Practical Guidance for
Climate Resilience: Buildings & Energy

Ned Gardiner, U.S. Climate Resilience Toolkit Engagement Manager
presentation to Metropolitan Washington Council of Governments
July 18, 2019

Current and future climate are no longer certain

https://www.vox.com/science-and-health/2017/8/28/16211392/100-500-year-flood-meaning

Houston has suffered several "1 in 500-year storms" over the last several years

Socio-economic systems are less certain than the climate

We'd like climate-resilient roads, but do we even know what will be driving on them?

Slide credit: Rob Lempert, RAND

Flood Risk Management Planning Resources for Washington, DC

National Capital Planning Commission

January 2018

Objectives

- Define Resilience
- Practical Guidance
  - Explore Hazards
  - Assess Vulnerability and Risk
- Resources



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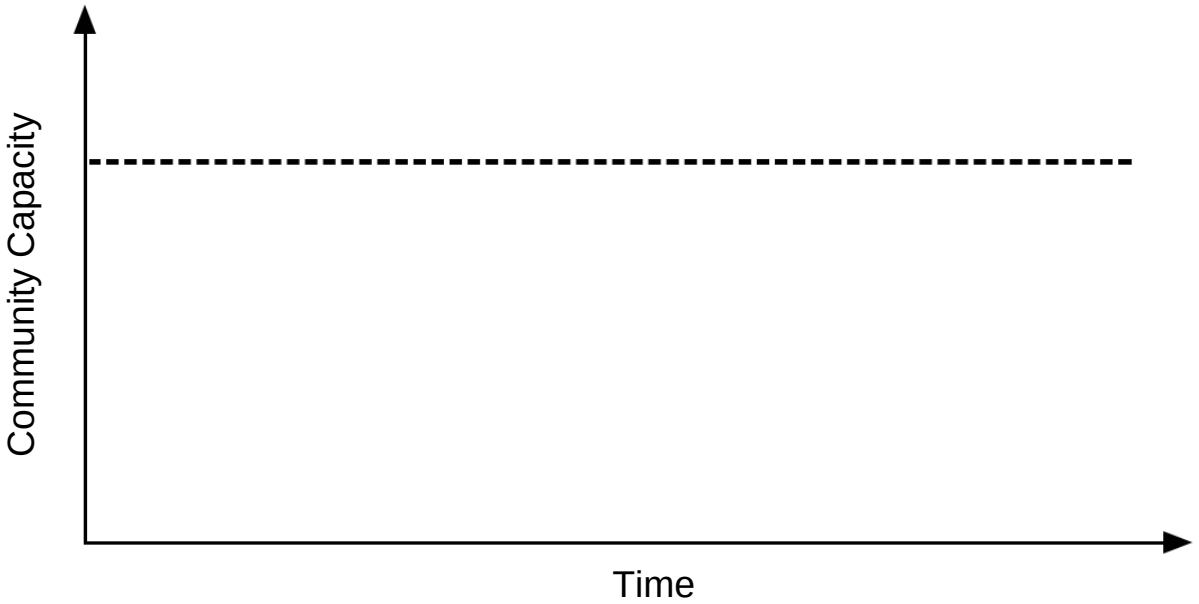
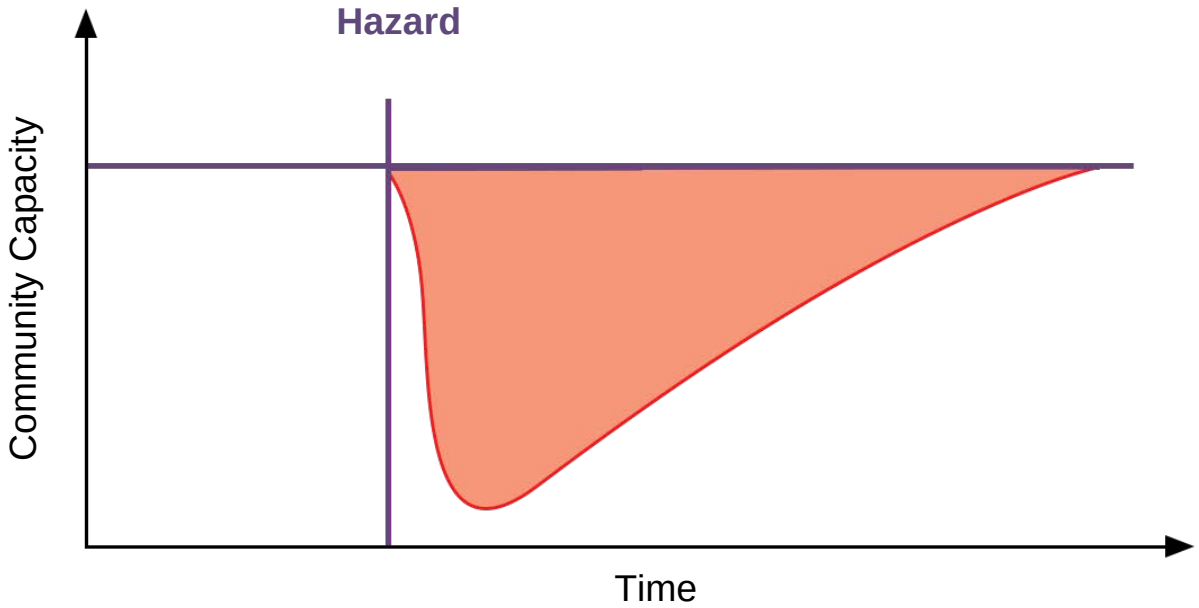
What is Resilience?



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

What is Resilience?



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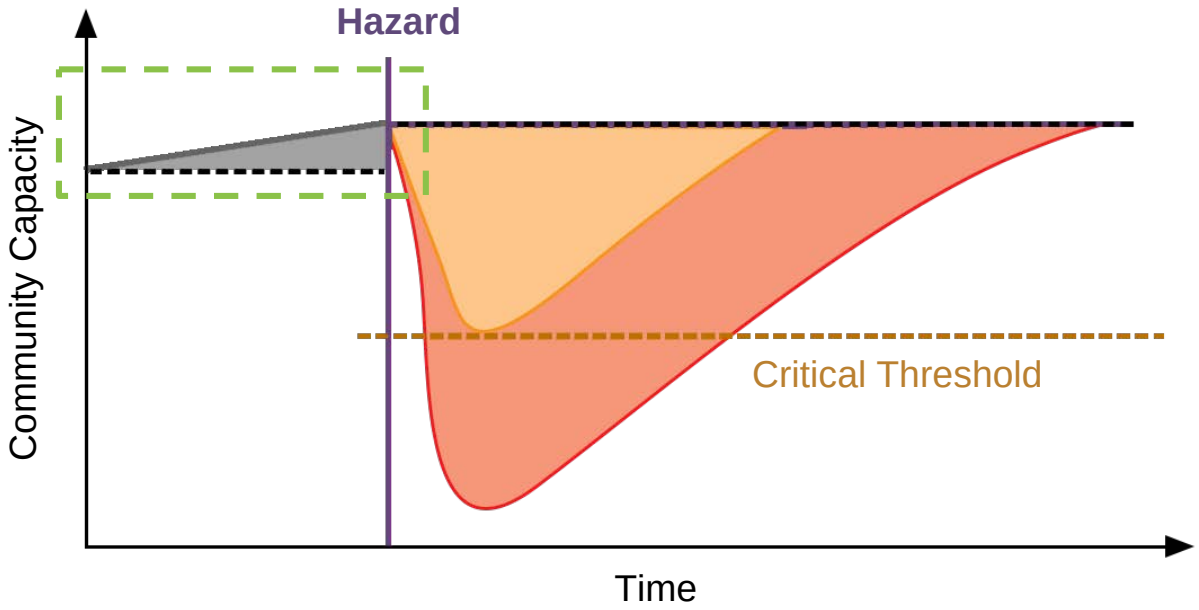

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… same exposure but different vulnerability

Benjamin Lowy for The New York Times

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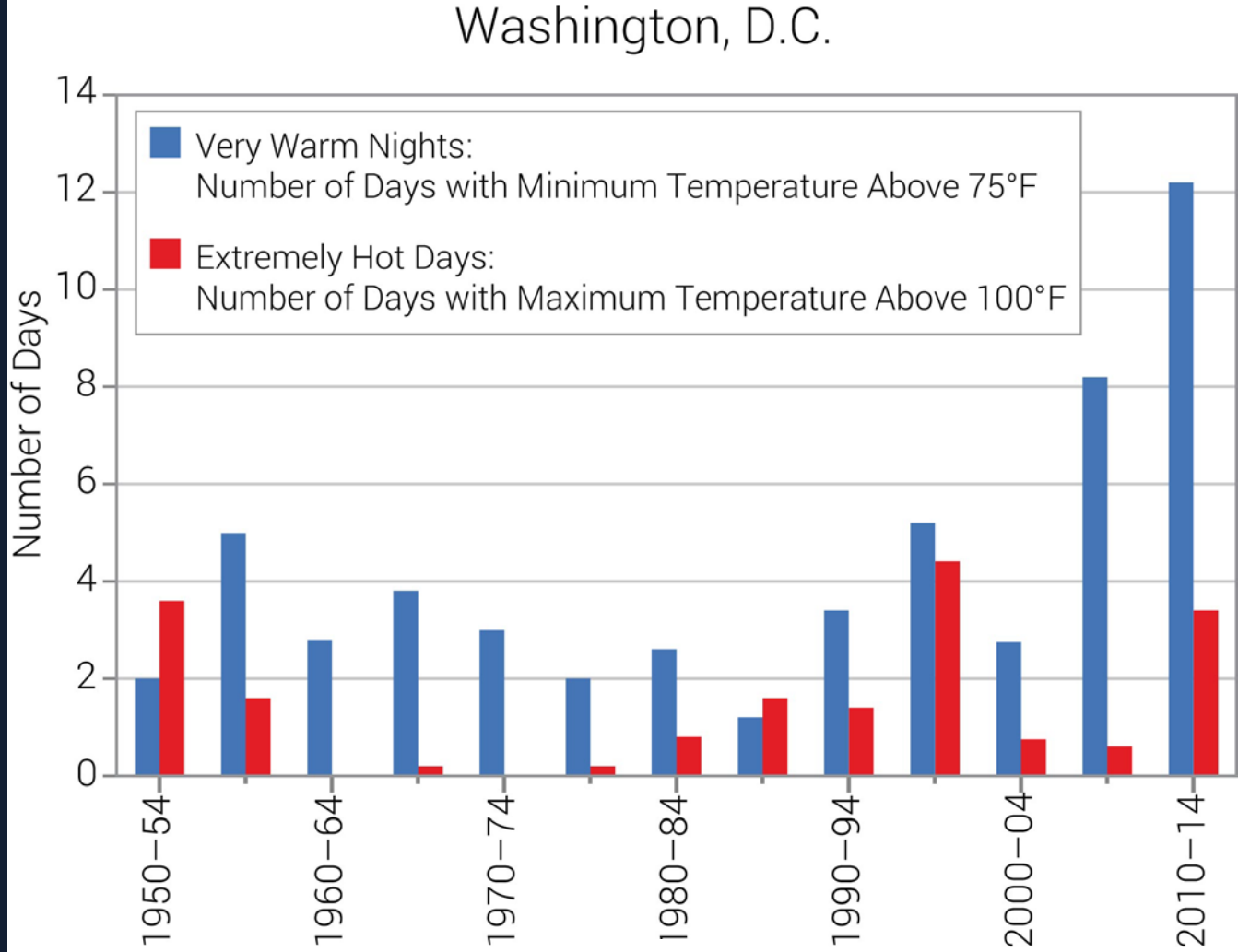
The Steps to Resilience

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

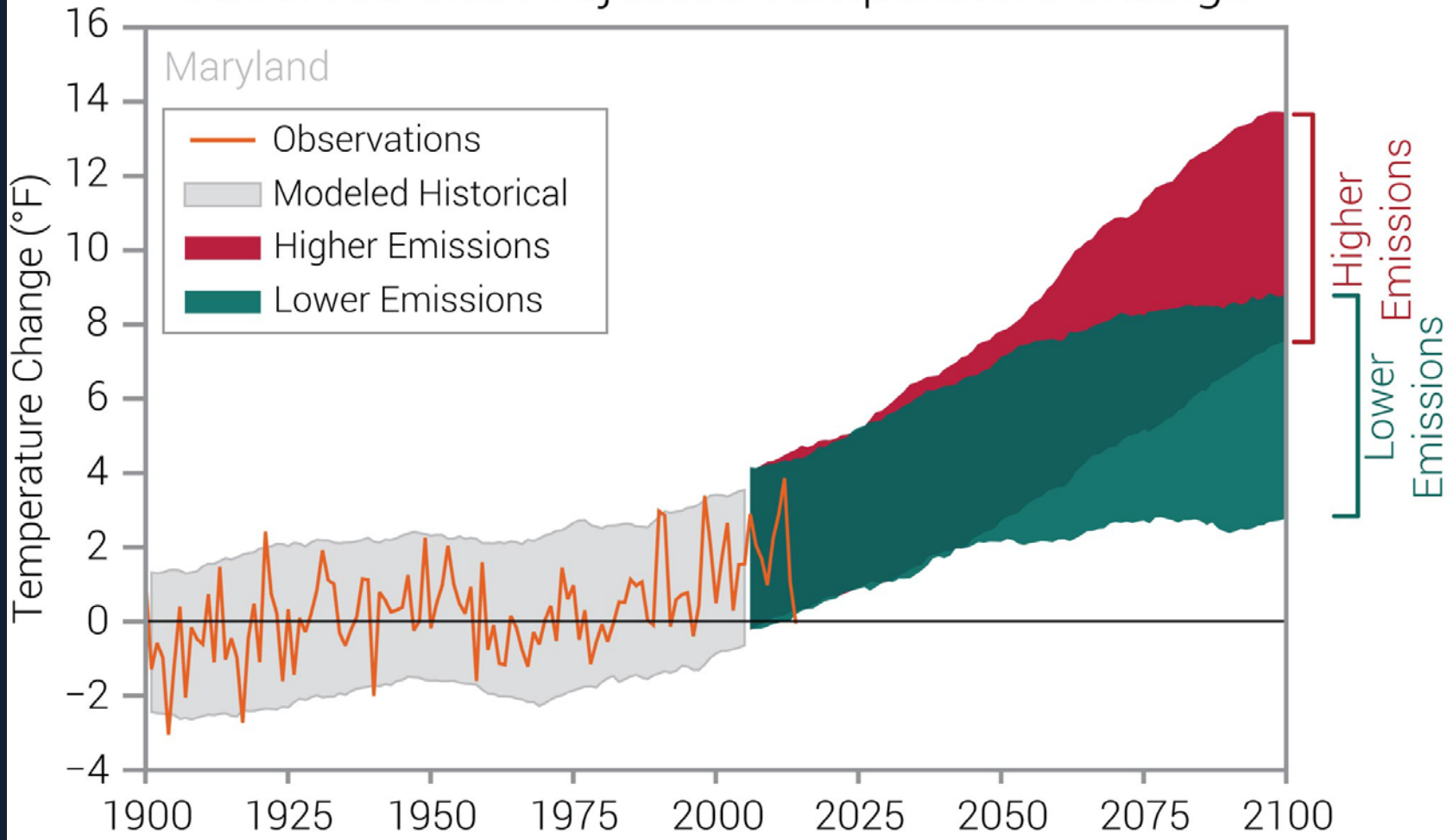
https://toolkit.climate.gov/#steps

Explore Hazards



https://statesummaries.ncics.org/chapter/md#fig-3

Observed and Projected Temperature Change

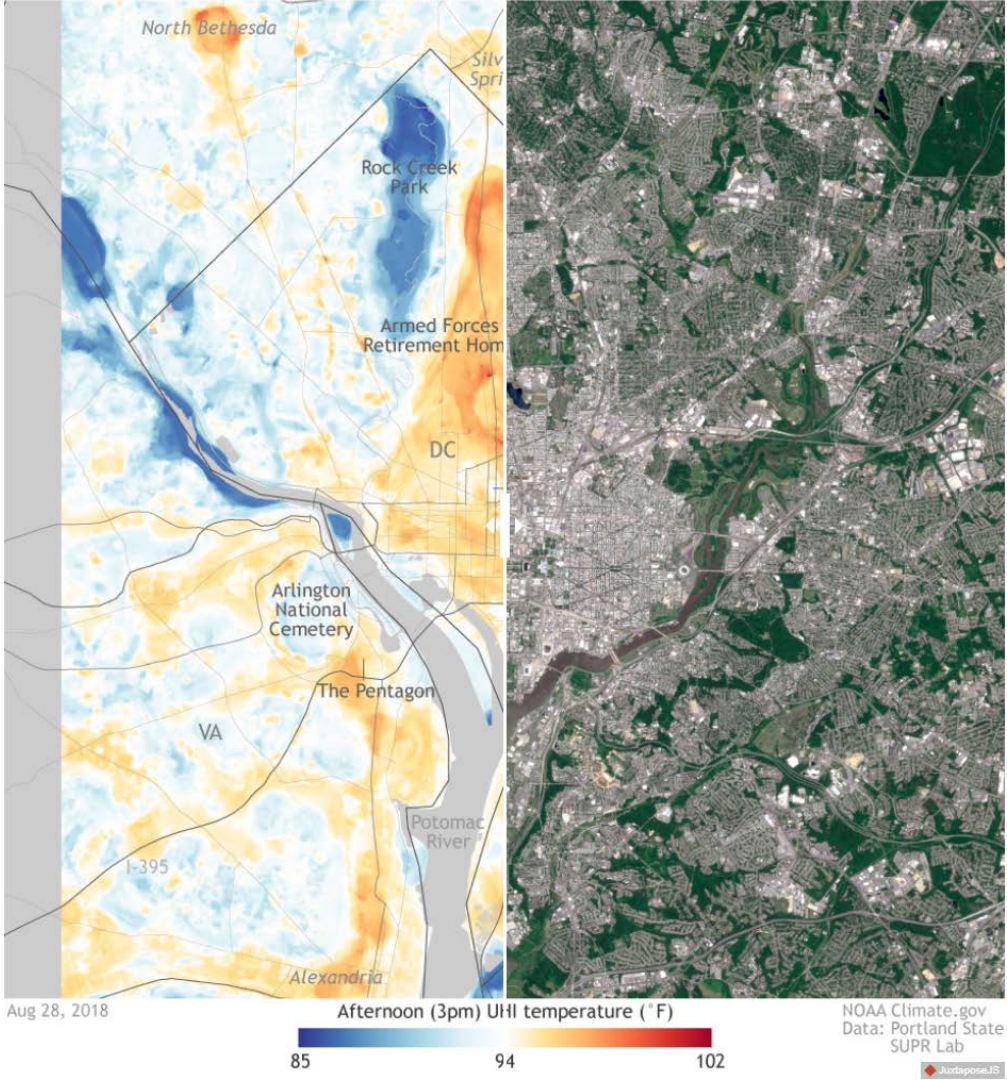


https://statesummaries.ncics.org/chapter/md#fig-1

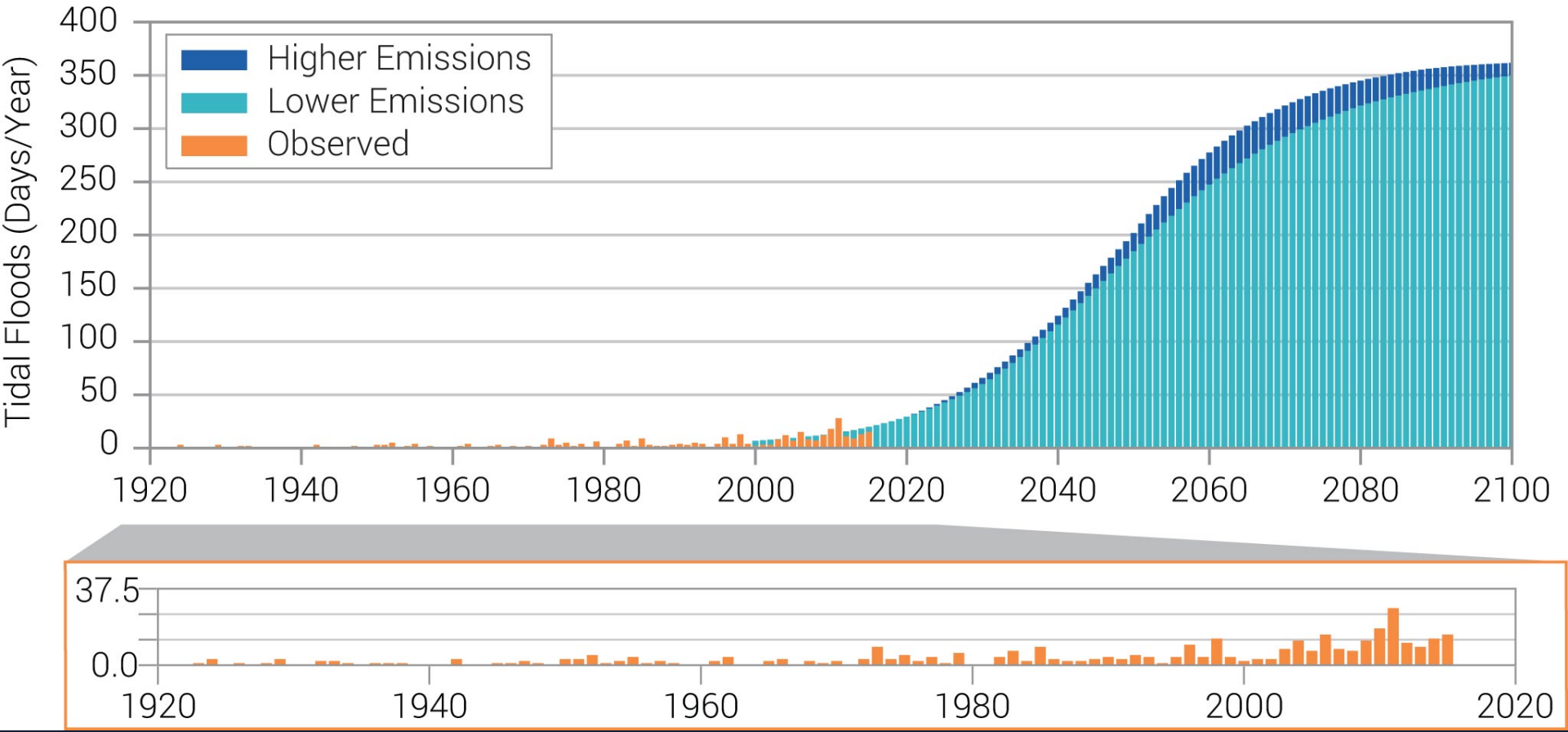
Climate.gov
science & information for a climate-smart nation

Urban Heat Island Mapping

- DC and Baltimore studies conducted summer 2018
- Multiple cities around the nation summer 2019
- Coordinated with local governments and citizens

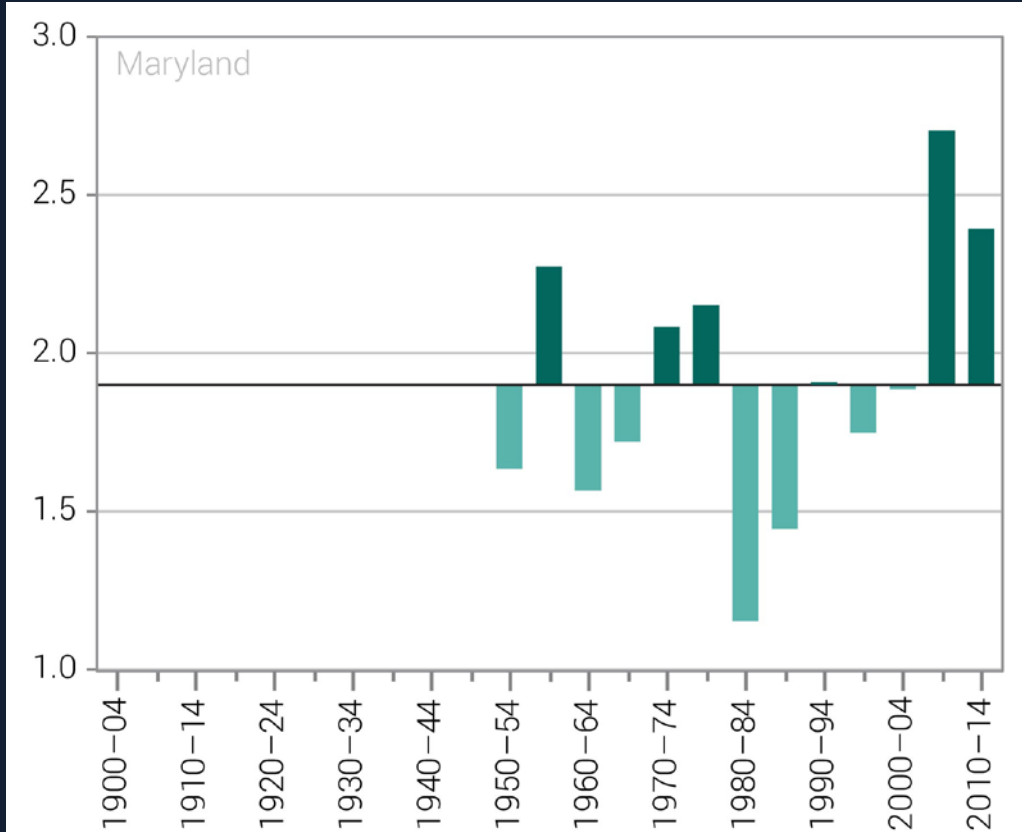


Observed and Projected Annual Number of Tidal Floods for Baltimore, MD



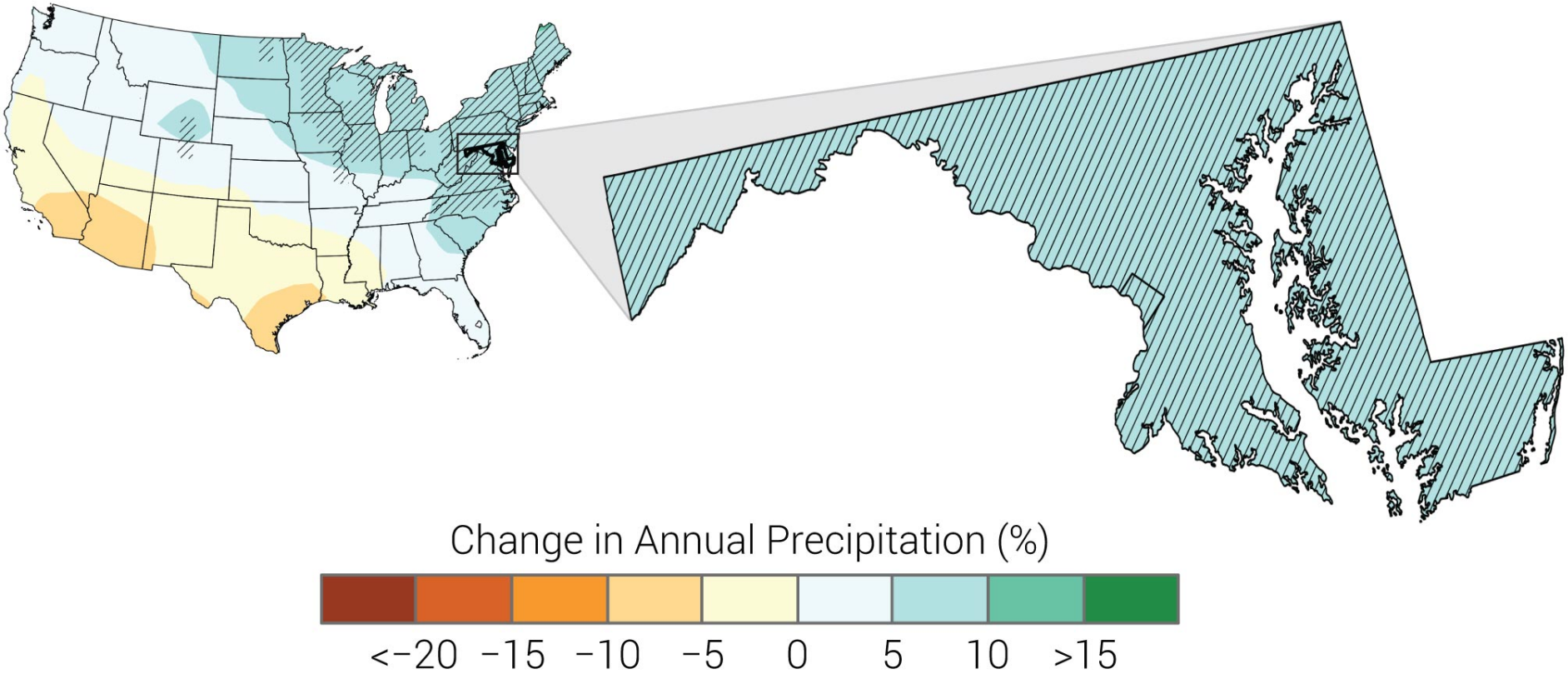
https://statesummaries.ncics.org/chapter/md#fig-6

Days with precipitation >2”



https://statesummaries.ncics.org/chapter/md#fig-4

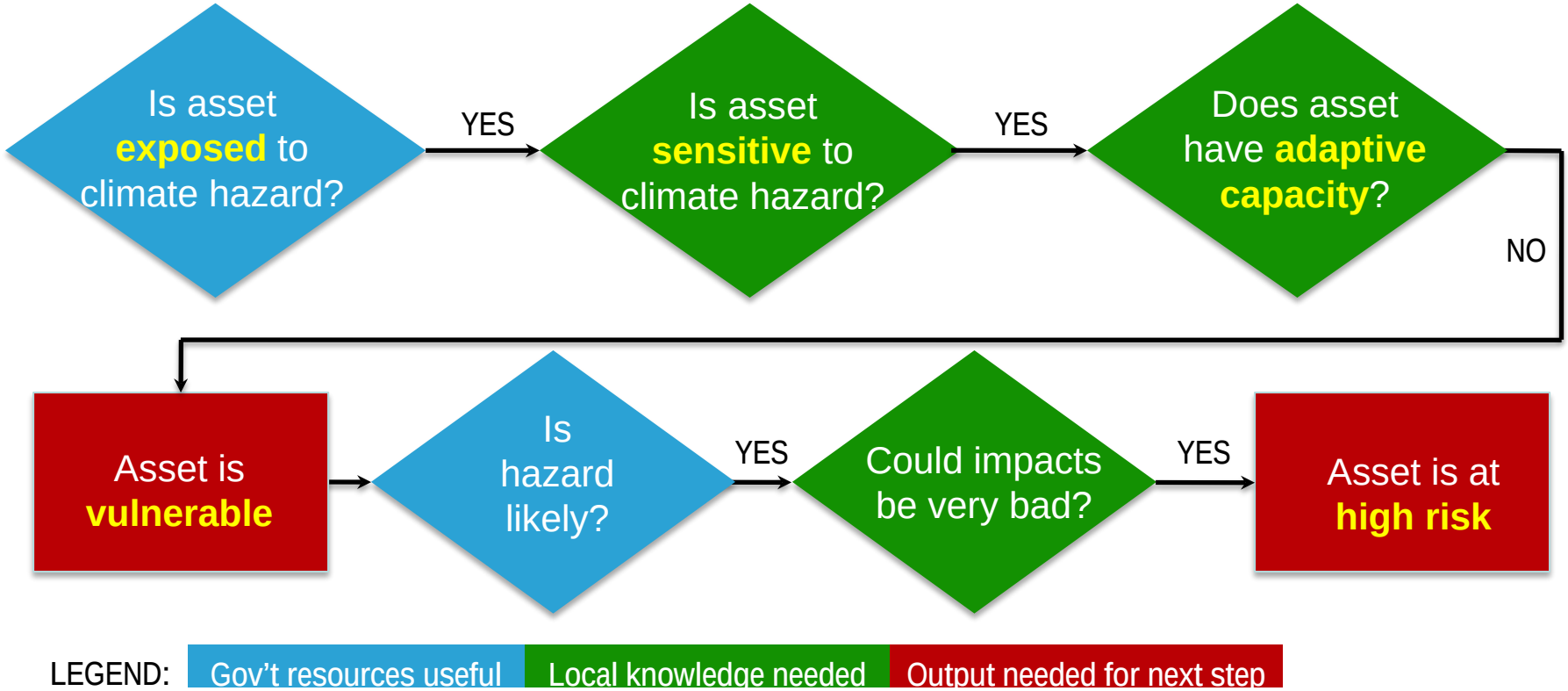
Projected Change in Annual Precipitation



https://statesummaries.ncics.org/chapter/md#fig-5

Assess Vulnerability & Risk

Exposure, Vulnerability & Risk

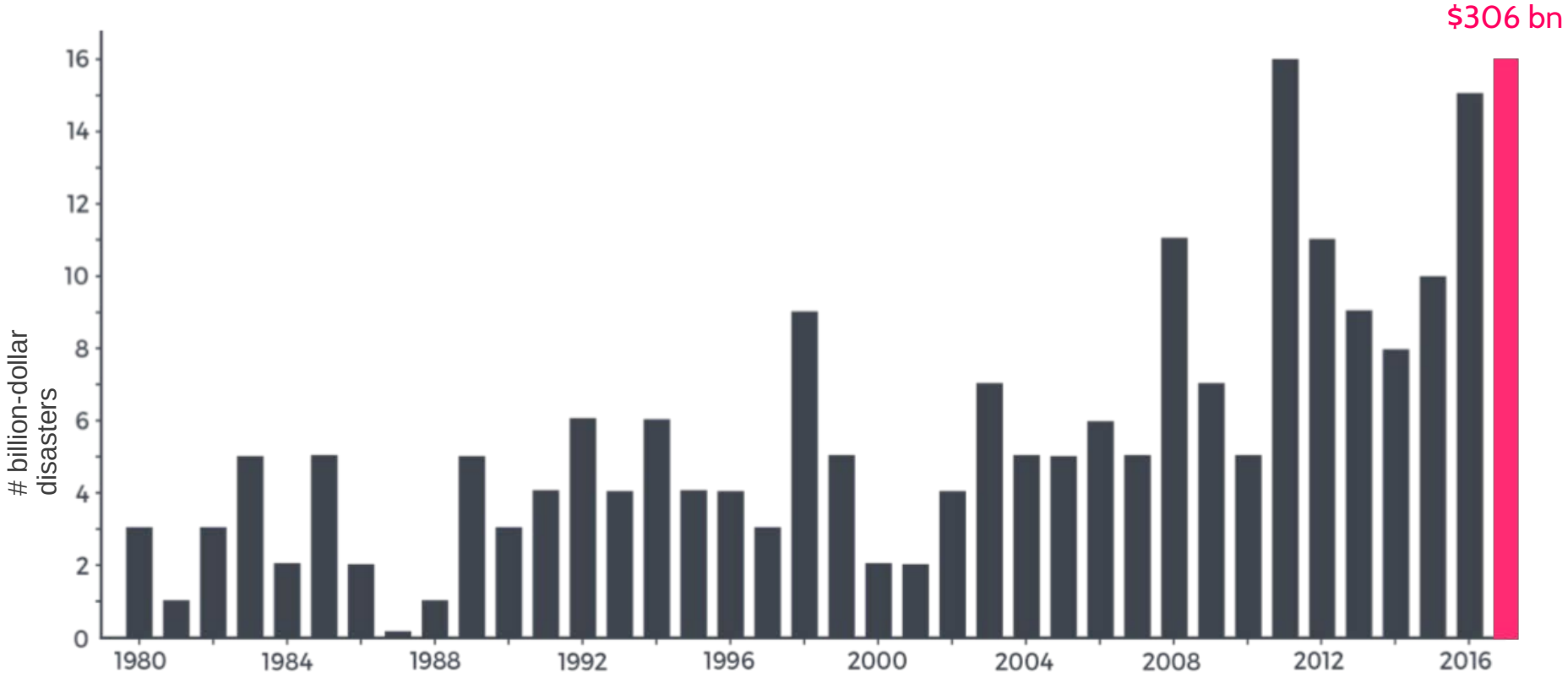


Built Environment, Energy, and Health

Built Environment, Energy, and Health

https://toolkit.climate.gov/topics/built-environment

Risk is increasing. We address this problem locally.

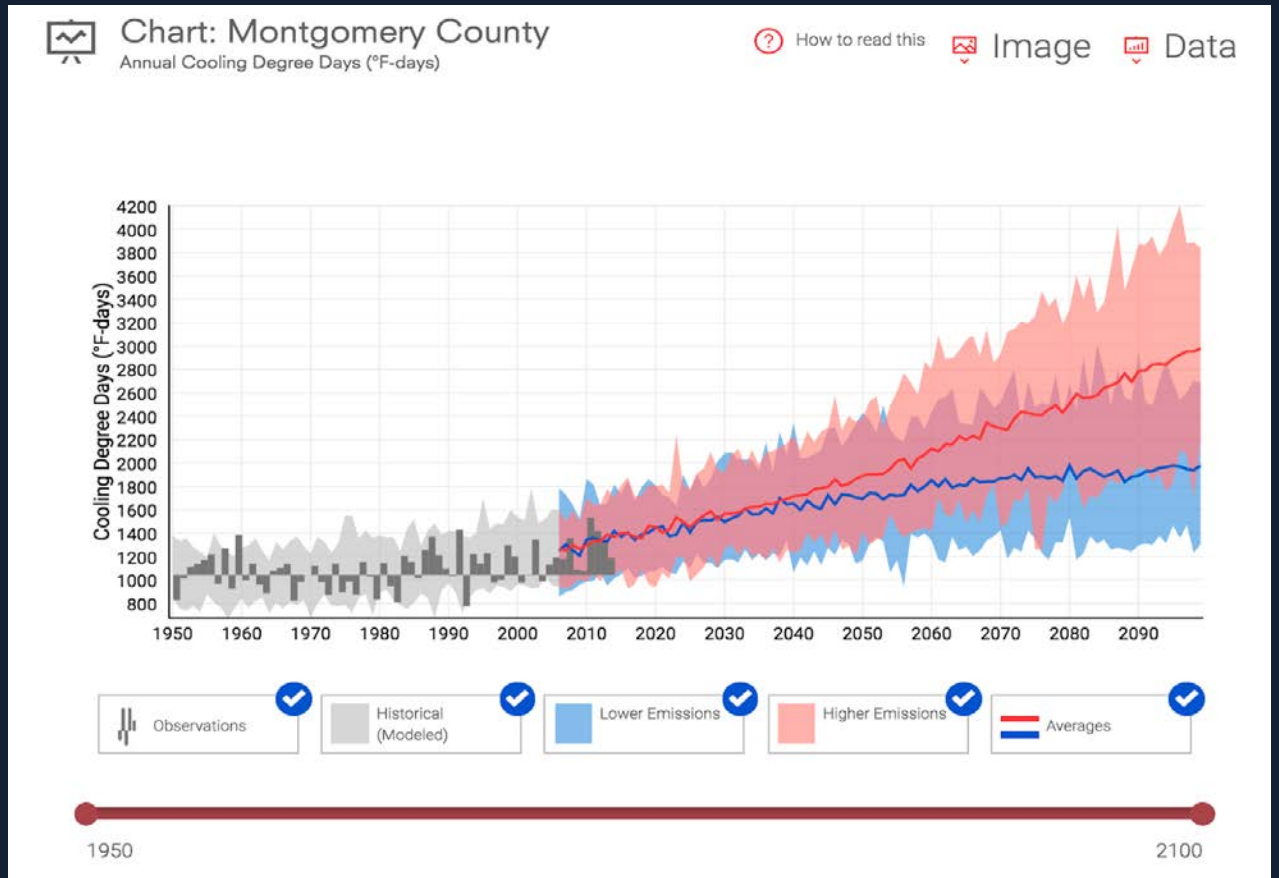


Built Environment, Energy, and Health

https://toolkit.climate.gov/topics/energy-supply-and-use

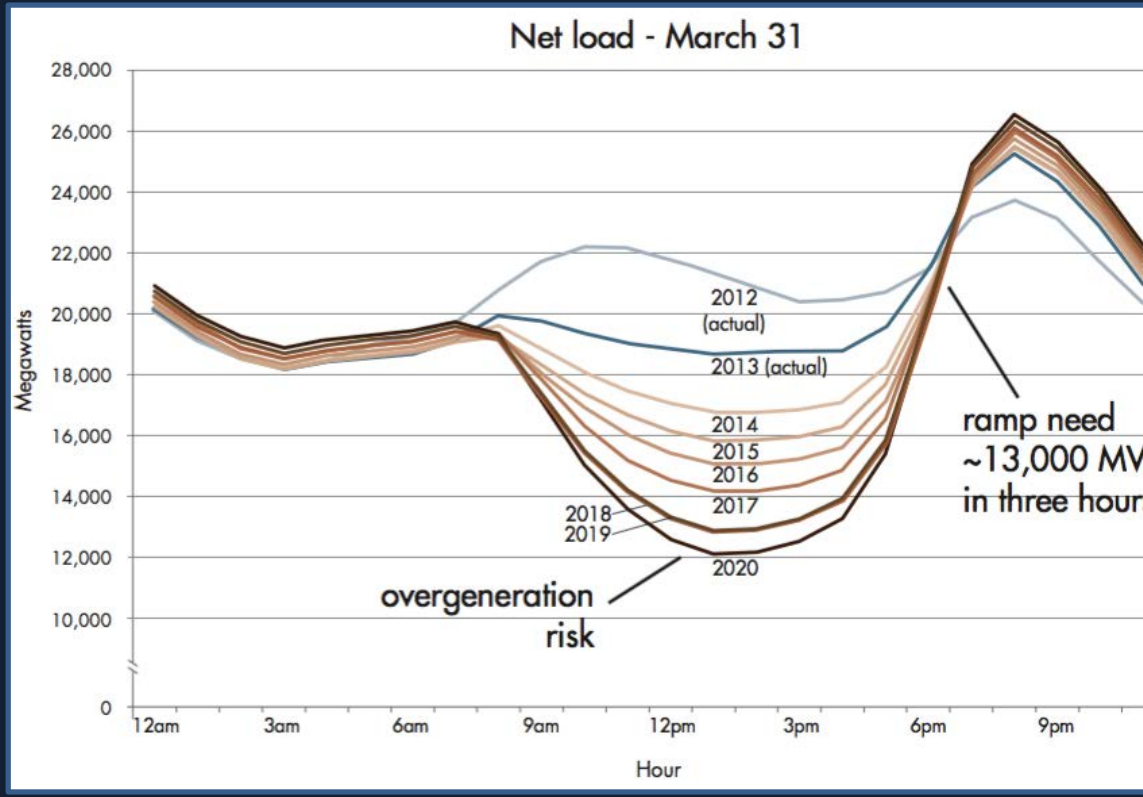
https://nca2018.globalchange.gov/chapter/4/

Projected increase in energy demand (air conditioning)



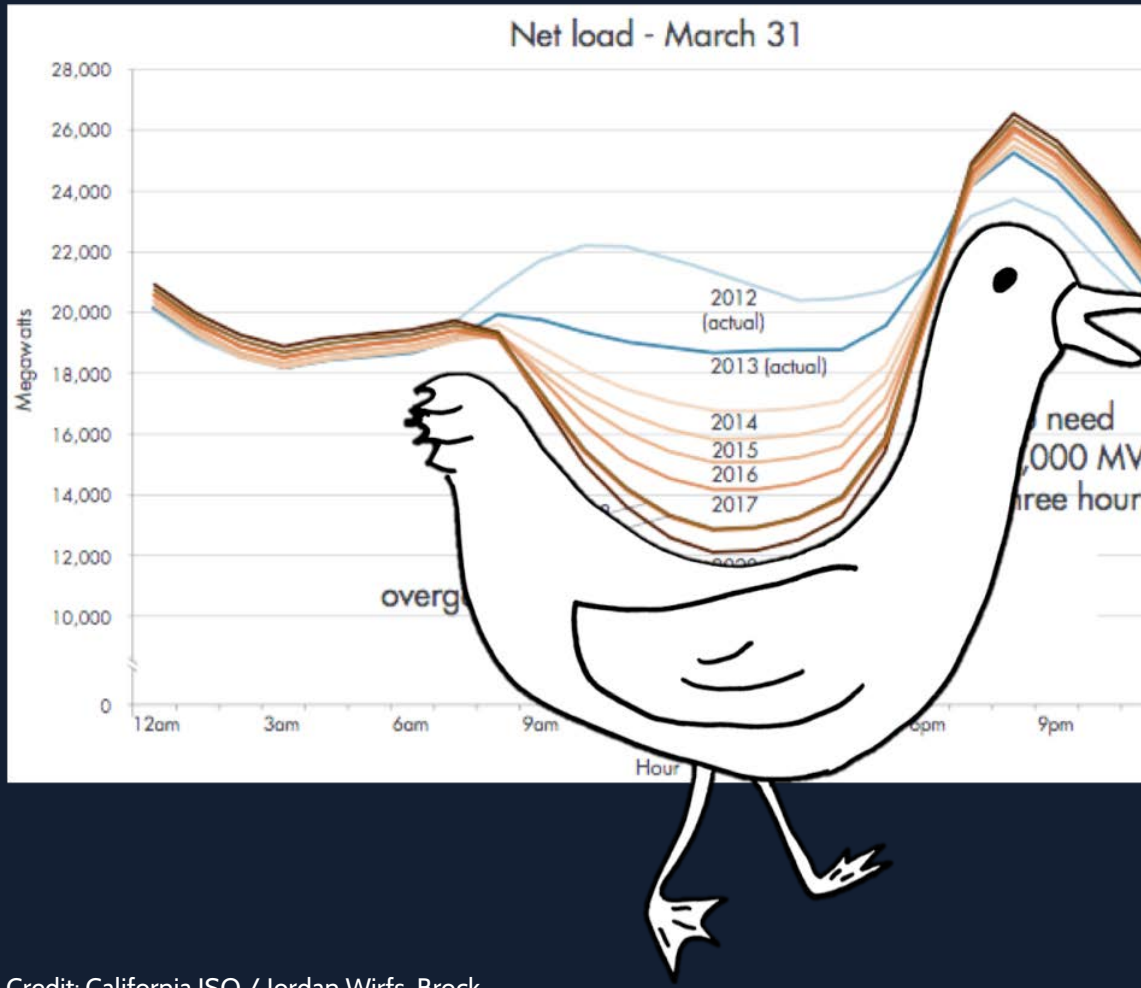
https://crt-climate-explorer.nemac.org/

Solar (distributed grid and utility scale) reduces demand during day



Credit: California ISO / Jordan Wirfs-Brock
http://insideenergy.org/2014/10/02/ie-questions-why-is-california-trying-to-behead-the-duck/

Duck Curve



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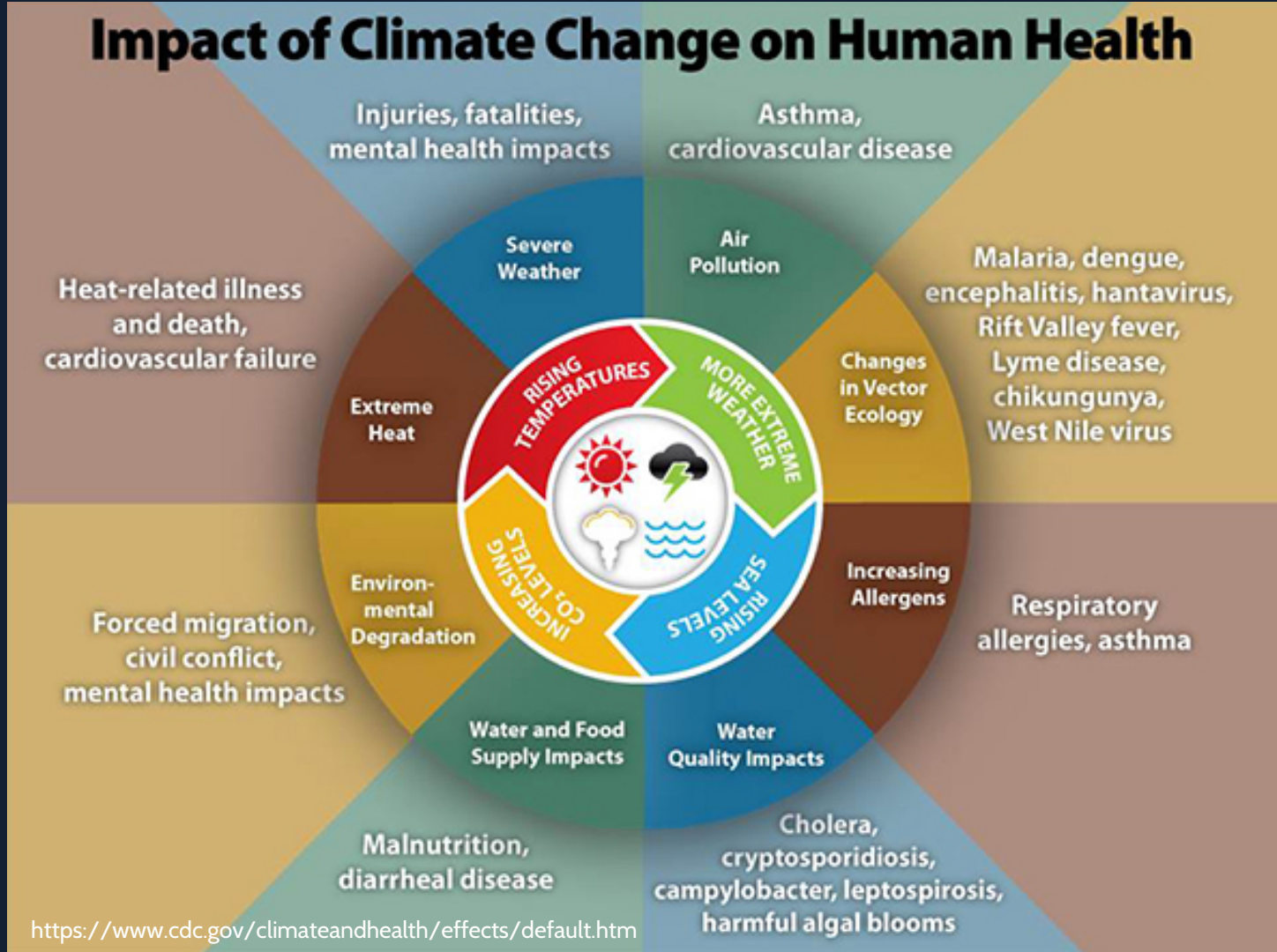
Built Environment, Energy, and Health

https://toolkit.climate.gov/topics/human-health


Impact of Climate Change on Human Health
Injuries, fatalities, mental health impacts
Asthma, cardiovascular disease
Heat-related illness and death, cardiovascular failure
Malaria, dengue, encephalitis, hantavirus, Rift Valley fever, Lyme disease, chikungunya, West Nile virus
Forced migration, civil conflict, mental health impacts
Respiratory allergies, asthma
Malnutrition, diarrheal disease
Cholera, cryptosporidiosis, campylobacter, leptospirosis, harmful algal blooms
Severe Weather
Air Pollution
Extreme Heat
Changes in Vector Ecology
Environ-mental Degradation
Increasing Allergens
Water and Food Supply Impacts
Water Quality Impacts
RISING TEMPERATURES
MORE EXTREME WEATHER
INCREASING CO2 LEVELS
RISING SEA LEVELS
https://www.cdc.gov/climateandhealth/effects/default.htm

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Resources

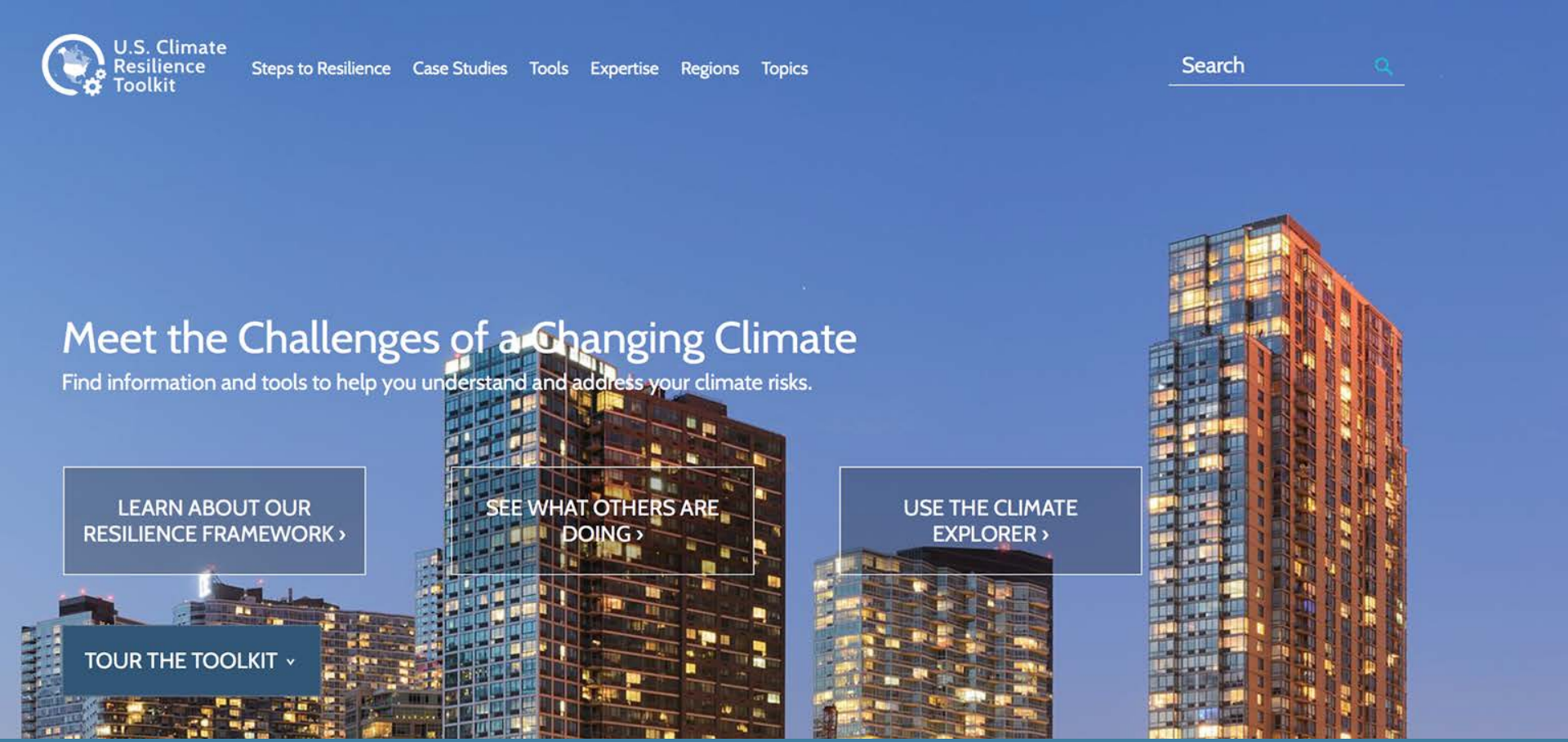
- Steps to Resilience
- U.S. Climate Resilience Toolkit
- Energy Resilience Storymap
- Climate Explorer
- National Climate Assessment
- DC/MD State Summaries

The Steps to Resilience

1. Explore Hazards → Did you know?
2. Assess Vulnerability & Risks → Why should I care?
3. Investigate Options
4. Prioritize & Plan
5. Take Action

→ What can we do about it?

https://toolkit.climate.gov/#steps
Contact: ned.gardiner@noaa.gov



toolkit.climate.gov

Summary overview

Video orientation for each step

Narrative text on each step of the StR process

Glossary & downloadable spreadsheet to help users capture notes

You are here in the StR process

Links to case studies showing others taking this step.

Links to tools useful/relevant to this step.

U.S. Climate Resilience Toolkit

Steps to Resilience | Case Studies | Tools | Expertise | Regions | Topics | Search

SHARE TWEET PRINT

Explore Hazards

- *Gather a team of people who want to protect local assets.*
- *Check past weather events and future climate trends.*
- *List the things you value that could be damaged.*

After this exploration, you'll discover if weather and climate represent a hazard to things you value.

Steps to Resilience

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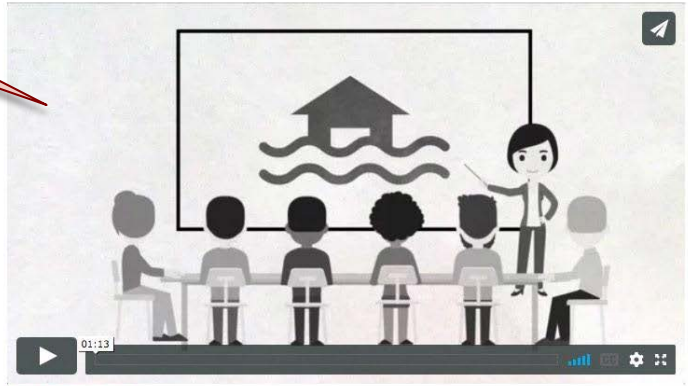
Steps to Resilience › Explore Hazards ›



Step 1. Explore Hazards

Establish a team

- Engage stakeholders and decide how you'll work together.

There's a saying: "If you want to go fast, go alone. If you want to go far, bring others." In almost every case, projects that build climate *resilience* require going far *(linked terms in these Steps to Resilience pages provide access definitions and examples)*.

To ensure you have the broad support necessary to implement a resilience-building project, start by recruiting a comprehensive group of stakeholders. All the individuals and organizations that could be

Case Studies

Motivating the Agricultural Community to Build Climate Resilience ›

Shopping Mall Exhibit Raises Awareness of Sea Level Rise ›

Yukon Delta Villages Document Baseline Environmental Data ›

Tools

Climate at a Glance ›

Climate Explorer ›

Coastal Flood Exposure Mapper ›

Guidelines for Considering Traditional Knowledges in Climate Change Initiatives ›

Hawai'i and U.S. Pacific Islands Region Climate Impacts and Outlook ›

Local Environmental Observer (LEO) Network ›

Pacific Islands Regional Climate Assessment (PIRCA) ›

Sea Level Rise and Coastal Flooding Impacts Viewer ›

Relevant Reports

Climate Change Impacts in the United States: The Third National Climate Assessment ›

Compare to gallery

CLIMATE INFORMATION FOR ELECTRIC UTILITIES

Enhancing the Resilience of the Nation's Electricity System focuses on identifying, developing, and implementing strategies to increase the power system's resilience to events that can cause large-area, long-duration outages. This site contributes to that goal by helping utilities recognize their exposure to climate-related hazards.

https://bit.ly/2JKDSqd


U.S. Climate Resilience Toolkit
https://crt-climate-explorer.nemac.org
Tour This Page
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FAQ
Credits
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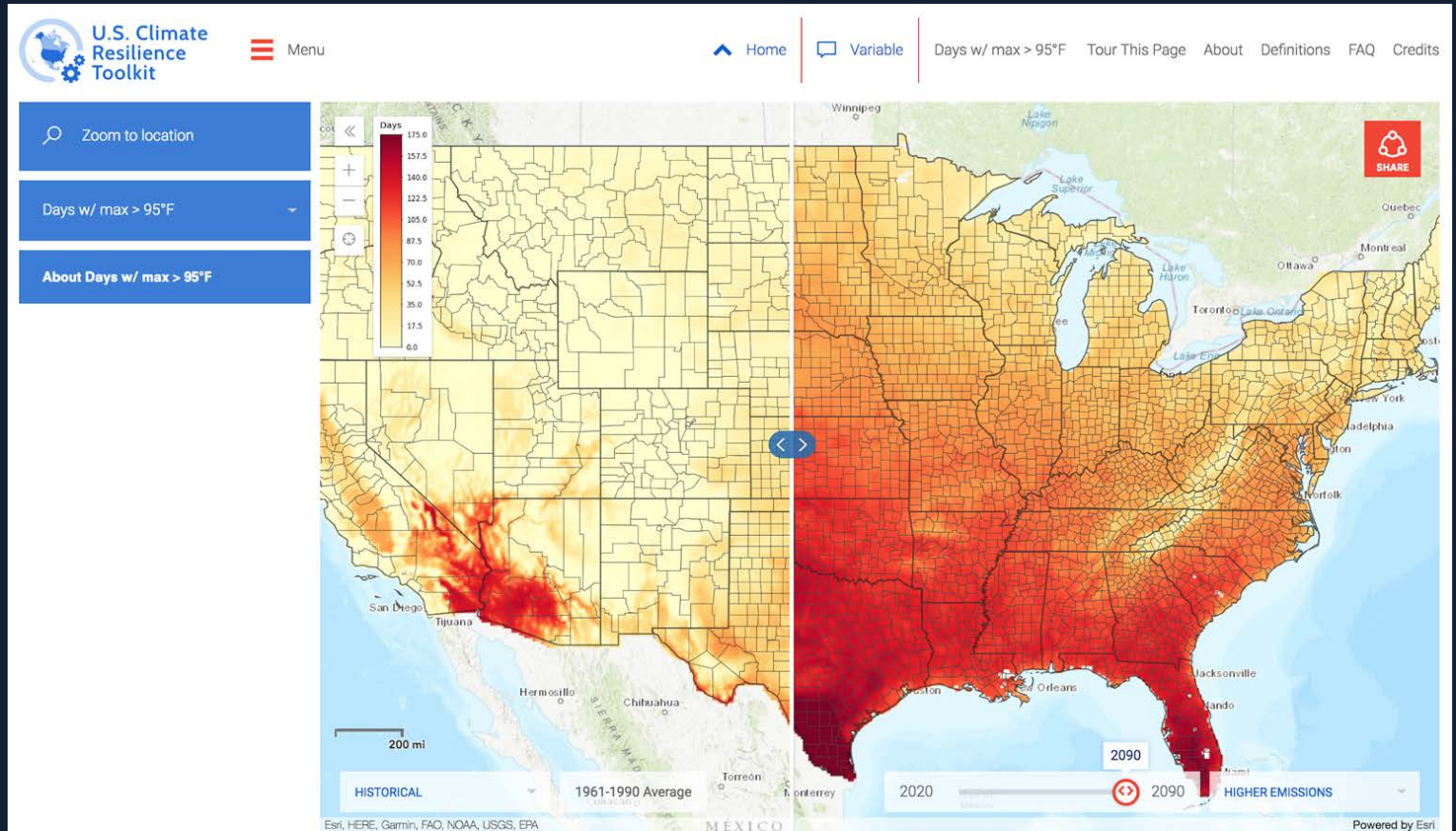
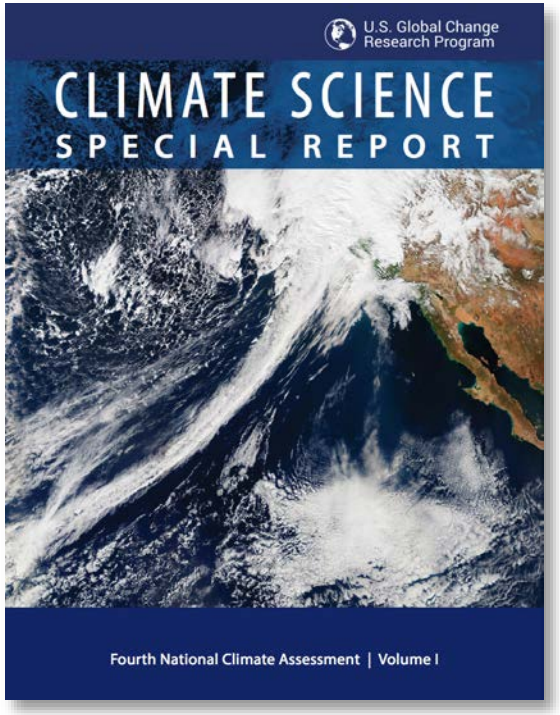
THE CLIMATE EXPLORER
Explore graphs and maps of historical and projected climate variables for any county in the contiguous United States.
Select a location
View by variable
Weather & Tidal Stations
New here? Take the tour
GlobalChange.gov
USGS
NASA
Designed by Habitat Seven

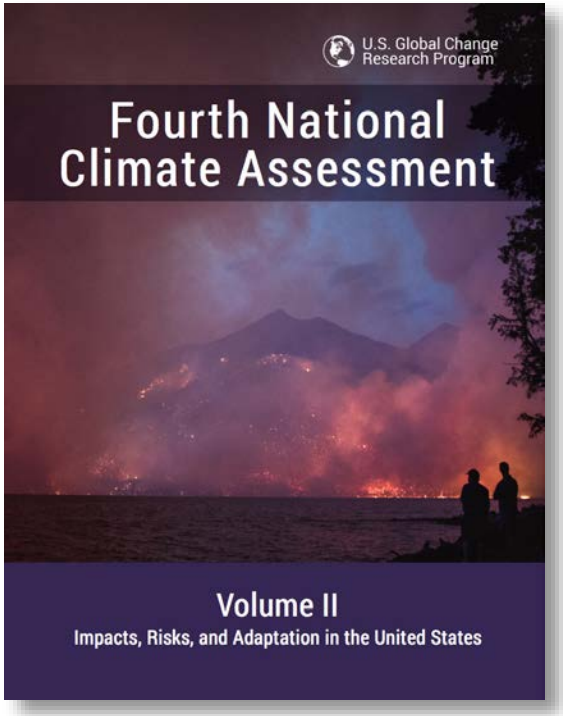
Number of very hot days is projected to increase in U.S.



National Climate Assessment: Free, authoritative assessments on the science of climate change & variability, and their impacts

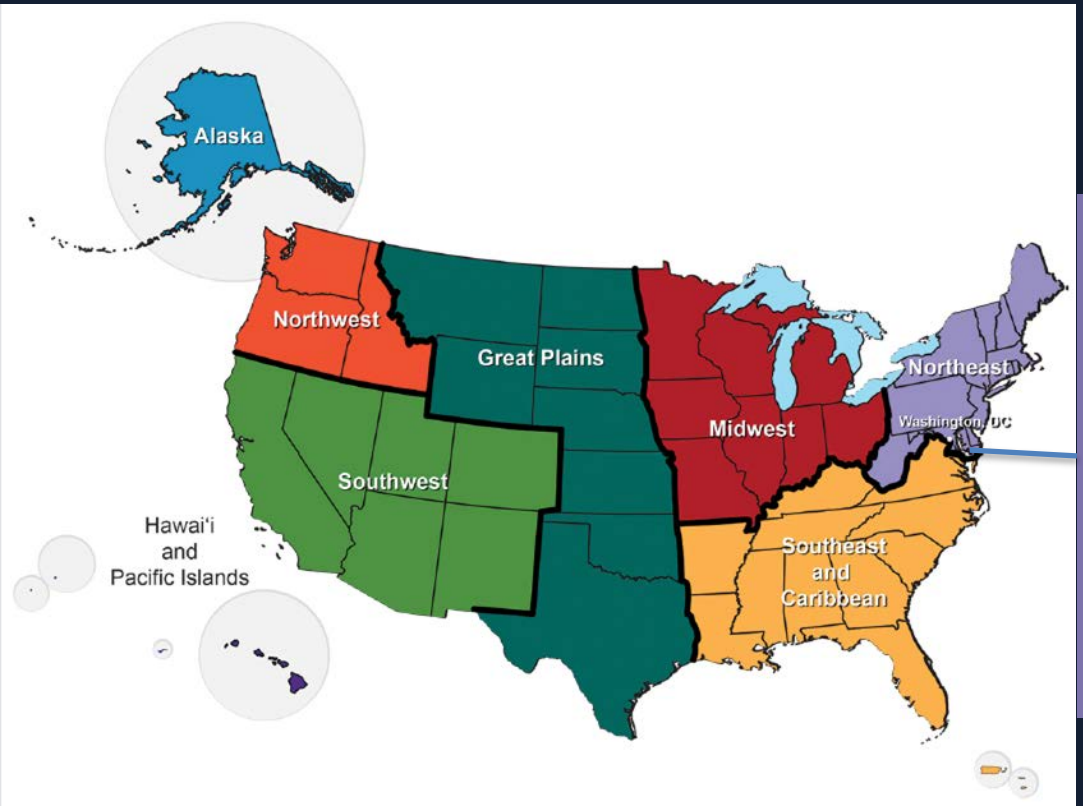


science2017.globalchange.gov



nca2018.globalchange.gov

National Climate Assessment



- Heat Waves
- Coastal Flooding
- River Flooding


NOAA NATIONAL CENTERS
FOR ENVIRONMENTAL INFORMATION
STATE CLIMATE SUMMARIES
MARYLAND AND
DISTRICT OF COLUMBIA
https://statesummaries.ncics.org/chapter/md/

Conclusion

- Climate data illustrate the need to shape decisions in better ways
- The U.S. Climate Resilience Toolkit is a bridge to climate-smart decisions
- Our team stands ready to consult/assist the Steps to Resilience (ned.gardiner@noaa.gov)