

# CDC Environmental Health Nexus

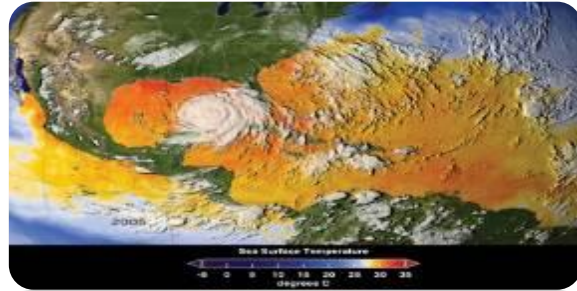


**Climate Change and Human Health Webinar  
will begin at 1 p.m. ET**

National Center for Environmental Health  
Agency for Toxic Substances and Disease Registry



# Climate Change and Human Health



**Dr. Patrick Breyse, Ph.D., CIH**

Director

National Center for Environmental Health (NCEH)/

Agency for Toxic Substances and Disease Registry (ATSDR)

Centers for Disease Control and Prevention

National Center for Environmental Health  
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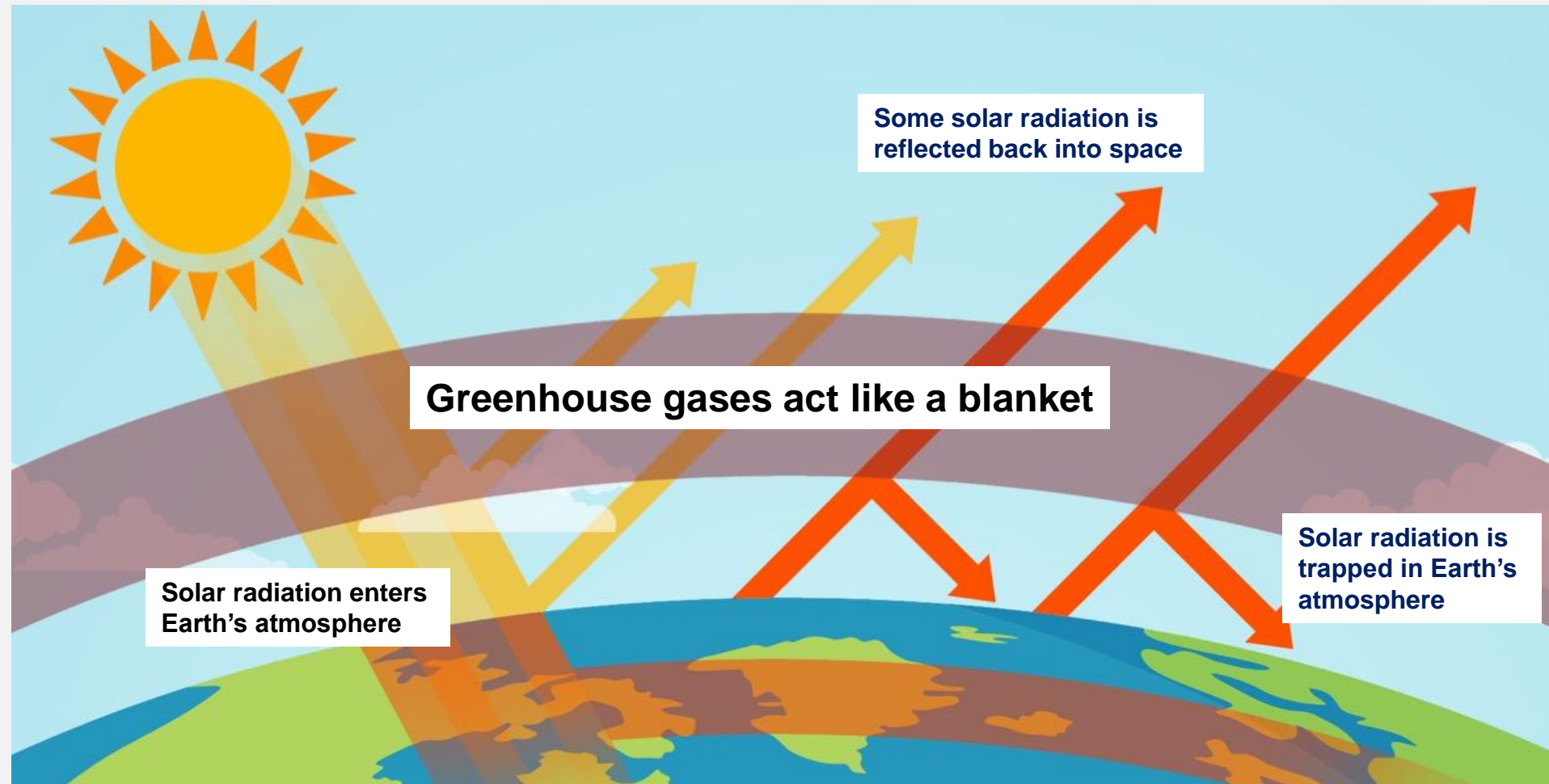


# Video: How Climate Affects Community Health



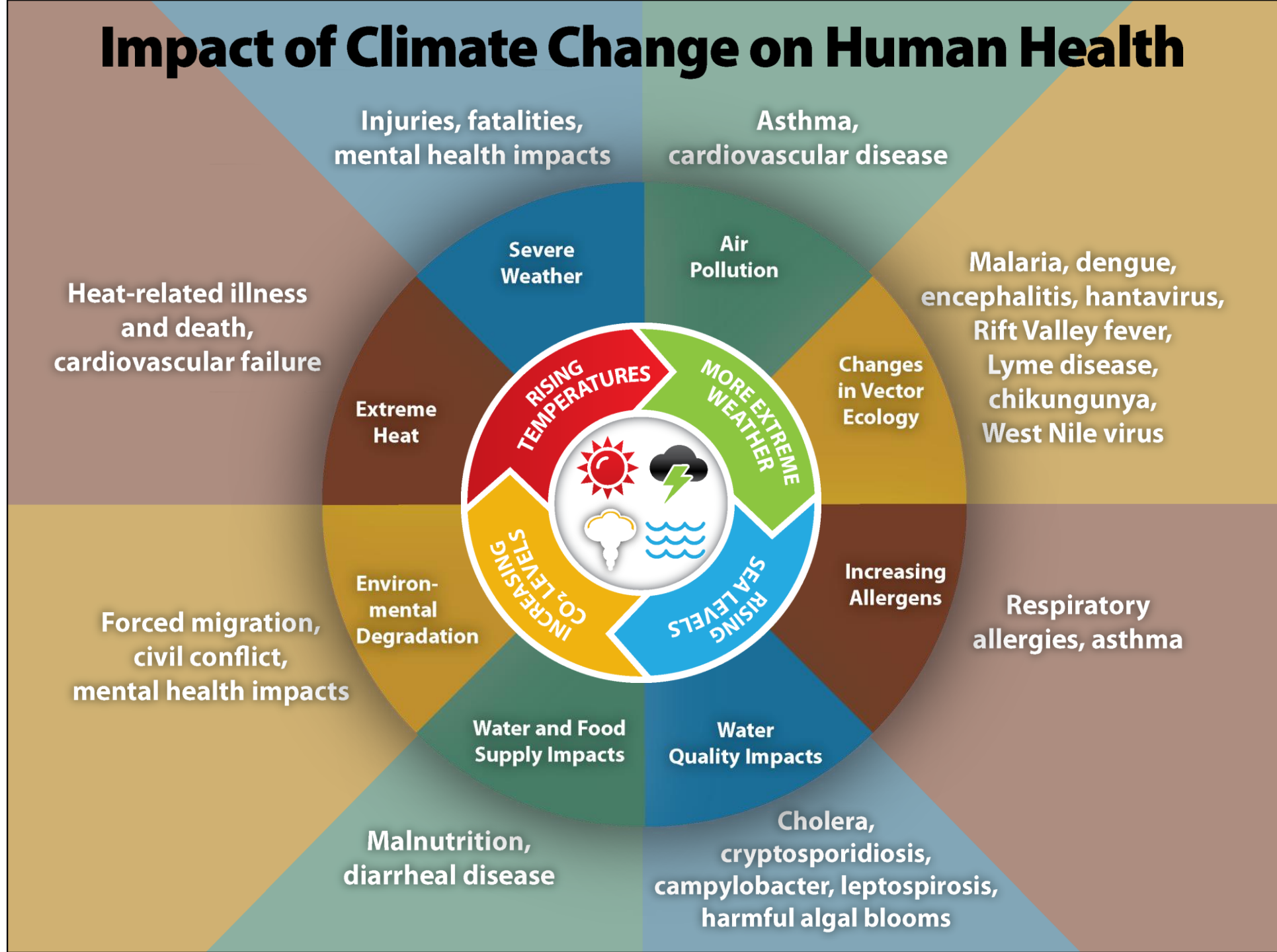
<https://www.youtube.com/watch?v=JywsWktvODc>

# What is Climate Change?





# Impact of Climate Change on Human Health

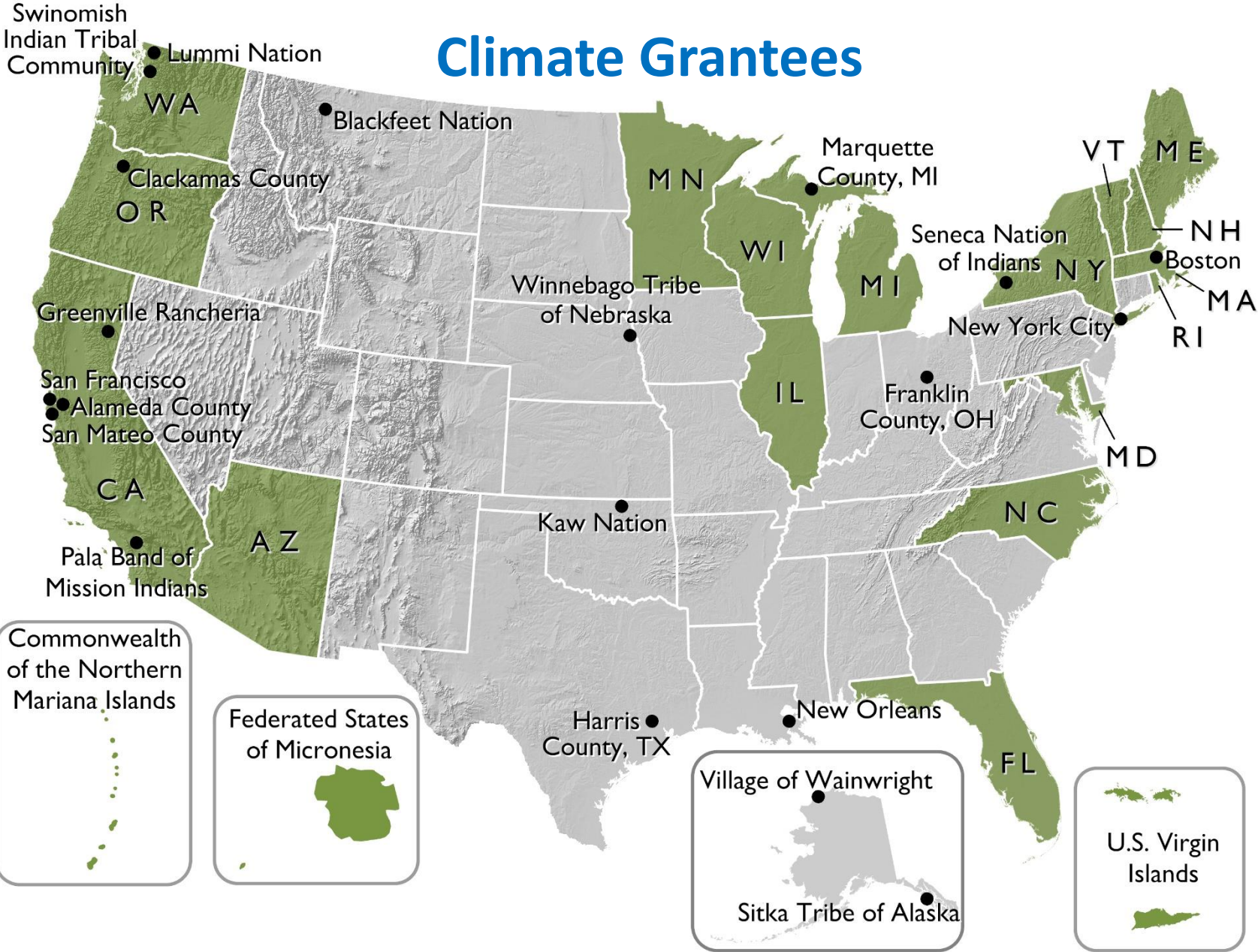


\*Animated

# CDC's Climate and Health Program

- **Serve as a resource** for federal, state, local, and tribal health agencies
- **Prepare public health practitioners** to address the health effects of climate change
- **Provide tools, guides, and processes** to help assess vulnerability to possible health effects
- **Serve as a leader** in planning for public health effects of climate change

# Climate Grantees



# Climate Ready Tribes and Territories Initiative

- **Partnership with the National Indian Health Board and the Association of State and Territorial Health Officials**
- **Since the first-year of funding in 2016, nine tribes and three territories have been funded**
- **Individual awards range from \$5,000 to \$80,000**
- **Three tribes currently funded**
  - Lummi Nation
  - Pala Band of Mission Indians
  - Sitka Tribe of Alaska



# Recent Executive Orders on Climate Change, Environmental Justice, and Health Equity

- **EO 14008** Tackling the Climate Crisis at Home and Abroad
- **EO 13990** Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis
- **EO 14013** Rebuilding and Enhancing Programs To Resettle Refugees and Planning for the Impact of Climate Change on Migration
- **EO 13985** Advancing Racial Equity and Support for Underserved Communities Through the Federal Government

# CLIMATE JUSTICE AND HEALTH EQUITY

LCDR Heather Joseph, M.P.H.

Health Scientist, Climate and Health Program

Asthma and Community Health Branch

Division of Environmental Health Science and Practice

National Center for Environmental Health

Centers for Disease Control and Prevention

# Overview

- What determines climate vulnerability?
- How do specific climate threats vary by race and space?
- What is climate justice?
- How is CDC responding?

# Climate Vulnerability

**Climate  
change does  
not affect  
everyone  
equally**





# Unequal Climate Vulnerability

## Root Causes<sup>1</sup>

Racism, historical and current disenfranchisement, unequal distribution of power and resources rooted in institutions and processes

## Environmental justice factors that may increase climate vulnerability<sup>2</sup>

Proximity and exposure to environmental stressors

Unique exposure pathways

Physical infrastructure, such as poor housing

Multiple stressors, cumulative, and compounding impacts

Capacity to participate in decision making

Unequal climate vulnerability

1) Adapted from Climate Change, Health and Equity: A Guide for Health Departments, Public Health Institute and American Public Health Association, 2018

2) Adapted from Guidance on Considering Environmental Justice During Development of Regulatory Actions, EPA, 2015

# Snapshot of Today's Climate Inequities

## Urban Flooding

- Impacts low-lying areas with poor infrastructure
- Disproportionately affects low-income residents and people of color
- Further reduces capacity to adapt



# Agriculture, Food Security, and Food Safety

- Native American and Alaskan Native communities are disproportionately affected
- High exposure to climate impacts but limited capacity to adapt
- Ability to fish, farm, and hunt
  - Diminishing crop yields and nutrition
  - Dangerous thawing permafrost
  - Increase of water toxins leading to contamination



A boy and his grandfather fish in Selawik, Alaska

# Heat

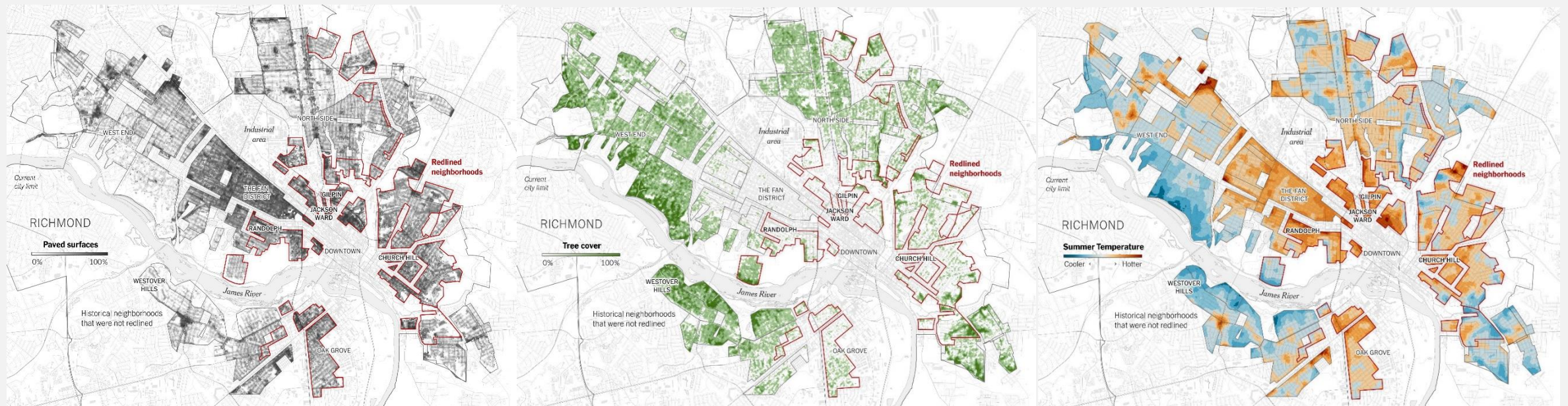


- ~12,000 U.S. premature deaths annually<sup>1</sup>
- Greater vulnerability for extreme heat risk among elderly, people of color
- Energy insecurity is common in U.S., but unequally distributed

1) Shindell et al, GeoHealth, 2020



# History of Redlining: People of Color More Likely to Live in the Hottest Neighborhoods



Paved surfaces

Tree cover

Summer temperature

Source: New York Times. How Decades of Racist Housing Policy Left Neighborhoods Sweltering, Plumer and Popovich, 2020 from Hoffman, Shandas, and Pendleton, Climate, 2020

# Environmental & Climate Justice

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 policy (EPA)



*Those who are least responsible for global warming  
bear the brunt of climate impacts*

# Three Key Strategies for the National Center for Environmental Health

01

Build expertise

Enhance the skills and expertise of our workforce

02

Shine a light on environmental injustice

Amplify community voices by sharing data that tell the story of environmental injustice

03

Partner to empower

Conduct strategic stakeholder engagement and develop pathways to involve communities and partners

# Summary

- Climate vulnerability is a function of exposure, sensitivity, and capacity to adapt.
- Climate threats vary by race and space.
- Environmental and climate justice drive action.



# HEALTH CO-BENEFITS OF CLIMATE MITIGATION

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Asthma and Community Health Branch

Division of Environmental Health Science and Practice

National Center for Environmental Health

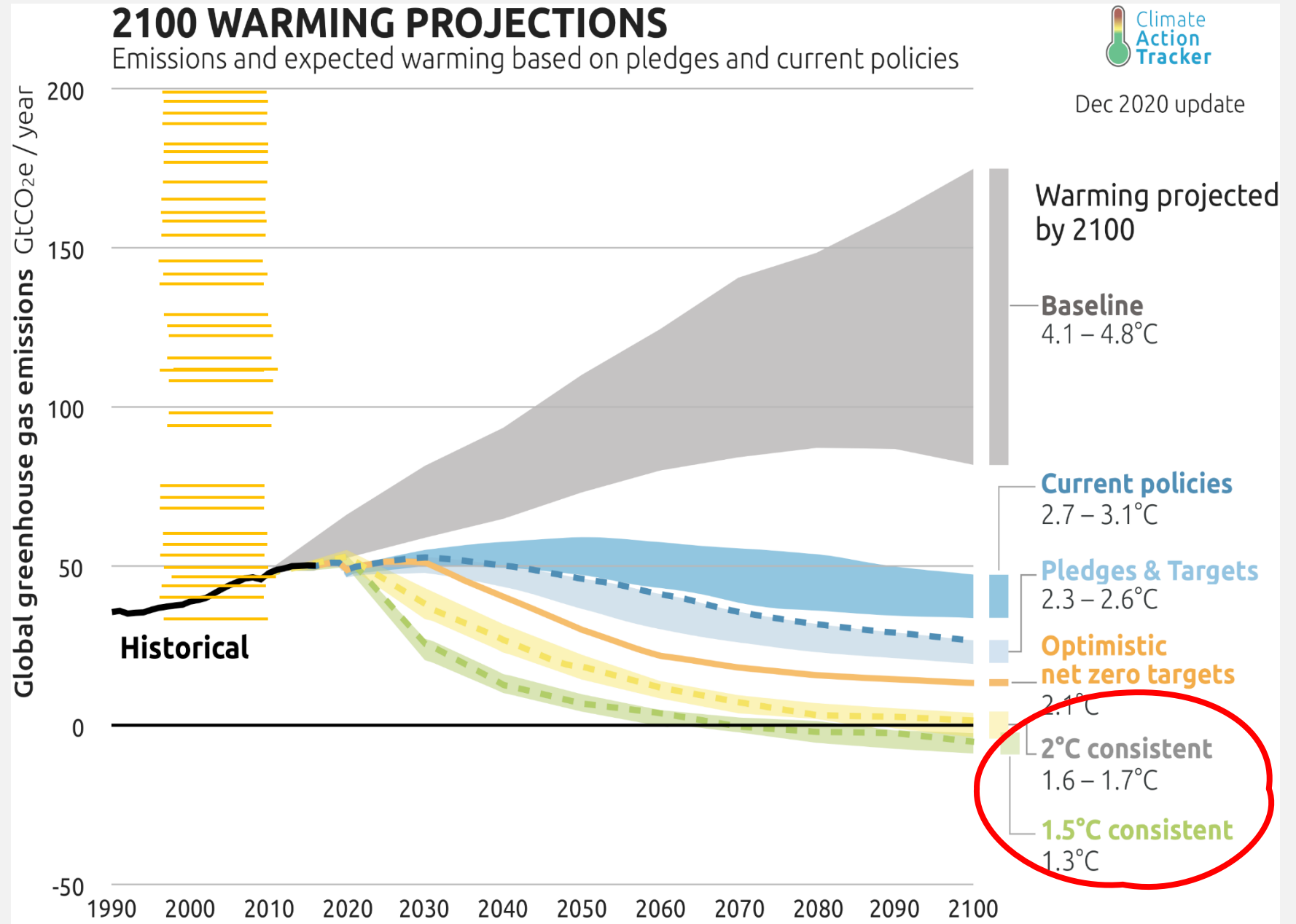
Centers for Disease Control and Prevention

# Overview

- Mitigation is the process by which a condition is made less severe
- Climate change mitigation: slow warming by reducing the accumulation of heat-trapping gases
- Can lead to near-term health opportunities: reduced air pollution, increased physical activity, and healthier diets
- Huge potential for achieving health equity, today and tomorrow







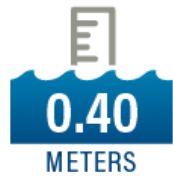
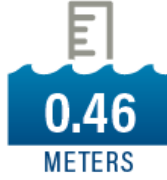


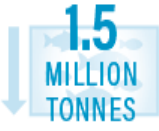
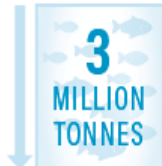
# Where Do We Stand With Warming Projections Based on Global Emissions?



Source: Climate Action Tracker

<https://climateactiontracker.org/global/temperatures/>

# What is the Difference Between 1.5 and 2.0°C Warming?

	1.5°C	2°C	2°C IMPACTS
<b>EXTREME HEAT</b> Global population exposed to severe heat at least once every five years	 14%	 37%	<b>2.6x</b> WORSE
<b>ECOSYSTEMS</b> Amount of Earth's land area where ecosystems will shift to a new biome	 7%	 13%	<b>1.86x</b> WORSE
<b>SEA LEVEL RISE</b> Amount of sea level rise by 2100	 0.40 METERS	 0.46 METERS	<b>.06M</b> MORE
<b>CROP YIELDS</b> Reduction in maize harvests in tropics	 3%	 7%	<b>2.3x</b> WORSE
<b>FISHERIES</b> Decline in marine fisheries	 1.5 MILLION TONNES	 3 MILLION TONNES	<b>2x</b> WORSE

The difference will have big impacts on where we can safely live, farm, and fish





# Mitigation: Reduce Sources and Support Sinks

## Reduce Sources



## Support Sinks



# Mitigation Leads to Multiple Health Co-Benefits

Improved health

Health & wellbeing



Benefits

Mental health and social equity

Clean air

Physical activity

Healthy diets

Actions

Access to clean household energy

Low carbon electricity

Healthy transport

Sustainable healthcare

Reduced red and processed meat

Sectors

Urban planning



Power generation



Transport



Industry



Healthcare



Agriculture and forestry



Source: The Lancet Countdown

<https://www.lancetcountdown.org/data-platform/mitigation-actions-and-health-co-benefits>





# Burning and extracting fossil fuels harms people

**8.7** million deaths worldwide annually due to fossil fuel air pollution<sup>1</sup>

**355k** deaths in US annually<sup>1</sup>

Black and Latinx people are exposed to 56% and 63% more pollution than they cause by their consumption<sup>2</sup>



1) Vorha et al, Environmental Research, 2021, 2) Tessum et al, Proceedings of the National Academy of Sciences, 2019

# Transitioning Away From Fossil Fuel Use for Energy Production Leads to U.S. Air Pollution Health Co-benefits

- Green house gas reductions would prevent 24,000 air pollution related deaths by 2050<sup>1</sup>
- Air quality benefits offset costs of U.S. carbon policies<sup>2</sup>
- Shutdown of 334 coal-fired electricity plants saved 22,563 lives<sup>3</sup>
- Health equity impacts





# Conclusion

- Urgent transformative changes are needed to slow warming
- Climate mitigation brings health co-benefits to local areas in short term, offsets transition costs, and helps achieve health equity



# CLIMATE AND HEALTH ADAPTATION

PREPARING FOR AND RESPONDING TO THE HEALTH IMPACTS OF CLIMATE CHANGE

Claudia Brown, M.D.P.

Health Scientist, Climate and Health Program

Asthma and Community Health Branch

Division of Environmental Health Science and Practice

National Center for Environmental Health

Centers for Disease Control and Prevention

# BRACE Video

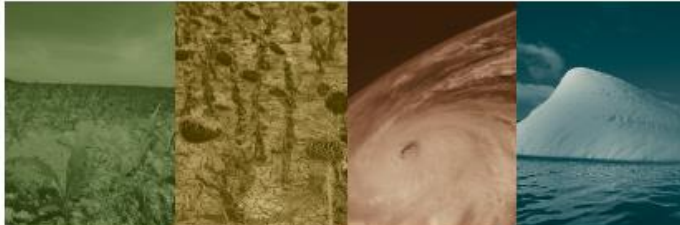


<https://www.youtube.com/watch?v=2PWPGI7NSUo>



# Focus on Health Equity and Vulnerability Assessment

**Assessing Health Vulnerability to Climate Change:**  
A Guide for Health Departments



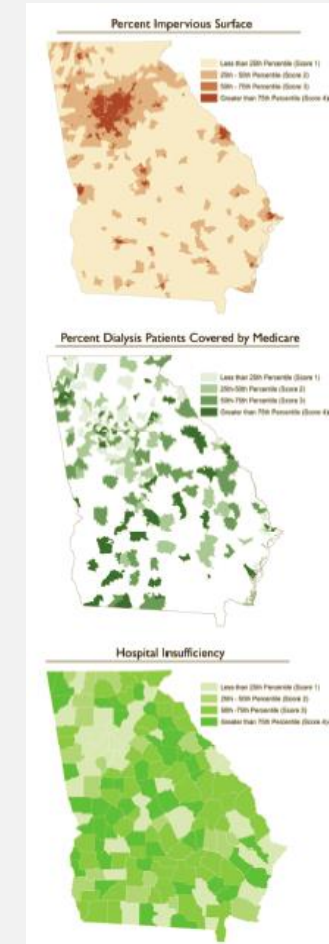
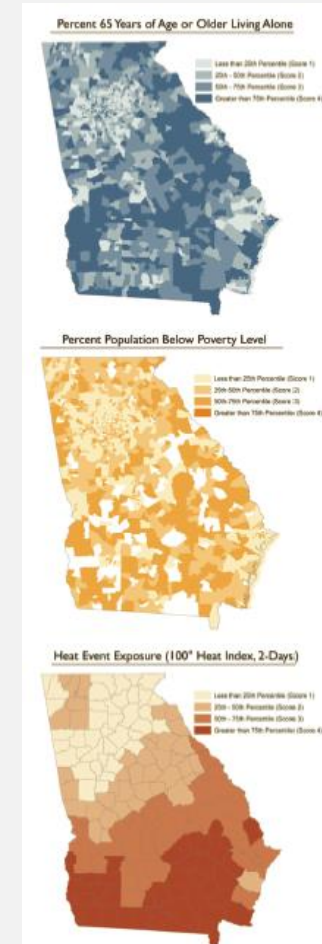

**Climate and Health Technical Report Series**  
Climate and Health Program,  
Centers for Disease Control and Prevention

Arie Ponce Manangan<sup>1</sup>, Christopher K. Uejir<sup>2</sup>, Shubhayu Saha<sup>3</sup>, Paul J. Schumm<sup>4</sup>,  
Gino D. Marinucci<sup>5</sup>, Jeremy J. Hess<sup>5M</sup>, George Luber<sup>2</sup>

<sup>1</sup>Climate and Health Program, Division of Environmental Hazards and Health Effects (DEHHE), National Center for Environmental Health (NCEH), Centers for Disease Control and Prevention (CDC), Atlanta, GA, USA  
<sup>2</sup>Department of Geography, Florida State University, Tallahassee, FL, USA  
<sup>3</sup>Department of Emergency Medicine, School of Medicine, Emory University, Atlanta, GA, USA  
<sup>4</sup>Department of Environmental Health, Rollins School of Public Health, Emory University, Atlanta, GA, USA

*The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.*

National Center for Environmental Health  
Division of Environmental Hazards and Health Effects



Guidance for health departments to identify communities that will be disproportionately affected by climate change

# Two Complementary Paths to Resilience

## Adaptation

Manage the risks of climate change impacts



Flood protection



Disaster preparedness



Managed retreat

Upgraded infrastructure



Green urban



Public health



Sustainable agriculture



Education



Active transport

## Mitigation

Reduce emissions causing climate change



Afforestation and reforestation



Carbon capture (CCS)



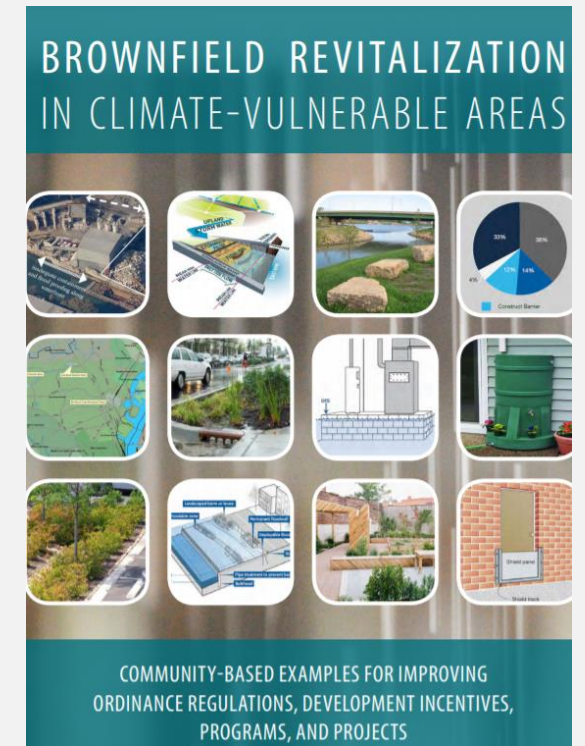
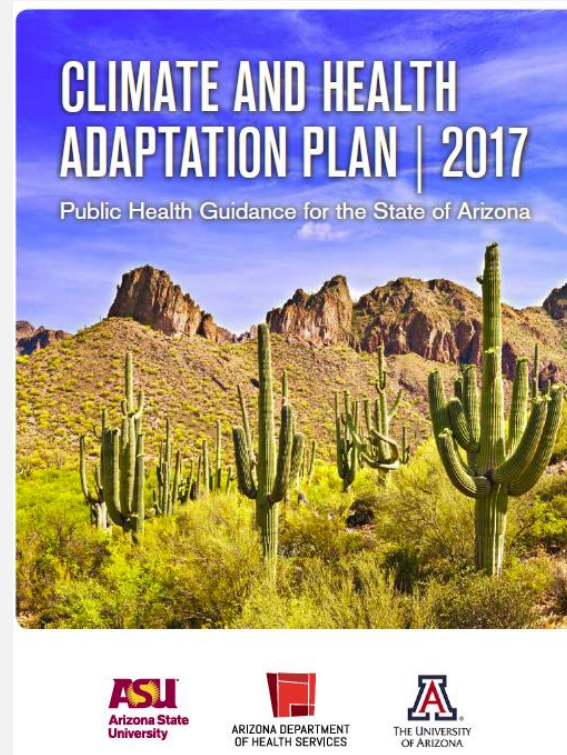
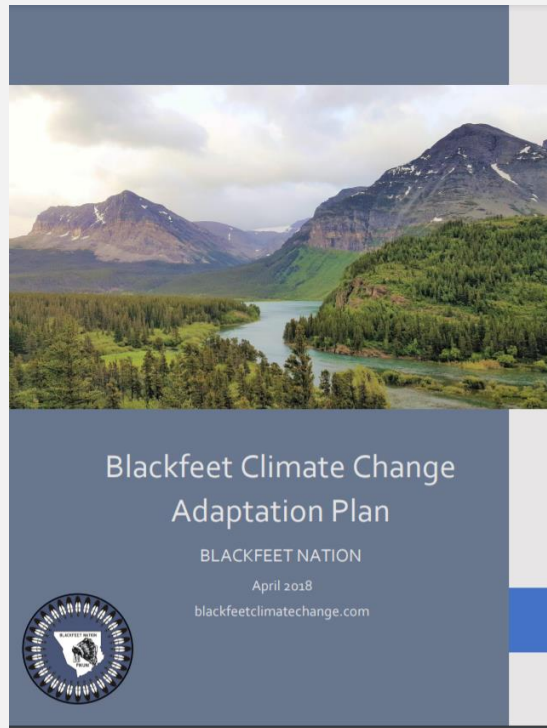
Energy efficiency

Clean energy sources

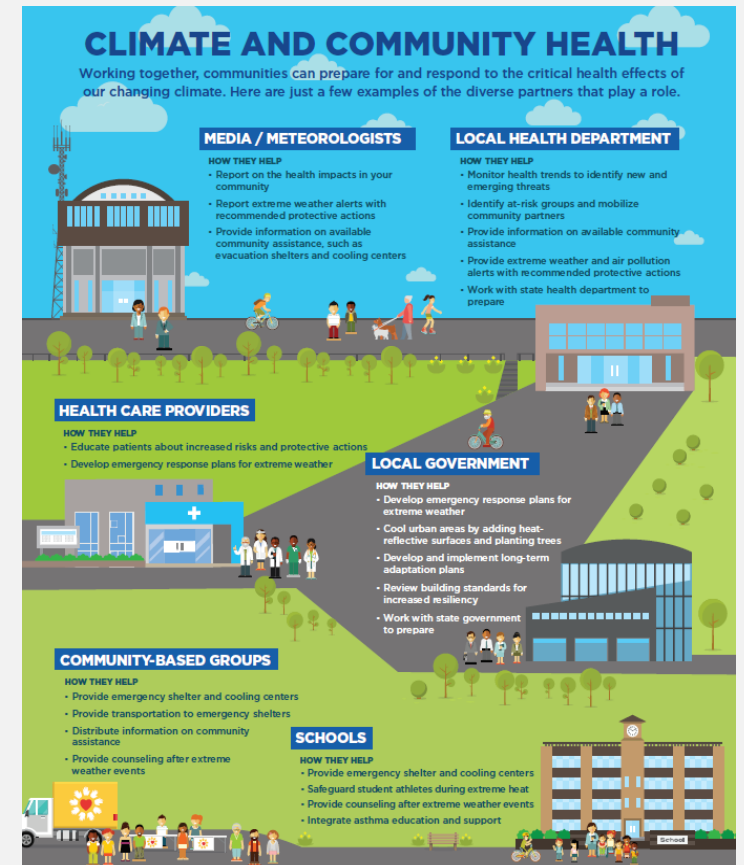
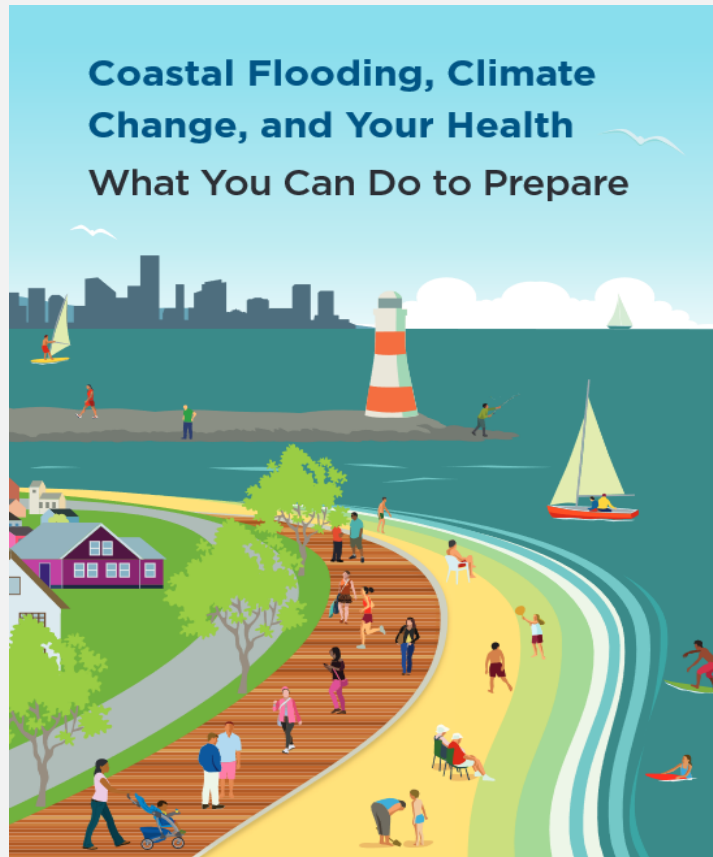




# Adaptation Plans Come in All Shapes and Sizes



# Resources for Communities



# **ADAPTION IN ACTION**

Successes from the Climate-Ready States and Cities Initiative





# How New York City is Addressing Extreme Heat



## THE PROBLEM

Disadvantaged communities face **increased risk** of climate-related illness and death.



## OUR SOLUTION

**Be A Buddy** was implemented to prepare residents and local organizations to check in on vulnerable residents.



## LASTING IMPACT

**Strengthened relationships** between residents and local organizations to **reduce vulnerabilities** to extreme heat and other weather emergencies in four low-income communities



<https://www1.nyc.gov/site/doh/health/health-topics/climate-change-and-public-health.page>



# How Minnesota is Protecting Drinking Water



## THE PROBLEM

**Extreme rainfall** can wash contaminants into drinking water resources. One in five Minnesotans use **private wells** and must maintain water quality themselves.



## OUR SOLUTION

Assessed and found **22,000** private wells were in floodplains. Led to collaboration that **improved and enhanced** private well water testing.



## LASTING IMPACT

This was the first time deliberate actions were taken to **institutionalize climate knowledge** into drinking water programs in the state and have established new and continuing **collaborations**.



# How the Tribal Village of Wainwright is Preparing for Thinning Ice



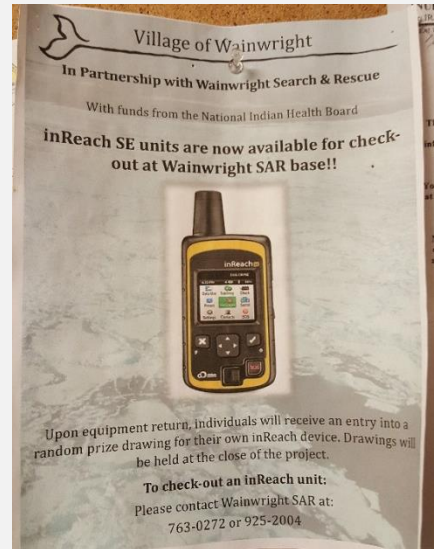
## THE PROBLEM

Recent warming as caused a **thinning of ice** that was previously stable for much of the spring and used for **transportation** by snow machines, creating hazardous travel conditions.



## OUR SOLUTION

“InReach” devices implemented for emergency communication. Allows for **emergency communication** when snow mobiles get stuck in unseasonably thin ice.



## LASTING IMPACT

**Money saved** due to reduction in helicopter rescues for ice emergencies and improved community awareness of hazards of unseasonably thin ice on travel.



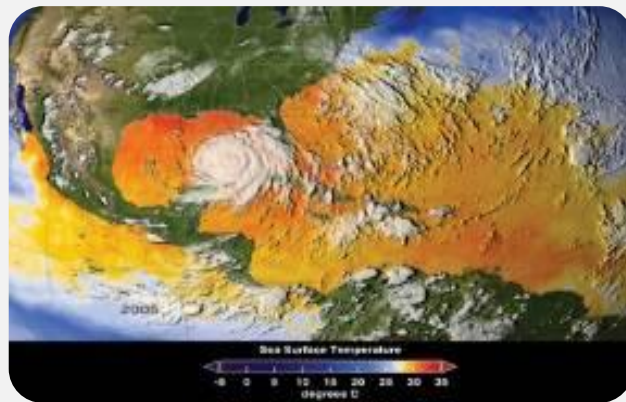
Source:  
CDC

# How Florida is Protecting Residents During Hurricane Season



## THE PROBLEM

With increasing **sea level rise** and more **intense hurricanes**, Florida is more prone to flooding and will need to set up **emergency shelters** more readily and make them more accessible.



Source: NASA



## OUR SOLUTION

The Florida Department of Health conducted **assessments of emergency shelters** and made recommendations to clarify shelter roles and the resilience of communication systems.



## LASTING IMPACT

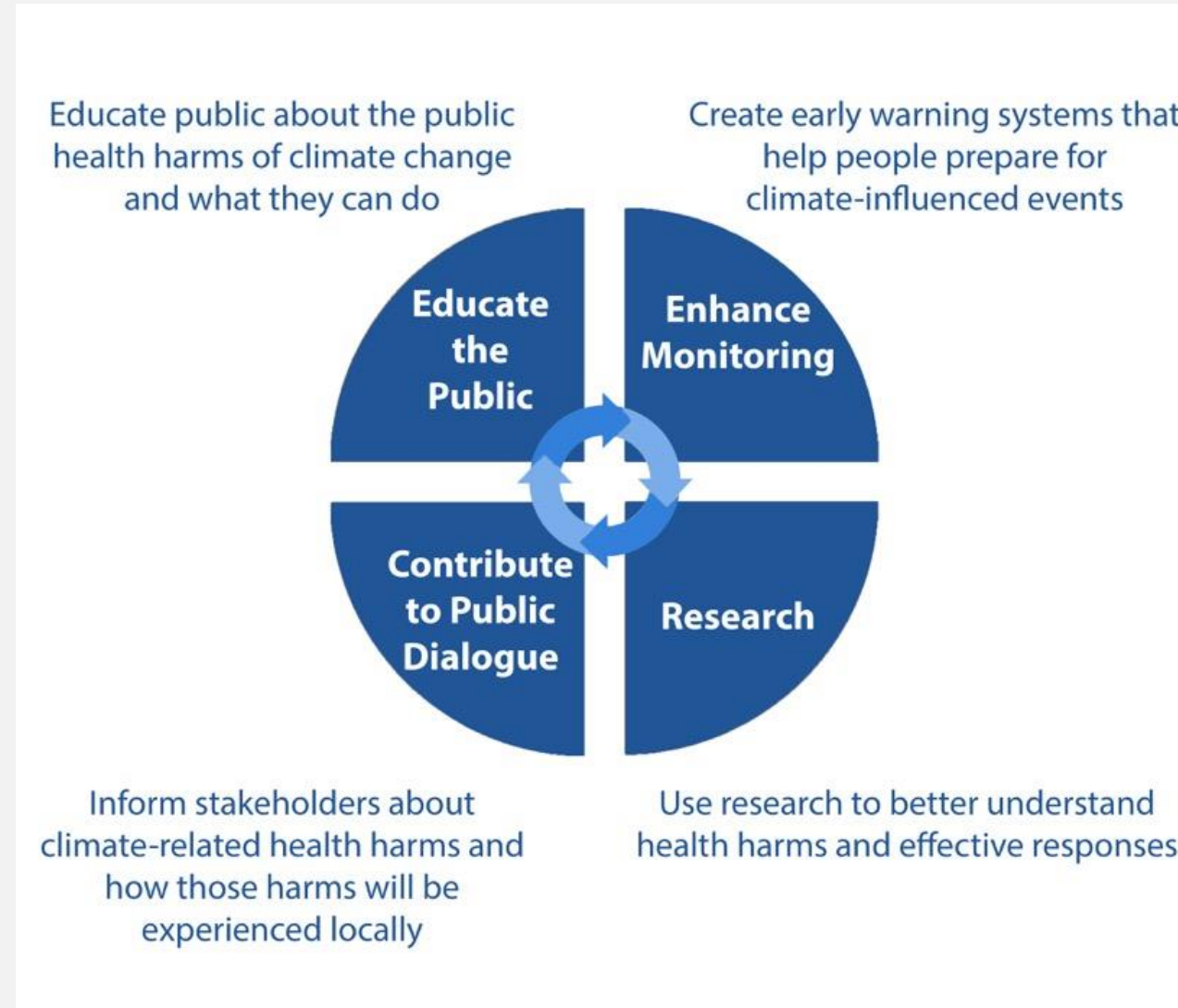
Emergency shelters are **better prepared to serve the most in need residents**, particularly those with disabilities, and the partnership with FEMA and Red Cross is an established and **ongoing collaboration**.



<https://flbrace.org/>



# Four Strategies for Continued Success



# CLIMATE AND HEALTH COMMUNICATION

Eric Lahr, M.Sc.

Health Communication Specialist, Climate and Health Program

Asthma and Community Health Branch

Division of Environmental Health Science and Practice

National Center for Environmental Health

Centers for Disease Control and Prevention



# Why is Climate and Health Communication Important?

- 72% of U.S. adults believe global warming is happening, but only 43% believe it will harm them personally.<sup>1</sup>
- Effectively communicating climate and health impacts can increase this number by showing tangible and relatable ways people are vulnerable.
- Because climate communication needs vary by location, we must support local health officials in communicating with their communities about adaptation and mitigation.

# **CLIMATE AND HEALTH COMMUNICATION RESOURCES**

# Climate and Health Communication Webinar Series



Best Practices for Effective Climate & Health Communication

A six-webinar series designed to help state and local health departments effectively communicate about the health impacts of climate change in their communities

[Climate and Health - Webinars | CDC](#)

# Social Media Toolkit

## How Climate Affects Community Health

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A Social Media Toolkit for Engaging Local Communities  
in Climate and Health Adaptation



- Includes suggested post copy, shareable graphics, videos, and best practices
- Includes tips on using this content to engage audiences and boost the reach of messages

**How Climate Affects  
Community Health: A  
Social Media Toolkit for  
Engaging Local  
Communities in Climate  
and Health Adaptation  
([cdc.gov](https://www.cdc.gov))**





**AFFECTING HEALTH DIRECTLY**  
**EXTREME HEAT**

Higher heat, increased humidity, and longer and more frequent heat waves can lead to **dehydration and heat stroke.**

**Most at Risk:** Outdoor workers, athletes participating in outdoor sports, people in cities, people without air conditioning, people with chronic diseases, pregnant women, older adults, and young children

**EXTREME HEAT CASE STUDY**

San Francisco Department of Public Health (SFDPH), Climate and Health Program

**Problem:** San Francisco is built for a cool coastal climate. Many buildings lack air conditioning, making the city particularly vulnerable to the health effects of extreme heat. Rising temperatures are expected to increase heat-related illnesses unless adaptation measures are undertaken.

**Approach:** SFDPH established a Heat Vulnerability Index to identify factors that make neighborhoods more vulnerable to extreme heat such as the amount of heat-absorbing concrete and tree density. SFDPH used this information to develop eight adaptations for extreme heat, including establishing emergency cooling centers and alerts.

**Results:** SFDPH engaged San Franciscans around the health risks of extreme heat, supported the development of an extreme heat annex in the City Emergency Operations Plan, and built capacity at the city level to plan future climate and health adaptations and interventions.

 Centers for Disease Control and Prevention  
**CLIMATE-READY STATES AND CITIES INITIATIVE**

[cdc.gov/climateandhealth](https://cdc.gov/climateandhealth)  
Communities are developing a coordinated response to heat risks by using CDC's Building Resilience Against Climate Effects (BRACE) framework, a five-step process for climate adaptation

# Health Harm Cards

These eight health harm cards

- Provide simple information about health harms and the vulnerable populations associated with each
- Feature a case/success story from another community
- Useful for both stakeholders and the general public

## CDC Health Harms Postcards

# CLIMATE AND COMMUNITY HEALTH

Working together, communities can prepare for and respond to the critical health effects of our changing climate. Here are just a few examples of the diverse partners that play a role.

## MEDIA / METEOROLOGISTS

### HOW THEY HELP

- Report on the health impacts in your community
- Report extreme weather alerts with recommended protective actions
- Provide information on available community assistance, such as evacuation shelters and cooling centers

## LOCAL HEALTH DEPARTMENT

### HOW THEY HELP

- Monitor health trends to identify new and emerging threats
- Identify at-risk groups and mobilize community partners
- Provide information on available community assistance
- Provide extreme weather and air pollution alerts with recommended protective actions
- Work with state health department to prepare

## HEALTH CARE PROVIDERS

### HOW THEY HELP

- Educate patients about increased risks and protective actions
- Develop emergency response plans for extreme weather

## LOCAL GOVERNMENT

### HOW THEY HELP

- Develop emergency response plans for extreme weather
- Cool urban areas by adding heat-reflective surfaces and planting trees
- Develop and implement long-term adaptation plans
- Review building standards for increased resiliency
- Work with state government to prepare

## COMMUNITY-BASED GROUPS

### HOW THEY HELP

- Provide emergency shelter and cooling centers
- Provide transportation to emergency shelters
- Distribute information on community assistance
- Provide counseling after extreme weather events

## SCHOOLS

### HOW THEY HELP

- Provide emergency shelter and cooling centers
- Safeguard student athletes during extreme heat
- Provide counseling after extreme weather events
- Integrate asthma education and support



CLIMATE-READY STATES  
AND CITIES INITIATIVE  
[cdc.gov/climateandhealth](https://cdc.gov/climateandhealth)

Communities are developing a coordinated response to health risks by using CDC's Building Resilience Against Climate Effects (BRACE) framework, a five-step process for climate adaptation.

# Climate and Community Health Infographic

Identifies community partners and the role each of them can play in addressing the public health impacts of a changing climate

[Climate and Community Health \(cdc.gov\)](https://cdc.gov)

# Communication Opportunities Going Forward

- New focus on mitigation and co-benefits.
- Opportunities to increase community involvement
  - As more people understand the health impacts of climate change and are empowered to take action individually and as a community.

**For more information, please visit our website:**

**Website: [www.cdc.gov/climateandhealth/](http://www.cdc.gov/climateandhealth/)**

**Email: [climateandhealth@cdc.gov](mailto:climateandhealth@cdc.gov)**

For more information, contact NCEH/ATSDR  
1-800-CDC-INFO (232-4636)

TTY: 1-888-232-6348      [www.atsdr.cdc.gov](http://www.atsdr.cdc.gov)      [www.cdc.gov](http://www.cdc.gov)

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention and the Agency for Toxic Substances and Disease Registry.

