

Climate Vulnerability Assessment

Tools and Techniques



U.S. Climate
Resilience Toolkit

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NOAA Climate Program Office

FFC Cyber/Physical Security Committee

June 20, 2024 meeting

Introduction



Climate Vulnerability Assessment

Handouts (links)

U.S. Climate Resilience Toolkit: toolkit.noaa.gov

Glossary: toolkit.climate.gov/content/glossary

Steps to Resilience: toolkit.climate.gov/steps-to-resilience/steps-resilience-overview

Federal Sustainability: sustainability.gov

Federal Agency Climate Action Plans (CAPs): Policy

- Executive Order (E.O.) 14008, *Tackling the Climate Crisis at Home and Abroad*
- E.O.14057, *Catalyzing Clean Energy Industries And Jobs Through Federal Sustainability*
- *Disaster Resilience Planning Act* calls for Federal agencies to incorporate natural hazard and climate resilience information into their agencies' real property management practices
- E.O. 14030, *Climate-Related Financial Risk*

Results



Federal Agency Climate Action Plans (CAPs)

- (1) identify aspects of climate change that are impacting**, or are likely to impact, the agency's ability to achieve its statutory mission and sustain operations, and
- (2) develop a strategic implementation plan** to adapt and build resilience to current and future climate impacts.

Federal Agency Climate Action Plans (CAPs)

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SELECTING CLIMATE INFORMATION TO USE IN CLIMATE RISK AND IMPACT ASSESSMENTS

GUIDE FOR FEDERAL AGENCY CLIMATE
ADAPTATION PLANNERS

MARCH 2023



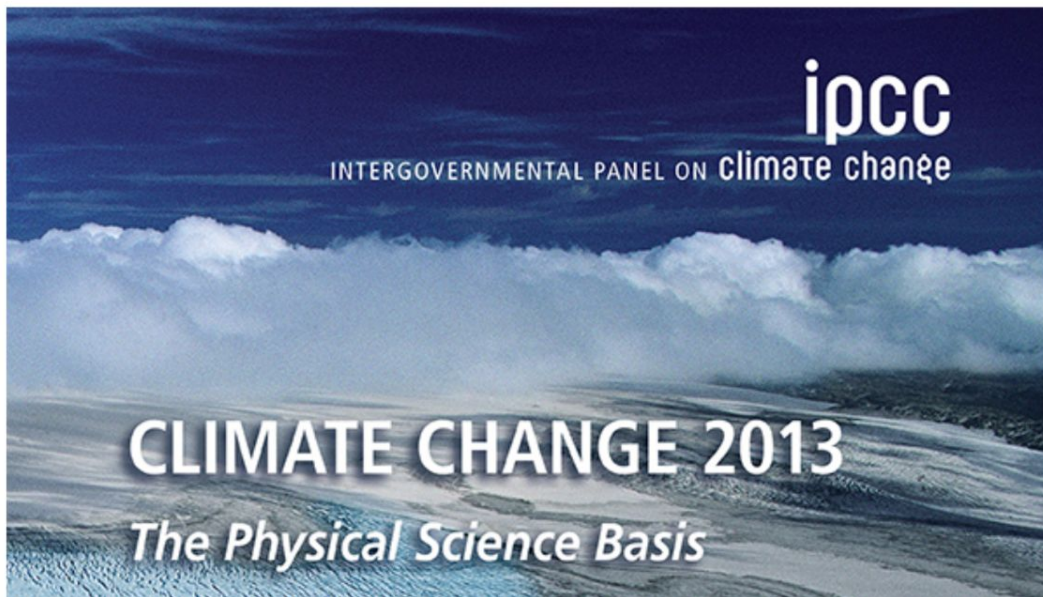
THE WHITE HOUSE
WASHINGTON

[Home](#) >

Climate Change 2013: The Physical Science Basis

Published September 2013

This report, representing the Intergovernmental Panel on Climate Change (IPCC) Working Group I's contribution to the IPCC Fifth Assessment report (AR5), explores the hard science elements of global climate change.



URL to Main Site for Report

<http://www.ipcc.ch/report/ar5/wg1/#.UkV2GLybKKw> >

Issuing Agencies

[Intergovernmental Panel on Climate Change](#) >

Related Links

[Summary for Policymakers \(PDF\)](#) >

[Frequently Asked Questions Brochure \(PDF\)](#) >

Content

[Climate Impacts](#)

[Climate Education](#)

Scope

[Global](#)

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The Fifth National Climate Assessment

The Fifth National Climate Assessment is the US Government's preeminent report on climate change impacts, risks, and responses. It is a congressionally mandated interagency effort that provides the scientific foundation to support informed decision-making across the United States.



Understand Exposure

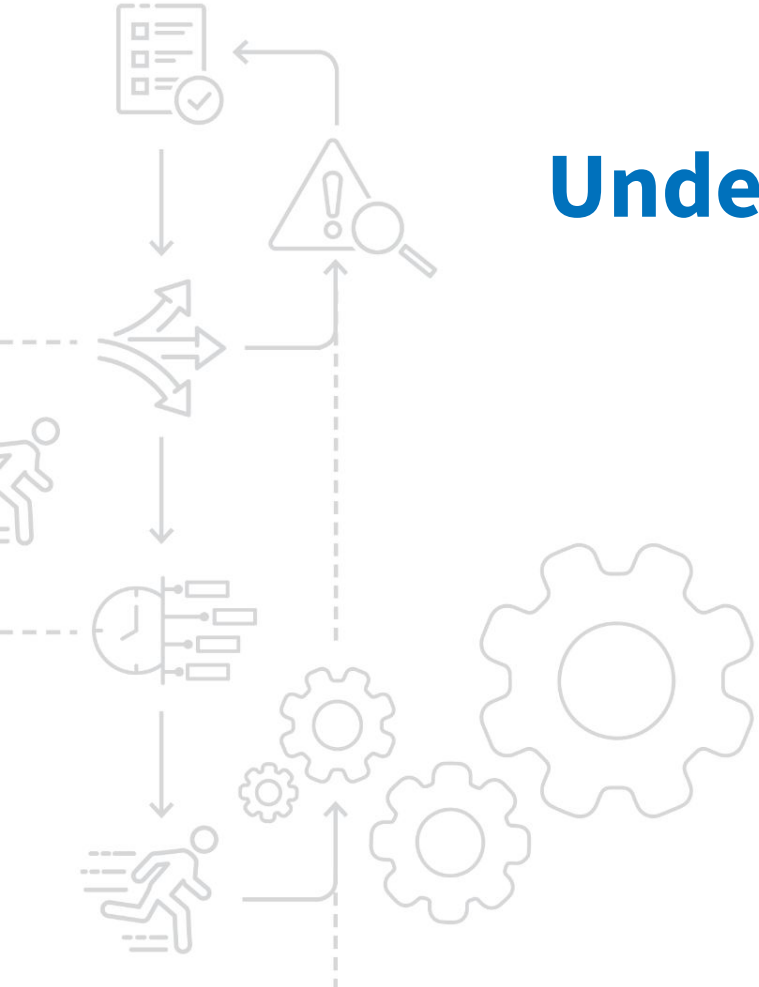


Table 1. Examples of Climate-Related Hazards and Associated Climate and Non-Climate Stressors.

Hazard	Climate Stressors	Non-Climate Stressors
Tidal flooding	<ul style="list-style-type: none"> • Sea level rise • Heavy precipitation 	<ul style="list-style-type: none"> • Deteriorating infrastructure or cybersecurity risks • Increased development/impervious surfaces • Elevated coastal ground water levels; decreased drainage and more standing water
Storm surge	<ul style="list-style-type: none"> • Sea level rise • Tropical systems 	<ul style="list-style-type: none"> • Deteriorating infrastructure or cybersecurity risks • Increased development/impervious surfaces • Lack of coastal vegetation (e.g., dunes, coral reefs)
Floodplain inundation	<ul style="list-style-type: none"> • Sea level rise • Increase in rainfall frequency/intensity 	<ul style="list-style-type: none"> • Increased development/impervious surfaces • Socioeconomic vulnerability
Extreme heat	<ul style="list-style-type: none"> • Temperature variability 	<ul style="list-style-type: none"> • Increased development/impervious surfaces/decrease in trees, vegetation, etc. • Socioeconomic vulnerability
Wildfire	<ul style="list-style-type: none"> • Drought (water shortage and vegetation desiccation) • Temperature variability 	<ul style="list-style-type: none"> • Wildland–urban interface/fuels and vegetation, historic fire suppression • Invasive grasses • Human-caused ignitions, historic fire suppression
Landslides	<ul style="list-style-type: none"> • Increase in rainfall frequency/intensity, high temperatures, and snowstorms 	<ul style="list-style-type: none"> • Development/vegetation removal • Wildfire-affected landscapes

Source: adapted from the U.S. Climate Resilience Toolkit.



Federal Climate Mapping for Resilience and Adaptation

(Federal Mapping App)



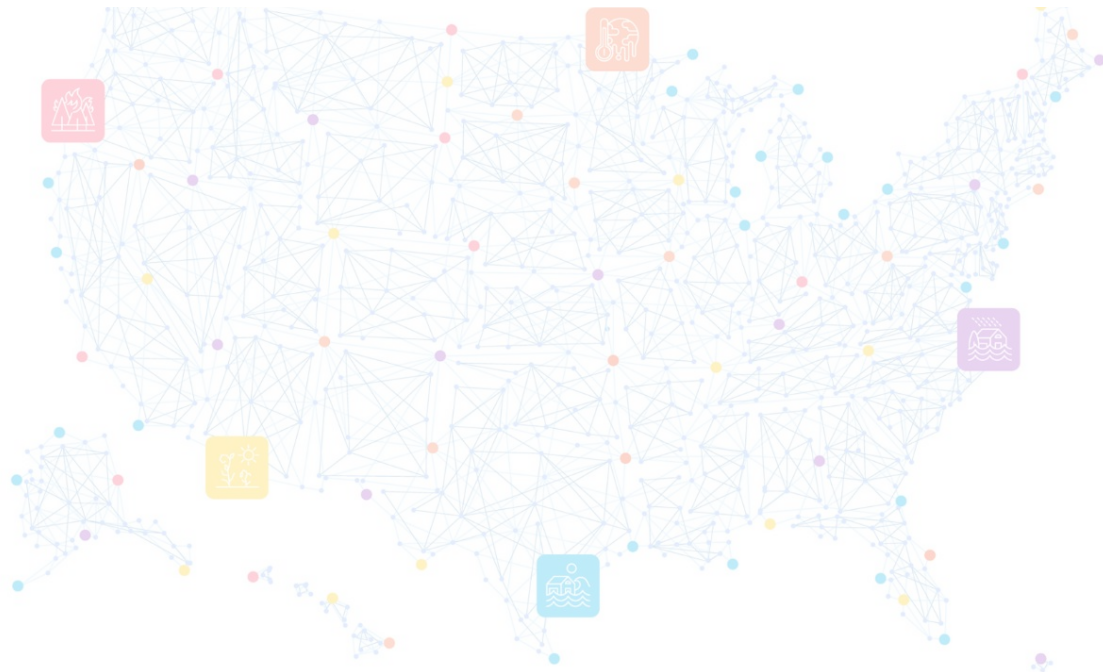
Climate Mapping for Resilience & Adaptation

[Get Started](#)

[Steps to Resilience](#)

[Assessment Tool](#)

[Federal Funding](#)





CMRA

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[Open Data](#)

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Federal Mapping App

resilience.climate.gov



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Model Generation	Commonly Used Scenarios	Notes
CMIP5	RCP2.6 RCP4.5 RCP6.0 RCP8.5	<ul style="list-style-type: none">• By using both RCP4.5 and RCP8.5, those assessing risk can incorporate a range of possible futures and take advantage of the large literature base available on climate impacts.¹⁰• RCP4.5 and RCP6.0 are the most similar to current emissions trajectories based on global climate policy, but RCP6.0 data are generally less available and accessible.• RCP8.5 may most accurately reflect near-term risk because it closely follows historical emissions but represents an upper-bound/ high-consequence future for the end of the century.

Federal Climate Mapping for Resilience and Adaptation

(Federal Mapping App)

- Wildfire
- Flooding
- Extreme Precipitation
- Sea Level Rise
- Extreme Heat

Agencies have the option to include exposure to other key natural hazards

Exposure of buildings

Climate Hazard	Historical Data	RCP8.5 2050 (Mid-Century)	RCP8.5 2080 (Late-Century)
Wildfire	✓	✗	✗
Flooding (100 and 500-year floodplains)	✓	✗	✗
Extreme Heat	✓	✓	✓
Extreme Precipitation (indicator for flooding)	✓	✓	✓
Sea Level Rise	✗	✓	✓

Exposure of Employees

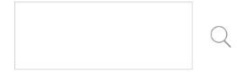
Climate Hazard	Historical Data	RCP8.5 2050 (Mid-Century)	RCP8.5 2080 (Late-Century)
Wildfire	✓	✗	✗
Extreme Heat	✓	✓	✓
Extreme Precipitation (indicator for flooding)	✓	✓	✓
Sea Level Rise	✗	✓	✓

Sea Level Rise Resources

- 2022 Sea Level Rise Technical Report
- Application Guide for the 2022 Sea Level Rise Technical Report
- Interagency Sea Level Rise Scenario Tool
- NOAA Sea Level Rise Viewer
- USACE Sea Level Tracker
- Coastal Storm Modeling System (CoSMoS)
- Hazard Exposure and Reporting Analytics (HERA)

Federal Agency Climate Action Plans (CAPs)

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Federal Progress, Plans, and Performance

[Home](#) / Progress

All

Annual Climate Adaptation Plans

Annual Sustainability Plans

Agency Progress Data

OMB Scorecards



[Army Corps of Engineers](#)



[Department of Agriculture](#)



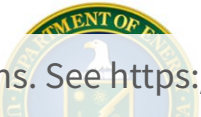
[Department of Commerce](#)



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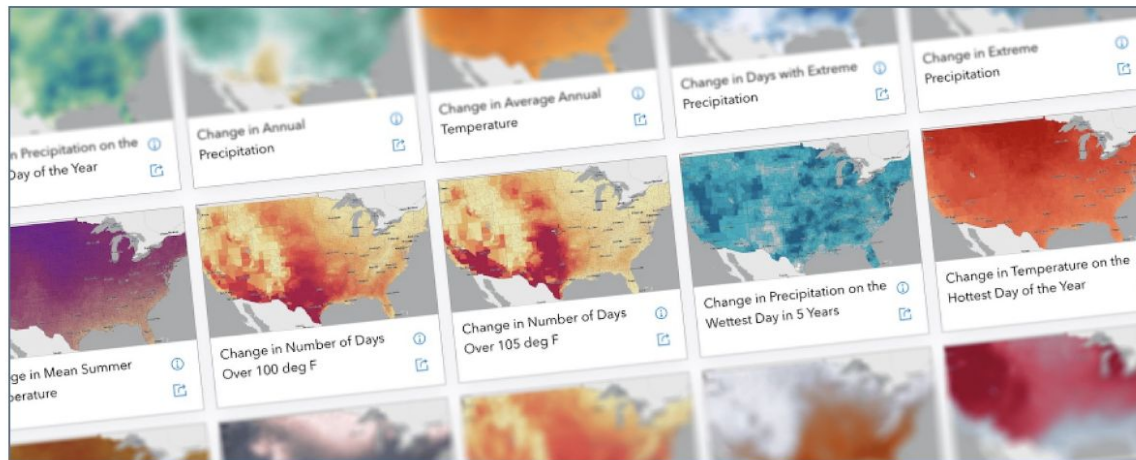
28 agency plans. See <https://www.sustainability.gov/progress.html>

Tools



TOOLS

Looking for climate data? Need to compile a Climate Vulnerability Assessment or Adaptation Plan? Our catalog of more than 500 digital tools can help you take steps to build resilience, from engaging a community to developing a climate action plan. Here's one example of the tools in our catalog:



NCA Interactive Atlas >

The Atlas is an extension of the Fifth National Climate Assessment (NCA5), providing interactive access to maps and data used in NCA5. The initial release offers maps showing 15 variables of downscaled climate projections at 4 levels of global warming.

BROWSE ALL TOOLS >

Steps to Resilience

Get Started

Understand Exposure

Assess Vulnerability and Risk

Investigate Options

Prioritize & Plan

Take Action





Get Started



Understand Exposure



Assess Vulnerability & Risk



Investigate Options



Prioritize & Plan



Take Action



<https://toolkit.climate.gov/steps-to-resilience/steps-resilience-overview>

See reference list at the bottom of the overview page for citations



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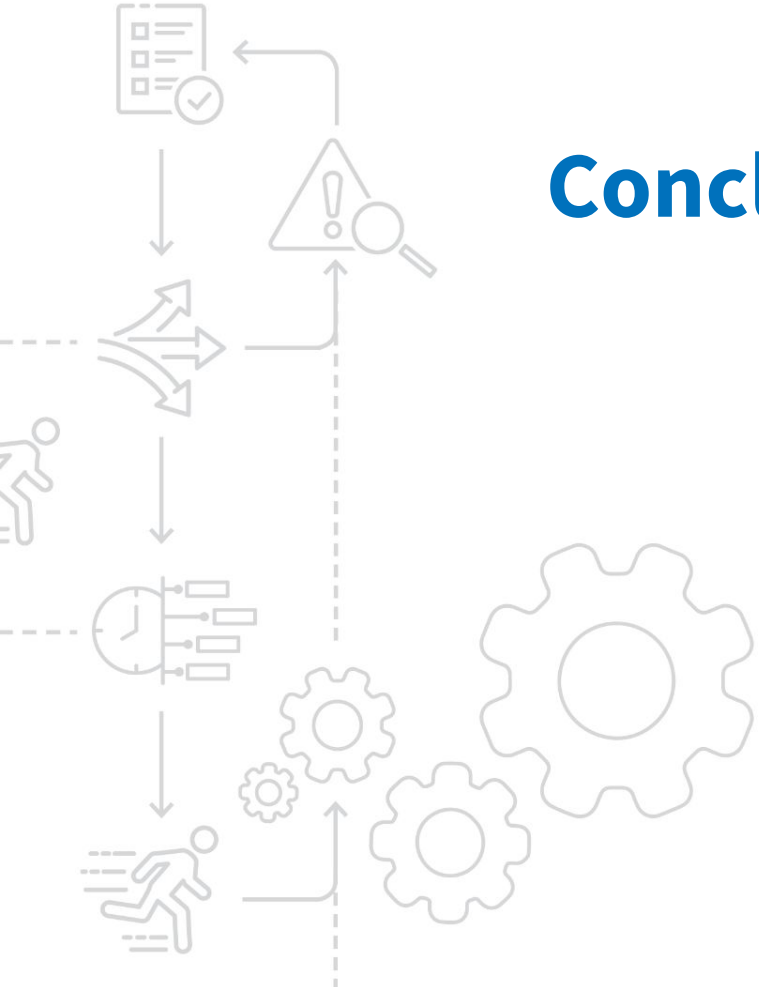
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Use the Steps to Resilience

- build a team to establish shared goals
- determine what's at stake
- agree on potential impacts of greatest concern
- establish methods for reducing unacceptable risks
- make a realistic plan, weighing resources and benefits
- implement those plans

Conclusion



Reduce Friction

... make it easy to understand exposure



Step 1: Understand Exposure

Decompose multimetrics

... so that vulnerability is explicitly linked to hazards

... incorporate climate change projections



Step 2: Assess Vulnerability and Risk

Use the Options Database

toolkit.climate.gov/content/options-database



Step 3: Investigate Options



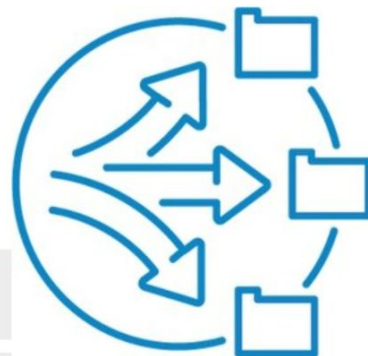
Options Database

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The Options Database lets you explore resilience-building solutions that other communities have considered.

It lists more than 1000 options tied to specific hazards and assets; options were compiled from recent Climate Adaptation and Resilience Plans published in the United States. Learn more about the Options Database on its [tool page](#) »

Click the filter button and set the drop-down menus to display proposed solutions related to the climate-related hazards that concern you and the assets you want to protect.

[► Instructions to filter the Options Database](#)[► Instructions to export filtered options](#)

Hide fields

Filter

Group

Sort

...



Option



Hazards



Assets



Action Type

1

72 hour resilience for all city infrastructure: generator, supplies and storage, points of relocation for ops and loc center, training for all city departments about our response.

Flooding – Rainfall-induced

Critical Facilities

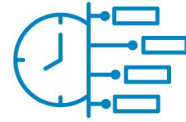
Capacity Building

Meet Decision Makers Where They Are

... do better with benefit-cost analysis

... Nature-based Solutions

... Address equity



**Prioritize
& Plan**



Step 4: Prioritize and Plan

Overcome the Implementation Gap



Step 5: Take Action

Resilience Journey Map

Persona Combined Last-mile Service Providers & Local Decision Makers

Scenario Doing climate resilience planning/adaptation work/planning



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