



Climate Essentials for Emergency Managers

July 2023



FEMA

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Overview

Climate change is a defining crisis of our time. From extreme heat, drought and wildfires to more severe coastal storms and inland flooding, the consequences of climate change are all around us. The emergency management community is challenged by more severe, frequent, widespread and costly disasters. From 1980 to 2022 there were, on average, 7.9 disasters per year in which damages reached at least one billion dollars. Within the last five years, there was an annual average of 17.8 of these “billion-dollar disasters”^{1,2} (NOAA, [2022 U.S. billion-dollar weather and climate disasters in historical context](#)). See Figures 1 and 2 below, respectively.

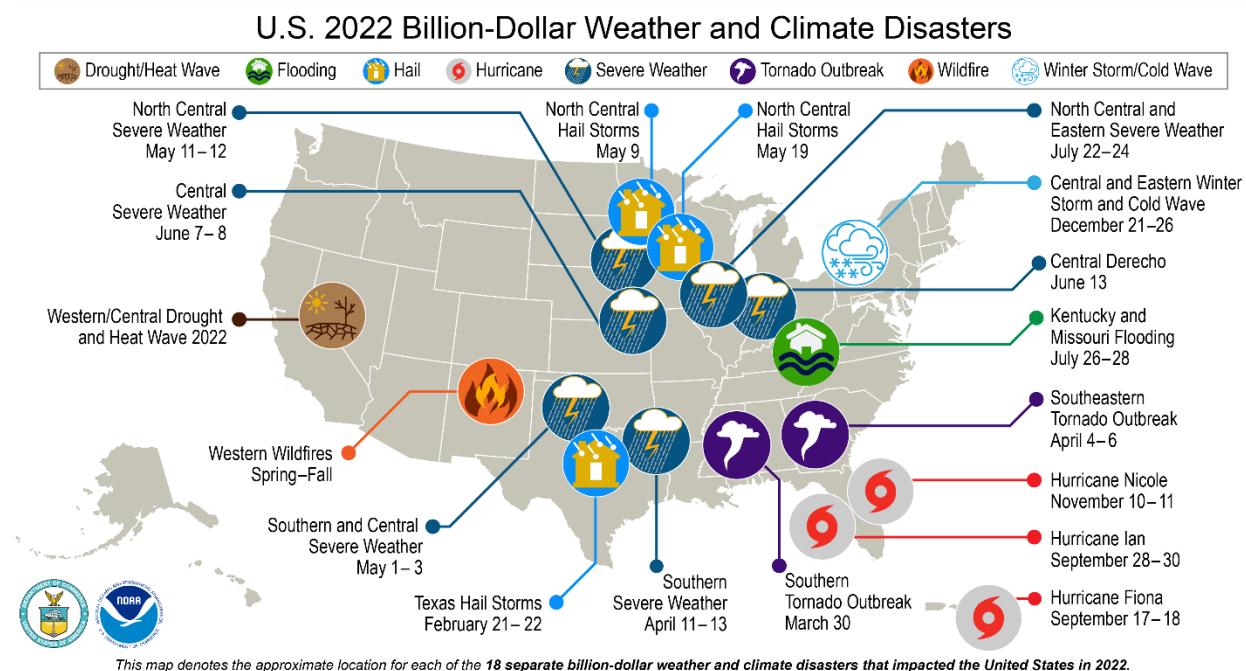


Figure 1. In 2022, the United States experienced 18 separate weather and climate-driven disasters² that each resulted in at least \$1 billion in damages. NOAA map by NCEI.

¹ These statistics are adjusted for inflation using the Consumer Price Index. [www.climate.gov/news-features/blogs/2022-us-billion-dollar-weather-and-climate-disasters-historical-context](#)

² Note: Not all identified disasters were Stafford Act declarations.

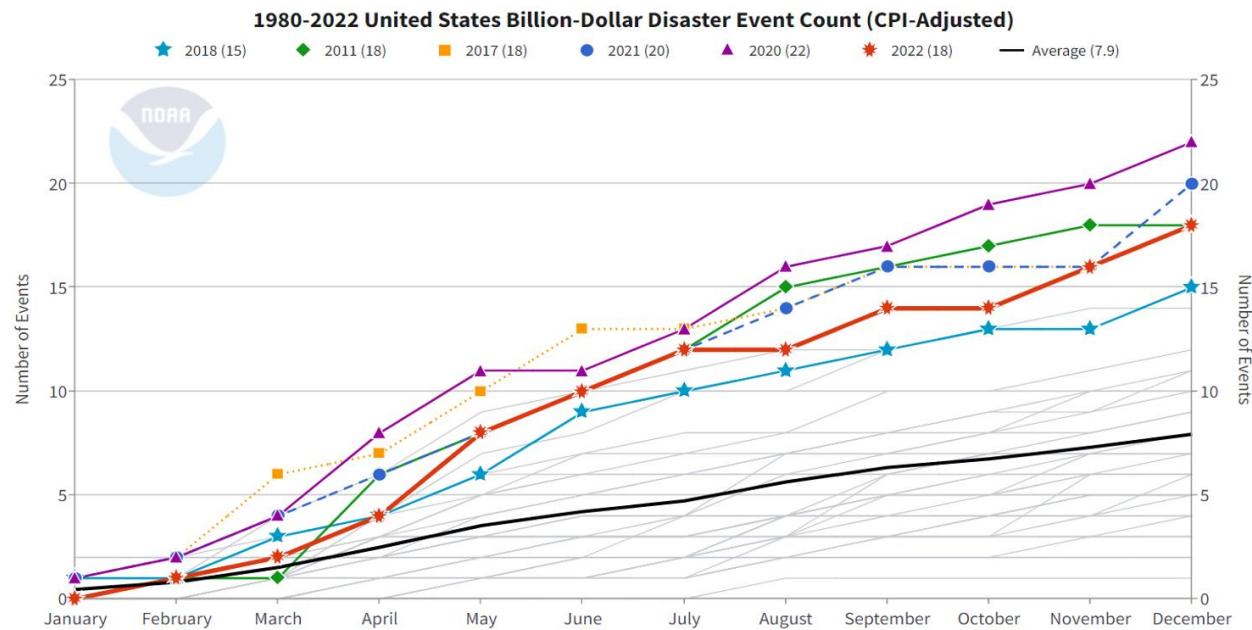


Figure 2. Month-by-month accumulation of billion-dollar disasters for each year on record. The colored lines represent the top 6 years for most billion-dollar disasters³. All other years are colored light gray. NOAA image by NCEI.

To better manage these threats, the Federal Emergency Management Agency (FEMA) is committed to enhancing the nation's capability to anticipate, prepare for, and adapt to future [climate](#) conditions. This starts with taking initial steps to advance climate literacy across FEMA and the wider emergency management community, and to foster a common understanding of how climate change impacts emergency management.

Increasing climate literacy

Goal 2 of the 2022–2026 FEMA Strategic Plan is to “Lead Whole of Community in Climate Resilience.” Objective 2.1 is to “increase climate literacy among the emergency management community.” Increasing climate literacy of emergency managers and communities will improve disaster outcomes and long-term climate resilience through a shared understanding of climate risks, terminology, and impactful mitigation opportunities.

This document offers foundational learning opportunities for the emergency management community and beyond. By sharing communication techniques, climate information, data resources and guidance for connecting with experts, this resource helps advance the integration of climate change considerations into actionable efforts before, during, and after disasters.

³ Note: Not all identified disasters were Stafford Act declarations.

Climate Change Affects Each Phase of the Disaster Lifecycle

Hazard Mitigation

Traditionally, preparedness and hazard mitigation activities have relied on historical data to determine which hazards are most relevant and their probabilities of occurring at a given location. As the climate changes, historical data is no longer sufficient for communities to evaluate current and future [risks](#). A warmer atmosphere and warmer ocean waters have wide-ranging impacts on regional climate, including lengthening wildfire seasons, increasing vulnerability to drought, driving more intense rainfall events and accelerating relative sea level rise. Effective hazard mitigation and community planning requires adaptation approaches that account for future conditions to help reduce risk systematically.



Preparedness

In addition to driving increased frequency and severity of [natural hazards](#), climate change is shifting the geographic areas affected by certain types of natural hazards. This means in addition to preparing for more frequent and more severe hazards, communities may need to prepare for new hazards that they have not historically experienced. Communities must routinely reevaluate the risks they face and appropriately update their hazard mitigation and preparedness plans for all natural and human-caused threats.

Response

Climate change is lengthening many natural hazard seasons compared to historical patterns. Emergency management operations will continue shifting from seasonal to year-round as the frequency and severity of various disaster types increase. With increasingly frequent, intense and unpredictable disasters, multiple overlapping disasters may impact a single location, complicating response and recovery efforts. In partnership with state, local, tribal, and territorial emergency managers, the emergency management community continue to improve their ability to respond to both gradually unfolding hazards and to multiple simultaneous disasters. This may require new, critical considerations for response such as quantifying the impacts from climate-related incidents and how to potentially adapt federal requirements to support expanded emergency response.

Recovery

Recovery operations for multiple or cascading events may overlap and diminish available resources, extend timelines, and raise costs. Communities should incorporate [hazard mitigation](#) and adaptation measures into pre- and post-disaster recovery planning and investments to address current and future impacts. Enforcing floodplain management and land use regulations in concert with adopting and enforcing hazard-resistant [building codes and standards](#) can reduce future risk and help ensure a sustainable recovery. Where possible, communities should consider other climate resilient solutions such as:

- Integrating [nature-based solutions](#) or other adaptation strategies;
- Promoting sustainable community development—including implementation and enforcement of local floodplain management programs and disaster resilient building codes and standards into recovery plans;
- Leveraging hazard insurance, such as flood or earthquake insurance, to cover residual risk;
- Considering [community-driven relocation](#) in places where risk cannot be sufficiently mitigated; and
- Using low carbon construction materials and low-carbon or net-zero energy projects when rebuilding.

Advancing the Inflation Reduction Act

On August 16, 2022, the Inflation Reduction Act of 2022 was signed into law, marking a historic commitment to building a new clean energy economy and tackling the climate crisis. The act authorizes FEMA to fund costs associated with low-carbon materials, even when the costs are higher than those for conventional materials, to reduce carbon pollution and build back more resilient.

After receiving this new authority, [FEMA announced it will make grant funds available to communities for low-carbon materials used in disaster recovery and climate resilience projects](#). States, tribes, territories and local communities will now have more access to low-carbon building materials through eligible FEMA programs to rebuild from disasters and become more resilient to climate change.

Emergency Management's Role in Climate Resilience

The impacts of a changing climate are being felt today in communities across the country and are increasingly testing our resilience. The emergency management community would benefit from having general knowledge of Earth's climate, the impacts of climate change and the benefits of climate mitigation and adaptation approaches so they can operationalize this information. This

further helps emergency managers support communities and survivors prepare for and thrive in future climate conditions.

The emergency management community must work to confront the demands of climate change to enhance the nation's ability to anticipate, prepare for, and adapt to future conditions. This requires the emergency management community to address climate change before, during and after disasters.

Before declared disasters emergency managers work with—and invest in—communities to build resilience so they can withstand the climate hazards of today and those we can anticipate for tomorrow.



During declared disasters, emergency managers support state, local, tribal and territorial (SLTT)-led efforts to address life-saving and life-sustaining needs resulting from natural hazards and the cascading effects of climate change on community lifelines.

After declared disasters, emergency managers provide information and funding to help federal, state, local, tribal and territorial governments strategically invest in building back to increase climate resilience.

FEMA promotes climate resilience

A comprehensive explanation of FEMA programs advancing climate change can be found in the [FEMA Resources for Climate Resilience](#).

Essential Climate Change Concepts

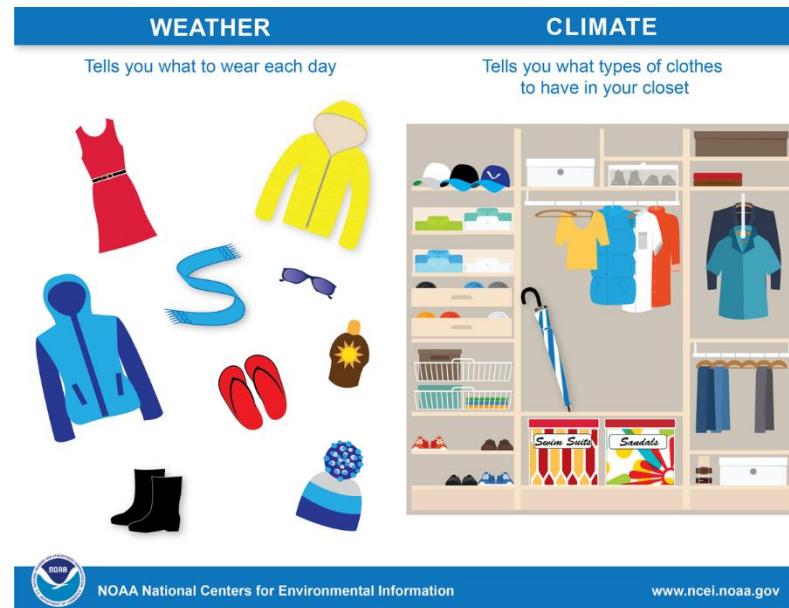
This section helps answer key questions to help advance the climate literacy of the emergency management community so they can more effectively address climate risk alongside one another and with the public. Knowing the meaning of the following concepts, and having uniform meanings, will help the emergency management community to understand how climate change reshapes emergency management and the communities we serve. Knowing how our climate is changing will help our nation best adapt and become better prepared and more resilient. We need to apply climate science and data from our partners, such as city planners, public health officials and more to better help people before, during and after disasters. The emergency management community can use climate knowledge to communicate with partners more effectively about future risks and solutions.

Greater climate literacy will also empower partners to make risk-informed decisions to adapt to future climate conditions.

What is the difference between weather and climate?

Although weather and climate are related, they are not the same. The National Oceanic and Atmospheric Administration (NOAA) has a saying, “Climate is what to expect, weather is what you get.”

Weather is what people experience when they step outside on any given day and is a result of the state of the atmosphere at a particular location over the short term. In short, weather is the *short-term* atmospheric conditions at a given location on a specific day and time. Across the globe, observers and automated stations measure hourly or daily weather conditions at thousands of locations. Over time, these weather observations allow us to quantify long-term average conditions, which provide insight into an area’s climate.



Climate is usually described as the *long-term* average weather at a given place, but it also means the range of weather conditions that are possible at a given place, including the types and historical frequency of [extreme events](#) that occur there.

For more information, visit [What's the difference between weather and climate?](#)

What is the difference between global warming and climate change? Why are they happening?

Both phrases can have slightly different meanings in different contexts, but these days, global warming generally refers to the long-term increase in global average temperature as a result of

human activity. Climate change is a much broader term that covers changes in multiple parts of the climate system, from temperature to precipitation to wind patterns. Climate change can be local, regional or global, and it can have natural or human causes. Global warming is a type of climate change; however, not all climate change is global warming" ([Global warming frequently asked questions](#)).

Throughout time, Earth's climate has varied due to natural causes. When the term [climate change](#) is used today, it refers to the [global warming](#) observed since the mid-20th century and the climatic changes caused by that warming (NASA, [The Causes of Climate Change](#) and [Global Climate Change Frequently Asked Questions](#)). Global warming and climate change are caused primarily by human industrial activity (NASA, [The Causes of Climate Change](#)).

Through industrial activity, humans have emitted a substantial amount of greenhouse gases. Greenhouse gases play a major role in the climate because they trap the sun's heat and warm the planet (NASA, [The Causes of Climate Change](#)).

In addition, humans have often developed land, resources and infrastructure in ways that are unsustainable. While not always intentional, this has disrupted ecosystems and naturally occurring processes. These practices are sometimes necessary and positive in the short-term but can also have damaging long-term consequences that decrease our resilience.

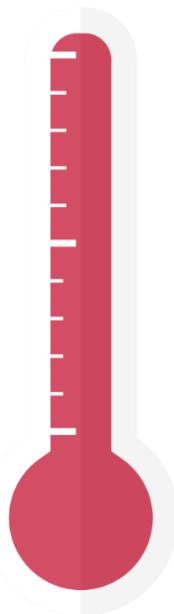
Learn more on the warming of the Earth at NOAA's [Global warming frequently asked questions](#) and the science behind climate change at [NASA Causes of Climate Change](#).

What is the difference between hazard mitigation, climate mitigation and climate adaptation?

Climate mitigation, hazard mitigation and climate adaption all involve changing human behaviors and the natural and built environment to cope with and reduce the effects of climate change and other hazards. While the emergency management community often shortens the phrase "hazard mitigation" to "mitigation," in the climate discipline "mitigation" refers to reducing greenhouse gas emissions.

Understanding the difference between hazard mitigation, climate mitigation and climate adaptation is critical to communicating about climate change.

- **Hazard mitigation** is any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazard events and their effects
- **Climate mitigation** is reduction of greenhouse gas emissions and levels in the atmosphere to reduce the severity of human-caused climate change.



- [Climate] adaptation is adjustment in natural or human systems to a new or changing environment that takes advantage of beneficial opportunities or moderates negative effects.

Hazard mitigation efforts often also serve to improve climate adaptation. Both have the same goals: long-term risk reduction for people, increased safety for communities and enhanced community resilience. The key difference between hazard mitigation and adaptation is that hazard mitigation encompasses all natural hazards, including short-term, episodic events that may or may not be connected to climate change. Climate adaptation efforts are focused on mitigating risk and impacts from current or expected climate conditions, so adapting to the expected impacts of climate change is a form of hazard mitigation. A hazard mitigation activity that addresses climate change in its design and approach can help reduce a community's risk from current and future climate events (FEMA, [Hazard Mitigation Assistance Program and Policy Guide](#), March 2023).

Examples of strategies contributing to hazard mitigation and climate adaptation include but are not limited to:

- Promoting nature-based solutions;
- Conservation of wetlands, restoring floodplains, and preservation of open space;
- Using resilient infrastructure design and adopting and enforcing floodplain management regulations and disaster resilient building codes and standards;
- Incorporating future conditions data into community planning; and
- Using low carbon construction materials and low-carbon or net-zero energy projects when rebuilding.

Find more examples in the Environmental Protection Agency's [Strategies for Climate Change Adaptation](#).

Hazard mitigation and climate adaptation help communities reduce the risk of damage caused by natural disasters. They can also shorten recovery time by increasing community resilience and preparedness for current and future hazards. Both hazard mitigation and climate adaptation are essential because the effects of climate change are happening now and expected to worsen (NASA, [The Effects of Climate Change](#)).

Addressing future risk through hazard mitigation planning

In April 2022, the National Mitigation Planning Program released the next generation of the [State Mitigation Planning Policy Guide](#) and [Local Mitigation Planning Policy Guide](#) and, in Spanish, the [Guía de políticas de planificación de mitigación a nivel local](#). The policies reinforce resilience as a Whole Community effort.

State, local and territorial hazard mitigation plans must address current and future risks, including those from climate change, land use and population change. The policies seek to

integrate mitigation planning with other complementary activities, such as climate adaptation, resilience and sustainability planning. These efforts build state and local capabilities and help jurisdictions plan for long-term risk reduction, climate change and more-equitable outcomes.

Are individual extreme events caused by climate change?

Scientific research indicates that climate change may contribute to more extreme and frequent weather events. According to NOAA:

"To date, climate research has yet to show that any given event was caused solely by global warming. However, over the past decade, research has demonstrated that climate change due to global warming has made many extreme events more likely, more intense, longer lasting, or larger in scale than they would have been without it. For many of the events that have been studied, global warming has been identified as the primary driver of the event, not just a supporting player. And a number of recent studies have concluded that certain heat-related extreme events would not have been possible without human-caused global warming ([Global warming frequently asked questions](#))."

A quickly developing field known as "extreme event attribution" or "climate change attribution studies" focuses on the ways climate change has made a specific weather event more severe or likely to occur. This field of scientific research aims to understand the causes and drivers of changes in the Earth's climate system, particularly regarding human influences on the climate.

Learn more about extreme event attribution from NOAA [here](#).

Climate and Equity

Climate change and [equity](#) are interconnected.

Although the natural environment and all its inhabitants, regardless of socioeconomic status, are affected by the impacts of climate change, the most severe harm from climate change disproportionately impacts [underserved](#), [disadvantaged](#) and marginalized communities. These are often [frontline communities](#), which are more likely to be impacted by disasters and other climate change impacts due to systematically racist practices, such as historical redlining.

Additionally, many of the communities most at risk to climate change impacts are those who contributed the least to causing it, making it a justice issue as well. These communities often have limited access to political power and limited influence on decisions that affect them, their economy, and local government services. Disasters can worsen



inequities that are already present in society, leading to greater risks and vulnerabilities, including greater poverty and declines in community and individual health. These inequities can reduce the availability of resources for preparation, emergency evacuation or long-term relocation, hazard mitigation, response and recovery.

Underserved and disadvantaged communities

Examples of underserved and disadvantaged communities include, but are not limited to: Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders, and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; persons otherwise adversely affected by persistent poverty or inequality; persons with limited English proficiency, children, pregnant women, older adults, vulnerable occupational groups; persons with access and functional needs; and persons with preexisting or chronic medical conditions ([The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment](#) and [Executive Order 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government](#)).

Underserved and disadvantaged communities are especially vulnerable to climate change effects on human health. The Centers for Disease Control and Prevention (CDC) states that the effects of climate change on human health include “increased respiratory and cardiovascular disease, injuries and premature deaths related to extreme weather events, changes in the prevalence and geographical distribution of food- and water-borne illnesses and other infectious diseases, and threats to mental health”. In underserved and disadvantaged communities, where preparation and resources are limited, these effects are felt more severely and have a larger impact.

The emergency management community can make more equitable [environmental justice](#)-based decisions by targeting resources and grants to the underserved and integrating environmental justice into communications and directives. Emergency managers can also collaborate with historically underserved communities to ensure their perspectives and knowledge are included in adaptation planning and decision making.

Emergency managers should prioritize supporting at-risk communities and aiming for equitable outcomes, consistent with applicable law. Emergency managers can lead Whole Community efforts by working with partners to reduce the vulnerability of underserved and disadvantaged communities by incorporating environmental justice into all emergency management activities.

Be mindful of how underserved and disadvantaged communities are portrayed.

The [United Nations](#) states “Poorer countries and underserved communities, including indigenous peoples who have protected the environment for generations, are often portrayed solely as victims of climate change, rather than positive agents of change. The same is often the case for women and girls. Make sure to highlight the voices, expertise, innovations, positive action, and solutions by people from all walks of life and communities from all parts of the world.”



Communicating Climate Change

No matter the topic, it is always a best practice for the emergency management community to be aware and considerate of their audience. Climate change is no different. Discussions around climate change causes and impacts can produce diverse reactions. It is important to ensure that information is based on widely accepted science, that statements avoid political agendas and that discussions

emphasize concrete actions to minimize climate change impacts. Building risk awareness and encouraging the Whole Community, through individual efforts or collectively, to proactively decrease climate risk exposure is essential. Below are some best practices for connecting with and communicating climate change with diverse audiences:

- Use terms that resonate with your target audience and find common ground or shared values. Observed changes can be an opportunity to discuss tangible actions. Has it become drier, wetter or hotter? Use this shared experience and work to find mutual solutions to reduce and adapt to future risks.
- Avoid stereotypes. Members of the Whole Community, of all capacities, capabilities and beliefs, are encouraged to take action against climate change.
- Do not focus only on the problem—highlight solutions. Be sure to convey opportunities and a positive outlook. Highlight ongoing efforts and solutions that can instill hope. Get your audience excited about a climate resilient nation and let them know they have the power to be a changemaker.
- Leverage the power of story. Data should only be presented when woven within the context of an engaging story. Without a locally relevant story, focusing too much on the data may cause people to retreat from the conversation. Stories can make climate change more relatable and help forge an emotional connection to the issue.
- Create feedback loops with trusted partners to gain additional perspective and help inform potential solutions. Identify community unifiers who can help carry your message.
- When communicating or referencing climate science ensure that you are using peer reviewed or authoritative sources, such as the [National Climate Assessment](#).



Building Partnerships

When someone asks a climate-related question that goes beyond your expertise, think partnership! Direct them to the appropriate resource or partner. That might be a colleague, an external climate expert or one of the scientific agencies within SLTT governments. Additionally, the emergency management community is encouraged to establish and foster relationships with the climate community to collectively work towards a climate-resilient nation.



Regional and locally focused centers across the nation are available to help you build resilience to climate-related changes and impacts in your community. The [U.S. Climate Resilience Toolkit Find Experts](#) tool can help you identify the best point of contact. Additionally, FEMA's [Resilient Nation Partnership Network](#) provides an opportunity to build Whole Community partnerships to advance natural [hazard mitigation](#) and climate adaptation. Learn how partners are coming together [Building Alliances for Climate Action](#).

Everyone does not need to be a climate expert. The emergency management community has the ability to connect our partners and stakeholders with resources. In the following pages, we include a recommended list of resources and programs that can help.

Contact the FEMA-Resilience Climate Team at FEMA-ClimateAdaptation@fema.dhs.gov with additional questions.

Resources

Consider looking at these resources from FEMA and partners as you advance climate actions.

Resources cited in this section are provided solely for informational purposes and are not intended to be an endorsement of any non-federal entity by FEMA, U.S. Department of Homeland Security or the U.S. Government.

Federal Regional Climate Science Organizations

[Climate Adaptation Partnerships \(CAP\)/Regional Integrated Sciences and Assessments \(RISA\) \(NOAA\)](#): The CAP/RISA program is an applied research and engagement program that expands society's regional capacity to adapt to climate impacts in the U.S. It supports sustained, collaborative relationships that help communities build lasting and equitable climate resilience through teams of research institutions, nonprofit organizations, and state/local/Tribal governments in multi-state regions.

[Climate Adaptation Science Centers \(U.S. Geological Survey\)](#): The USGS National and Regional Climate Adaptation Science Centers connect scientists with natural and cultural resource managers and local communities to help fish, wildlife, water, land and people adapt to a changing climate.

[Climate Hubs \(U.S. Department of Agriculture\)](#): The mission of the Climate Hubs is to develop and deliver science-based, region-specific information and technologies, with USDA agencies and partners, to agricultural and natural resource managers that enable climate-informed decision-making, and to provide access to assistance to implement those decisions.

[Climate Resilience Toolkit Find Experts Tool \(NOAA\)](#): Regional and locally focused centers across the nation are available to help build resilience to climate-related changes and impacts in your community. The tool can help identify the best point of contact.

[National Centers for Environmental Information \(NCEI/NOAA\)](#): NCEI is the nation's leading authority for environmental data. It manages one of the largest archives of atmospheric, coastal, geophysical and oceanic research in the world. Their stewardship practices maximize NOAA's investment in environmental research, converting scientific insights into dynamic, usable information that inform strategy and decision making in government, academia, and the private sector. NCEI also manages the [Regional Climate Center Program](#), which provides climate services to six regions encompassing the United States.



Climate Data and Hazard Mapping Applications

[Climate Risk and Resilience Portal \(ClimRR\) \(Center for Climate Resilience and Decision Science/FEMA\)](#): ClimRR is a public/private partnership that represents the newest developing climate science modeling. It empowers individuals, governments, and organizations to examine simulated future conditions at mid- and end-of-century for a range of climate perils. Additional hazards will be added over the next year. The ClimRR Data Explorer allows users to view more than 100 different climate visualizations in an interactive map and the ClimRR Report Generator provides users with a snapshot of [climate projections](#) at a chosen point on a map.

[Climate Mapping for Resilience and Adaptation \(CMRA\) \(USGCRP/NOAA\)](#): CMRA aggregates currently available federal datasets to create a climate risk information tool and includes grant finance opportunities. This tool is a community-focused, user-friendly model that provides high level trend information for state, local, tribal and territorial communities. It allows viewing maps to see where climate-related hazards are occurring in real-time.

[U.S. Climate Resilience Toolkit \(USGCRP/NOAA\)](#): The U.S. Climate Resilience Toolkit is a website to help people find and use tools, information, and subject-matter expertise to build climate resilience. It offers information from across the U.S. Federal Government in one location.

[FEMA Resilience Analysis and Planning Tool \(RAPT\)](#): The RAPT is a powerful GIS planning tool to inform strategies for emergency management. RAPT includes more than 100 preloaded layers including FEMA's Community Resilience Index, Census demographic data, infrastructure, live weather, hazards and NOAA sea level rise projections, and will incorporate ClimRR future conditions data this year.

[Google Earth Engine](#): Google Earth Engine combines a multi-petabyte catalog of satellite imagery and geospatial datasets with planetary-scale analysis capabilities. Scientists, researchers and developers use Earth Engine to detect changes, map trends, and quantify differences on the Earth's surface.

[GIS for Climate \(Esri\)](#): From collecting data in the field, to managing, mapping and analyzing the data, or sharing it for everyone to use with cutting-edge web services or no-code applications, GIS can support any part of assessing potential climate impacts and developing solutions using location intelligence. The GIS for Climate Hub provides a variety of resources to get you started in climate analysis or help develop more advanced workflows.

[National Risk Index for Natural Hazards \(FEMA\)](#): The National Risk Index is an online mapping application from FEMA that identifies communities' current and historic risk to 18 natural hazards. This application visualizes natural hazards risk metrics and includes data about expected annual losses from natural hazards, social vulnerability and community resilience.

Climate Training

FEMA's National Training and Education Division, through partnerships with the University of Hawaii's National Disaster Preparedness Training Center, Columbia University's Climate School, and the Georgia Tech Enterprise Innovation Institute is developing training courses to build climate literacy and help students operationalize climate science and data to reduce risk and build more resilient communities. Several climate-related courses, including *Climate Adaptation Planning for Emergency Management*, *Nature-Based Solutions for Mitigating Hazards*, and *Coastal Hazard and Vulnerability Assessment Tools*, can be found by searching FEMA's National Preparedness Course Catalog at <https://www.firstrespondertraining.gov/frts/npcatalog>.

Climate Partnership Resources and Opportunities

[FEMA Resilient Nation Partnership Network \(FEMA\)](#): The Resilient Nation Partnership Network is a diverse network of voices united in their commitment to help communities act and become more resilient toward natural disasters and climate-related events with representation from over 1,500 organizations. The Network is driven by three central priorities which influences the work, partnerships, programming, and strategic goals: (1) promoting natural hazard mitigation and climate adaptation actions; (2) advancing equitable resilience initiatives; (3) expanding capacity through partnerships.

[FEMA Building Alliances for Climate Action \(FEMA\)](#): Powered by partnership, this resource is the result of collaboration by 36 partners across the field of climate resilience. Through it, the Resilient Nation Partnership Network and partners seek to inspire the Whole Community to take action and address climate change as part of their day-to-day activities. In it you will find guidance, perspectives, personal stories, resources and more.

[Branch of Tribal Climate Resilience \(Bureau of Indian Affairs\)](#): The mission of the Branch of Tribal Climate Resilience is to enable climate preparedness and resilience across all Indian Affairs programs and for all Federally Recognized Tribal Nations and Alaska Native villages through technical and financial assistance, access to scientific resources and educational opportunities.

[Climate Change \(US National Park Service\)](#): The National Park Service details a comprehensive strategy to understanding the science behind and adapting to climate change, while preserving national parks and restoring ecosystems.

Climate Literacy

[Climate Change Glossary \(USGCRP\)](#): A compilation of climate terms and definitions provided by the US Global Change Research Program.

[Climate Change Resource Center \(USDA/USFS\)](#): The US Forestry Service's Climate Change Resource Center is a web-based national platform that connects land managers and decision makers with useable science to address climate change in natural resources planning and management. Current and expected climate changes have serious implications for ecosystems and the benefits they provide.

[Fourth National Climate Assessment \(NCA4\) \(USGCRP\)](#): NCA4 Volume II, draws on the foundational science described in Volume I, the Climate Science Special Report. Volume II focuses on the human welfare, societal and environmental elements of climate change and variability for 10 regions and 18 national topics. *Note, the *Fifth National Climate Assessment is expected to be released in fall 2023*.

[Fourth National Climate Assessment Frequently Asked Questions \(USGCRP\)](#): A compilation of FAQs updated from the Third National Climate Assessment and emerging scientific inquiry. The US Global Change Research Program bases answers on assessments, peer-reviewed literature, and consultation with experts. *Note, the *Fifth National Climate Assessment is expected to be released in fall 2023*.

[Global Warming FAQ \(NOAA\)](#): Frequently asked questions about climate change and climate science prepared by NOAA.

[Sixth Assessment Report - Intergovernmental Panel on Climate Change](#): As the international body for assessing science related to climate change, the IPCC reports the assessments of hundreds of leading experts in climate change research. The *Sixth Assessment Report* illustrates the Intergovernmental Panel on Climate Change (IPCC) most recent findings.

[The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment \(USGCRP\)](#): The USGCRP's assessment of how climate change affects human health, with consideration to factors such as air quality, temperature changes, extreme events, illness and disease.

[Understand Climate Change \(USGCRP\)](#): The USGCRP provides an overview of climate change, why it is happening, its impacts on society, and possible responses.

Equity

[Building Alliances for Equitable Resilience \(FEMA\)](#): Powered by partnership, this resource is the result of collaboration by 26 partners in the fields of equity and resilience. Through it, the Resilient Nation Partnership Network and partners seek to inspire the Whole Community to make equitable and resilient practices part of their day-to-day activities. In it you will find guidance, perspectives, personal stories, resources and more.

[Climate and Economic Justice Screening Tool \(CEJST\) \(Council on Environmental Quality\)](#): This tool is being developed by the Council on Environmental Quality per Presidential directive. The purpose of the tool is to help Federal agencies identify disadvantaged communities that are marginalized, underserved, and overburdened by pollution. The current version of the tool provides socioeconomic, environmental, and climate information to inform decisions that may affect these communities. The tool identifies disadvantaged communities through publicly available, nationally consistent datasets.

[EJSscreen \(EPA\)](#): To better meet the EPA's responsibility to protect public health and the environment, they have developed a new environmental justice mapping and screening tool called EJSCREEN. It is based on national data and combines environmental and demographic indicators in maps and reports.

Hazard Mitigation and Climate Adaptation

[Guides to Expanding Mitigation \(FEMA\)](#): The Guides to Expanding Mitigation are part of a series designed to highlight innovative and emerging partnerships for hazard mitigation. The booklets show how communities can better support hazard mitigation projects and planning by engaging other sectors. This supports FEMA's goal of building a culture of preparedness, which is part of the agency's strategic plan.

[Hazard Mitigation Planning \(FEMA\)](#): FEMA's Hazard Mitigation Planning provides information on planning, best practices, grants, regulations and more to minimize the impacts of disasters and break the cycle of disaster damage and reconstruction.

[Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards \(FEMA\)](#): The document provides a resource that communities can use to identify and evaluate a range of potential hazard mitigation actions for reducing risk to natural hazards and disasters.

[Hazard Mitigation Planning Program Resource List \(FEMA\)](#): This fact sheet provides a list of resources to assist with every step of the hazard mitigation planning process.

[Hazard Mitigation Assistance Program and Policy Guide \(FEMA\)](#): This guide provides helpful information for prospective applicants and sub-applicants from state, local, tribal and territorial governments on the application and grant processes for FEMA's hazard mitigation assistance grant programs. The guide includes detailed descriptions of the many different mitigation project types that communities can use to reduce risk from natural hazards in the face of changing climate conditions.

[Mitigation Action Portfolio \(FEMA\)](#): This document provides detailed examples of hazard mitigation activities that are eligible for funding under FEMA's hazard mitigation assistance programs.

[Adaptation Planning Tools \(EPA\)](#): Environmental Protection Agency staff have developed tools to help communities anticipate, plan for and adapt to the changing climate.

[Adaptation Principles \(The World Bank\)](#): An article on six ways to build resilience to climate change from the World Bank.

[Adaptation Workbook \(USDA\)](#): The Adaptation Workbook, supported by the Department of Agriculture Climate Hubs, is a process to consider the potential effects of climate change, and design land management and conservation actions that help prepare for changing conditions.

[Continuity Resource Toolkit \(FEMA\)](#): The Continuity Resource Toolkit provide partners from all levels of government, private and nonprofit sectors with tools, templates and resources to help organizations develop and maintain a successful [continuity](#) plan and program.

[Nature-Based Solutions \(FEMA\)](#): FEMA's Nature-Based Solutions website offers information, planning and funding resources, and more that promote sustainable planning, design, environmental management and engineering practices.

[State Adaptation Progress Tracker \(Georgetown Climate Center\)](#): States and communities around the country are preparing for climate change. This planning process typically results in a document called an adaptation plan. The State Adaptation Progress Tracker includes a map highlighting the status of state adaptation efforts.

[Community Resilience Toolkit \(US Department of Housing and Urban Development\)](#): The HUD Community Resilience Toolkit guides recipients of HUD Community Planning and Development (CPD) funds to identify ways to use their funds to mitigate natural hazards.

[Resources for Climate Resilience \(FEMA\)](#): FEMA created this resource to serve as a roadmap of FEMA programs and to assist Whole Community partners in navigating the available resources to advance climate resilience and support communities in mitigating impacts of climate change.

[Long-term Community Resilience Exercise Resource Guide \(FEMA\)](#): The Long-Term Community Resilience Exercise Resource Guide is a “one-stop-shop” for any jurisdiction or organization looking to conduct a climate-focused exercise.

Glossary

This is not an exhaustive list of every climate-relevant definition. For additional resources with climate definitions please refer to the [National Climate Assessment, USGCRP 2022-2031 Strategic Plan Glossary](#) and the [Intergovernmental Panel on Climate Change \(IPCC\) Glossary](#) as authoritative sources.

Adaptation: Adjustment in natural or human systems to a new or changing environment that takes advantage of beneficial opportunities or moderates negative effects ([USGCRP 2022-2031 Strategic Plan](#)).

Climate: Climate is determined by the long-term pattern of temperature and precipitation averages and extremes at a location ([Climate.gov](#)).

Climate Change: A change in the state of the climate that can be identified by changes in the mean and/or variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions, persistent human-driven changes in the composition of the atmosphere or in land use ([USGCRP 2022-2031 Strategic Plan](#)).

Climate Mitigation (“Mitigation” also “Greenhouse Gas Mitigation”): Measures to reduce the amount and speed of future climate change by reducing emissions of heat-trapping gases or removing carbon dioxide from the atmosphere ([USGCRP 2022-2031 Strategic Plan](#)).

Climate Projection: The simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases (GHGs) and aerosols, generally derived using climate models. Climate projections are distinguished from climate predictions by their dependence on the emission/concentration/radiative forcing scenario used, which is in turn based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized ([Intergovernmental Panel on Climate Change Glossary](#)).

Community-driven relocation: A climate adaptation strategy for populations seeking to enhance resilience to climate-related hazards by relocating away from areas prone to repeated hazards. Unlike more commonly known terms such as “managed retreat”, “climate migration”, and “climate-induced relocation or resettlement” the term “community-driven relocation” intentionally emphasizes the importance of the Whole Community being the driver of what is recognized as an incredibly complex and difficult process ([FEMA*](#)).

*Note: FEMA, alongside interagency federal partners, is in the early stages of formalizing how to best support community-driven relocation efforts. As of the time of issuing this resource, no authoritative definition of community-driven relocation has been published.

Disadvantaged Community: Agencies should consider appropriate data, indices, and screening tools to determine whether a specific community is disadvantaged based on a combination of variables that may include, but are not limited to the following: Low income, high and/or persistent poverty; High unemployment and underemployment; Racial and ethnic residential segregation, particularly where the segregation stems from discrimination by government entities; Linguistic isolation; High housing cost burden and substandard housing; Distressed neighborhoods; High transportation cost burden and/or low transportation access; Disproportionate environmental stressor burden and high cumulative impacts; Limited water and sanitation access and affordability; Disproportionate impacts from climate change; High energy cost burden and low energy access; Jobs lost through the energy transition; Access to healthcare *See also underserved* ([Executive Order 14008: Tackling the](#)

[Climate Crisis at Home and Abroad; OMB Memo M-21-28: Interim Implementation Guidance for the Justice40 Initiative](#)).

Greenhouse Gases: Gases that absorb heat in the atmosphere near the Earth's surface, preventing it from escaping into space. If the atmospheric concentrations of these gases rise, the average temperature of the lower atmosphere will gradually increase, a phenomenon known as the greenhouse effect. Greenhouse gases include, for example, carbon dioxide, water vapor and methane ([USGCRP Climate Change Glossary](#)).

Emissions Scenarios: Quantitative illustrations of how the release of different amounts of climate altering gases and particles into the atmosphere from human and natural sources will produce different future climate conditions. Scenarios are developed using a wide range of assumptions about population growth, economic and technological development, and other factors ([USGCRP Climate Change Glossary](#)).

Environmental Justice: The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation and enforcement of environmental laws, regulations, and policies ([USGCRP 2022-2031 Strategic Plan](#)).

Equity: Equity is the consistent and systematic fair, just and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality ([Executive Order 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government; USGCRP 2022-2031 Strategic Plan](#)).

Extreme Event: A weather event that is rare at a particular place and time of year, including, for example, heat waves, cold waves, heavy rains, periods of drought and flooding, and severe storms ([USGCRP Climate Change Glossary](#)).

Frontline Community: Communities or populations that have experienced systemic socioeconomic disparities, environmental injustice, or another form of injustice and are highly vulnerable to and will experience disproportionately high adverse impacts from environmental and climate injustice and inequitable climate actions ([USGCRP 2022-2031 Strategic Plan](#)).

Future Conditions: Future Conditions refers to the changing risk of natural disasters due to climate change, population patterns, land use, and community development (FEMA).

Global Warming: The observed increase in average temperature near the Earth's surface and in the lowest layer of the atmosphere. In common usage, “global warming” often refers to the warming that has occurred as a result of increased emissions of greenhouse gases from human activities. Global warming is a type of climate change; it can also lead to other changes in climate conditions, such as changes in precipitation patterns ([USGCRP Climate Change Glossary](#)).

Greenhouse Gases (GHGs): Gases that absorb heat in the atmosphere near the Earth's surface, preventing it from escaping into space. If the atmospheric concentrations of these gases rise, the average temperature of the lower atmosphere will gradually increase, a phenomenon known as the greenhouse effect. Greenhouse gases include, for example, carbon dioxide, water vapor, and methane ([USGCRP Climate Change Glossary](#)).

Hazard Mitigation: Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazard events and their effects ([FEMA Hazard Mitigation Assistance Program and Policy Guide](#)) – [see also 44 C.F.R. 201.2](#).

Maladaptation: Actions that may lead to increased risk of adverse climate-related outcomes, including via increased GHG emissions, increased vulnerability to climate change, or diminished welfare, now or in the future. Maladaptation is usually an unintended consequence. ([Intergovernmental Panel on Climate Change Glossary](#)).

Natural Hazards: Source of harm or difficulty created by a meteorological, environmental, or geological phenomenon or combination of phenomena ([FEMA National Mitigation Investment Strategy](#)).

Nature-Based Solutions: Sustainable planning, design, environmental management, and engineering practices that weave natural features or processes into the built environment to promote adaptation and resilience ([FEMA Nature-Based Solutions](#)).

Resilience: The ability to prepare for anticipated hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions due to emergencies ([PPD-8: National Preparedness](#)).

Risk: Threats to life, health and safety, the environment, economic well-being and other things of value. Risks are often evaluated in terms of how likely they are to occur (probability) and the damages that would result if they did happen (consequences) ([USGCRP 2022-2031 Strategic Plan](#)).

Underserved Communities: Underserved communities are defined in Executive Order 13985 as populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social and civic life, as exemplified by the list in the preceding definition of “equity” ([Executive Order 13985: Advancing Racial Equity and Support for Underserved Communities Through the Federal Government](#)).

Weather: The state of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc. Weather refers to these conditions at a given point in time ([NOAA National Weather Service Glossary](#)).

Whole Community: By working together, everyone can help keep the nation safe from harm and help keep it resilient when struck by hazards such as natural disasters, acts of terrorism and pandemics. Whole Community includes individuals and families, including those with access and functional needs; businesses; faith-based and community organizations; nonprofit groups; schools and academia; media outlets; all levels of government, including state, local, tribal, territorial and federal partners. ([FEMA Glossary](#))



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