes, or damage/disrupt emergency shelters
 - Increased vulnerability among those with existing chronic health conditions as well as children, the elderly, pregnant individuals, low-income residents, and anyone lacking access to health services and/or adequate health insurance
- Transportation**
 - Damage to transportation infrastructure (e.g., roads, bridges, culverts) following storms, floods, and extreme heat events
 - Road blockages and loss of access following extreme events, impacting evacuation routes, emergency access, and other critical travel
 - Loss of electricity due to flooding or heat waves, limiting use of electric vehicles and impacting public transit
 - Slower travel or road closures due to melting asphalt, overheating engines, and other impacts associated with extreme heat
- Housing**
 - Increased risk of damage to housing and critical infrastructure (e.g., utilities) following storms, floods, and extreme heat
 - Increased heat stress in developed areas, exacerbated by large areas of impervious surfaces and lack of vegetation
 - Increased energy demand during heat waves, straining electrical grids and potentially resulting in power outages
 - Extreme heat and flooding exacerbate existing patterns of inequity for low-income neighborhoods and other vulnerable communities more likely to experience heat island effect and poor drainage
- Natural Resources**
 - Reduced growth and productivity of native vegetation due to heat stress and increases in evapotranspiration
 - Expansion of non-native invasive plants and insect pests as temperatures increase (particularly winter temperatures)
 - Increased flooding and erosion, impacting native plant communities as well as public and management access to greenspace
 - Likely increases in the demand for groundwater (i.e., for municipal or agricultural use) as traditional surface water sources dry up earlier in the season and during longer periods of drought
 - Increased concentration of contaminants and increased risk of algal blooms in water sources during hot/dry periods, impacting aquatic organisms as well as recreational use
 - Increased risk of wildfire during severe droughts, impacting native plants and animals
 - Altered or decreased ecosystem functioning on conservation lands due to changes in hydrology and plant species composition and distribution

- Resources:**
- U.S. Climate Resilience Toolkit Climate Explorer (<https://crt-climate-explorer.nemac.org>)
 - Southeast Chapter of the Fourth National Climate Change Assessment (<https://nca2018.globalchange.gov/chapter/19/>)
 - FEMA's National Flood Map Hazard Viewer (<https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd>)
 - SGSF Wildfire Risk Assessment Portal (<https://www.southernwildfirerisk.com/Map/Public/#whats-your-risk>)
 - EPA's Environmental Justice Screening and Mapping Tool (<https://ejscreen.epa.gov/mapper/>)
 - Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts (<https://www.epa.gov/cira/social-vulnerability-report>)
 - Cleveland Racial Equity Tool (helps assess whether adaptation strategies will be equitable; <https://www.sustainablecleveland.org/racial-equity>)

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Observed/Projected Climate Changes & Associated Impacts

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Chattanooga Climate Change Adaptation Workshop

October 3, 4, and 6 2022, 1-5pm ET each day • online

Overview

This workshop focuses on understanding community vulnerabilities to climate change in Chattanooga, TN, and developing adaptation strategies to address those vulnerabilities. Participants will also learn how to use tools that are available for communities to enable ...

[\[show full overview\]](#)

Agenda & Speakers

- Workshop Agenda
- Presentations

Reading & Resources

- Climate Change Adaptation and Certification (CCAC) Tool
- [Rapid Vulnerability Assessment Tool \(RVAT\)](#)
- Projected Climate Changes and Associated Impacts for Chattanooga
- Chattanooga Network Map

[\[workshop home page\]](#)

[\[library\]](#)

Data sources and more information:

- [U.S. Climate Resilience Toolkit Climate Explorer](#)
- [Southeast Chapter of the 4th National Climate Assessment](#)
- [FEMA's National Flood Map Hazard Viewer](#)
- [SGSF Wildfire Risk Assessment Portal](#)
- [EPA's Environmental Justice Screening and Mapping Tool](#)
- [Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts \(includes factsheets that summarize impacts for specific communities\)](#)
- [Cleveland Racial Equity Tool \(an accessible screening tool to help people assess whether adaptation strategies they are considering will be equitable\)](#)

Workshop Support Page

Questions?



CAN'T STAND THE HEAT

Winter 2014-2015 Temperature Percentiles ■ Record Warmest ■ Record Coldest

