

# Climate Change as a Priority in Public Health Nursing



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***Inform***

***Engage***

***Empower***





NOAA, Todd Heitkamp Wikimedia Commons



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**“Climate change is the biggest global health threat of the 21<sup>st</sup> century... The impacts will be felt all around the world – and not just in some distant future but in our lifetimes and those of our children.”**

**The Lancet, 2009**



USDA, Wikimedia Commons



NOAA, Wikimedia Commons



Suat Eman, freedigitalphotos.net



# Health Effects of Climate Change

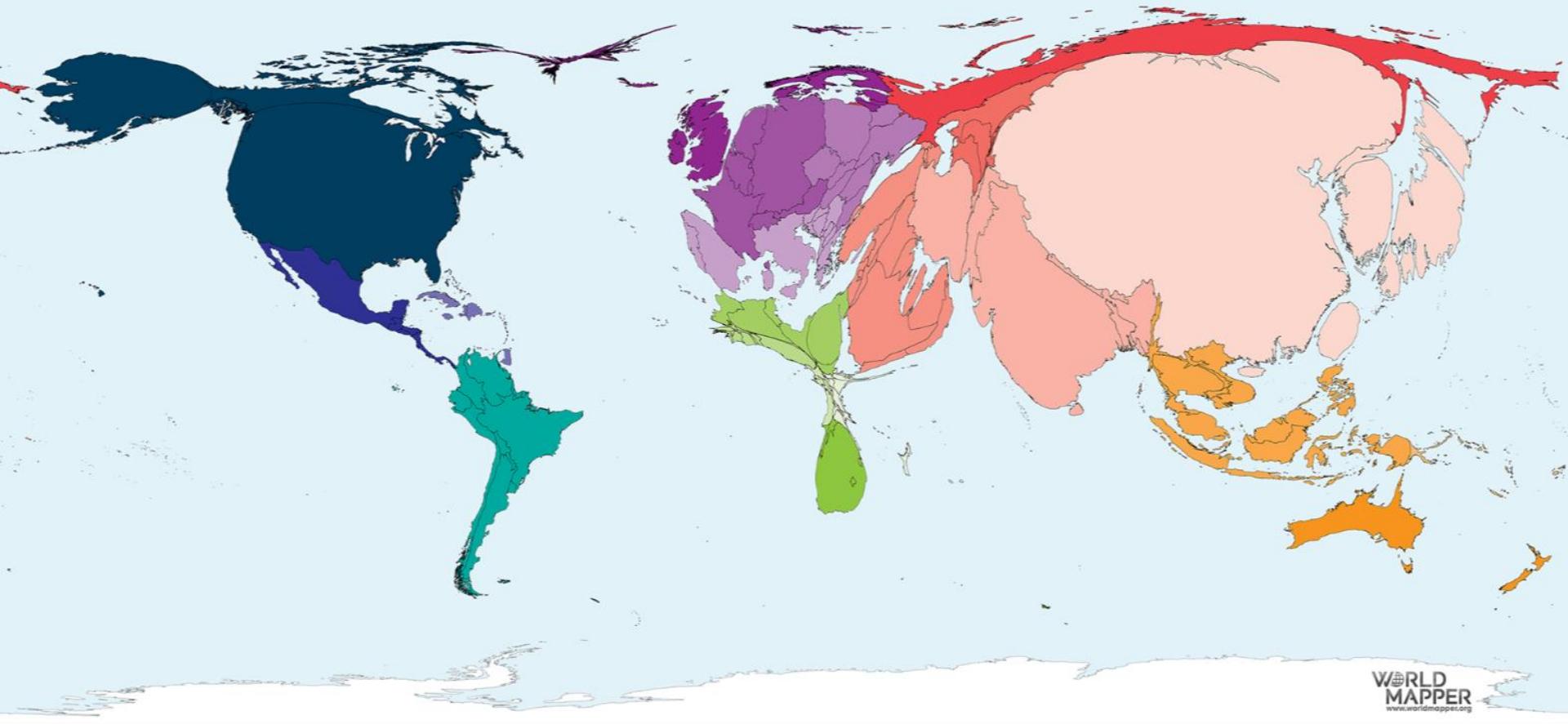


*Unique vulnerabilities*

*Environmental Justice*

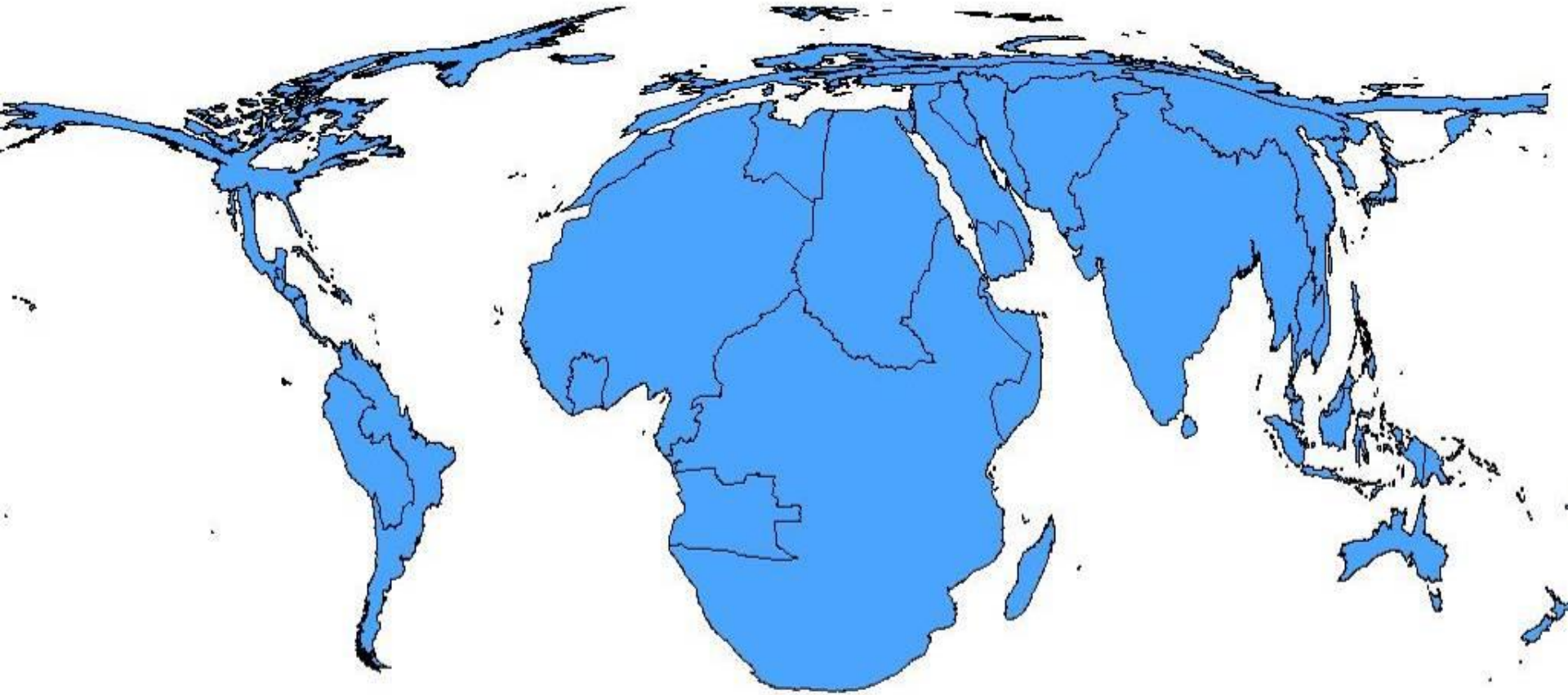


# Carbon Emissions 2015



*Note: Africa and Indian Subcontinent*

# Health Impacts of Climate Change



*Note: Africa and Indian Subcontinent*

**Data from: WHO 2015**

# Populations of Concern



Children and pregnant women

Older adults/elderly

Communities of Color, Low Income, Immigrants, and Limited English Proficiency Groups

Indigenous peoples

Occupational groups

People with disabilities

People with pre-existing medical conditions



# What Makes Us Vulnerable?

**Exposure:** Coming into contact with a climate change threat



**Sensitivity:** Being biologically susceptible to a climate change threat given factors like health status and age



**Ability to Adapt:** Being able to adjust or respond to a climate change threat



*While all Americans are affected by climate change, some groups are disproportionately vulnerable to climate health impacts.*

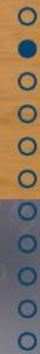


# The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment

Climate change is a significant threat to the health of the American people. This scientific assessment examines how climate change is already affecting human health and the changes that may occur in the future.



VIEW SUMMARY



## Climate Change and Human Health



<https://health2016.globalchange.gov>

***Around 88% of the global disease burden of climate change falls on children under 5 years.***



In Africa and South Asia alone, an estimated  
**250,000 children die every year**  
due to climate change.

**#right2Bcool**

Read: *The Challenges of Climate Change: Children on the Front Line*

Climate change drives child poverty.  
**175 million children**

Are hit by climate disasters every year.

**#right2Bcool**



## Vulnerability to the Health Impacts of Climate Change at Different Life Stages



*Mothers and babies*

Adverse pregnancy outcomes such as low birth weight and preterm birth have been linked to extreme heat events, airborne particulate matter, and floods.



*Infants and toddlers*

Young children's biological sensitivity places them at greater risk from asthma, diarrheal illness, and heat-related illness.

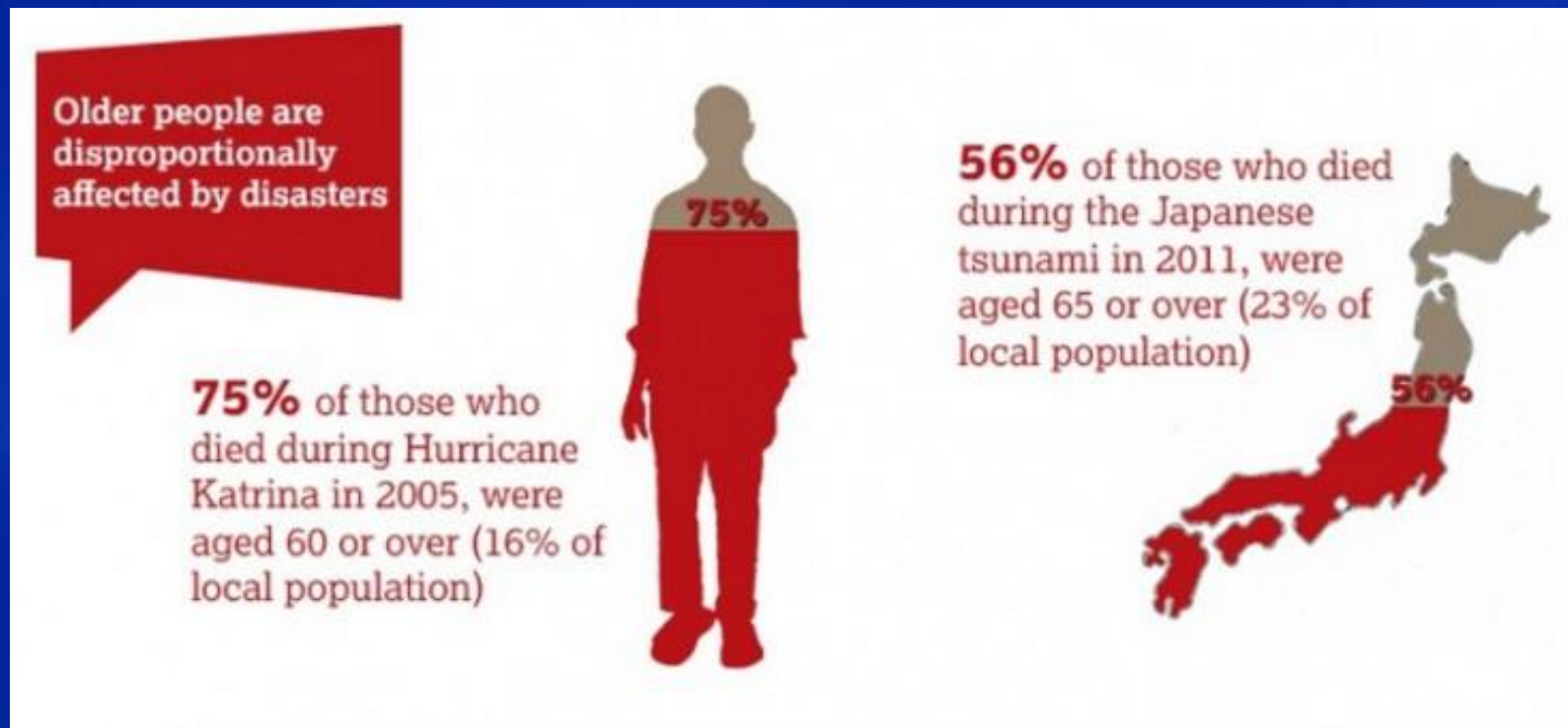


*School age and older children*

The behaviors and activities of older children increase their risk of exposure to heat-related illness, vector-borne and waterborne disease, and respiratory effects from air pollution and allergens.

# Extreme Events

- Older adults are more likely to suffer storm and flood-related fatalities.



***Superstorm Sandy: Almost 1/2 of deaths were over age 65***

# Extreme Events

- **Evacuation: Older adults have high risk of both physical and mental health impacts**
- **Most vulnerable-people with:**
  - disabilities
  - chronic medical conditions
  - living in nursing homes or assisted-living facilities

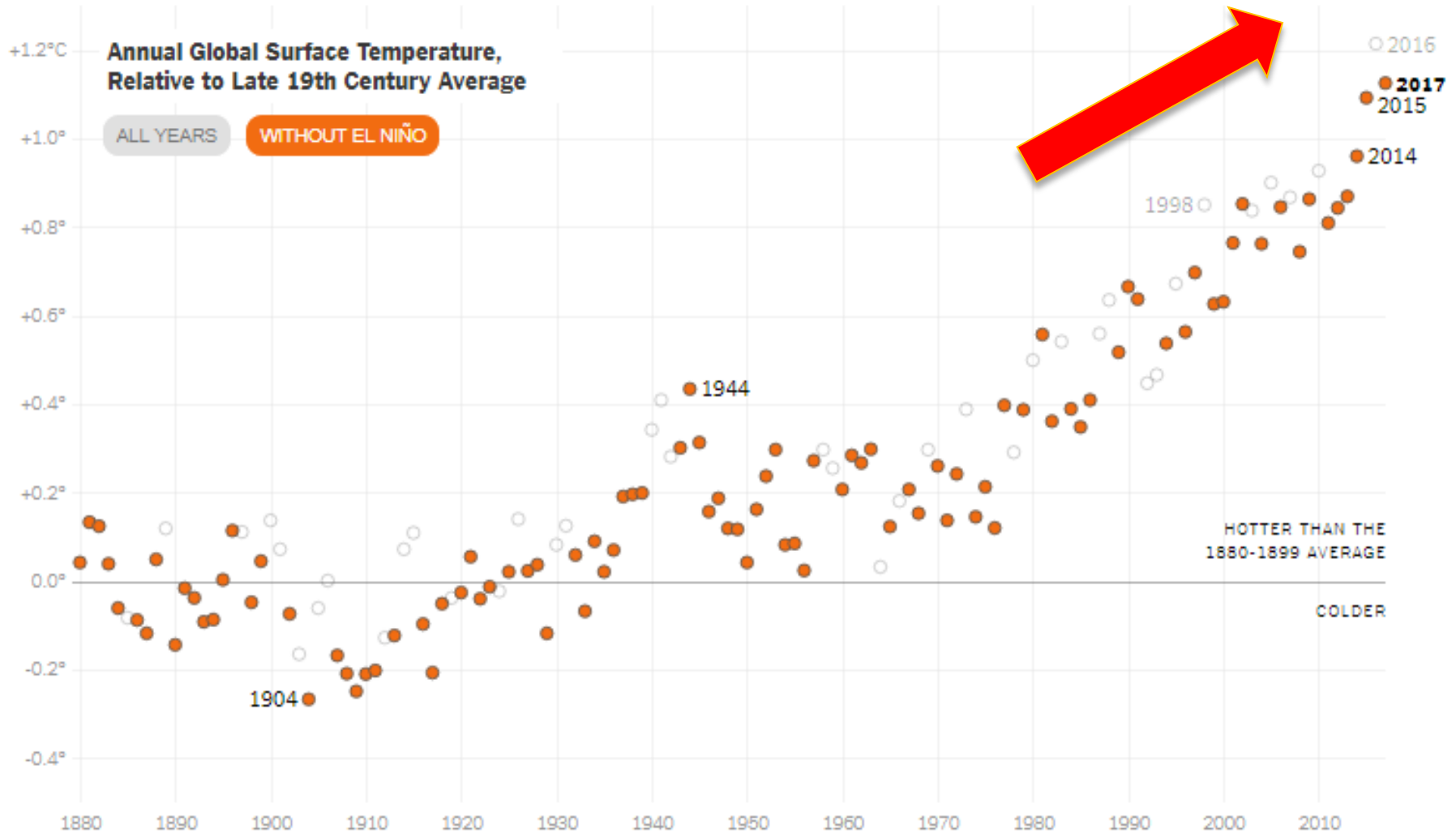


Residents at La Vita Bella nursing home in Dickinson, Texas  
*Timothy J McIntosh/ Twitter*

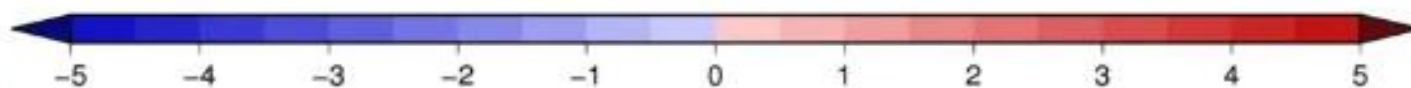
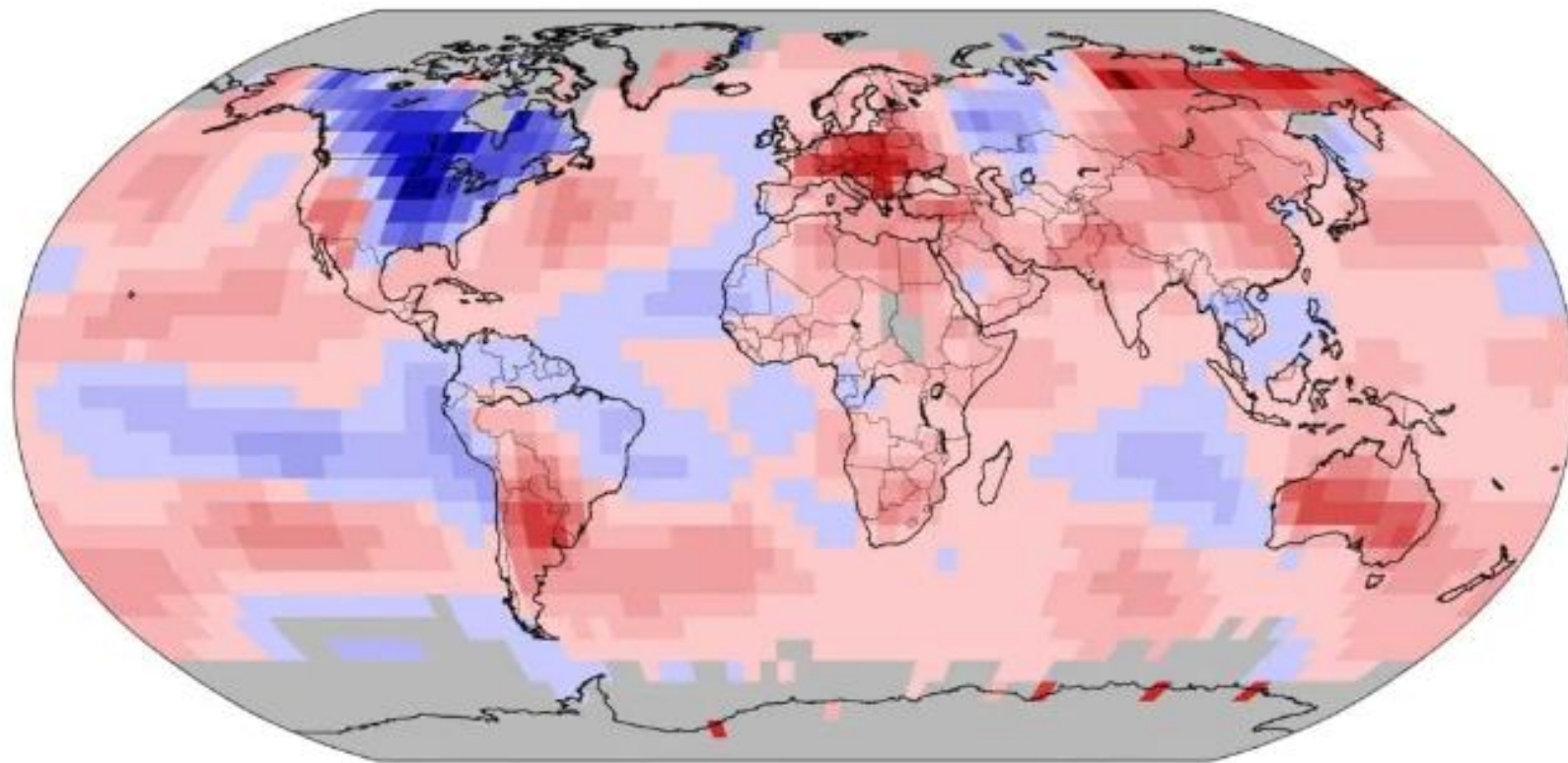


# The World Has Warmed

CLIMATE | 2017 Was One of the Hottest Years on Record. And That Was Without El Niño.



# April was Earth's 400th warmer-than-normal month in a row



National Centers for Environmental Information  
Mon May 14 07:06:31 EDT 2018

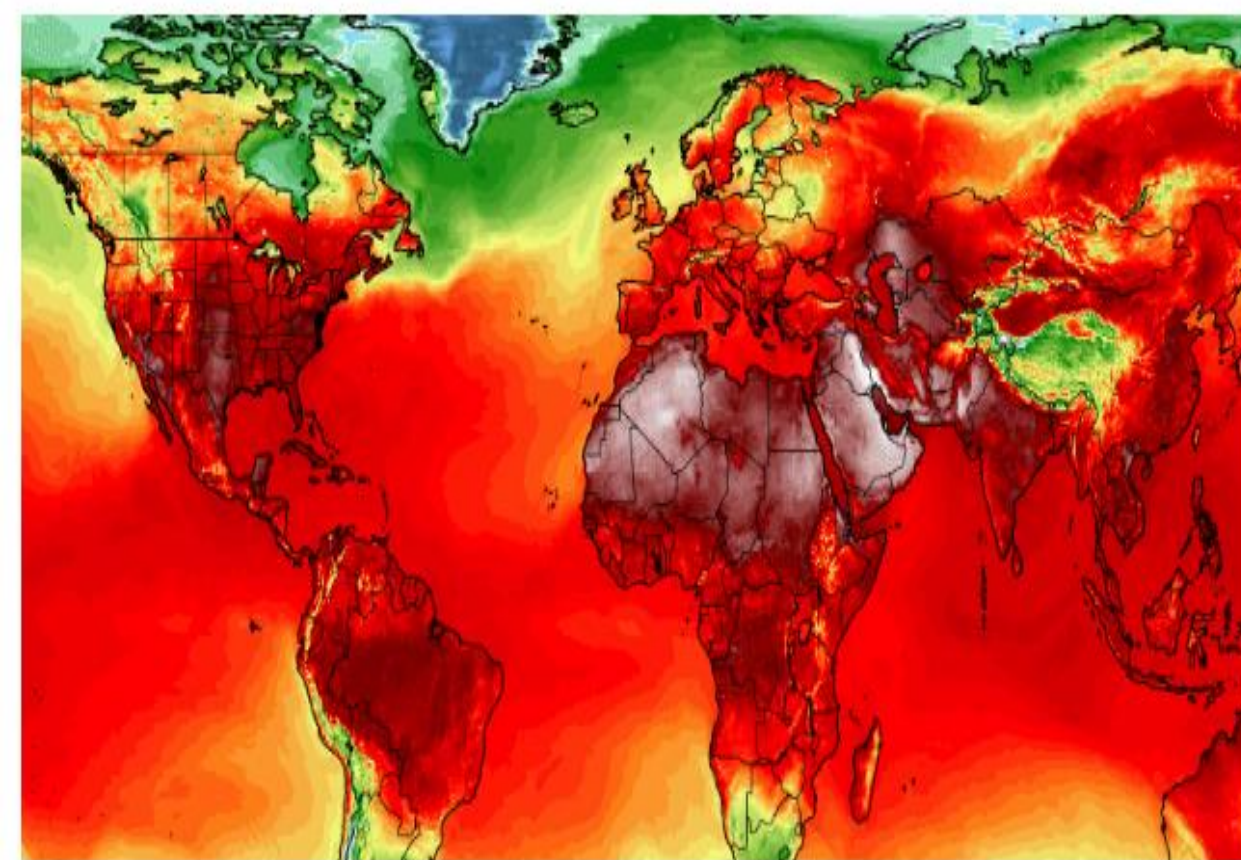
Degrees Celsius

Please Note: Gray areas represent missing data  
Map Projection: Robinson

# Red-hot planet: All-time heat records have been set all over the world during the past week

By Jason Samenow  
July 5

**The Washington Post**  
*Democracy Dies in Darkness*



**Temps on July 3, 2018**

Simulation of maximum temperatures on July 3 from American (GFS) weather model at two meters above the ground. (University of Maine Climate Reanalyzer)



# Summer 2018 Europe Heat Wave

## Heat Records Shattered

Madrid 104°

Kitzingen, Germany 104.5°

Berlin 100.2°

Frankfurt 102.2°

Paris 103.5°

Maastricht 100.8°

Extreme heat warnings across southern Europe as temperatures hit 40C and above

Not dangerous Potentially dangerous Dangerous Very dangerous, threat to life

113°



Split, in Croatia, saw a high of 42.3C on Wednesday. Parts of the Balkans and Italy might peak at 46C this weekend

Cordoba hit 42C on Thursday. Other cities in southern Spain are expecting similar highs

Spain

Popular holiday resorts on the Costa del Sol and Majorca are set to reach 43C

Italy

Catania, Sicily reached 42C on Thursday

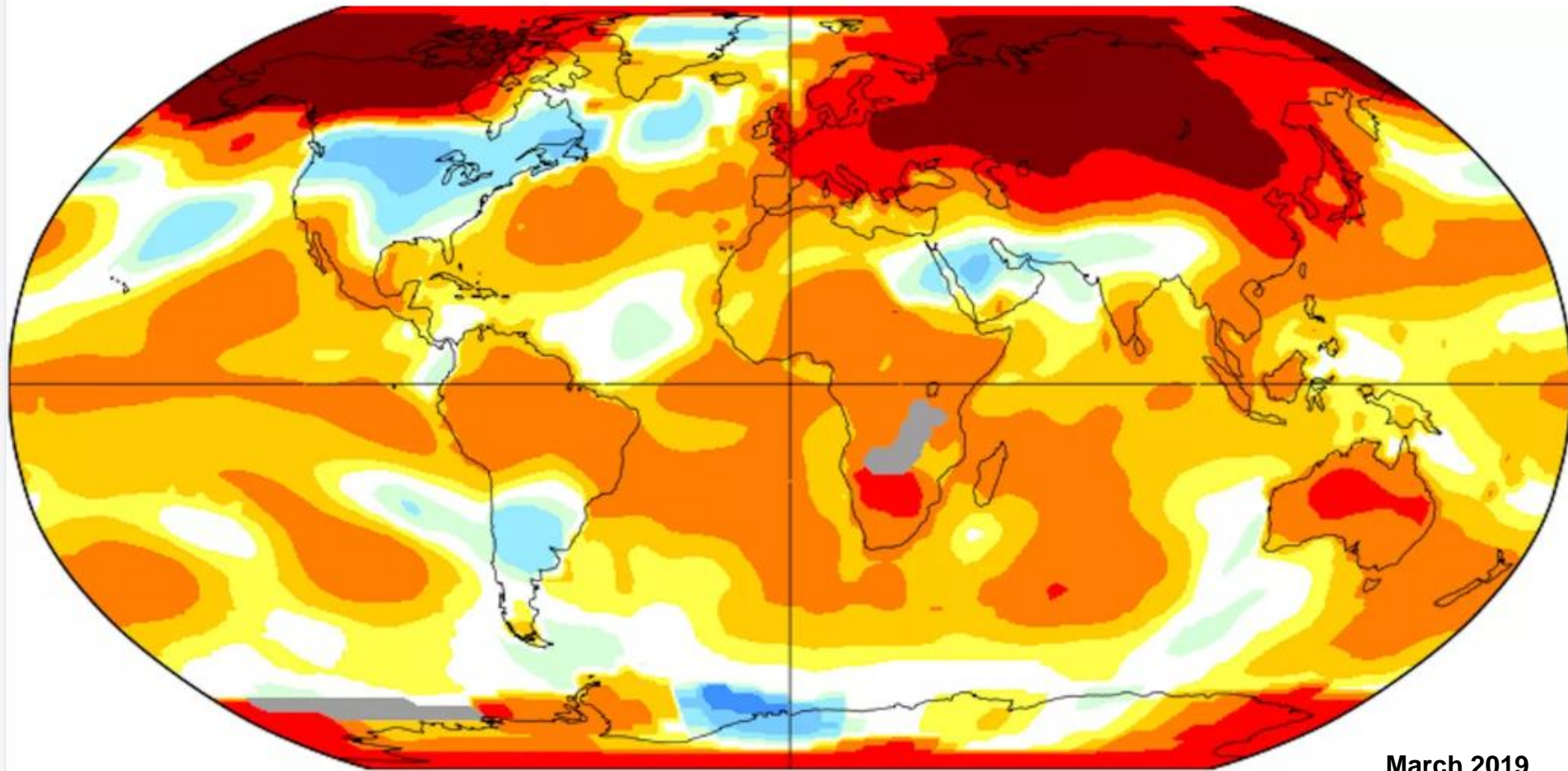
Hungary

Romania

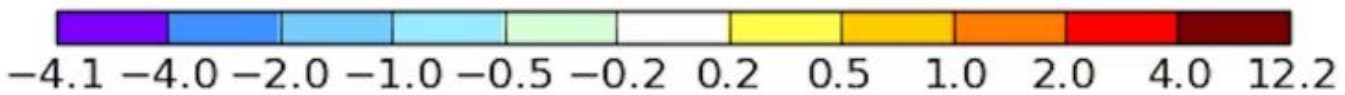
Serbia



# Earth had a top 3 warmest March on record, climate agencies find



March 2019



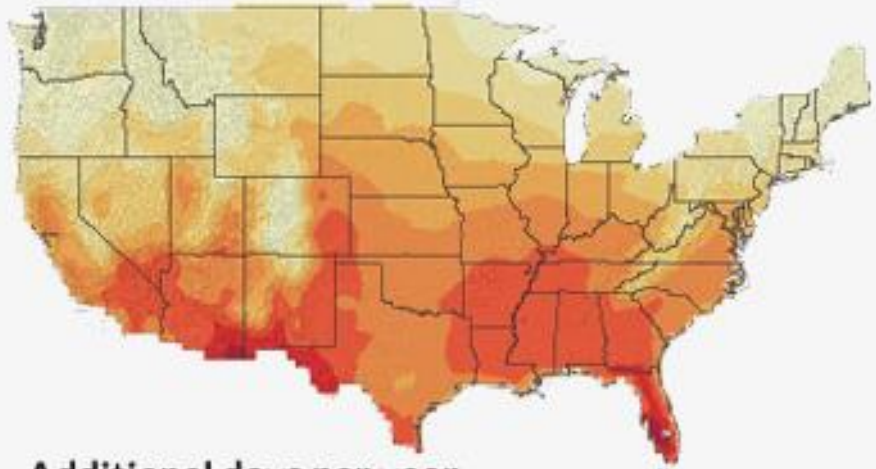
Global average temperature anomalies in degrees Celsius for March 2019 compared to the 1951-1980 average. Image: NASA GISS.



# Nowhere but up

The number of days each year above 95° Fahrenheit (35° Celsius) is expected to rise across the United States, and average summer temperatures will reach new heights if greenhouse gas emissions remain high. The maps below compare late 20th century temperatures to projections for the mid-21st century.

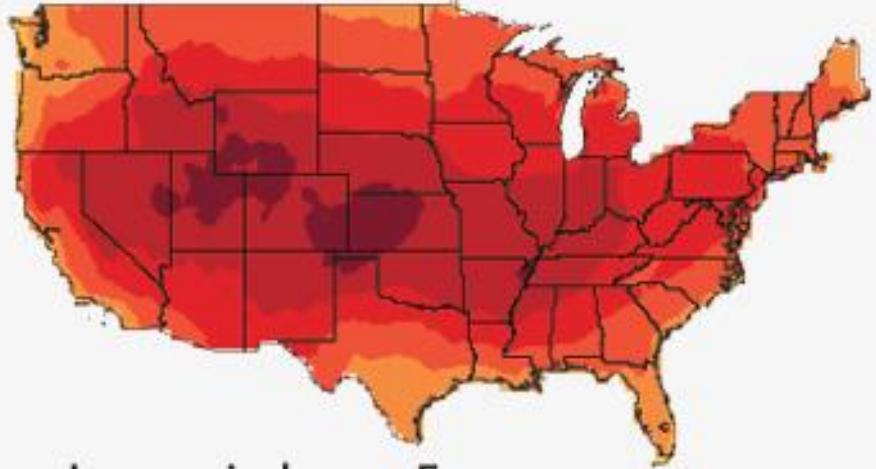
### Change in number of days above 95° F



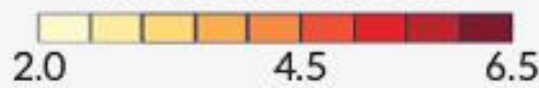
Additional days per year



### Change in average summer temperatures

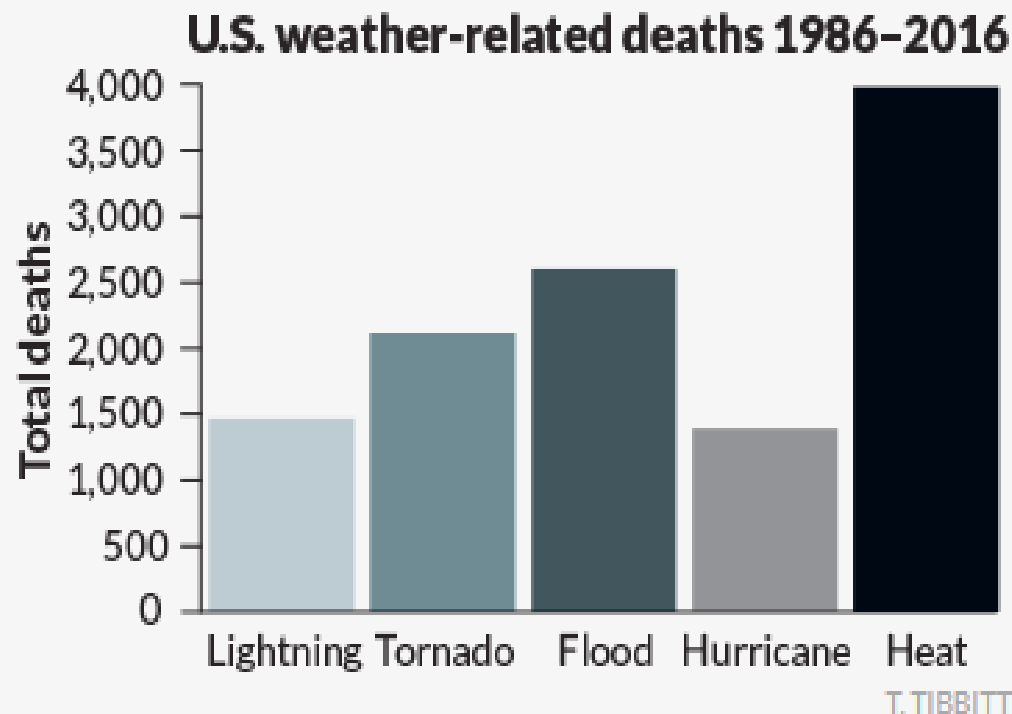


Increase in degrees F



# Weather dangers

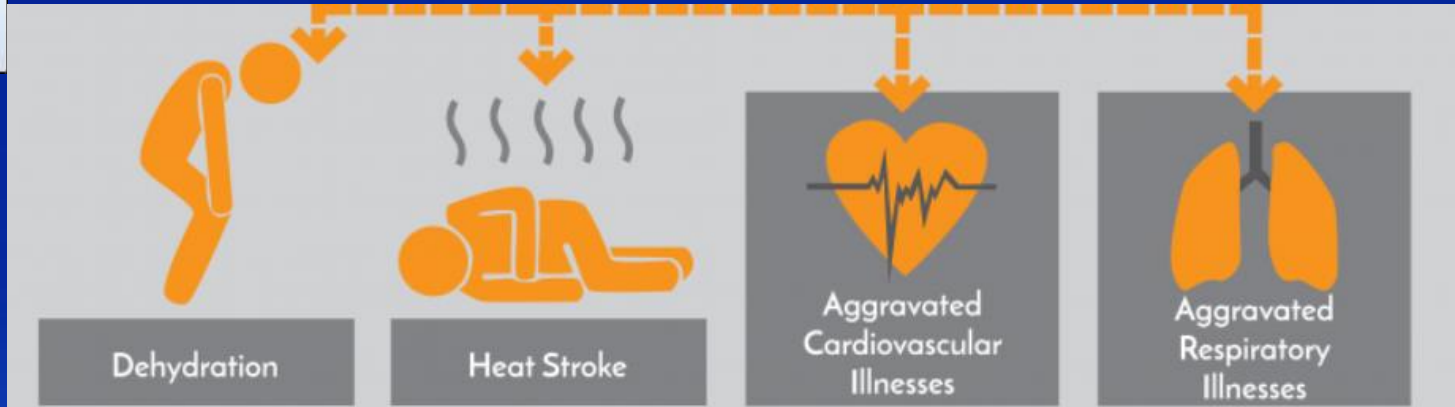
Although tornadoes, floods and hurricanes tend to get more attention, U.S. heat fatalities top the list of weather-related deaths in the 30 years since heat-related data were first reported.



Source: National Weather Service



# Extreme Temperatures: Heat Waves



## Most vulnerable populations:

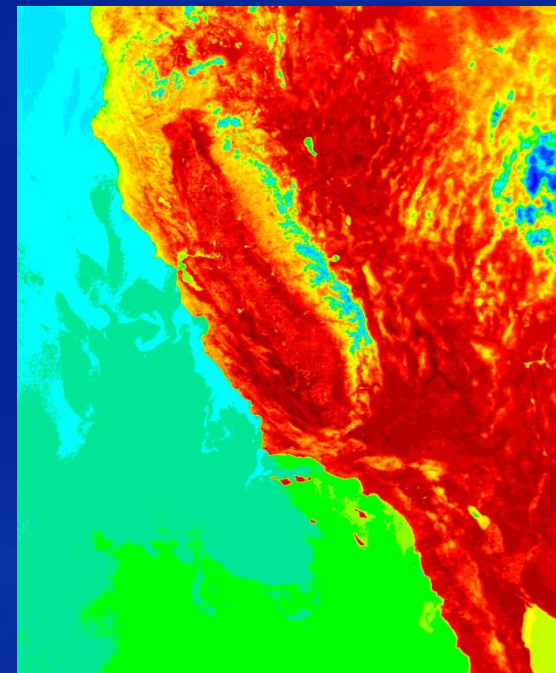
- Elderly, young children
- People living alone, socially isolated, mentally ill
- Socio-economically disadvantaged
- People lacking access to air conditioning or cooling spaces
- People with chronic diseases
- People who work outside
- People taking certain medications

# Heat Wave Examples

## 2006 California heat wave

- Daytime temperatures > 100 degrees for 2 weeks
- Record nighttime highs
- > 1 million people lost electricity
- 10 fold increase in hospital admissions/heat-related illness
- **Death toll: estimated >450**
- **Excess ER visits: >16,000**
- **Excess hospitalizations: >1,000**

(Cal EPA/Cal DPH, 2013)



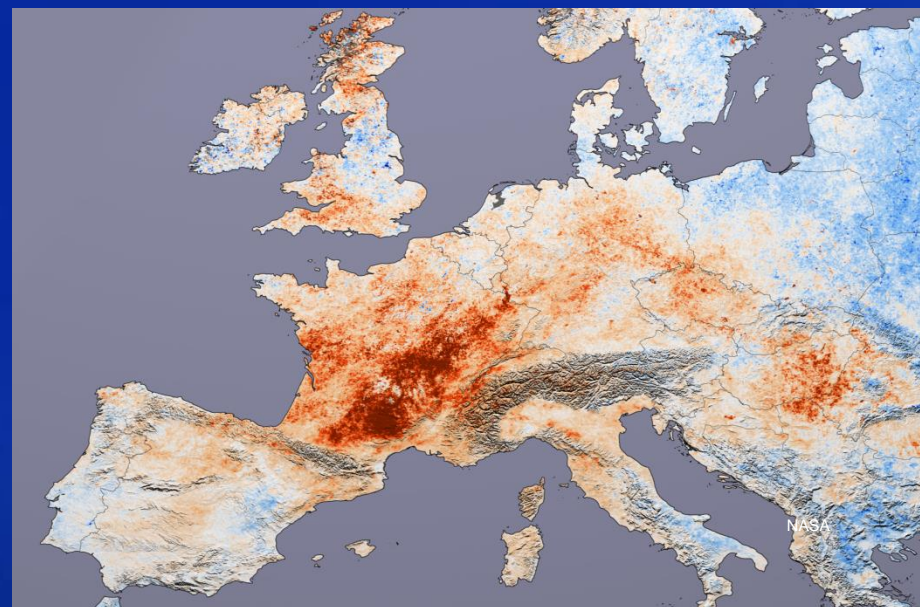
NASA

## 2003 European heat wave

- Death toll > 45,000

## 1995 Chicago heat wave

- Death toll: 900

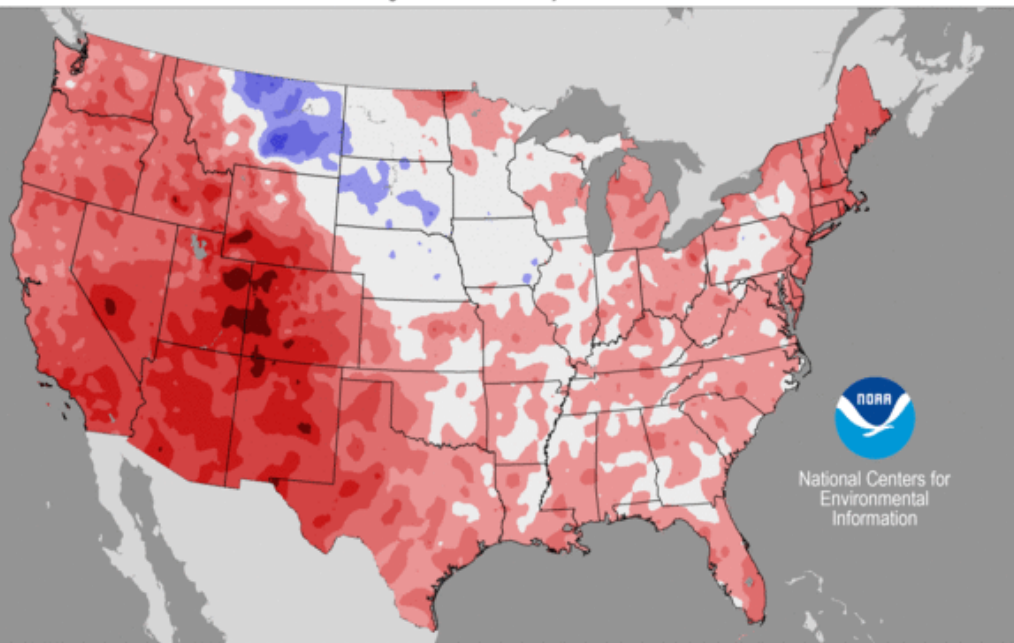


NASA

# Mean Temperature Departures from Average

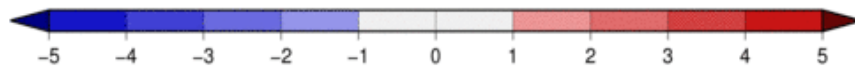
January–July 2018

Average Period: 20<sup>th</sup> Century



**So far-  
we have only warmed by  
close to 1° C, or 1.8° F,  
above preindustrial levels.**

**On a trajectory to reach  
3° C, or 5.4° F, by 2100!**



-5

-4

-3

-2

-1

0

1

2

3

4

5

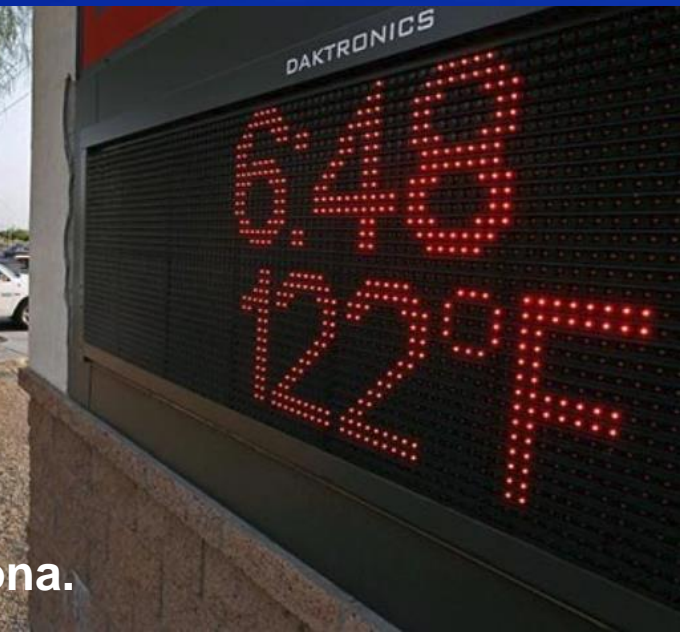
Degrees Fahrenheit

Data Source: 5km Gridded (nClimGrid)

Created: Mon Aug 06 2018



**June 20, 2018  
Phoenix, Arizona.**











**Climate Change:  
Not Just About  
Warming**

# Environmental Impacts of Climate Change

- More extreme temperatures
- Sea level increases
- Stronger hurricanes and storm surges
- Increased precipitation and flooding
- Increased droughts and water scarcity
- More frequent wildfires
- Increased ozone concentrations and diminished air quality
- Increased pollen and natural air pollutants
- Increased range for disease vectors





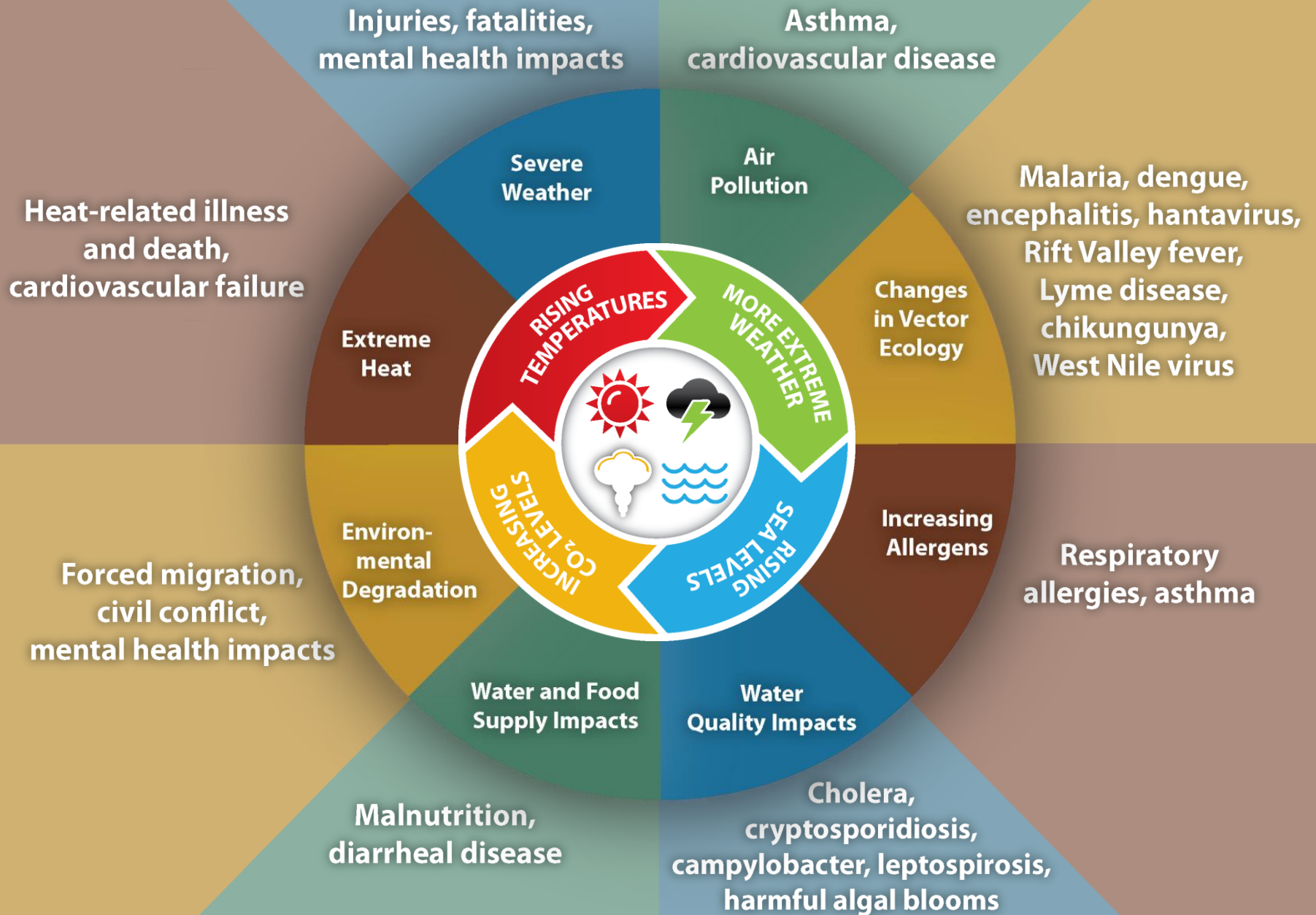
# Our Greatest Public Health Challenge

- Increased sea levels
- Decreased access to potable water
- Increased storm activities
- Increased drought / fires
- Increased heat waves
- Critical changes in agriculture / food security
- Environmental refugees
- Increased morbidity and mortality

- Exacerbation of chronic disease
- Infectious disease
- Mental health



# Impact of Climate Change on Human Health



# How Our Health is Harmed by Climate Change: Impacts Differ by Geographic Region



Extreme  
Temperatures



Outdoor  
Air Quality



Extreme Events  
Flooding, Hurricanes,  
Storms, Drought



Food-Related  
Infection &  
Agriculture



Water-Related  
Infection



Mosquito- and  
Tick-Borne  
Infections



Wildfires

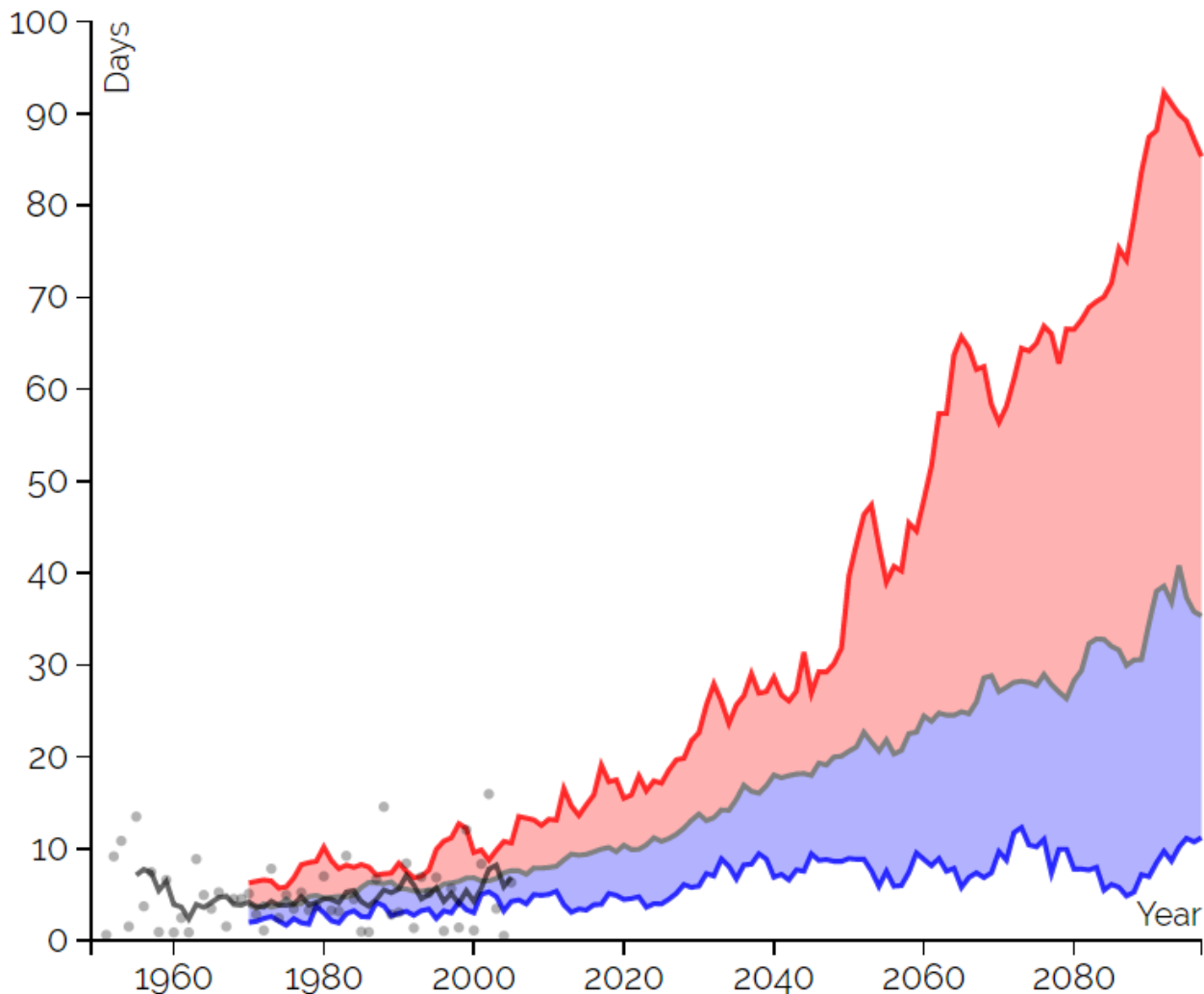


Mental Health  
& Well-being



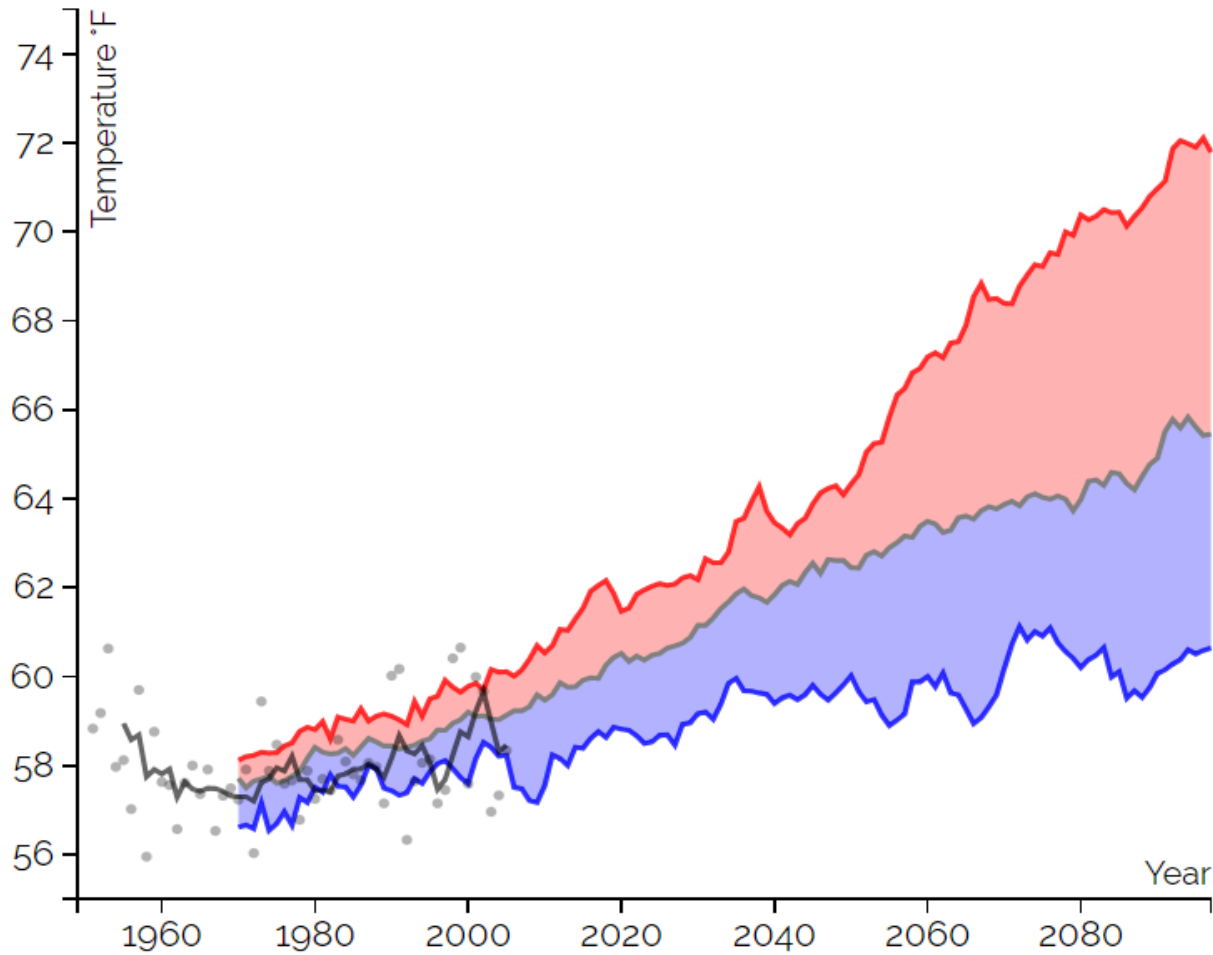
# Annual Days with Maximum Temperature Above 90°F

## Massachusetts



<b>Observed</b>	
5-yr Mean	days
<b>Modeled days</b>	
Max	days
Median	days
Min	days
Changes from 1971-2000 for:	
2020 -	11.19
2049	days
2040 -	17.75
2069	days
2060 -	24.51
2089	days
2080 -	29.21
2097	days

# Annual Maximum Temperature Massachusetts

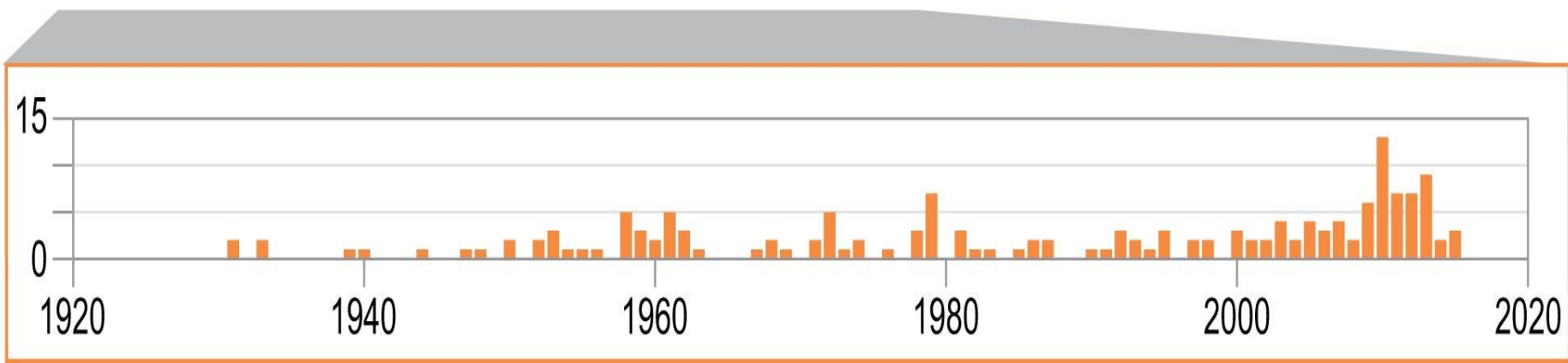
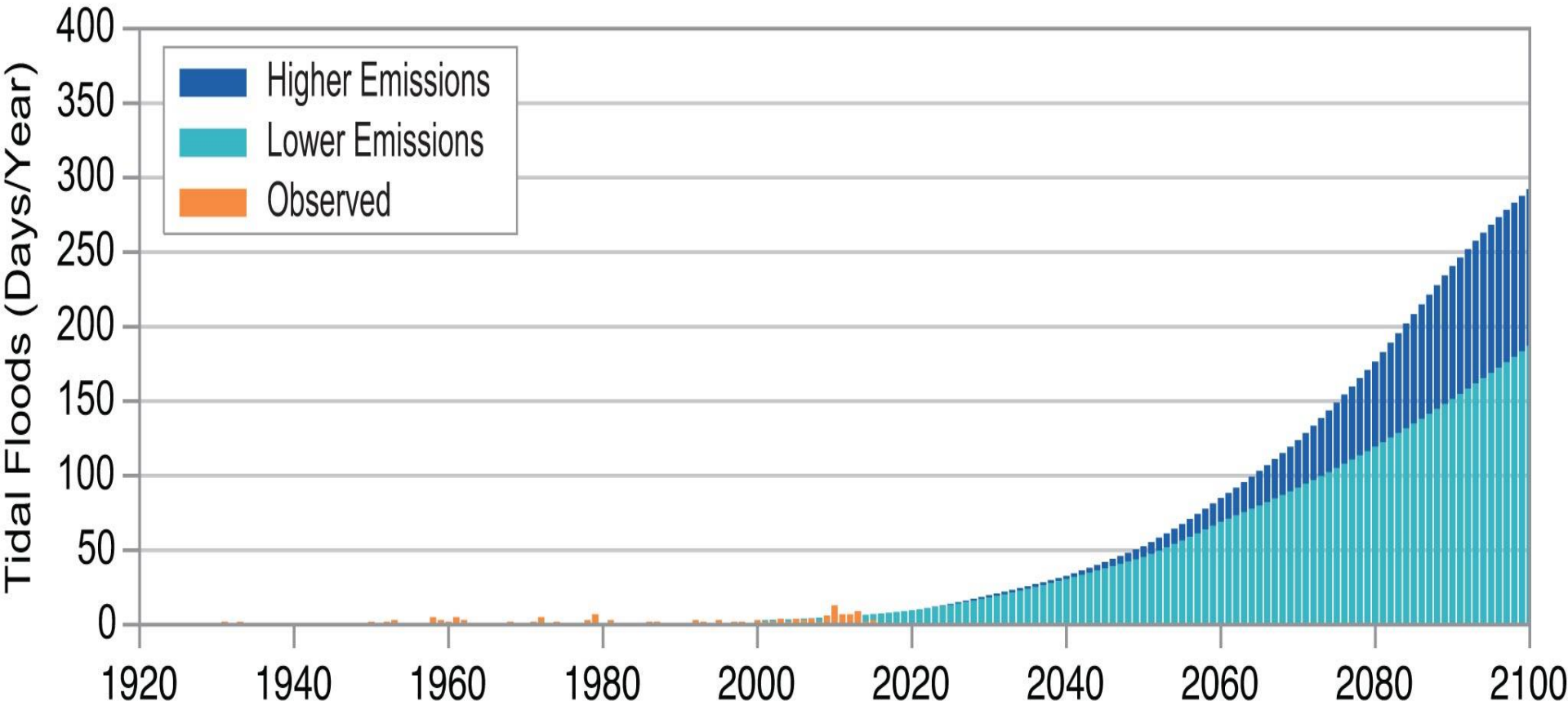


Observed	
5-yr Mean	°F
Modeled °F	
Max	
Median	
Min	
Changes from 1971-2000 for:	
2020 -	3.83°F
2049 -	5.02°F
2060 -	6.14°F
2080 -	6.84°F
2097 -	

Data source: US Dept of Interior Northeast Climate Adaptation Center



# Observed and Projected Annual Number of Tidal Floods for Boston, MA

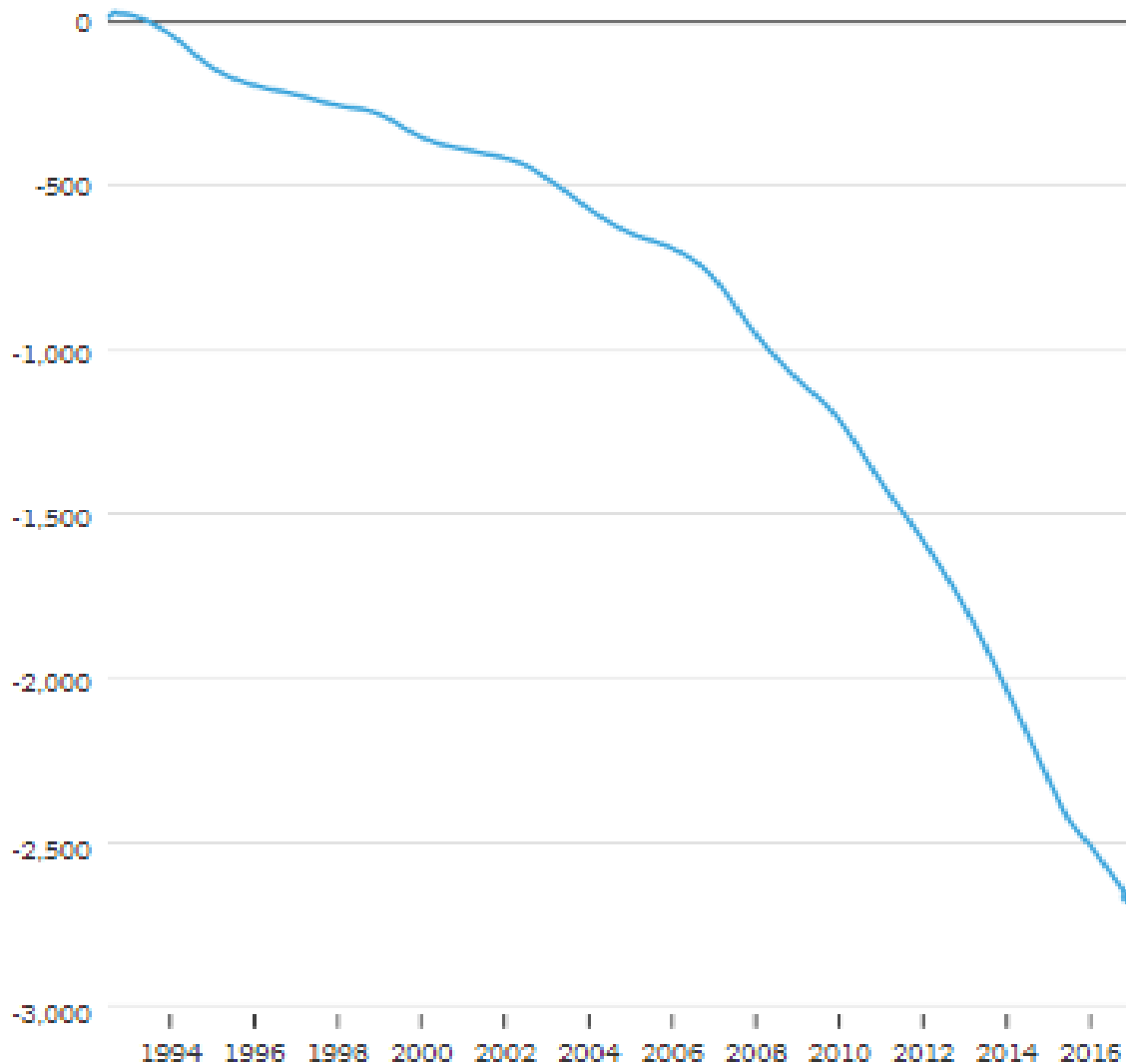




## Antarctica Is Melting Faster

The continent has lost nearly three trillion tons of ice since 1992.

Cumulative change in mass since 1992 (gigatons)



*The rate at which Antarctica is losing ice has tripled since 2007.*

*The continent is now melting so fast, it will contribute six inches to sea-level rise by 2100.*

# Sea Level Rise

- Increased risk of coastal flooding during storms and loss of private property
- Loss of coastal wetland ecosystems like salt marshes and mangroves
- Salt water intrusion in ground water supplies, aquifers, rivers, and bays
- Potable drinking water?





# Extreme Events



# Record Flooding in MA

March 8, 2018



Quincy



Watertown



# Increased Precipitation and Flooding



- Injuries and deaths
- Long term psychological and physical effects
- Increased risk of infectious disease
- Mold
- Contaminated water supplies

# Hurricanes and Storm Surges



Photos: NASA, FEMA

- Upward trend in intensity and duration of hurricanes since the 1970s.
- Ocean warming.
- Sea level rises as a result of climate change will make coastlines more susceptible to storm surges.



# Water- Borne and Food-Borne Diseases

- **Increased air and water temperatures:**
  - increase the replication, persistence, survival, transmission and range of some pathogens.
- **Heavy rainfall and flooding facilitates rapid transportation of pathogens to water supplies.**





A wastewater treatment plant is inundated from floodwaters in the aftermath of Hurricane Florence in Marion, S.C., Sept. 17, 2018.

**Raw sewage: Polluting estuaries and coastal water with human pathogens**



Surging floodwater overwhelms hog waste pits - bacteria released into water -algae blooms, death of marine life , contaminates drinking water



Steve Helber/AP

Hog farm buildings are inundated with floodwater from Hurricane Florence near Trenton, N.C., Sept. 16, 2018.



Pig excrement

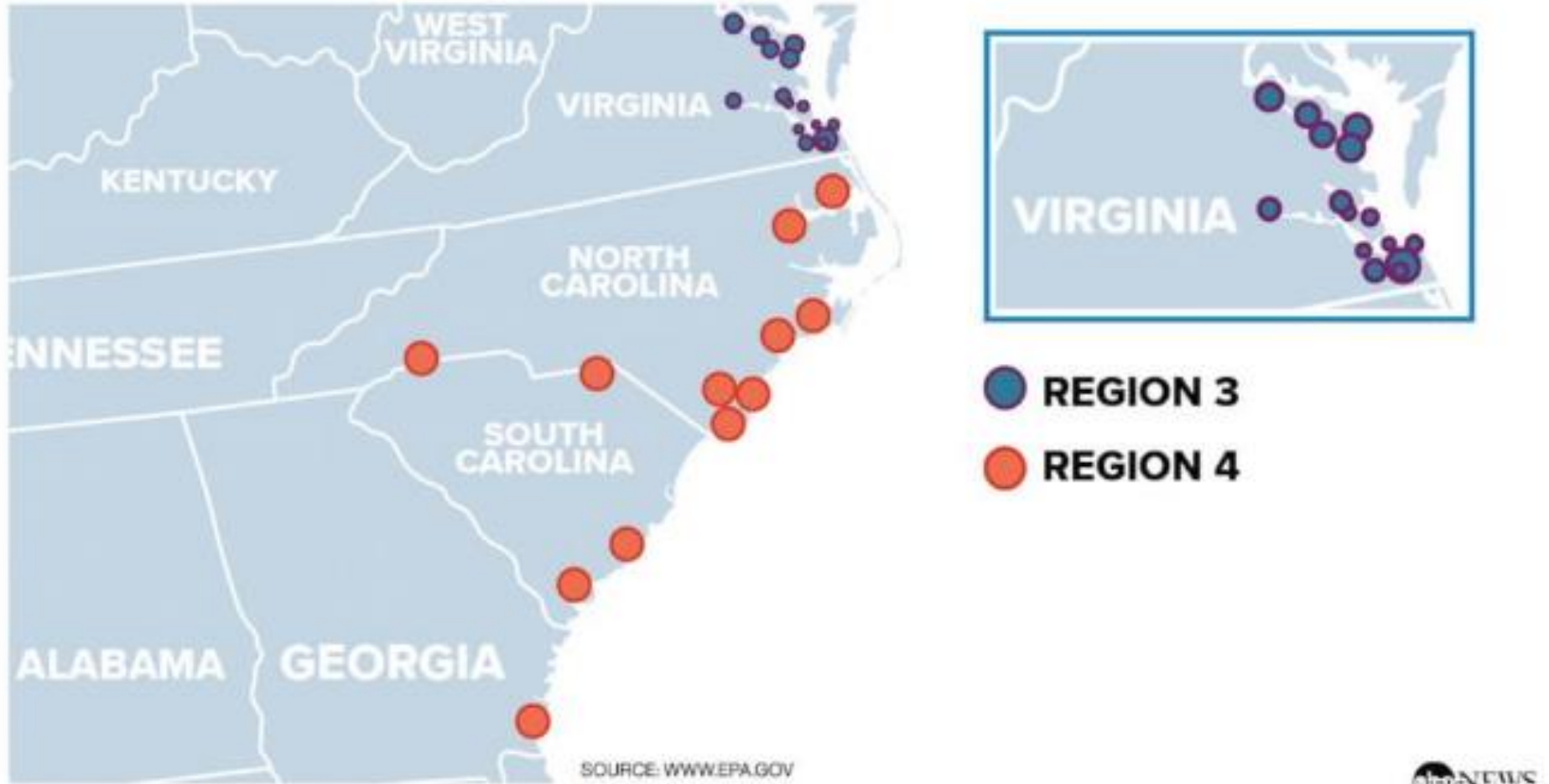




**Not just biological hazards-**

**Flooding the landscape and introduces **toxic** substances  
into the **water****

# SUPERFUND SITES IMPACTED BY FLORENCE



Superfund Sites Impacted by Florence

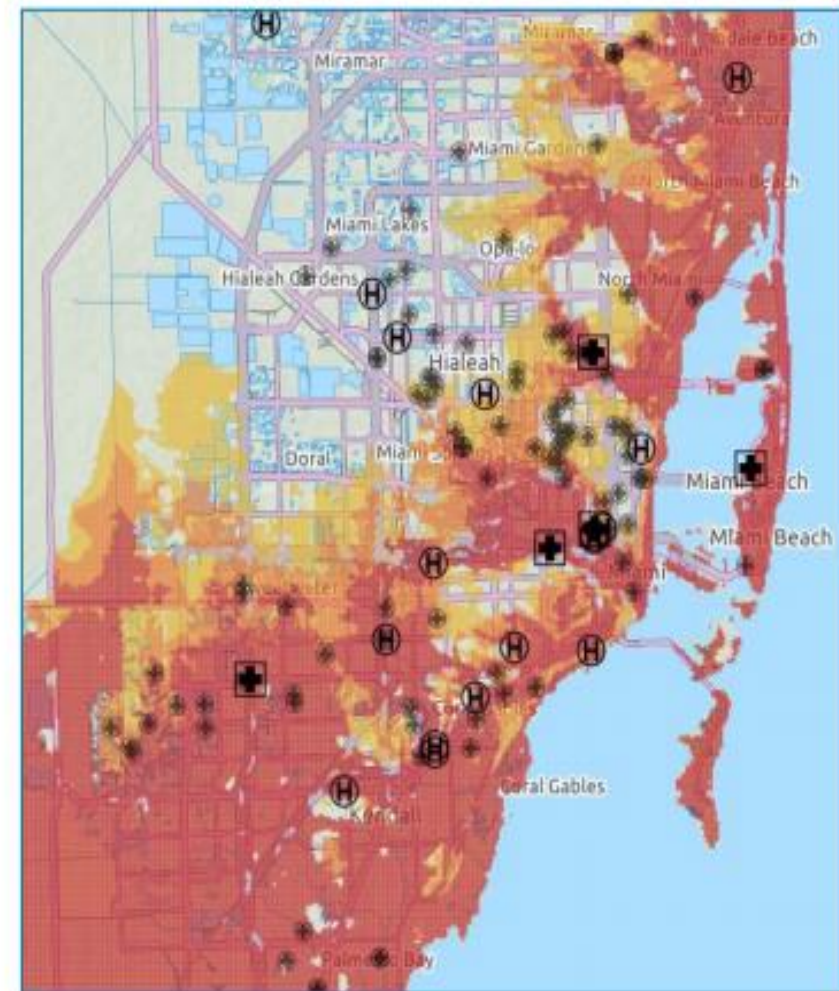
48 sites in North Carolina and 36 in South Carolina

*Manufacturing sites, landfill, mining sites, processing facilities –pose danger to human health (industrial contaminants like PCB, heavy metal, reproductive toxicants, carcinogens)*



# Every hurricane and flood disaster is also a public health disaster

Extreme disruption to public health and essential services



## Miami 2030 100-year Floodplain BAU Climate

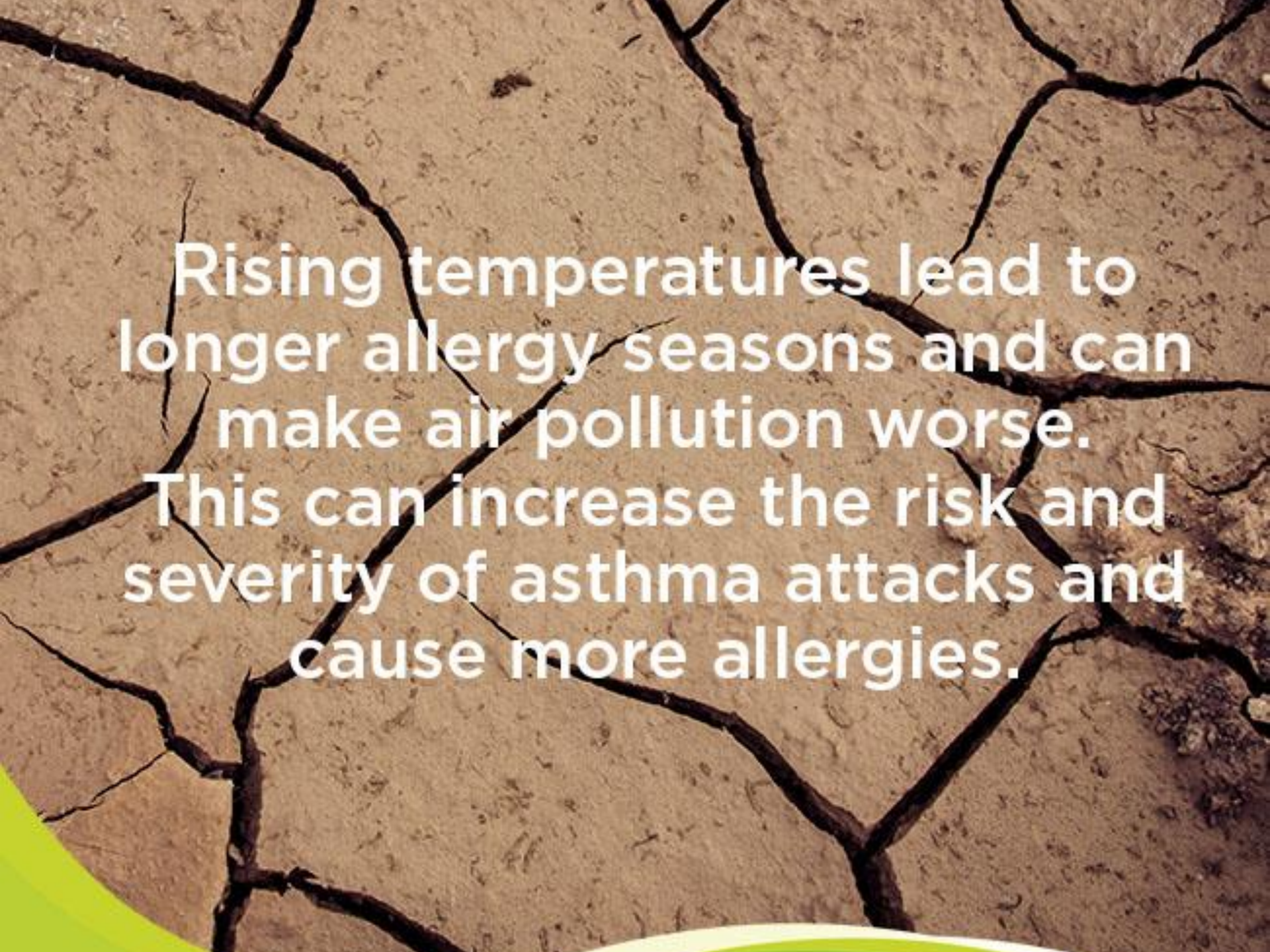
- (H) Hospitals
- (+) Medical Centers
- (⊕) Federally Qualified Health Centers

### Inundation Probabilities

- Median
- 1-in-20
- 1-in-200





The background of the slide is a close-up photograph of parched, cracked earth. The cracks are deep and dark, forming a network of irregular shapes across the light brown, textured soil. In the bottom-left and bottom-center corners, there are curved, lime-green shapes that appear to be part of a larger graphic design.

**Rising temperatures lead to longer allergy seasons and can make air pollution worse. This can increase the risk and severity of asthma attacks and cause more allergies.**



## Shifts in the timing of threats

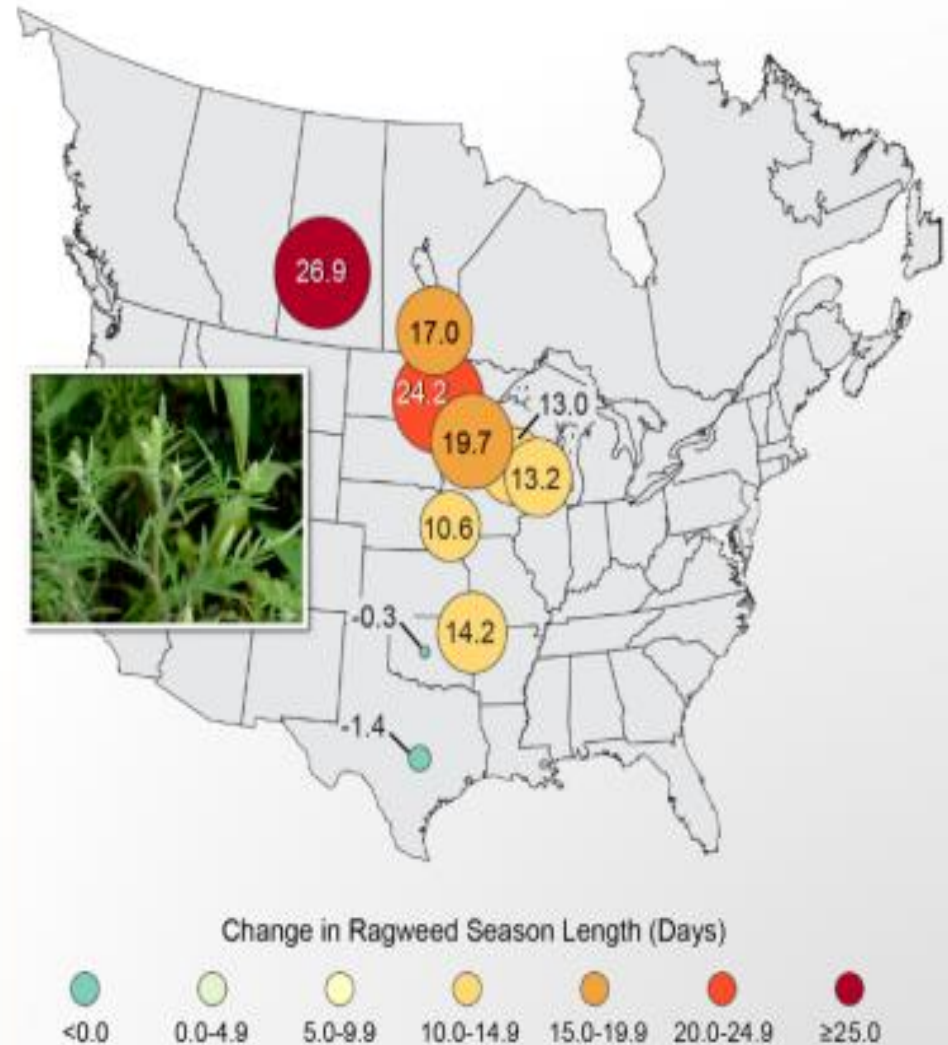
Between 1995 and 2011, the duration of the ragweed pollen season length has increased by as much as 11 to 27 days

Increases in temperature and CO<sub>2</sub> result in earlier flowering, but also greater floral numbers, greater pollen production, and increased allergenicity

Aeroallergen exposure contributes to:

- Asthma episodes
- Allergic rhinitis, sinusitis, conjunctivitis
- Urticaria (hives)
- Atopic dermatitis or eczema
- Anaphylaxis

## Ragweed Pollen Season Lengthens





# Zoonotic and Vector-Borne Diseases

- Introduction and spread of new diseases
- Increased geographical range and risk of current diseases
- Re-emergence of formerly prevalent diseases
- Prolonged transmission cycles
  - Lyme disease
  - West Nile Virus
  - Dengue Fever
  - Malaria
  - Chikungunya
  - Tularemia
  - Rabies



# Vector-Borne Diseases: Expanding Geographic Range



*By 2080, up to 1 billion people could be exposed to disease-carrying mosquitoes for the first time, increasing the risk of developing deadly diseases.*

*-Ryan, 2019*

## Shifts in the location of threats

Weather-related variables can determine geographic distributions of ticks

Low minimum temperatures can limit tick population survival

Declines in rainfall and humidity can also limit geographic distribution of blacklegged ticks

Reported Cases of Lyme Disease -- United States, 2001



Reported Cases of Lyme Disease -- United States, 2016



1 dot placed randomly within county of residence for each confirmed case



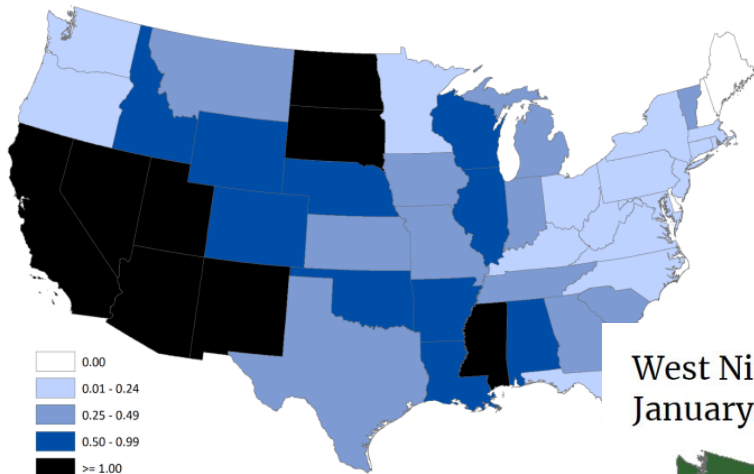
West Nile virus neuroinvasive disease incidence reported to ArboNET, by state, United States, 1999



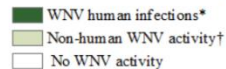
# West Nile Neuroinvasive Disease

West Nile virus neuroinvasive disease incidence reported to ArboNET, by state, United States, 2017

Incidence per 100,000



West Nile Virus Activity by State – United States, 2018 (as of January 8, 2019)



# Climate Change: Increased Ozone and Poor Air Quality

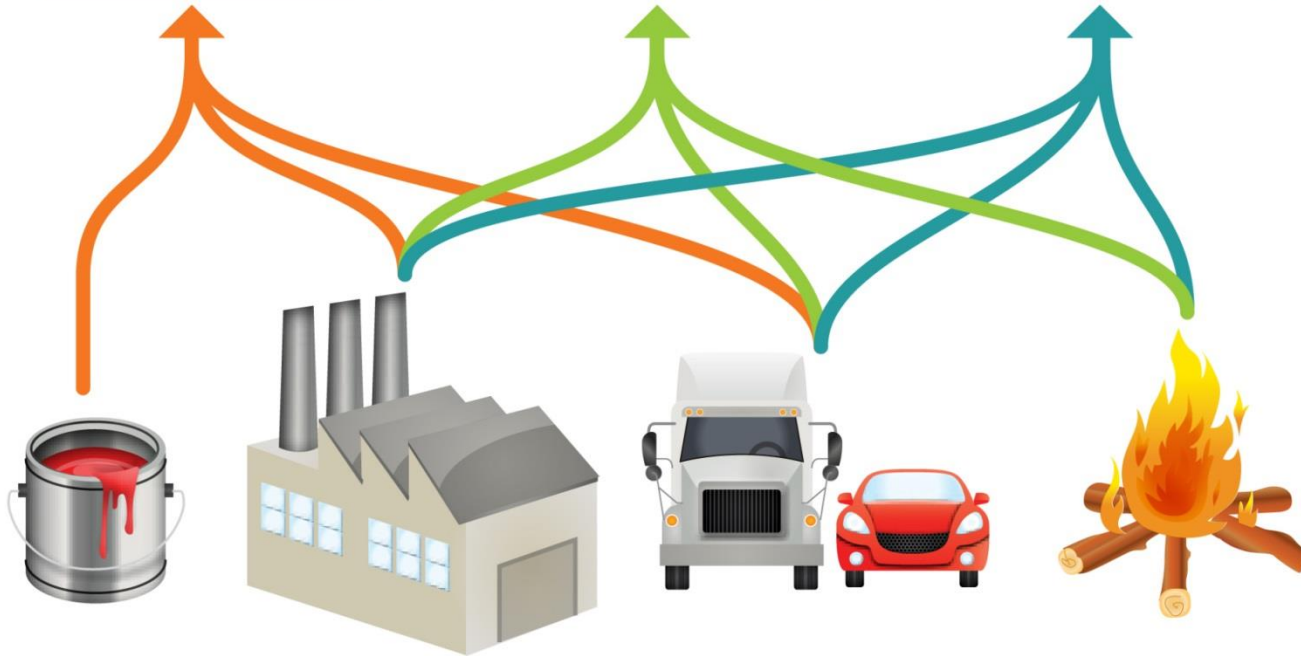


- Increased risk of ER visits and hospital admissions for respiratory illness.
- Increased risk of asthma onset and exacerbations, cardiac arrhythmias, myocardial infarction, and total mortality.

**OZONE POLLUTION**  
is smog, which is a highly irritating, but invisible gas.

**YEAR ROUND PARTICLE**  
pollution is the avg. level of microscopic bits of solids and aerosols in the air.

**SHORT TERM PARTICLE**  
pollution are days with spikes in those bits of pollution.



SOURCES OF POLLUTION





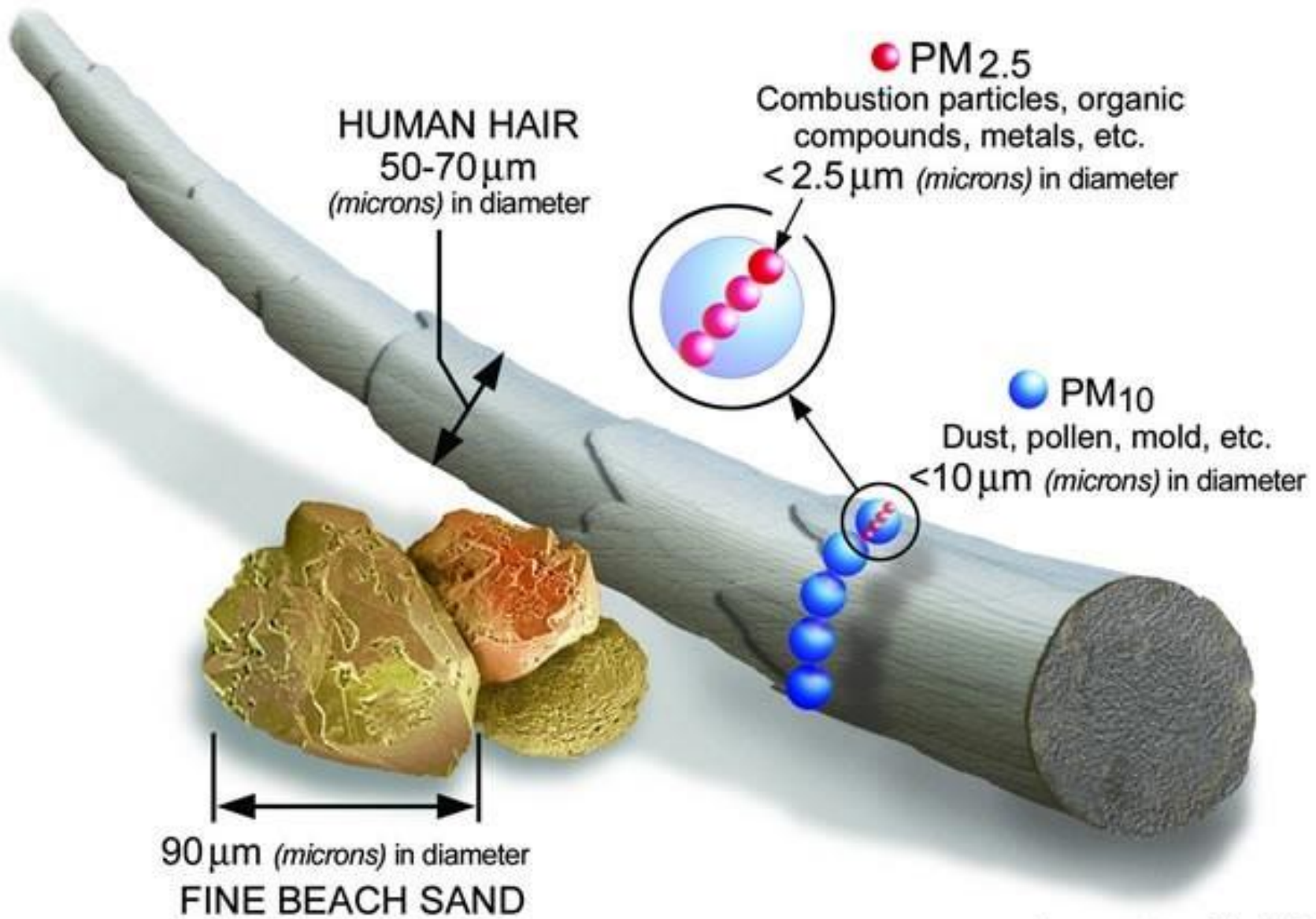
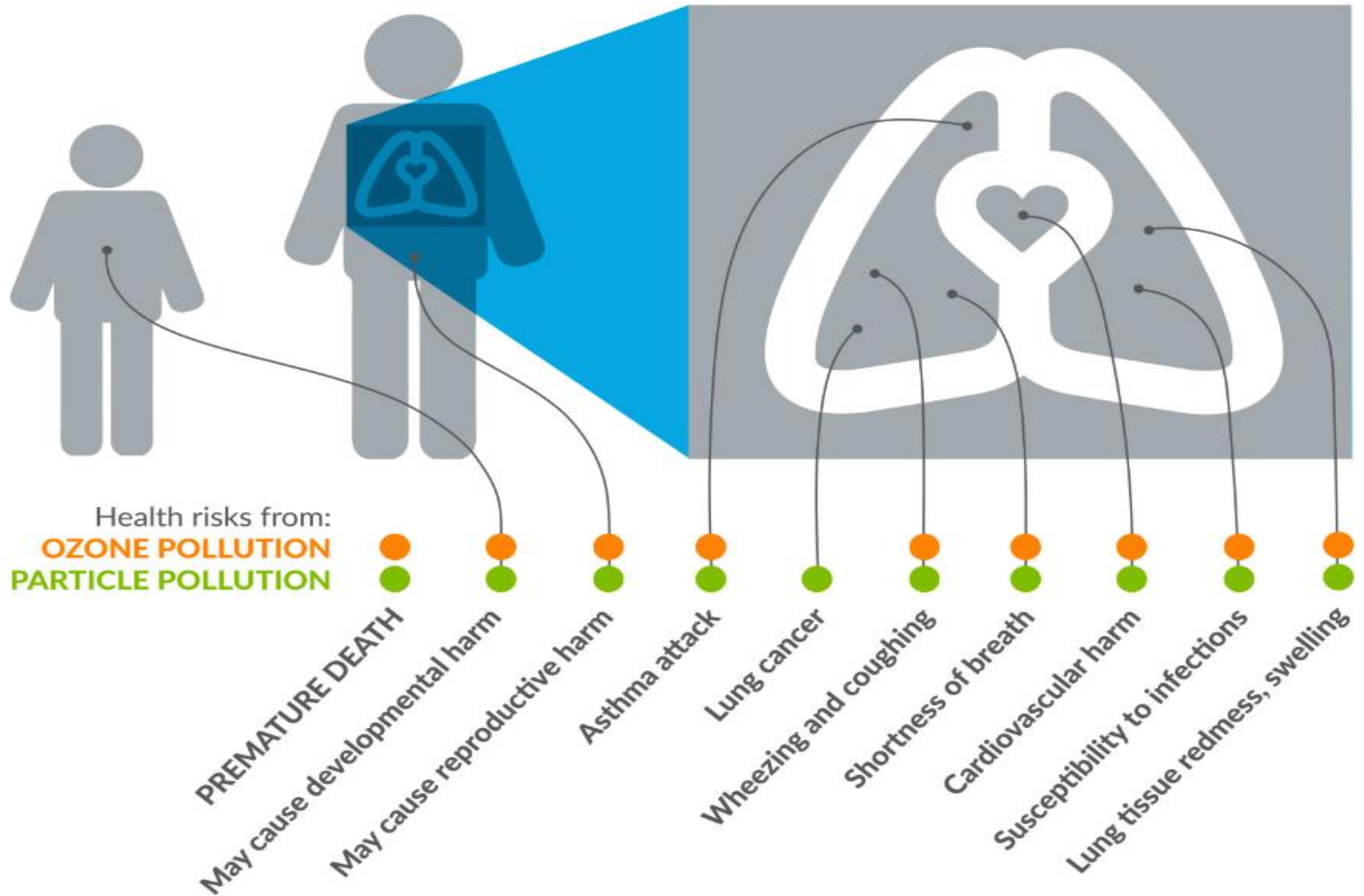


Image courtesy of the U.S. EPA

# Air pollution remains a major danger to the health of children and adults.





# STATE OF THE AIR 2019

20<sup>th</sup> ANNIVERSARY

For 20 years, the American Lung Association has analyzed data from official air quality monitors to compile the "State of the Air" report. The more you learn about the air you breathe, the more you can protect your health and take steps to make our air cleaner and healthier.

- **The "State of the Air" 2019 report shows, again, that climate change makes it harder to protect human health.**
- Spike in high ozone days and in unhealthy particle pollution episodes driven by wildfires.
- While *most of the nation* has much cleaner air quality than even a decade ago, many cities suffered increased ozone from the increased temperature and continued high particle pollution from wildfires driven by changing rain patterns.



More than 141 million Americans,  
or more than **4 in 10** of us,  
live in counties that got at least  
one “F” for unhealthy air.

**That’s 7 million more  
than last year’s report.**



- **43.3 % of the population, live in counties with unhealthy ozone and/or particle pollution.**
- **20.2 million people (6.2 percent) live in 12 counties with unhealthful levels of air pollution.**

# Compared to the 2018 report- *Massachusetts did Worse!*

- More bad air days for ozone.
- The counties of Barnstable, Bristol, Hampden, and Hampshire decreased one or more grades, earning F's in the 2019 report.
- Dukes, Plymouth, Suffolk, and Worcester also lost grades, earning them C's and D's.
- All together, the counties recorded a total of **97** combined "orange" and "red" bad ozone days compared to **59** bad ozone days from 2014-2016.
- The counties of Essex, Franklin, Middlesex, and Norfolk maintained their grades from last year, despite the overall trend of increased bad air days.



*Most at risk: Children, older adults and those with asthma and other lung diseases*

# Wildfires

- Fires are both a contributor and consequence of climate change
- Fire frequency is expected to increase especially in areas with reduced precipitation and drought
- They increase air pollutants, fine particulates (PM<sub>10</sub> and PM<sub>2.5</sub>) and ground-level ozone
- Most vulnerable: elderly, children, people with respiratory and cardiac illnesses





# Carr Fire\*

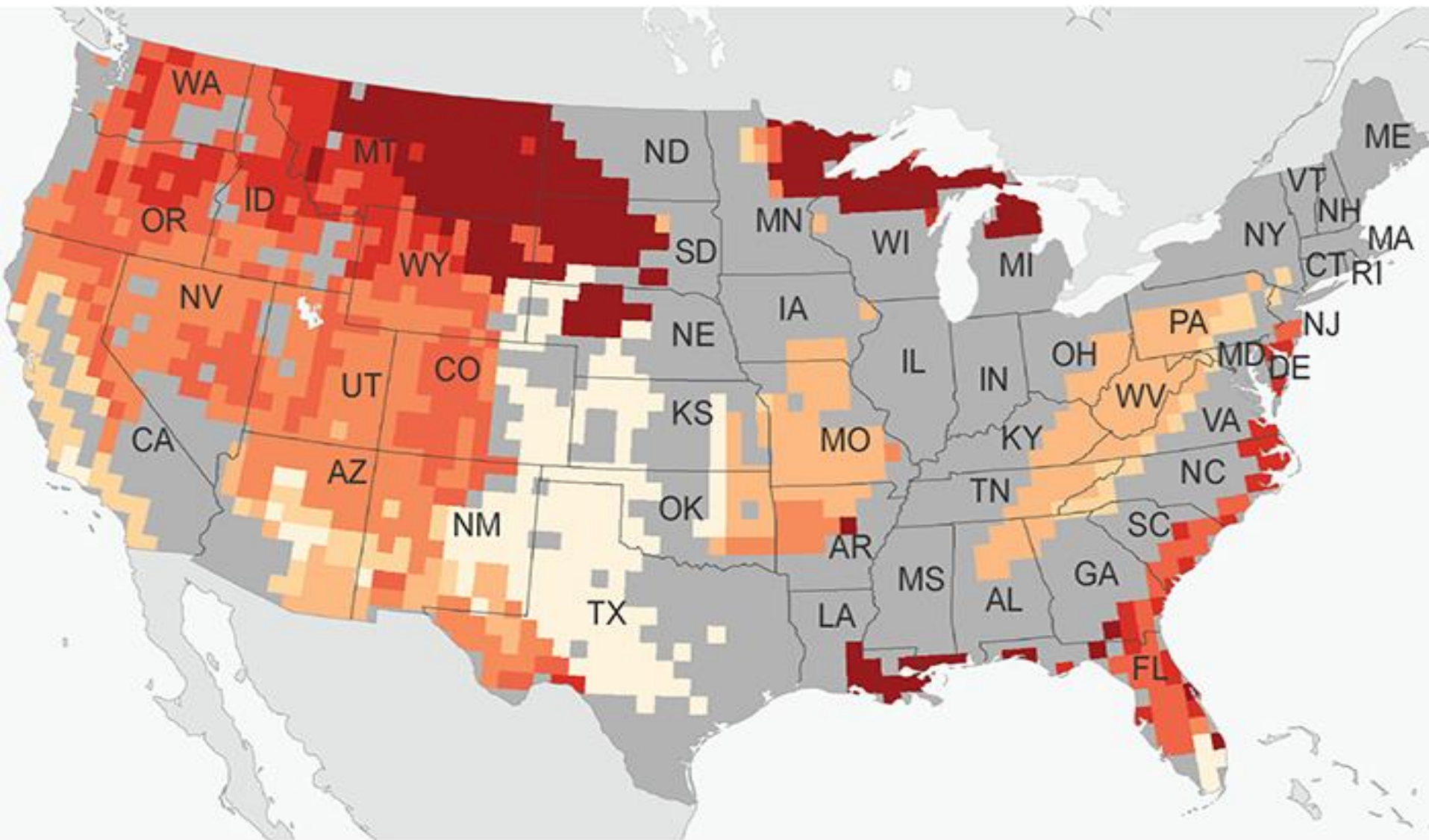


- Engulfed more than 200,000 acres
- Destroyed more than 1,200 buildings
- Eight fatalities
- ? Made ill

\* One of 17 fires major fires to hit CA in Summer 2018



# Projected Increase in Risk of Very Large Fires by Mid-Century

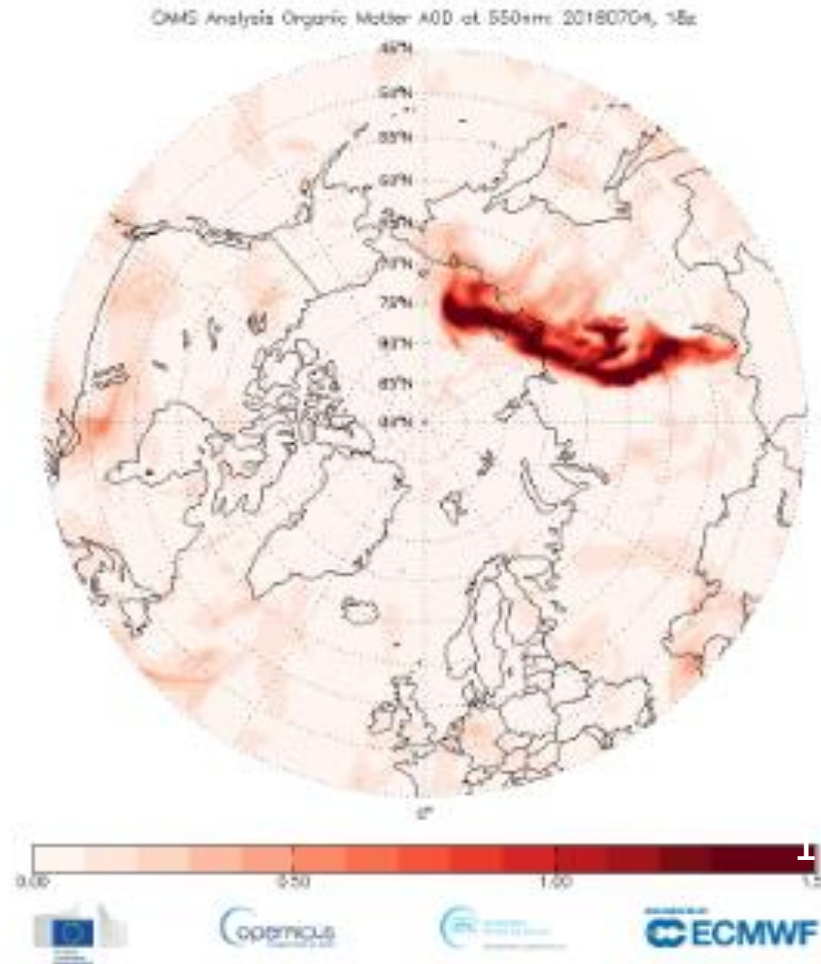


Increase in Weeks with Risk of Very Large Fires (%)





# Heat records fall in the Arctic as fires erupt in Sweden and Siberia



Computer model simulation showing smoke from Siberian wildfires drifting across the Pole, into North America.

A scorching heat wave has swept across Scandinavia, breaking all-time heat records into the Arctic Circle. Meanwhile, Sweden is facing a major wildfire outbreak, and the forests of Siberia are ablaze after weeks of extreme heat.



- **Food Insecurity**
  - **Low crop yields**
  - **Increased foodborne disease**
  - **Increased crop losses**
  - **Altered nutritional content of food**

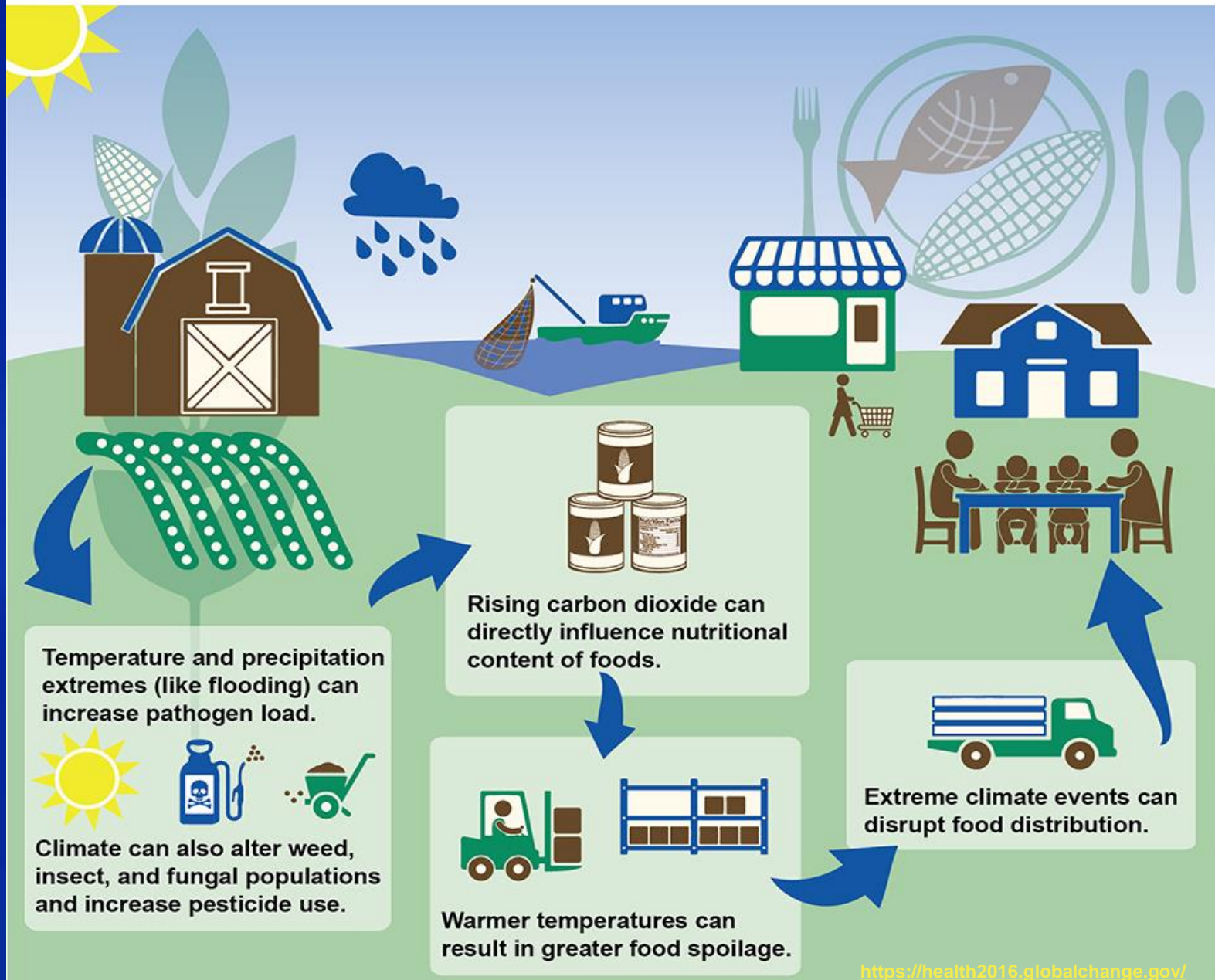


Food Safety, Nutrition, and Distribution



# Farm to Table

## The Potential Interactions of Rising CO<sub>2</sub> and Climate Change on Food Safety and Nutrition





## Sequelae of Climate Related Disasters

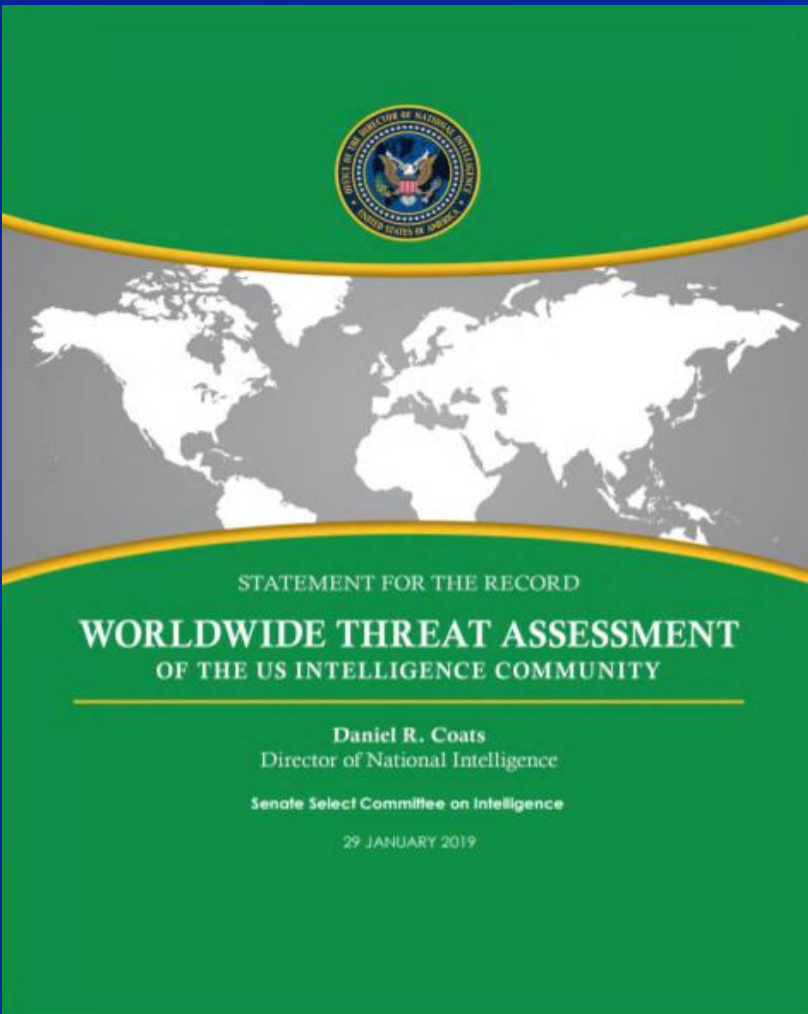
- Post-traumatic stress disorder: climate related disasters.
- Depression: survivors of natural disasters.
- Increased prevalence of suicidal ideation and suicide plans.
- Child abuse increase following extreme weather events.

Mental Health and Well-Being





# U.S. Intelligence Officials Warn Climate Change Is Threat to Human Security”



National Intelligence Director Dan Coats and directors of the FBI, CIA and Defense Intelligence Agency testify on the Worldwide Threat Assessment before a Senate committee.

Credit: Saul Loeb/AFP/Getty

Internal climate migrants are rapidly becoming the human face of climate change.

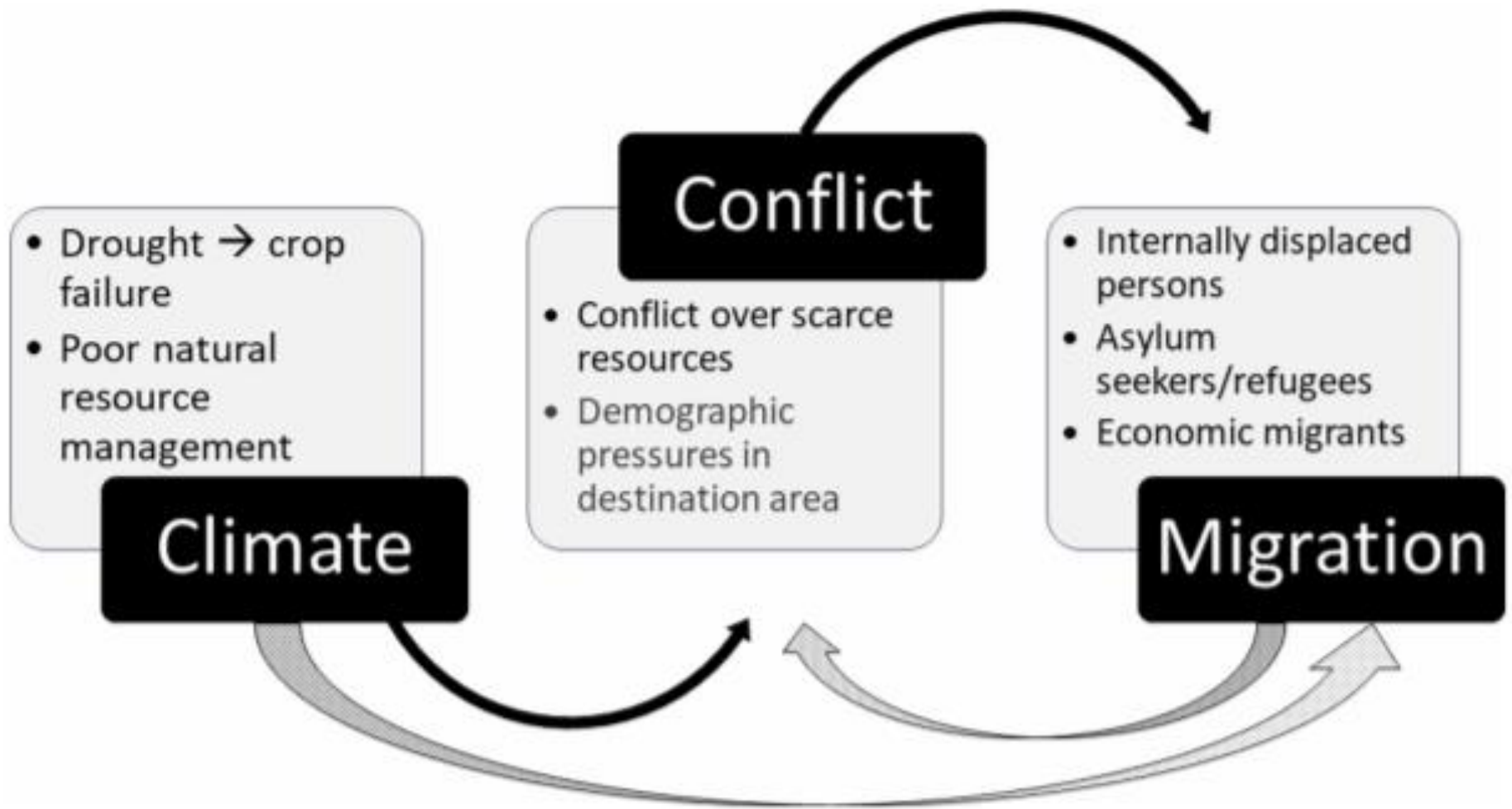
By 2050—in just three regions—climate change could force more than 143 million people to move within their countries.



Three regions:

- Sub-Saharan Africa
- South Asia
- Latin America

*Groundswell: Preparing for Internal Climate Migration, International Bank for Reconstruction and Development, The World Bank (2018)*



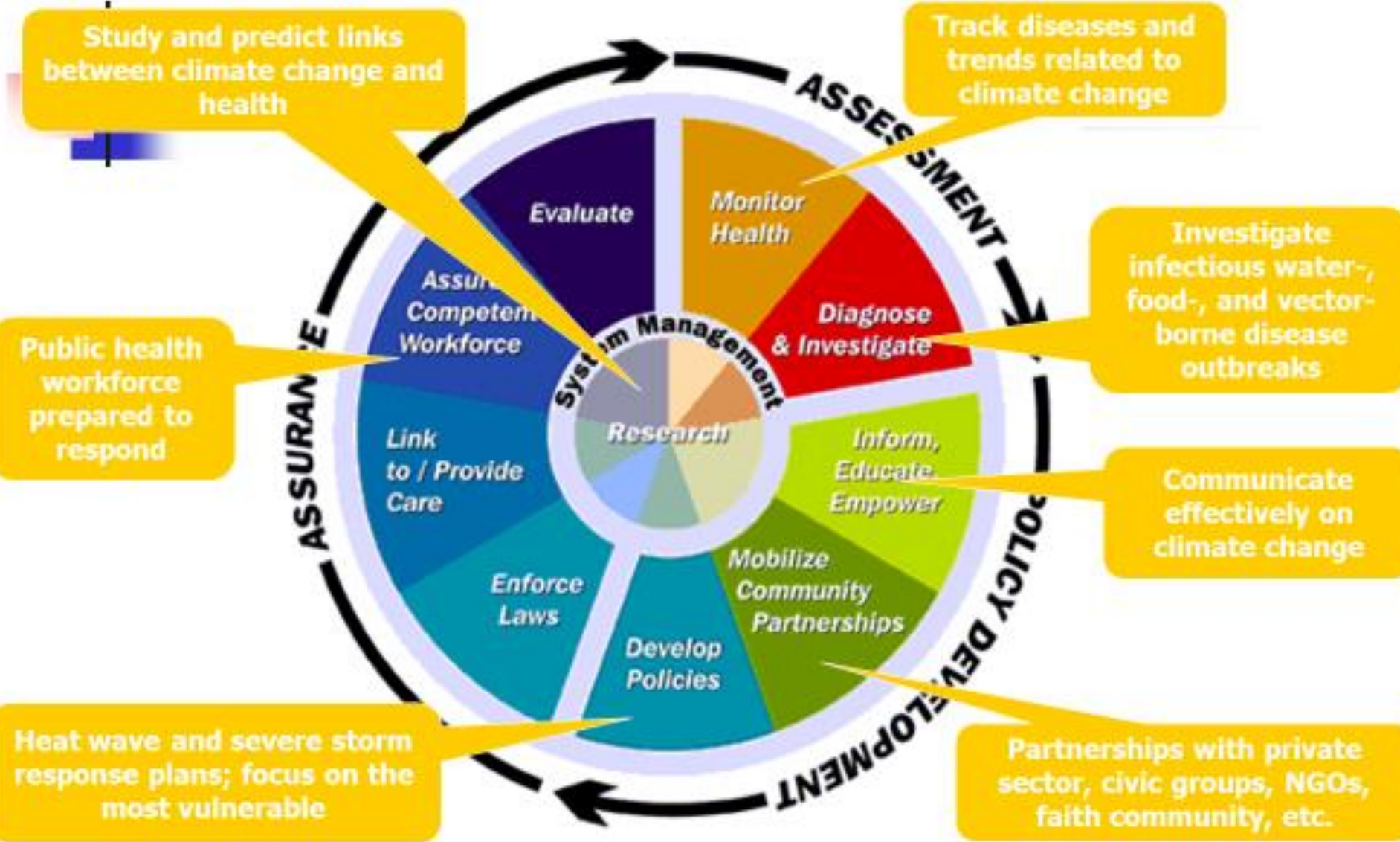


# Environmental Refugees

- **Highly vulnerable to disease**
- **At risk of spreading communicable diseases to new areas**
- **Vulnerable to shortages of often limited local resources**
- **Subject to interruptions in supply chains and access to therapies for chronic medical conditions**
- **Subject to physical attack and emotional stress**

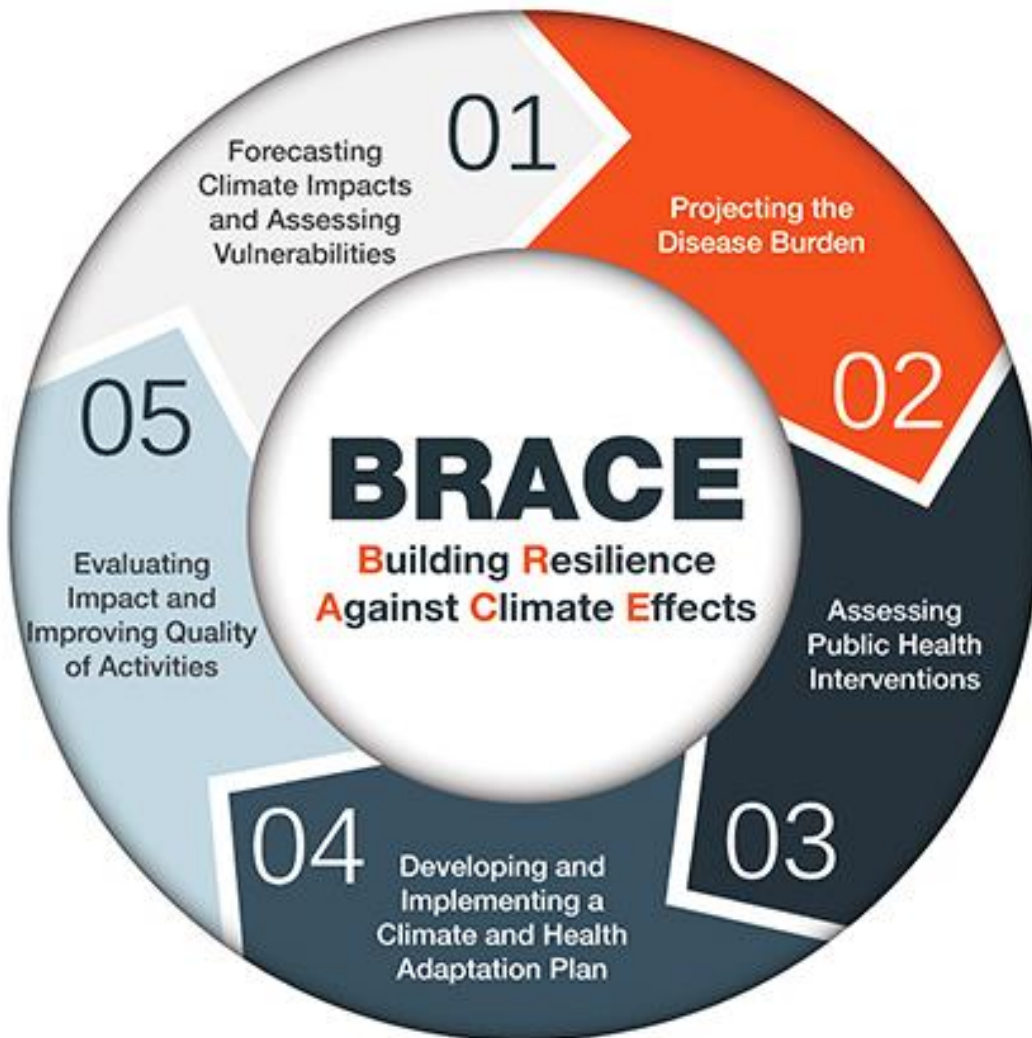


# Public Health Action on Climate Change



# CDC Climate & Health Program

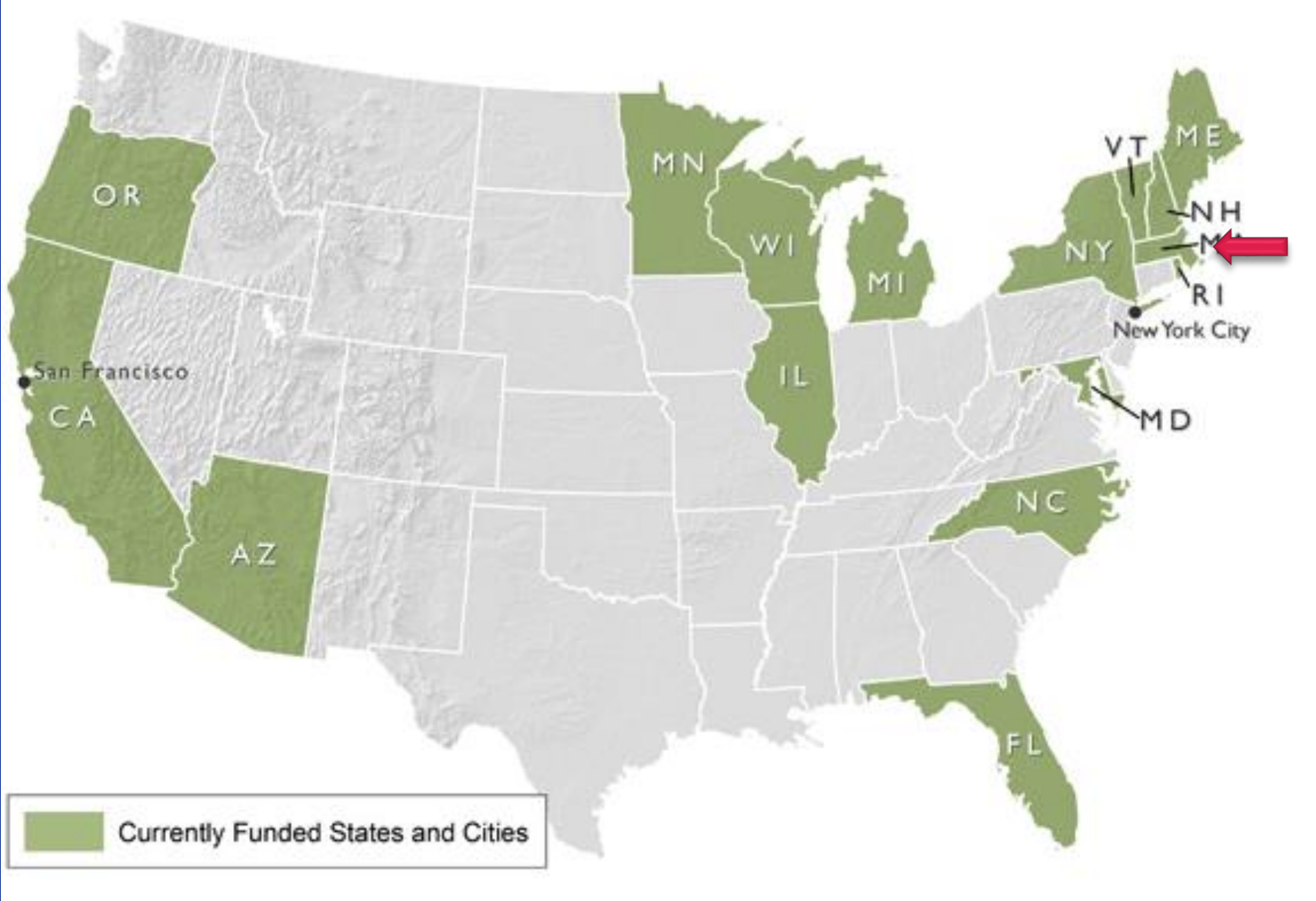
## Building Resilience Against Climate Effects



- To translate climate change science to inform states, local health departments and communities.
- To create decision support tools to build capacity to prepare for climate change.



# Climate-Ready States & Cities Initiative





# resilient MA

Climate Change Clearinghouse for the Commonwealth

Maps

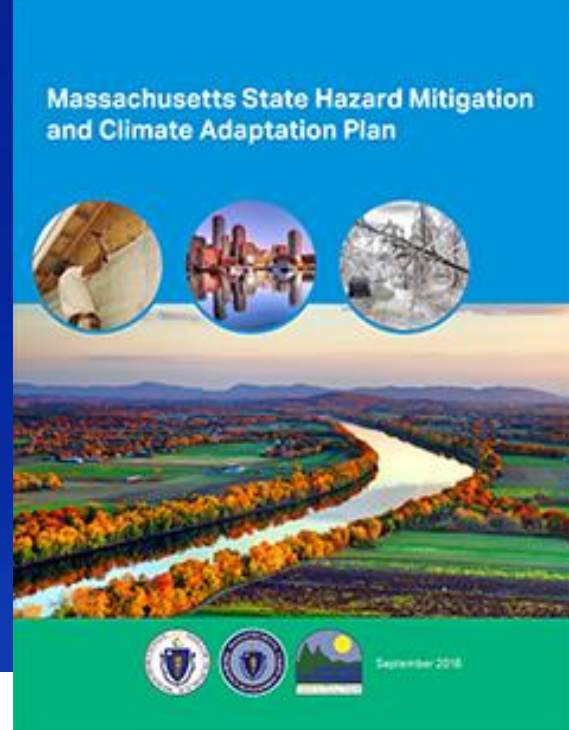
Data

Documents



<http://resilientma.org>

# Adaptation Planning



Powered by the Georgetown Climate Center's

 Adaptation Clearinghouse™



**CLIMATE READY BOSTON**  
FINAL REPORT



# Opportunities to Engage



BECOME A CLIMATE CHAMPION



CONTACT POLICYMAKERS



WRITE EDITORIALS



GIVE TALKS



#ClimateChangesHealth



**Thank you!**



## Medications that increase heat risk

- Anti-psychotics
- Anti-depressants (TCA>SSRI)
- Antihistamines
- Beta blockers
- Diuretics
- Anti-Parkinson's
- Stimulants
- Sympathomimetics

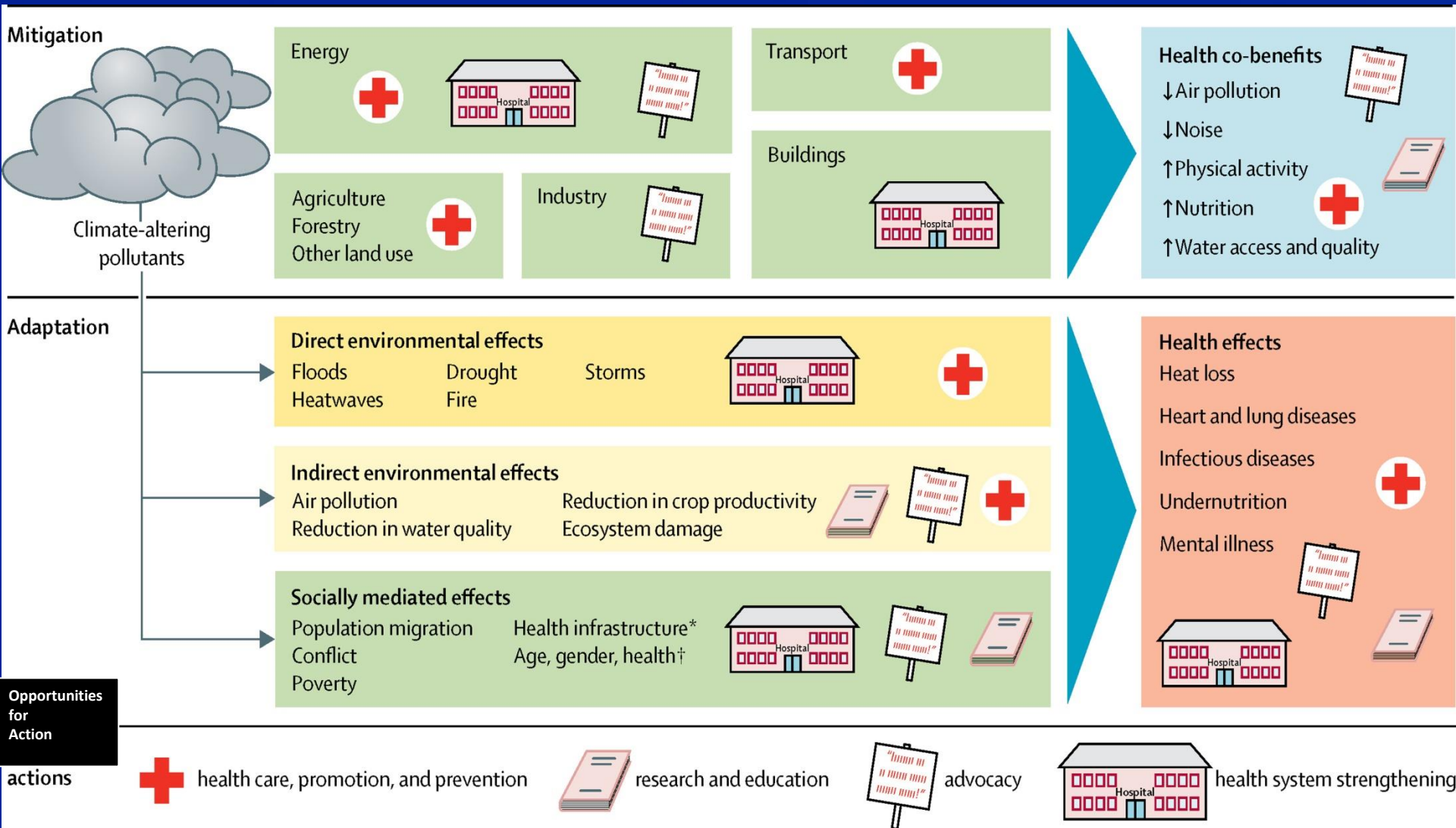
## Mechanisms

- Altered set point
- Impaired thirst
- Impaired sweating
- Dehydration





# Framework for Actions to Create Health Co-benefits, and Mitigate or Adapt to the Health Effects of Climate Change



# Social Vulnerability Index (SVI)

## CDC's Social Vulnerability Index 2016

Suffolk County, Massachusetts

PART 1

### Overall Social Vulnerability<sup>1</sup>



Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human-caused threats, such as toxic chemical spills. The **Social Vulnerability Index (SVI 2016)** **County Map** depicts the social vulnerability of communities, at census tract level, within a specified county. SVI 2016 groups fifteen census-derived factors into four themes that summarize the extent to which the area is socially vulnerable to disaster. The factors include economic data as well as data regarding education, family characteristics, housing, language ability, ethnicity, and vehicle access. Overall Social Vulnerability combines all the variables to provide a comprehensive assessment.

MAP PRODUCED 3/16/2018  
 Agency for Toxic Substances and Disease Registry  
 Division of Toxicology and Human Health Sciences  
**GRASP**  
 FINAL - FOR EXTERNAL USE

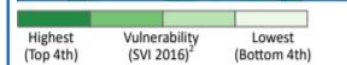
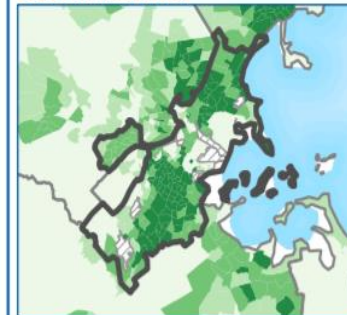


## SVI 2016 – SUFFOLK COUNTY, MASSACHUSETTS

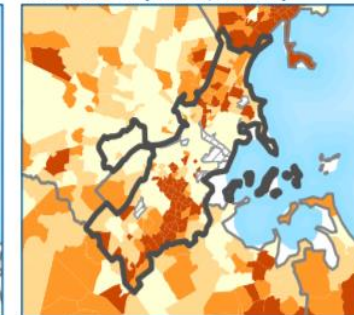
PART 2

### SVI Themes

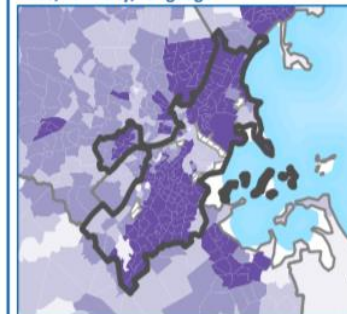
#### Socioeconomic Status<sup>5</sup>



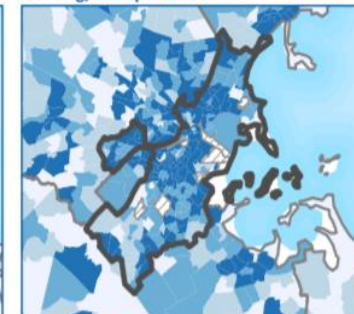
#### Household Composition/Disability<sup>6</sup>



#### Race/Ethnicity/Language<sup>7</sup>



#### Housing/Transportation<sup>8</sup>



**Data Sources:** CDC/ATSDR/GRASP, U.S. Census Bureau, Esri® StreetMap™ Premium.  
**Notes:** <sup>1</sup>Overall Social Vulnerability: All 15 variables. <sup>2</sup>Census tracts with 0 population. <sup>3</sup>The SVI combines percentile rankings of US Census American Community Survey (ACS) 2012-2016 variables, for the state, at the census tract level. <sup>4</sup>Socioeconomic Status: Poverty, Unemployed, Per Capita Income, No High School Diploma. <sup>5</sup>Household Composition/Disability: Aged 65 and Over, Aged 17 and Younger, Single-parent Household, Aged 5 and over with a Disability. <sup>6</sup>Race/Ethnicity/Language: Minority, English Language Ability. <sup>7</sup>Housing/Transportation: Multi-unit, Mobile Homes, Crowding, No Vehicle, Group Quarters.  
**Projection:** NAD 1983 StatePlane Massachusetts Mainland FIPS 2001.  
**References:** Fungazi, B.E., et al. A Social Vulnerability Index for Disaster Management. *Journal of Homeland Security and Emergency Management*, 2011. 8(1).  
 CDC's SVI web page: <http://svi.cdc.gov>.

FINAL - FOR EXTERNAL USE

### Elements

- SES
- Household composition

- Race/ethnicity/language
- Housing/transportation



### More Demographics

2012-2016 ACS (Blockgroup)

2012-2016 ACS 2010 Census 2000 Census

Thematic Map  Graduated Symbol Map

Category: Population

Variable: Pct. Hispanic Population

Method: Quantile

Breaks: 5

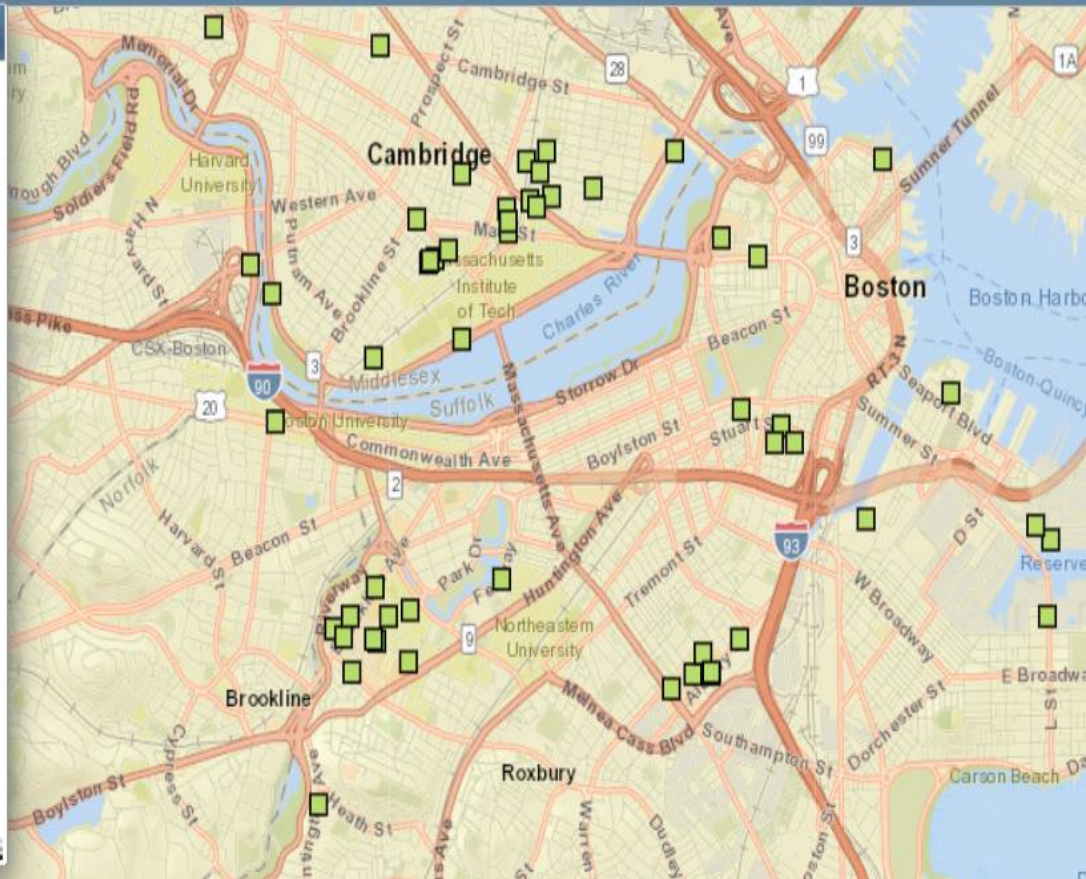
Colors:

Transparency:

Border: 1

Add to Map

2012-2016 ACS demographics are a set of variables derived based on a subset of 2012-2016 American Community Survey data.







# Climate Change, Health, and Equity: A Guide For Local Health Departments



## YOUTH & COLLEGE ORGANIZING TOOLKIT

FOR  
Environmental & Climate Justice



 **NAACP**  
Environmental and Climate Justice Program

### In the Eye of the STORM

People's Guide to Transforming Crisis & Building Equity in the Disaster Continuum



**NAACP**  
Environmental & Climate Justice Program



### More Demographics

2012-2016 ACS (Blockgroup)

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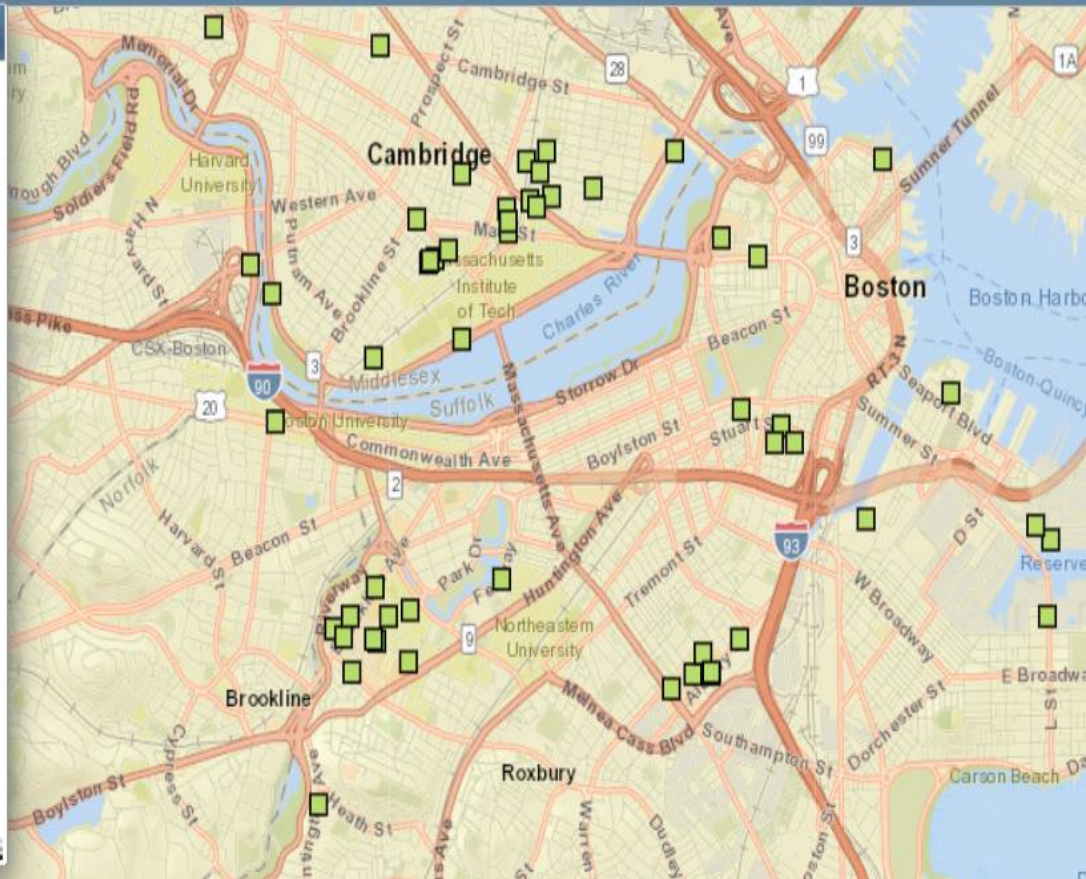
Colors:

Transparency:

Border: 1

Add to Map

2012-2016 ACS demographics are a set of variables derived based on a subset of 2012-2016 American Community Survey data.





Alliance of Nurses for Healthy Environments



**“Climate Change is a medical emergency.”**

Professor Hugh Montgomery, Co-Chair  
The 2015 Lancet Commission Report  
on Health and Climate Change



**“Climate Change offers greatest health opportunity of the 21<sup>st</sup> Century.”**

The 2015 Lancet Commission Report on Health and Climate Change

## CLIMATE CHANGE, HEALTH, AND NURSING: A CALL TO ACTION

Laura Anderko, PhD, RN;

Elizabeth Schenk, PhD, RN;

Katie Huffling, MS, RN, CNM;

Stephanie Chalupka, EdD, RN, PHCNS-BC, FAAOHN, FNAP



# The Health Care Climate Challenge



As the only sector with healing as its mission, health care has an opportunity to use its ethical, economic, and political influence to be a leader in climate solutions.

## **Opportunities:**

- **Improve patient/community health outcomes**
- **Financial savings**
- **Anchor institutions for community**

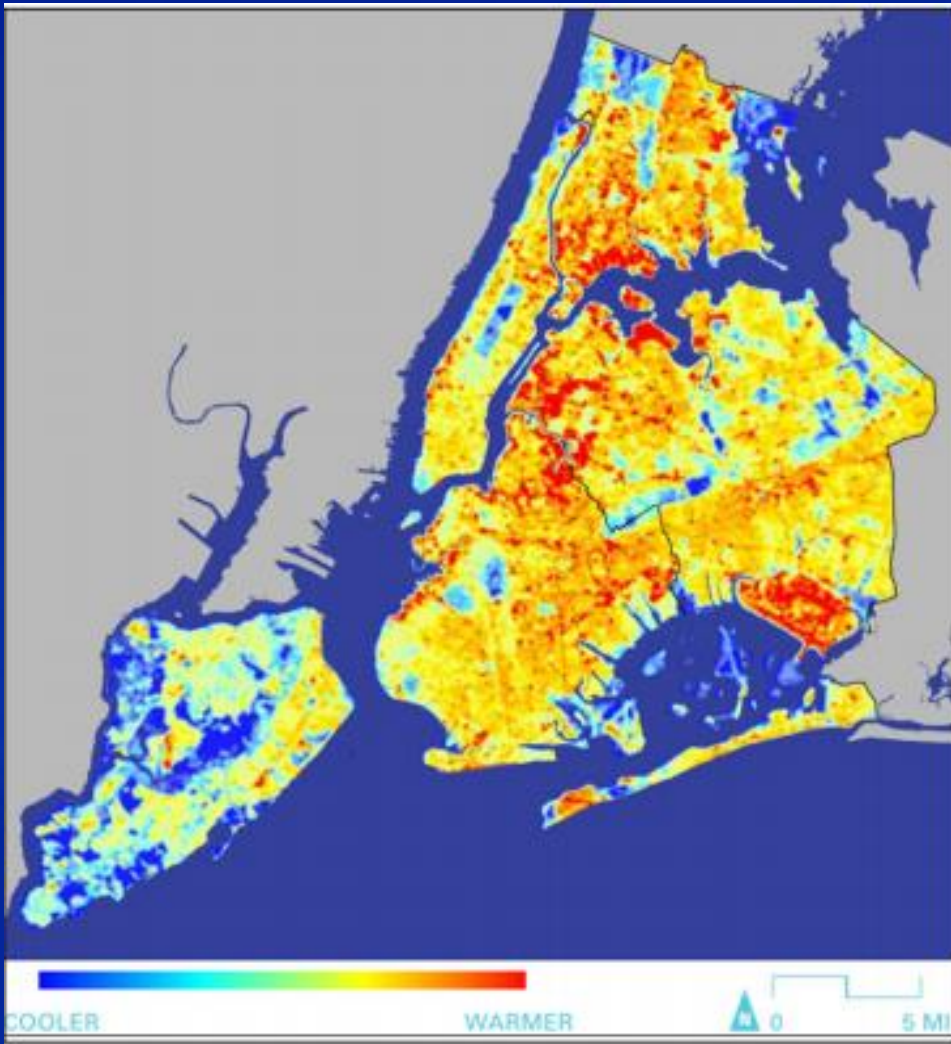




**Thank you.**

**Questions?**

# Cool Neighborhoods NYC



Urban Heat Island: dense urban environment traps and absorbs heat.

Densely built environment results in disparate neighborhood level risks

- South Bronx
- Northern Manhattan
- Central Brooklyn.

Source: LANDSAT Thermal Data, 2017.



# Cool Neighborhoods NYC



**Cool  
Neighborhoods for  
cooler  
summers.**

\$106 million invested to plant more trees, cool roofs, and more.



# NYC °CoolRoofs



*2.7 million sq ft.  
roofs in the  
heat-vulnerable  
areas*


- Reflective white coating:
  - that reduces energy use, cooling costs and carbon emissions.
  - combats the urban heat island effect.
  - supports New York City's goal to reduce greenhouse gas emissions by 30 percent by 2030.

# Partners

- Health care institutions
- Environmental groups
- Elected officials
- Community groups
- Faith communities
- Educational institutions



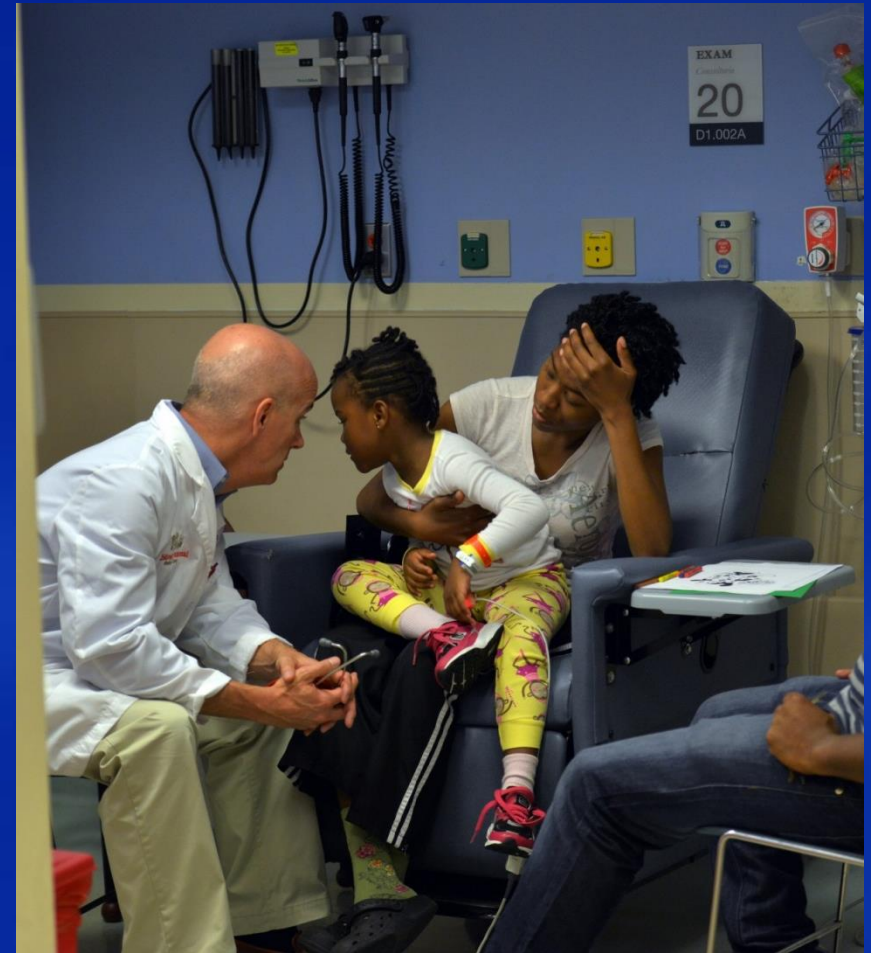




# Primary Protection: Enhancing Health Care Resilience for a Changing Climate







[Washingtonpost.com](http://Washingtonpost.com)

# Respiratory Diseases: Asthma

# Zoonotic and Vector-Borne Diseases

- Introduction and spread of new diseases
- Increased geographical range and risk of current diseases
- Re-emergence of formerly prevalent diseases
- Prolonged transmission cycles
  - Lyme disease
  - West Nile Virus
  - Dengue Fever
  - Malaria
  - Chikungunya
  - Tularemia
  - Rabies



## Shifts in the location of threats

Weather-related variables can determine geographic distributions of ticks

Low minimum temperatures can limit tick population survival

Declines in rainfall and humidity can also limit geographic distribution of blacklegged ticks

Reported Cases of Lyme Disease -- United States, 2001



Reported Cases of Lyme Disease -- United States, 2016



1 dot placed randomly within county of residence for each confirmed case



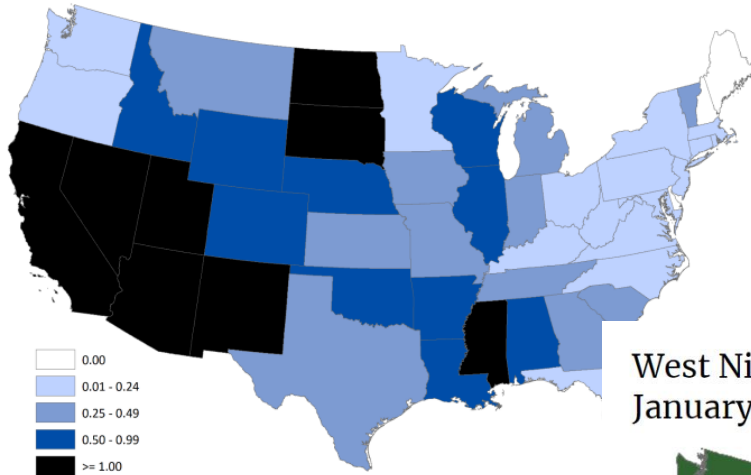
West Nile virus neuroinvasive disease incidence reported to ArboNET, by state, United States, 1999



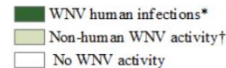
# West Nile Neuroinvasive Disease

West Nile virus neuroinvasive disease incidence reported to ArboNET, by state, United States, 2017

Incidence per 100,000



West Nile Virus Activity by State – United States, 2018 (as of January 8, 2019)




# Vector-Borne Diseases: Expanding Geographic Range



*By 2080, up to 1 billion people could be exposed to disease-carrying mosquitoes for the first time, increasing the risk of developing deadly diseases.*

*-Ryan, 2019*

The background of the slide is a photograph of parched, cracked earth in shades of brown and tan. The cracks are deep and irregular, forming a network across the surface. At the bottom of the image, there is a decorative graphic consisting of two overlapping, wavy shapes in shades of green and yellow.

Rising temperatures lead to longer allergy seasons and can make air pollution worse. This can increase the risk and severity of asthma attacks and cause more allergies.



Asthma and Allergy  
Foundation of America

Visit [AAFA.org](https://www.aaafa.org) to learn more.



## Shifts in the timing of threats

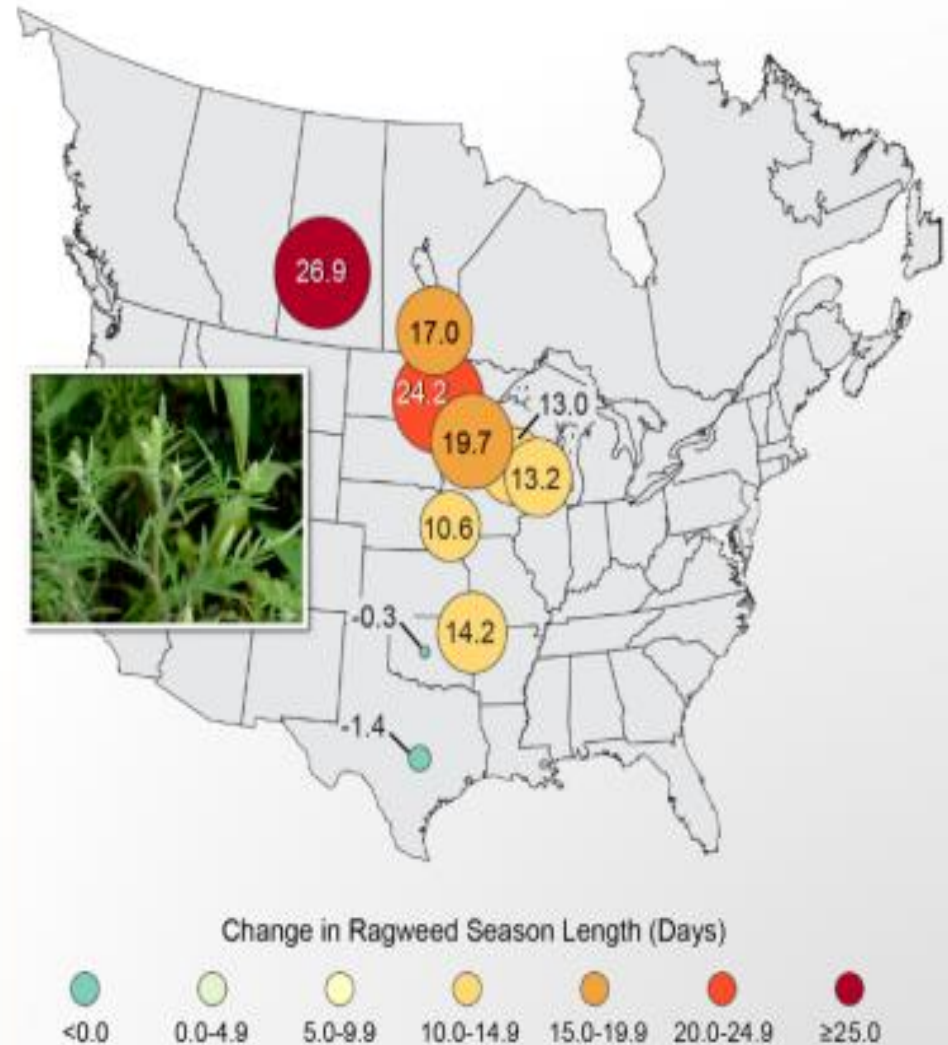
Between 1995 and 2011, the duration of the ragweed pollen season length has increased by as much as 11 to 27 days

Increases in temperature and CO<sub>2</sub> result in earlier flowering, but also greater floral numbers, greater pollen production, and increased allergenicity

Aeroallergen exposure contributes to:

- Asthma episodes
- Allergic rhinitis, sinusitis, conjunctivitis
- Urticaria (hives)
- Atopic dermatitis or eczema
- Anaphylaxis

## Ragweed Pollen Season Lengthens



# Vulnerability to Climate-Related Health Stressors

- **Climate change related events with health impacts for older adults:**
  - rising temperatures and heat waves
  - increased risk of more intense hurricanes (Cat IV and V)
  - degraded air quality
  - exposure to infectious diseases
  - floods, droughts, and wildfires
  - *other* climate-related hazards



# Climate Change & Older Adults

- Older adults are vulnerable to climate change-related health impacts for a number of reasons including:
  - normal changes in the body associated with aging (such as muscle and bone loss) which can limit mobility
  - being more likely to have a chronic health condition that requires medications or treatment
  - potentially needing assistance with daily activities



# Environmental Hazards

## Extreme Heat

- Heat exposure can increase the risk of illness and death among older adults, especially people with chronic health conditions that increase sensitivity to heat (i.e., diabetes)
- Higher temperatures have been linked to increased hospital admissions for older people with heart and lung conditions
- Older adults with limited incomes may not use air conditioning units during heat waves due to the high cost of operating them



# Environmental Hazards

## Poor Air Quality

- Poor air quality worsens respiratory conditions common in older adults, such as asthma and chronic obstructive pulmonary disease (COPD)
- Air pollution can also increase the risk of heart attack in older adults, especially those who are diabetic or obese



# Environmental Hazards

## Extreme Events

- Older adults are more likely to suffer storm and flood-related fatalities
- Extreme events can also cause power outages that can affect electrically-powered medical equipment and elevators, leaving some people without treatment or the ability to evacuate.





# Environmental Hazards

## Illnesses Spread By Ticks or Mosquitoes

- Climate change and increased temperatures will lead to ticks and mosquitoes expanding their ranges and being present for more of the year as warmer seasons last longer.
- Lyme disease, which is spread by ticks, is frequently reported in older adults
- Diseases spread by mosquitoes (like West Nile and St. Louis encephalitis viruses) pose a greater health risk among older adults with already weakened immune systems



# Environmental Hazards

## Illnesses Caused by Contaminated Water

- Climate change increases the contamination risk for sources of drinking water and recreational water.
- Older adults are at high risk of contracting gastrointestinal illnesses from contaminated water; those already in poor health are more likely to suffer severe health consequences, including death.



# The Impact of Location

- Depending on where they live, some older adults can be more vulnerable to climate change-related health effects than others.
- The increasing severity of tropical storms may pose risks for older adults living in coastal areas.
- For older adults residing in cities, factors such as the urban heat island effect and urban sprawl, and neighborhood safety may also present risks.
- For older adults and people with limited mobility who reside in multi-story buildings with elevators, the loss of electricity during a storm can make it difficult to get food, medicine, and other needed services.



# Older Adult Population (65 and older)

- Will nearly double in number from 2015 through 2050 (48 million to 88 million/19 million will be 85 or older)
- Diverse group with distinct subpopulations that can be identified not only by age but by:
  - race
  - educational attainment
  - socioeconomic status
  - social support networks
  - overall physical and mental health
  - disability status

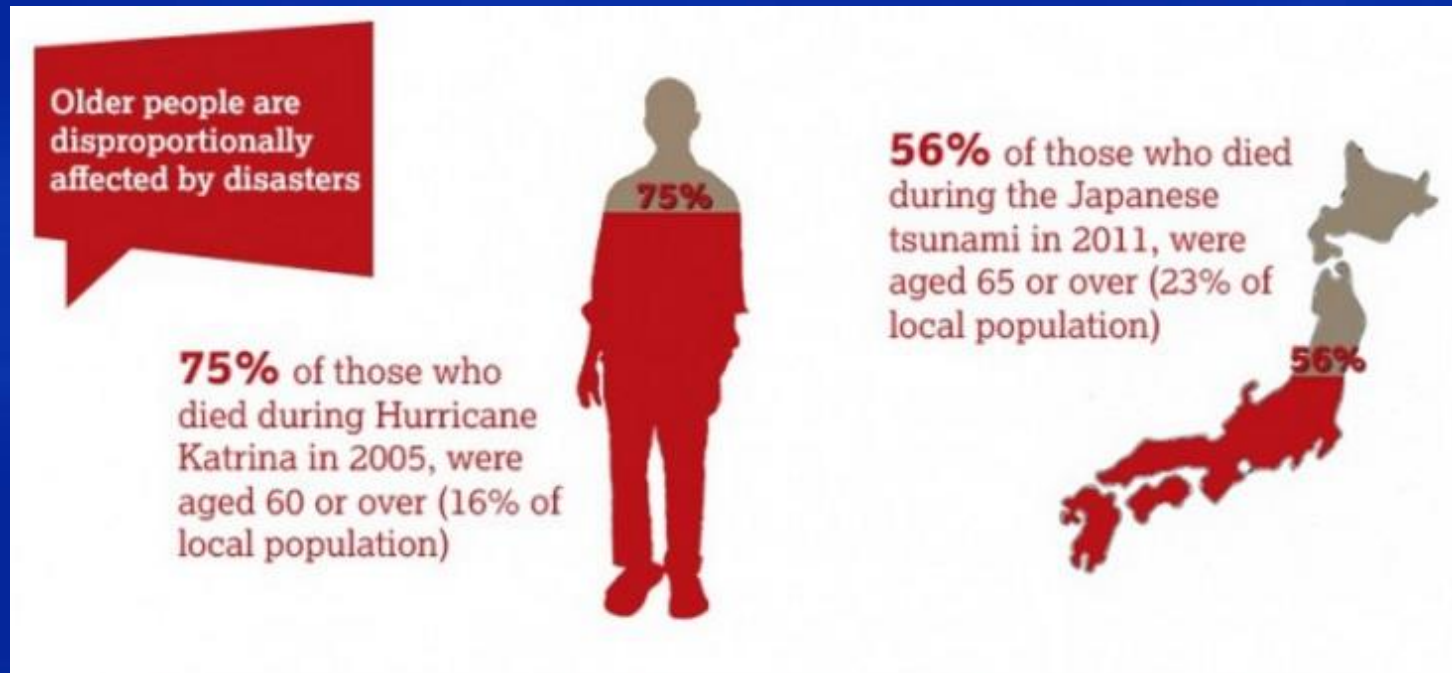


# Older Adults are Vulnerable to Climate Change-Related Health Impacts

- **Chronic health conditions, e.g., diabetes requiring medications**
- **May need assistance with ADLs**
- **Disabilities in:**
  - **communication (e.g., seeing, hearing, or speaking)**
  - **mental functioning (e.g., Alzheimer's disease or dementia)**
  - **physical functioning (e.g., limited/no ability to walk, climb stairs, or lift or grasp objects)**

# Extreme Events

- Older adults are more likely to suffer storm and flood-related fatalities.



- Superstorm Sandy: Almost 1/2 of deaths were over age 65



# Extreme Events

- **Evacuation: Older adults have high risk of both physical and mental health impacts**
- **Most vulnerable-people with:**
  - disabilities
  - chronic medical conditions
  - living in nursing homes or assisted-living facilities



Residents at La Vita Bella nursing home in Dickinson, Texas  
*Timothy J McIntosh/ Twitter*

# Extreme Events

- Health impacts could be made worse by interruptions in medical care and challenges associated with transporting patients, with necessary medication, medical records, and equipment like oxygen
- Power outages:
  - Electrically-powered medical equipment
  - Elevators: leaving some without treatment or ability to evacuate

## *Resilient power systems*



# Extreme Events: Heat

*Between 1979 and 2004:*

5,279 deaths were reported in the US related to heat exposure, with those deaths reported **most commonly among adults aged 65 and older.**



Phoenix, AZ  
June 2017



# Extreme Heat Events: Older Adults

- Increase risk of illness and death in those with chronic health conditions<sup>1,2</sup>
  - Congestive heart failure
  - Diabetes
  - Certain medications e.g., diuretics
- Increased hospital admissions
  - Heart and lung conditions<sup>2</sup>
- Limited income-may not have/ or use air conditioning



- **Shelters**

- **Wellbeing check**

- **Organizations already in home e.g., VNA**

<sup>1</sup>Prevalence of risk and protective factors associated with heat-related outcomes in Southern Quebec: A secondary analysis of the NuAge study. Laverdière É, Généreux M, Gaudreau P, Morais JA, Shatenstein B, Payette H., Can J Public Health. 2015 Jun 18; 106(5):e315-21.

<sup>2</sup>Climate change and older Americans: State of the science. Gamble, J et al. Environmental Health Perspectives, 2013, 15-22.

# Extreme Weather Events: Hurricane Sandy

- 90,000 buildings NYC in inundation zone
  - 6,500 patients - evacuated from nursing homes and hospitals
  - 3 weeks post storm - 4 NYC hospitals closed for inpatients
- Resilient hospitals***



Post Flood: Lower Manhattan, Brooklyn and Queens



# The Impact of Location

- 20% of older adults live in an area in which a hurricane or tropical storm made landfall within the last 10 years
- Manufactured housing/mobile homes
- Urban dweller risks
  - Urban heat island effect
  - Multistory dwelling with elevators (loss of electricity)
  - Neighborhood safety  
“house arrest”



Belle Glade, FL

***-Emergency notification by phone (reverse 911) - not social media***



# Climate Change Worsens Air Quality



- **Warming temperatures<sup>1</sup>**
  - Higher ground-level ozone
  - Longer season of aeroallergens season (e.g., ragweed pollen)
- **Increased ED visits and hospital admissions for cardiac and respiratory conditions common in older adults<sup>2</sup>**

<sup>1</sup>Climate change and older Americans: State of the science. Gamble, J et al. Environmental Health Perspectives, 2013, 15-22.

<sup>2</sup>Climate Change And The Health Of Older Adults, EPA 430-F-16-058 May 2016

# Infectious Disease

- Increasing geographic range of ticks and mosquitoes
  - West Nile
  - St. Louis Encephalitis
  - Lyme Disease
- Illnesses caused by contaminated water

Reported Cases of Lyme Disease -- United States, 2001



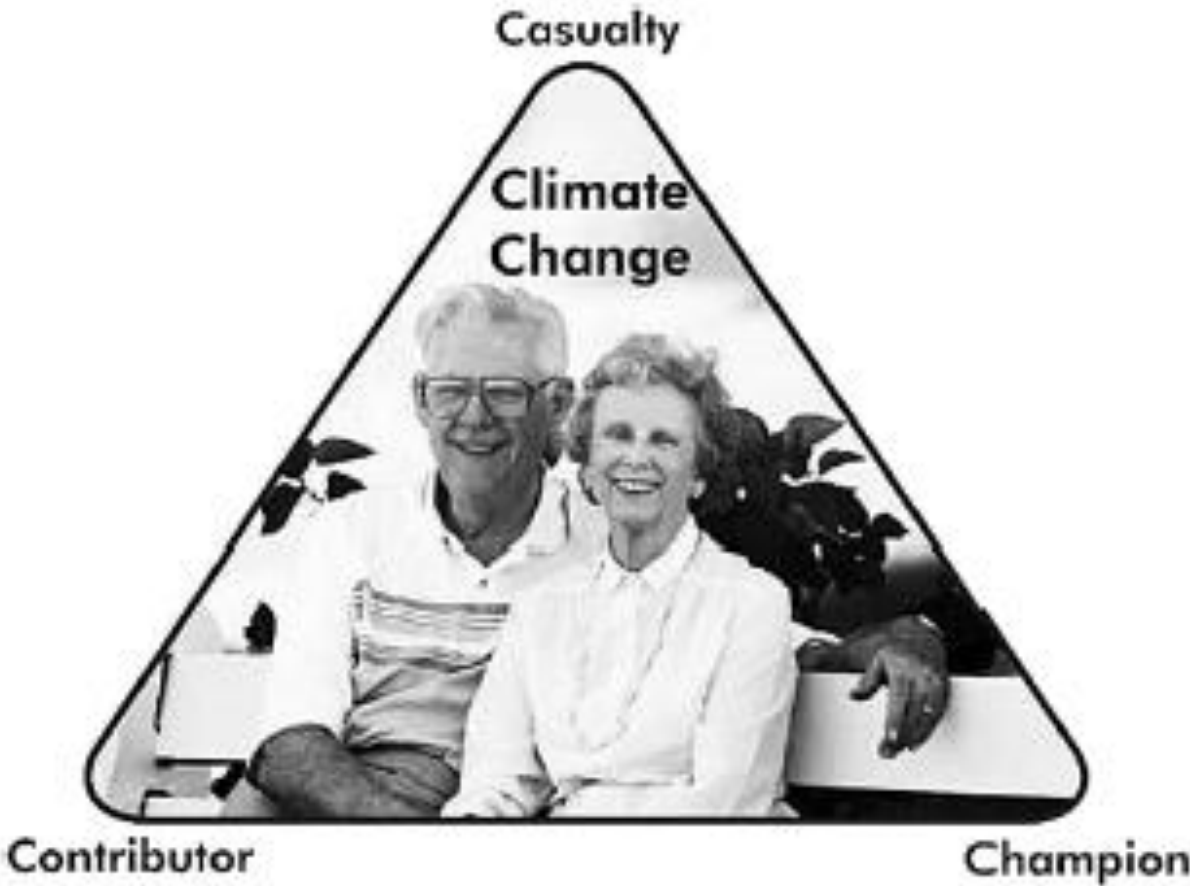
1 dot placed randomly within county of residence for each reported case

Reported Cases of Lyme Disease - United States, 2016



1 dot placed randomly within county of residence for each confirmed case

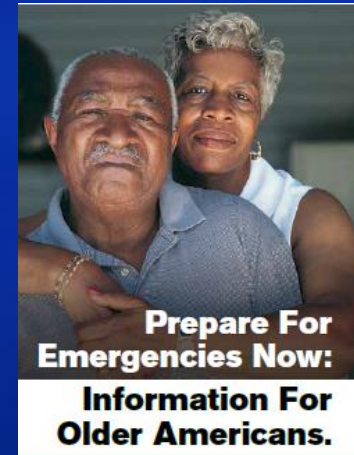
# 3 C Approach





# Recommendations

- Older adults are specifically mentioned in national disaster management and climate policies.
- Older adults have been consulted in the development of national and local disaster and climate risk assessment and their vulnerabilities and capacities included.
- Early warning signals and information are available, accessible, understandable and actionable by older adults.



# Recommendations

- Evacuation plans at community level have specific actions to ensure older adults can evacuate and are protected during these operations, including actions specific to mobility, sight, hearing and mental impairments and isolation.
- Disaster supplies and stockpiles include specialist items, medication and food required by older adults, and are accessible to older people in emergency distributions.
- Evacuation centers are age-responsive, with off-floor seating, wheelchair accessible facilities, handrails and privacy for men and women.



# Thank You

There is no planet B.



1978



2012



# WIN-WIN MEASURES

These measures increase the resilience of elderly people while contributing to wider sustainability and resilience benefits for cities and people. Selected examples are provided below.

## 1 GREEN / BLUE INFRASTRUCTURE

Transform as many urban areas from 'grey' surfaces to green and blue areas which increase cities' resilience to floods and heatwaves.

- ▶ The [Green Infrastructure Audit Best Practice Guide](#) helps to map green areas, evaluate benefits and identify opportunities in London.

## 2 AWARENESS, INFORMATION AND EDUCATION

Effective communication and access to knowledge and tools reduce vulnerability to extreme weather events

- ▶ The [Future Air – Knowledge Cards](#) raise awareness on the challenges, efforts and solutions around air pollution in China.

## 3 DESIGN FOR FUTURE CLIMATE

Design, build and retrofit buildings and spaces for future climate conditions while contributing to wider sustainability benefits.

- ▶ The [NYC Office of Housing Recovery Operations](#) worked towards ensuring the resilience of buildings in New York City to future storm surges.

## 4 COMMUNITY CAPABILITIES AND ENGAGEMENT

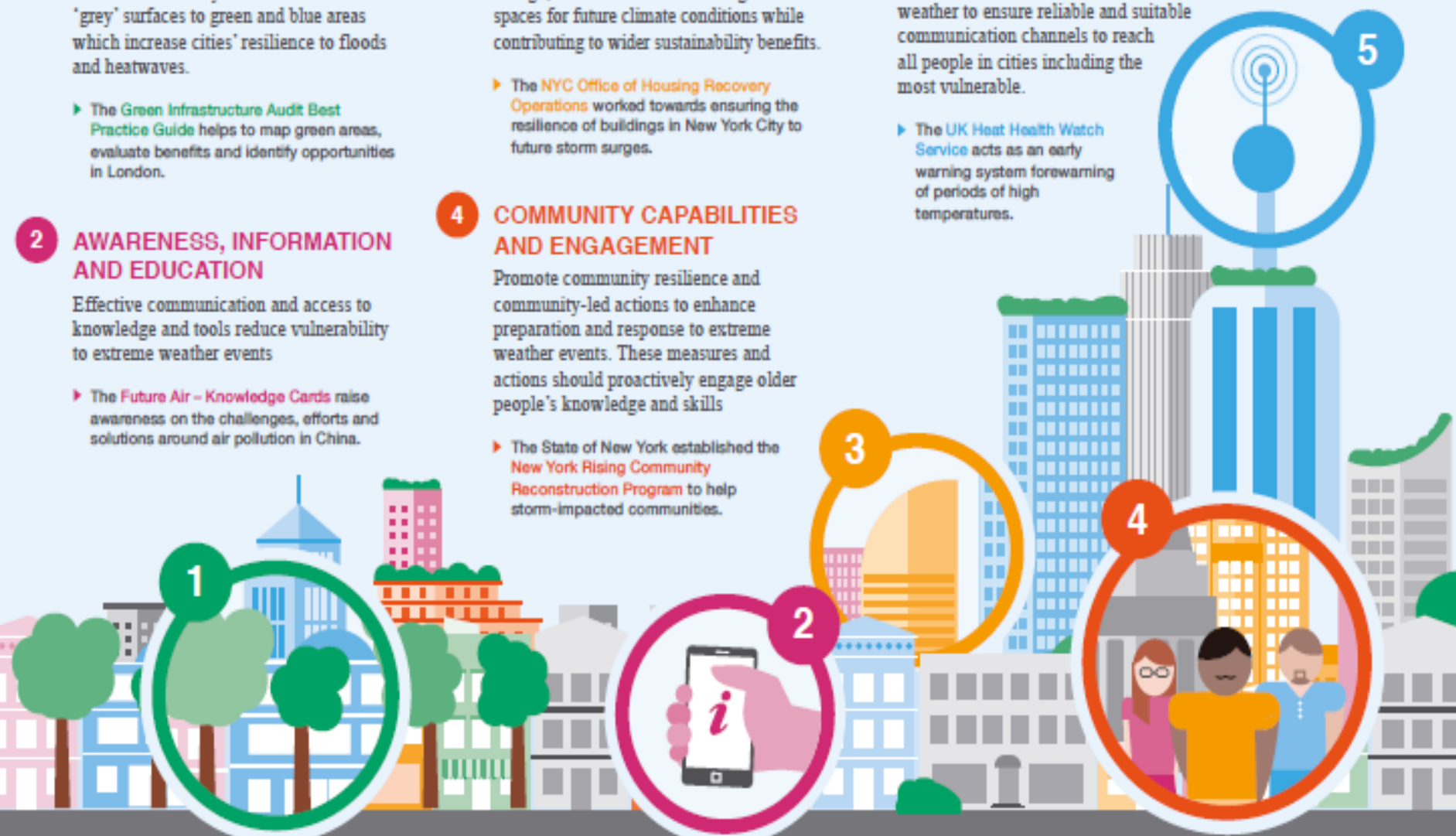
Promote community resilience and community-led actions to enhance preparation and response to extreme weather events. These measures and actions should proactively engage older people's knowledge and skills

- ▶ The State of New York established the [New York Rising Community Reconstruction Program](#) to help storm-impacted communities.

## 5 PLANNING FOR WEATHER

Enhance warning systems, emergency systems and city plans for extreme weather to ensure reliable and suitable communication channels to reach all people in cities including the most vulnerable.

- ▶ The [UK Heat Health Watch Service](#) acts as an early warning system forewarning of periods of high temperatures.



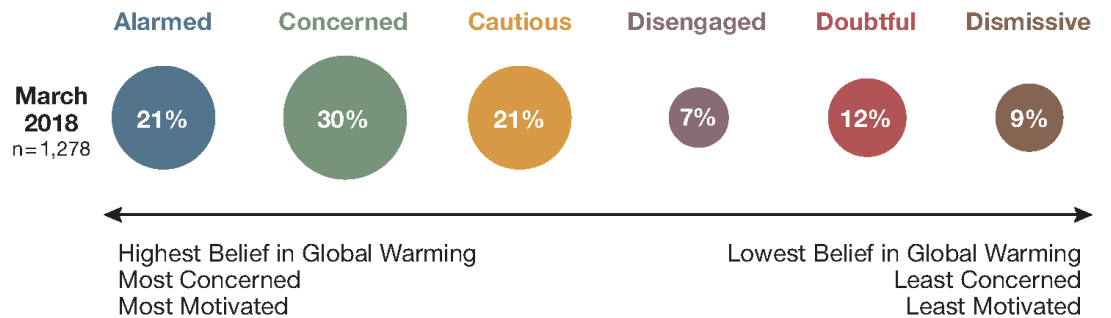
## Global Warming's "Six Americas"

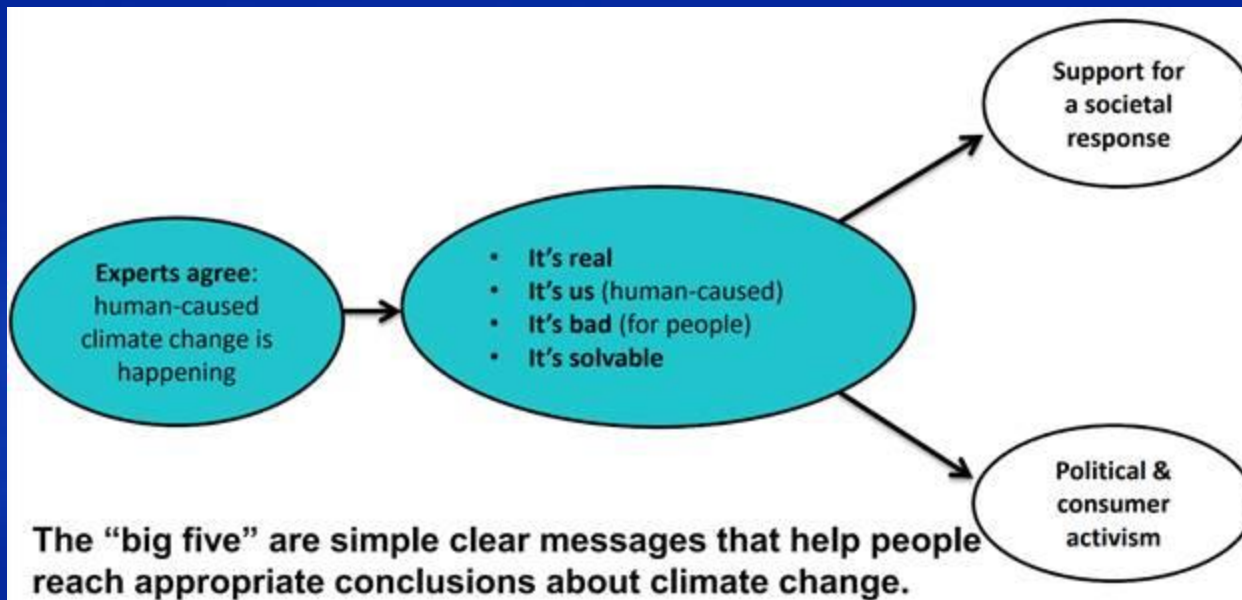


Proportion represented by area



Source: Yale/George Mason, November 2016; N=1,226



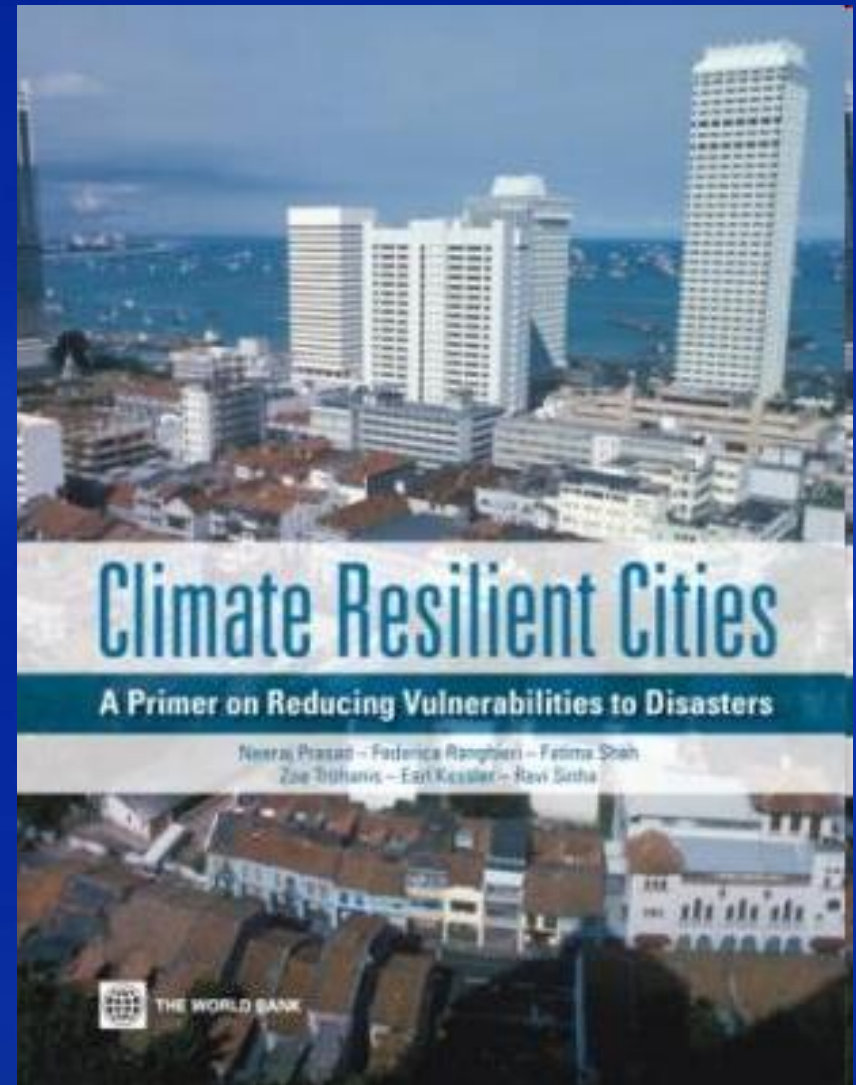


Sources: Ding-Ding *et al.*, 2012; Lewandowsky *et al.*, 2012; Roser-Renouf *et al.*, 2014; Krosnick *et al.*, 2006



# Public Health Response

- Mitigation
- Adaptation
- Resilience



# Resilience

*“Resilience is the ability to prepare for, and adapt to, changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents or naturally occurring threats or incidents.”*

*-U.S. Presidential Policy Directive 21 (2013)*

# Resilience: Case in Point



Source:

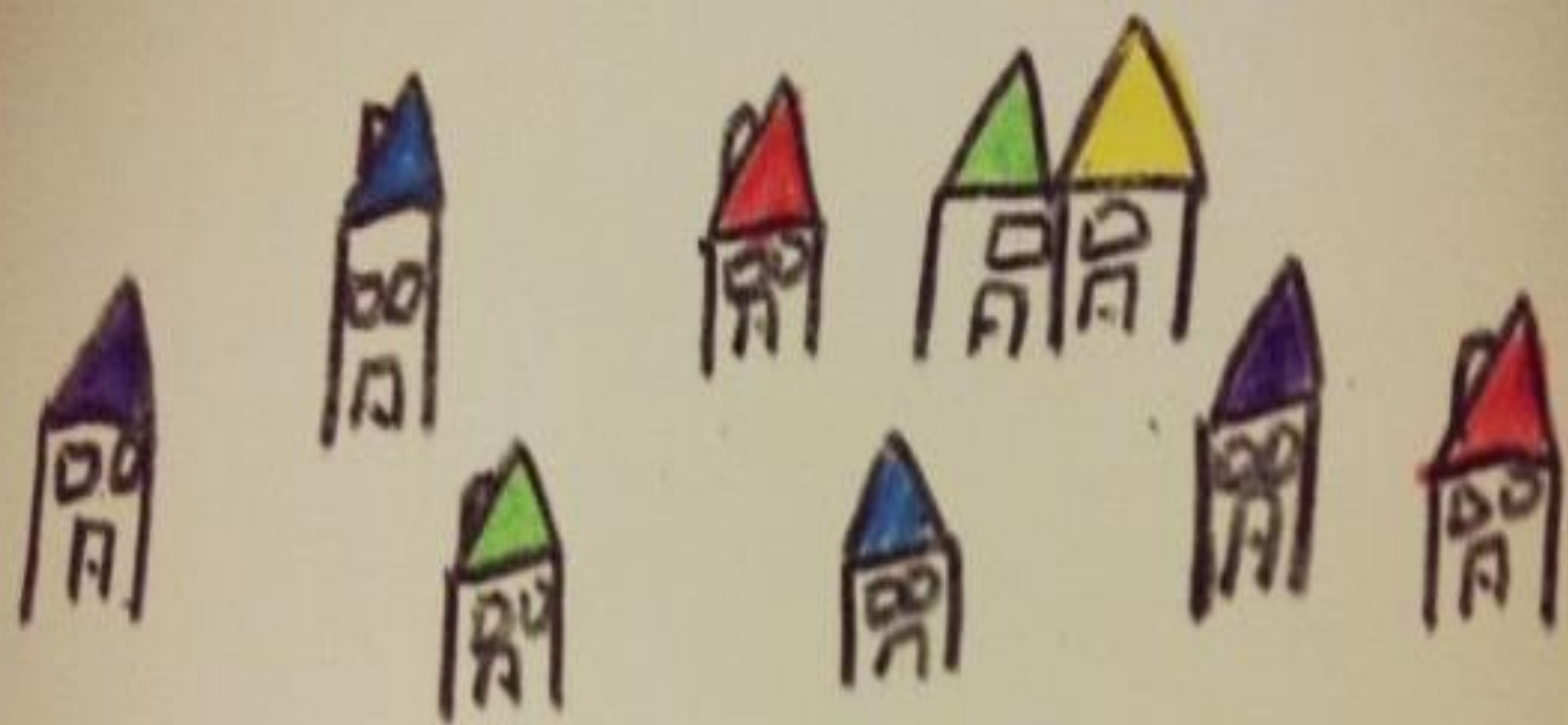
[Wikimedia Commons](#)

Image Credit: Hybirdd, CC BY-SA 2.0 (<http://creativecommons.org/licenses/by-sa/2.0>), via Wikimedia Commons.



# Resilience: Case in Point



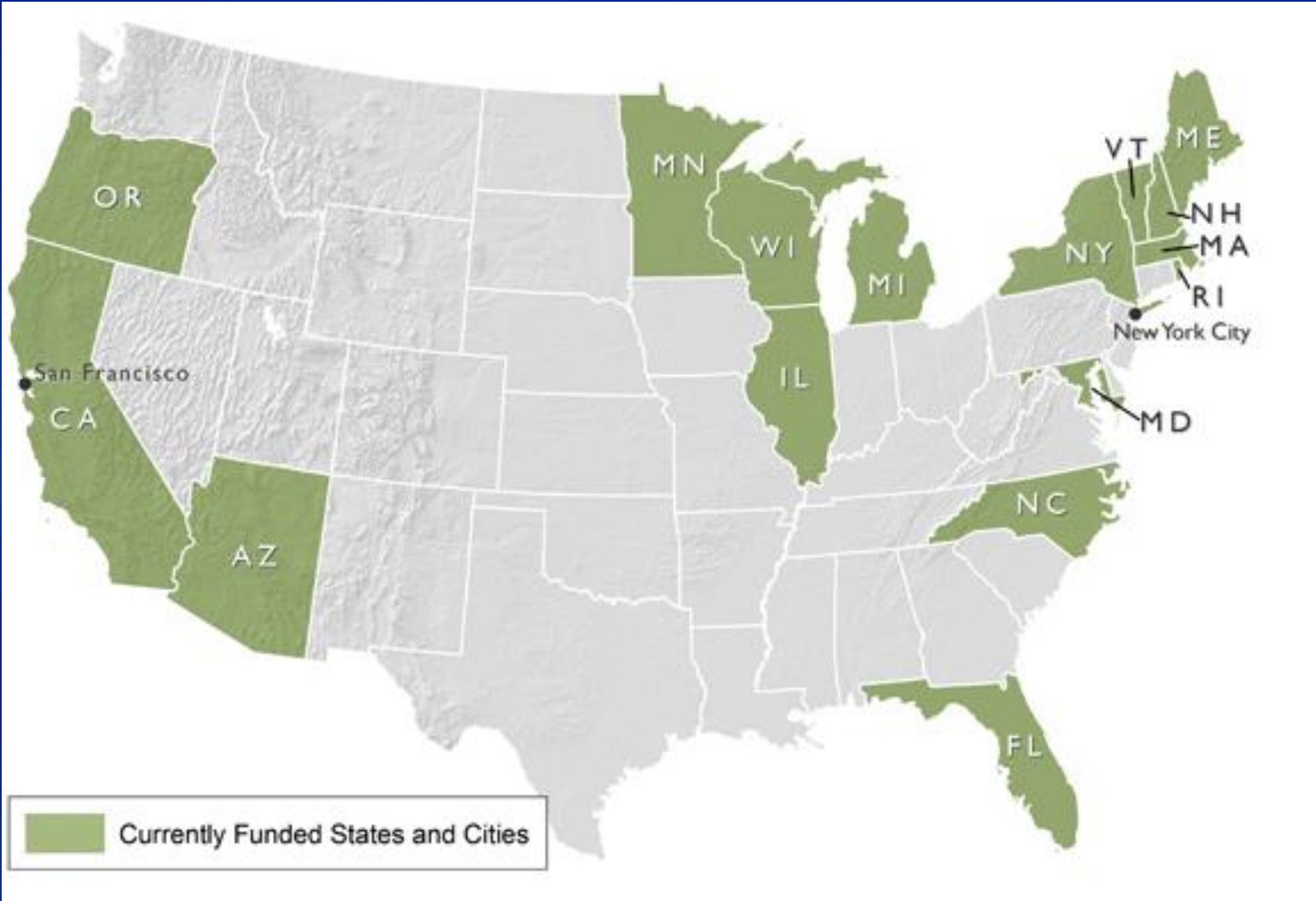


It takes a village...

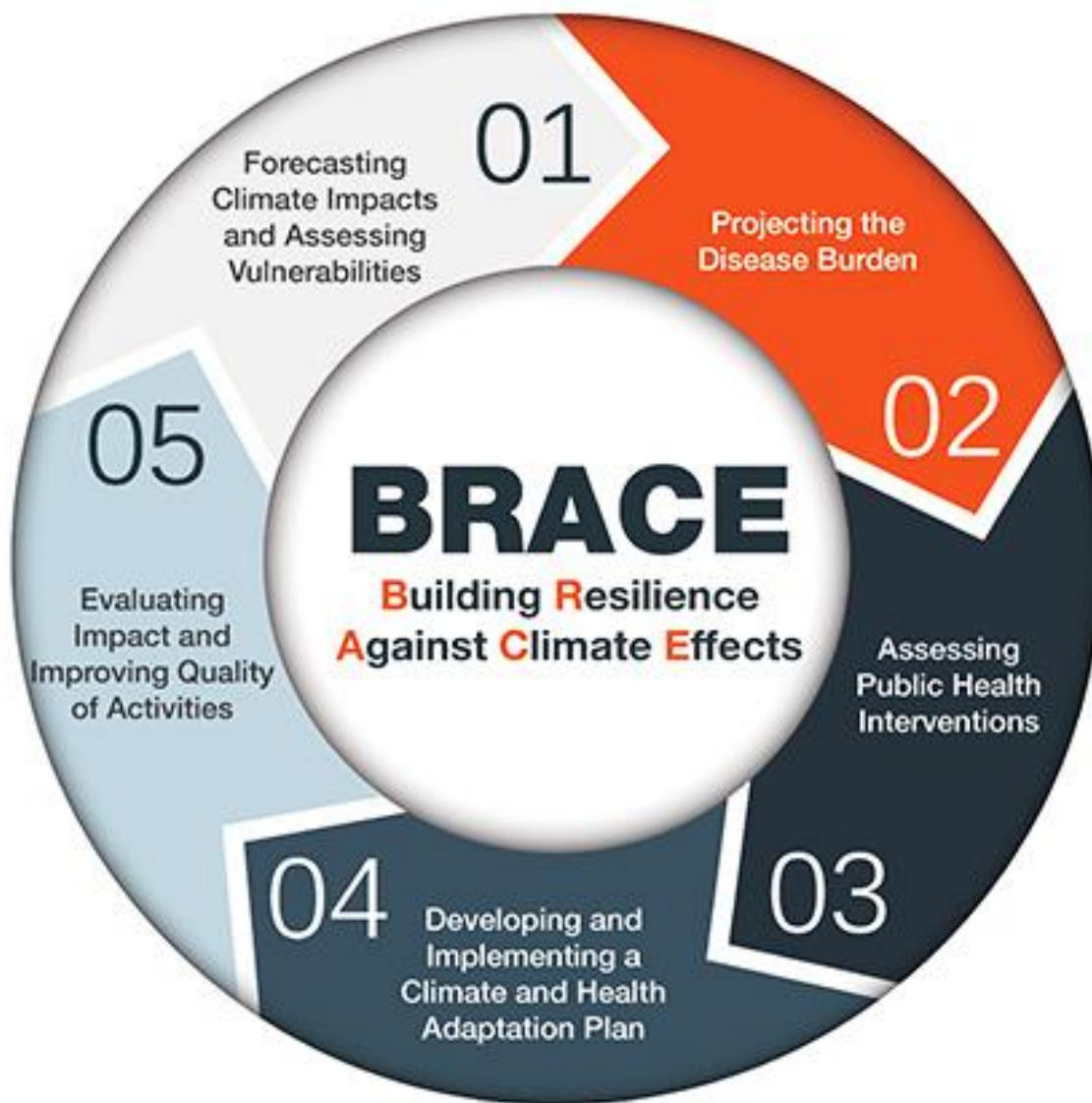
# Healthy and Safe Communities: An Effective Community, Statewide, and National Response



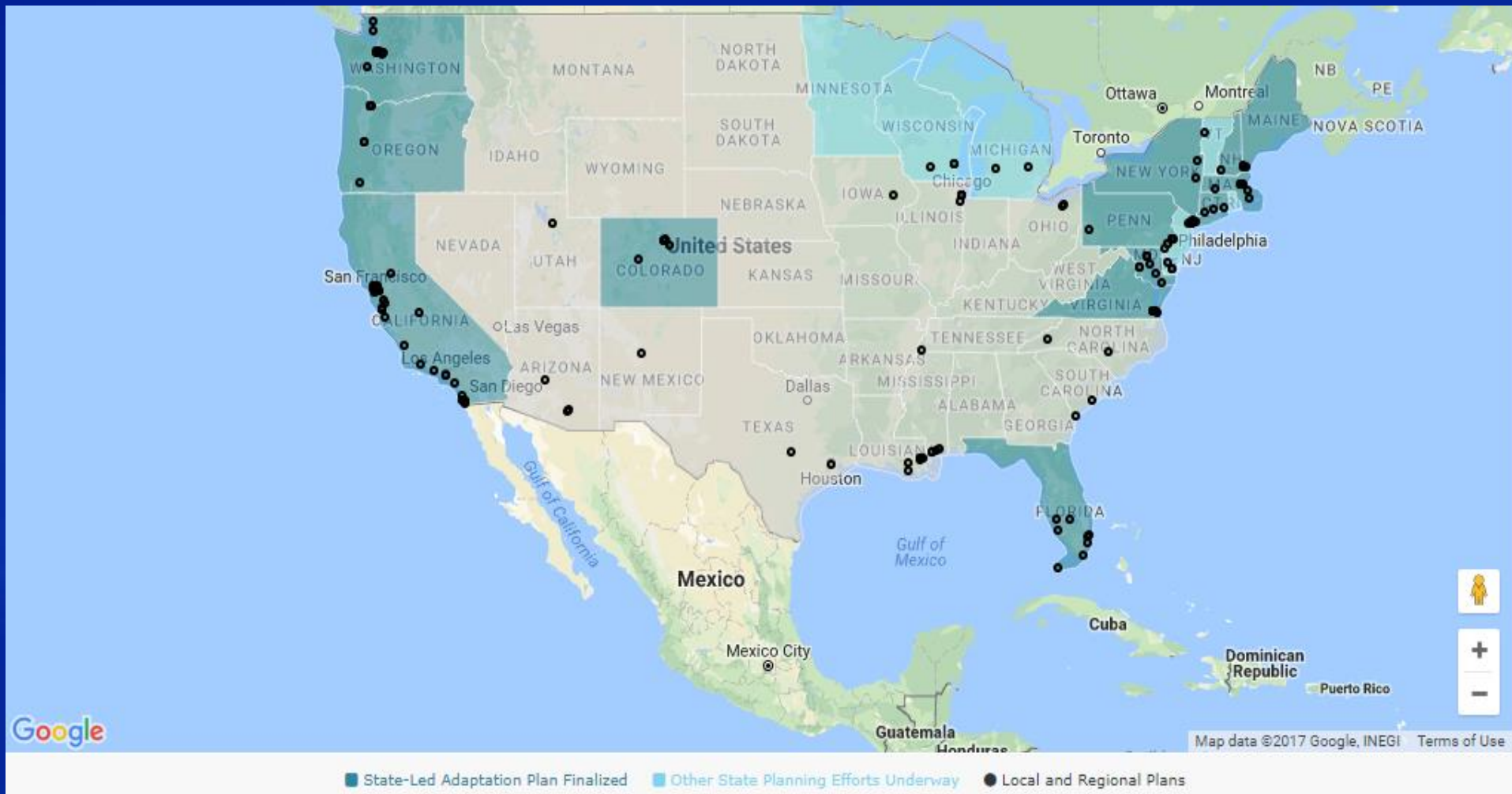
# Climate-Ready States & Cities Initiative



## Building Resilience Against Climate Effects



# Adaptation Planning





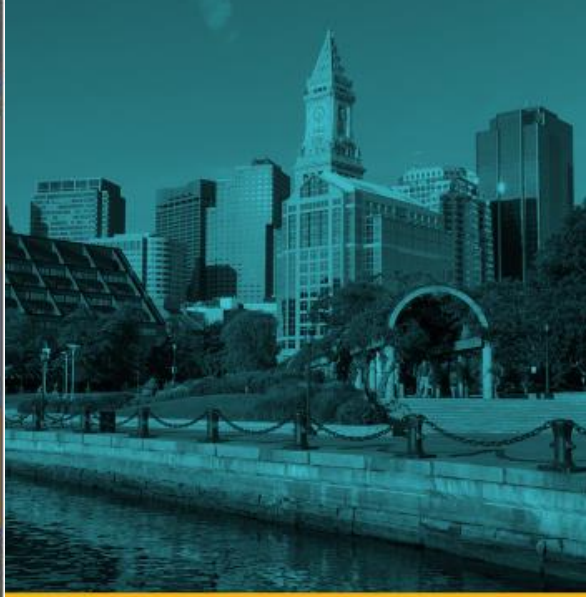


Massachusetts  
**CLIMATE CHANGE ADAPTATION  
REPORT**

September 2011



Submitted by the  
Executive Office of Energy and Environmental Affairs  
and the  
Adaptation Advisory Committee



**CLIMATE READY BOSTON**  
FINAL REPORT

MAYOR MARTIN J. WALSH **B**    DECEMBER 2014

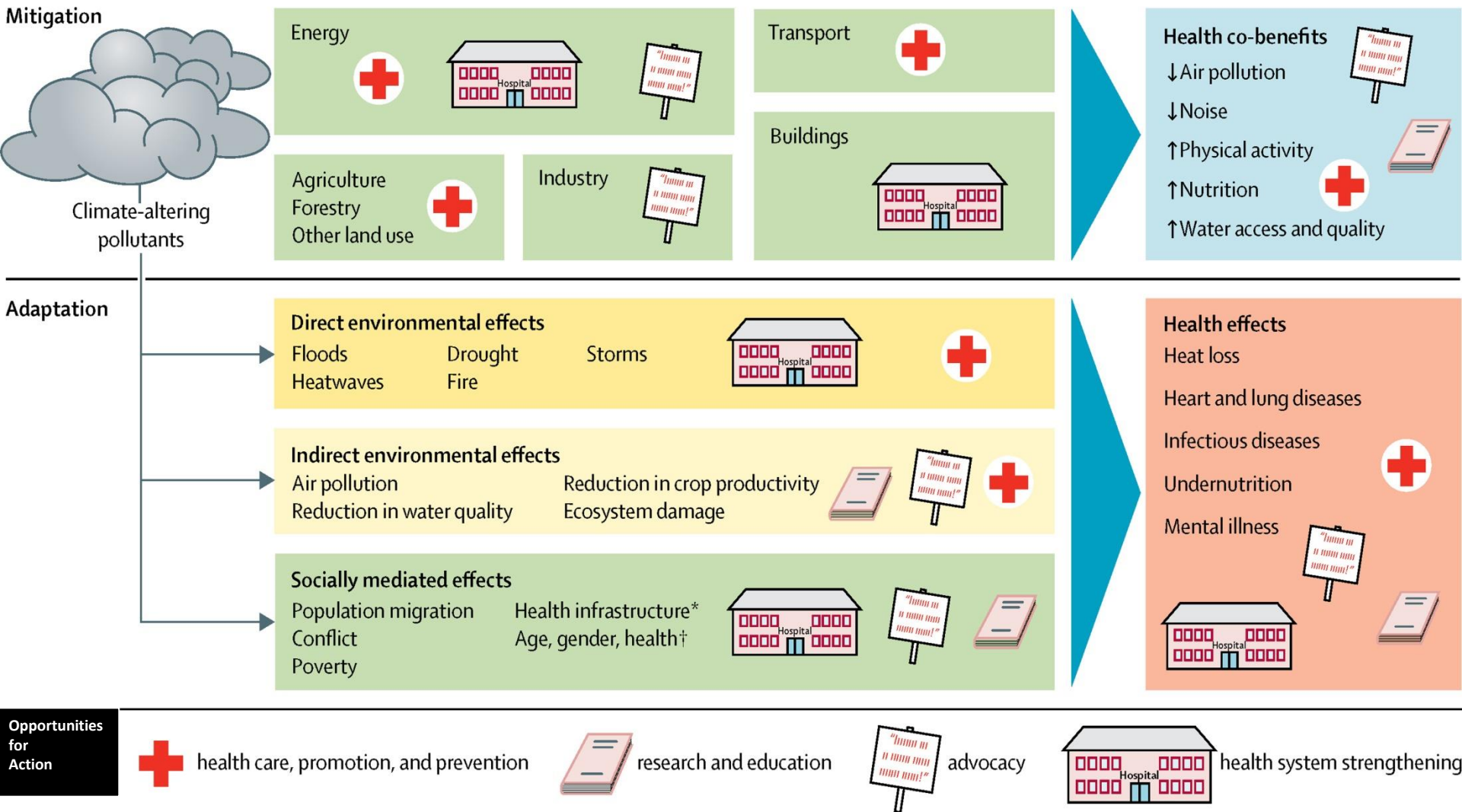


Powered by the Georgetown Climate Center's  
 Adaptation Clearinghouse™

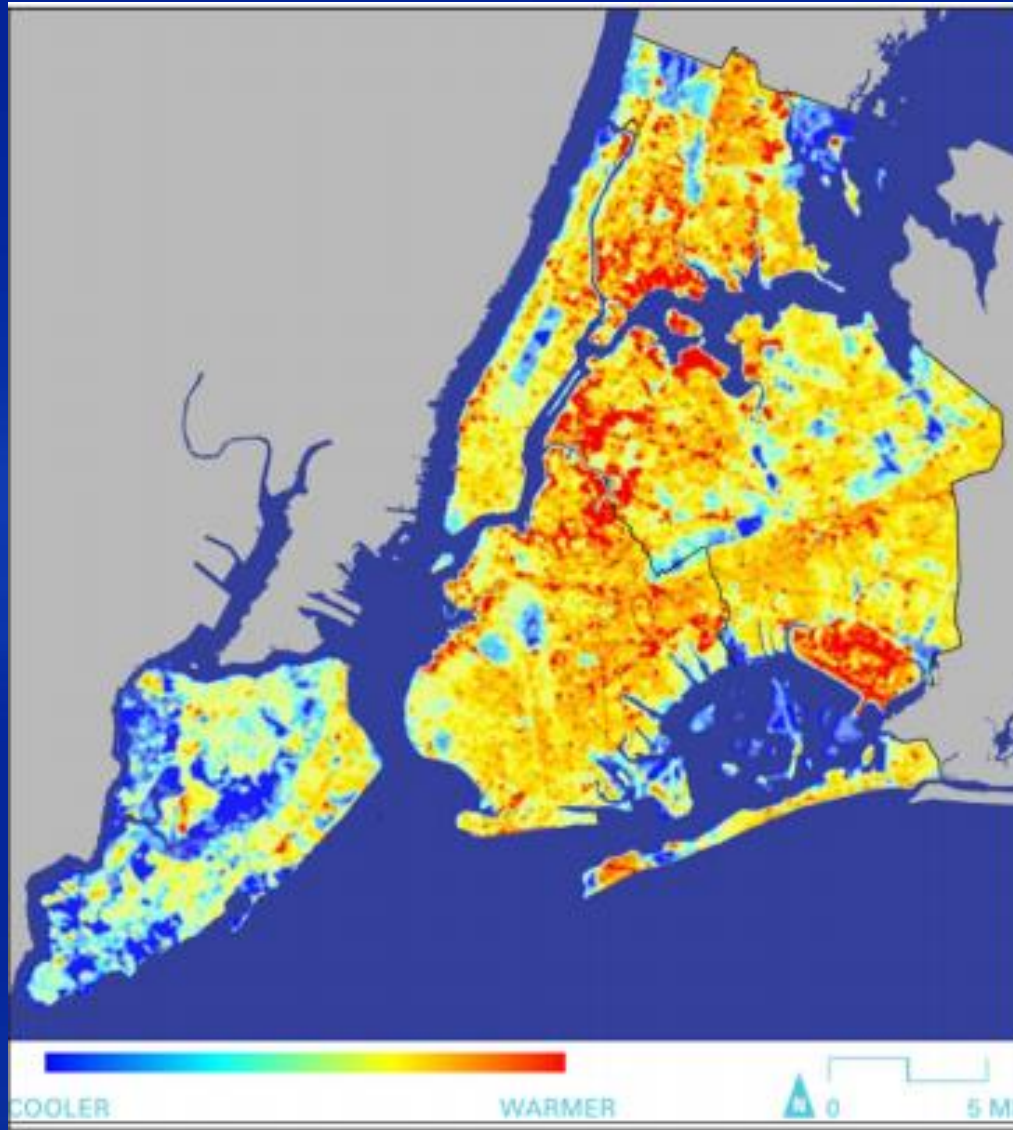
**ClimateCARE**

Climate: Community Action for Resilience through Engagement  
in East Boston, Massachusetts

# Framework for actions to create health co-benefits, and mitigate or adapt to the health effects of climate change



# Cool Neighborhoods NYC



Source: LANDSAT Thermal Data, 2009.



# Cool Neighborhoods NYC



**Cool  
Neighborhoods for  
cooler  
summers.**

\$106 million invested to plant more trees, cool roofs, and more.

# NYC °CoolRoofs







# The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment

Climate change is a significant threat to the health of the American people. This scientific assessment examines how climate change is already affecting human health and the changes that may occur in the future.



VIEW SUMMARY



1

## Climate Change and Human Health



<https://health2016.globalchange.gov>

***Around 88% of the global disease burden of climate change falls on children under 5 years.***



# What Makes Children Vulnerable?

**Exposure:** Coming into contact with a climate change threat



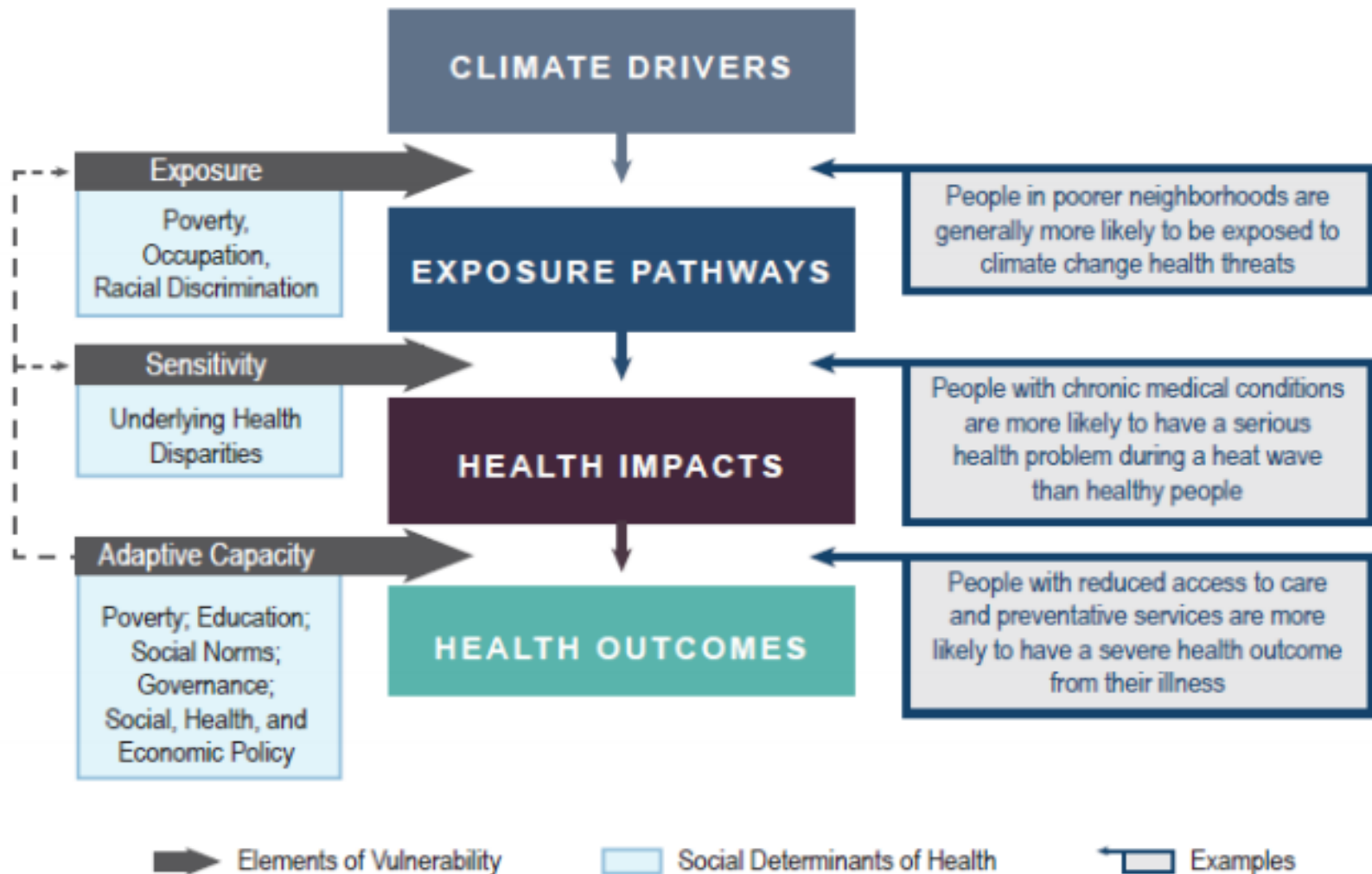
**Sensitivity:** Being biologically susceptible to a climate change threat given factors like health status and age



**Ability to Adapt:** Being able to adjust or respond to a climate change threat



# Intersection of Social Determinants of Health and Vulnerability



# Public Health Messaging: Heat & Pollution






- Anticipate earlier and longer allergy seasons
- Limit athletic activities on hot, high air pollution days
- Consider special heat accommodations for learning disabled students and citizens
- Guide parents and pregnant women to reduce heat exposures; counsel on combined risk from pollens and air pollutants (ozone)
- Advise athletic coaches, employers of children on heat precautions and policies; educate community on changes in pollen seasons and interactions with air pollution



# Air Quality Flag PROGRAM

## Know Your Air Quality



Air Quality Index	Outdoor Activity Guidance
 <p>green</p> <p>GOOD</p>	<p>Great day to be active outside!</p>
 <p>yellow</p> <p>MODERATE</p>	<p>Good day to be active outside!</p> <p>Students who are unusually sensitive to air pollution could have symptoms.*</p>
 <p>orange</p> <p>UNHEALTHY FOR SENSITIVE GROUPS</p>	<p>It's OK to be active outside, especially for <b>short activities</b> such as recess and physical education (PE).</p> <p>For <b>longer activities</b> such as athletic practice, take more breaks and do less intense activities.</p> <p>Watch for symptoms and take action as needed.*</p> <p>Students with asthma should follow their asthma action plans and keep their quick-relief medicine handy.</p>
 <p>red</p> <p>UNHEALTHY</p>	<p>For <b>all outdoor activities</b>, take more breaks and do less intense activities.</p> <p>Consider moving <b>longer or more intense activities</b> indoors or rescheduling them to another day or time.</p> <p>Watch for symptoms and take action as needed.*</p> <p>Students with asthma should follow their asthma action plans and keep their quick-relief medicine handy.</p>
 <p>purple</p>	<p>Move <b>all activities</b> indoors or reschedule them to another day.</p>

# Climate Resilient Schools



Photo courtesy of Broward County.

- Drought-tolerant landscapes
- Edible school gardens
- Promotion of resilient energy systems
- Comprehensive classroom
- Community discussions of climate, water issues, sea level rise

# Heat Illness Prevention School Project

## Heat Illness Prevention School Project (HIPSP)



STAY COOL.

STAY HYDRATED.

STAY INFORMED.



### Watch for common signs

**HEAT CRAMPS:** Muscle pains or spasms in arms, legs or abdomen. Heavy sweating.

**First Aid:** Apply pressure on cramping muscles or gently massage to relieve spasm.

Give sips of water. If nausea occurs,

discontinue water intake.

### When it's hot outside: Tips for preventing Heat Illness

**HYDRATE** before, during and after physical activity: Drink 10 gulps of water every 15-20 minutes.

Wear loose fitting, light weight clothing, a hat and apply sunscreen before going outside.

Monitor length of time outdoors, rest frequently and seek shade.

**STAY** in a cool environment: Avoid exercise or strenuous physical activity outside during periods of extreme weather.

**STAY** informed about weather-related health & safety updates.

Extremely hot weather can cause

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## Parent/Caregiver Information

This handout is designed to help parents and caregivers recognize the symptoms of heat-related illness and learn about how to treat and prevent its occurrence.

**Heat cramps** are muscle pains or spasms, usually in the legs, abdomen, or arms and might occur in association with strenuous activity.

Sweating depletes the body's salt and moisture and the low salt level in the muscles can cause painful cramps.

#### Treatment:

- Have athlete rest in a cool, shady, or air-conditioned place.
- Drink water, clear juice, or a sports beverage.
- Do not allow athlete to return to strenuous activity for a few hours after cramps subside.

**Heat Stroke** is the most serious heat-related illness. It occurs when the body becomes unable to control its temperature:

- the body's temperature rises rapidly,
- the sweating mechanism fails, and
- the body is unable to cool down.

**Warning!** Body temperature may rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not provided. **Seek medical attention immediately.**

#### Symptoms:

- An extremely high body temperature (104°F or higher)
- Red, hot, and dry or moist skin
- Rapid, strong pulse
- Throbbing headache

## HEAT-RELATED ILLNESS

### Welcome to the Teachers' Corner

This course was developed by the Centers for Disease Control and Prevention to help student athletes, coaches, athletic trainers, parents, teachers, and school nurses recognize symptoms, share prevention tips, and determine treatment options for heat-related illnesses (HRI). Therefore, this training is well-suited for adults or high school students (grades 9-12).

Teachers may use HRI to supplement their health education curricula. The HRI training course may be aligned with the National Health Education Standards (NHES). Therefore, the high school health course objectives may correspond to the objectives in this course.

This training may be implemented in one class lesson or taught in segments. The teacher may be the facilitator and project the Web-based modules onto a screen for classroom use. Students may also access the training in groups of two to four. Self-paced individual training is also appropriate. Furthermore, the scenario questions within the training may be discussed in group settings, including a classroom. Finally, the exam at the end of the training course may be used for individual assessment.

Content from slides and other resources throughout the course are available for printing. The HRI course objectives and a list of how they align with NHES are provided. A Discussion Questions Sheet for further assessment and a Crossword Puzzle are also available.

- Standards
- Crossword
- Discussion



Goal: Educate students, school staff, athletic coaches, and parents regarding heat-related illness and prevention.

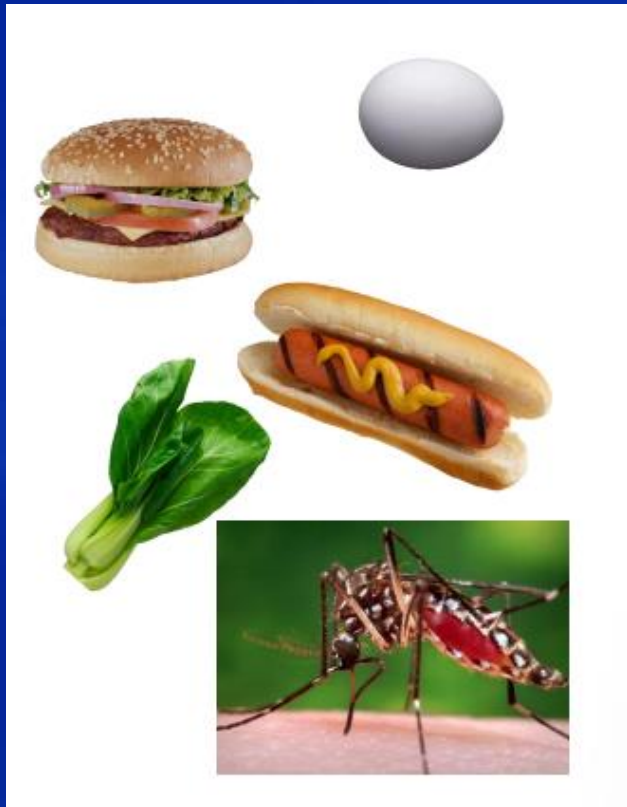


# Climate Resilient Schools



**Ocean Springs, Mississippi**

# Surveillance and Education: Food, Water and Vector-Borne Disease Risks



- Be alert to shifting timing, locations of diseases
- Food safety
- Ponds and lakes with algal blooms, mosquito/tick precautions
- Outdoor food presentation
- Vector control measures

# Protecting Children During Disasters



- Physical harm
- Exploitation and violence
- Psychosocial distress
- Family separation
- Abuses related to evacuation
- Denial of access to quality education
- Emotional impact of disaster



# The Emotional Impact of Disaster

## Psychosocial programs:

- Rebuild a sense of safety and normalcy
- Express their thoughts and feelings about their experiences
- Strengthen resilience, or coping skills
- Build positive relationships with peers and caregivers



# The Emotional Impact of Disaster: Preserving Family Unity

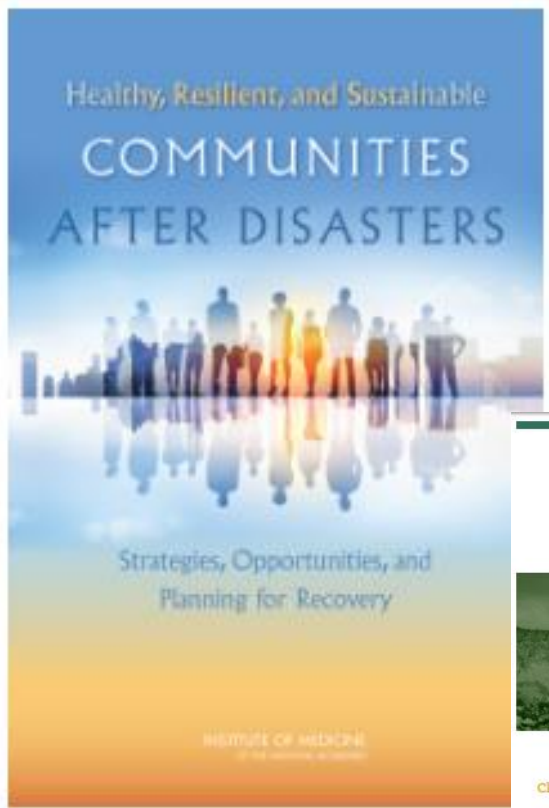
- Survey all children to identify unaccompanied children
- Identification bracelet on the child that matches a supervising adult, *if available*
- Report all unaccompanied children to the emergency operations center and NCMEC (National Center for Missing and Exploited Children)
- Provide a complete list of unaccompanied children to local emergency management officials
- Social and health screening of the child and the supervising adult



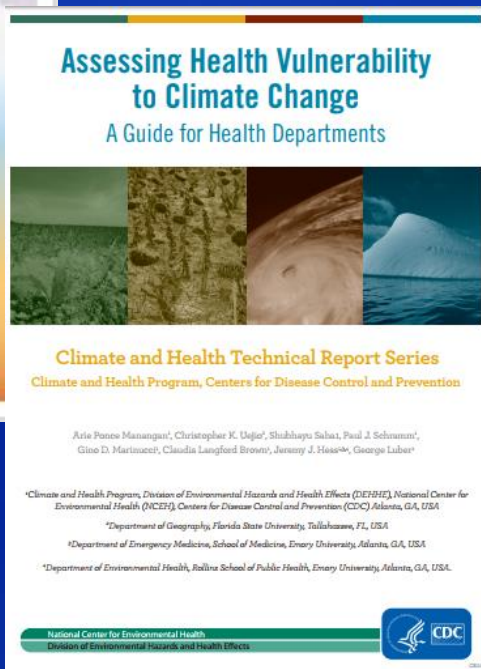


FEMA

Emergency Management Institute



Institute of Medicine. 2015.



### Online Courses:

- Planning for the needs of Children in Disasters IS-366
- Multi-hazard Planning for Childcare IS-36
- Introduction to the Incident Command System, I-100 for Schools IS-100.SCA
- Multi-hazard Emergency Planning for Schools IS-362.A



Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives, Protecting People™

### Caring for Children in a Disaster

- Caring for Children in a Disaster
- How Children are Different
- Real Stories +
- Families +
- Children
- Schools
- Health Professionals
- Emergency Planners and Responders

[CDC](#) > [Caring for Children in a Disaster](#) > [Emergency Planners and Responders](#)

### Emergency Planners and Responders



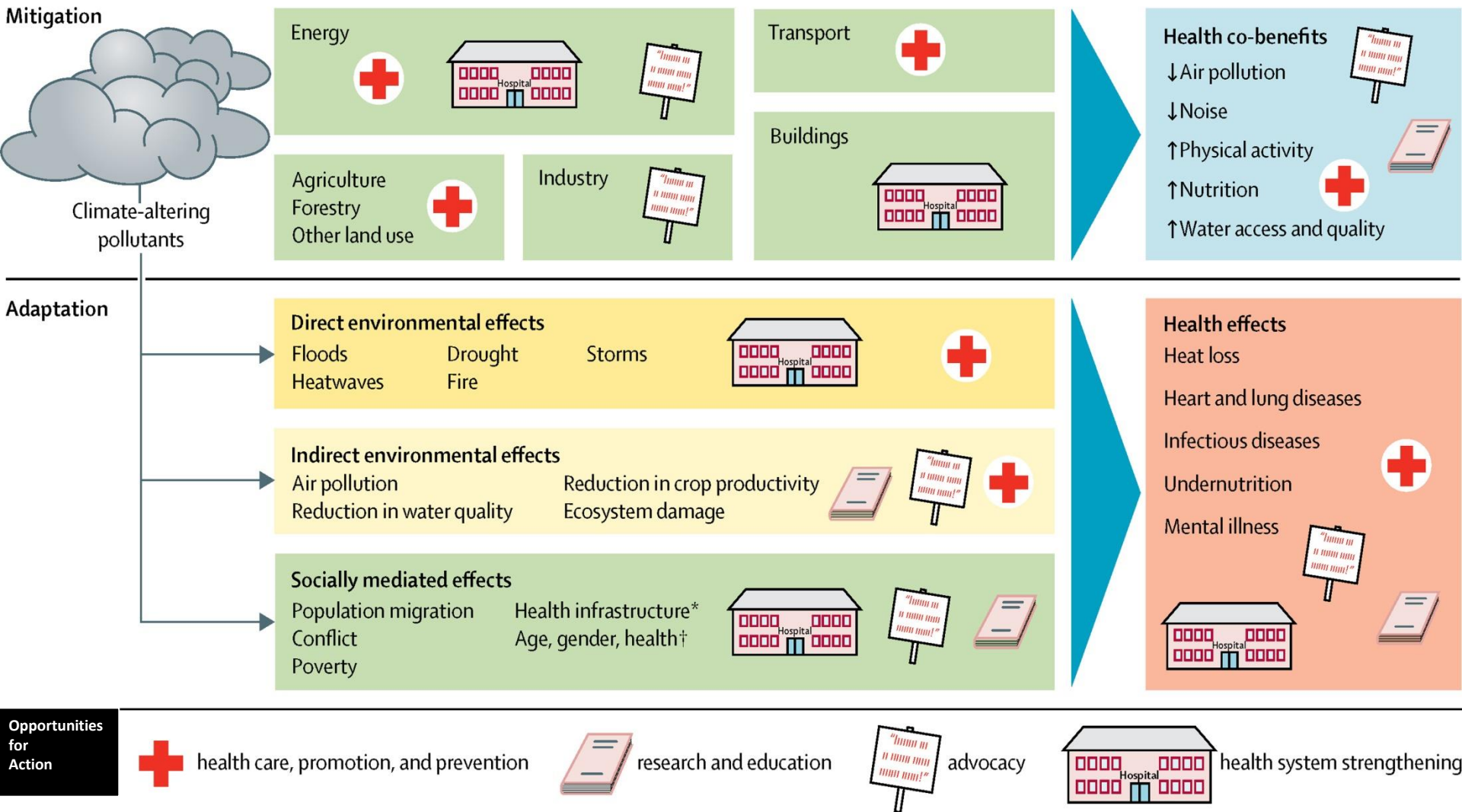
- CDC's [Planning Resources by Setting](#) for responders, communities, and schools
- [FEMA resources](#) for responders
- CDC [Guidelines for Evacuation Center Play Areas](#)
- [Guidelines, Tabletop Exercise Toolkit, and more](#) from the New York State Office of Emergency Services

### Training Resources

- [Just In Time Disaster Training](#) from the Disaster Resistant Community



# Framework for actions to create health co-benefits, and mitigate or adapt to the health effects of climate change



# NEHA Addressing Climate Change Impacts

[https://vimeo.com/291968741?utm\\_source=Climate+for+Health+-+Newsletter&utm\\_campaign=6cc96b6333-CFH+Newsletter+10+2018&utm\\_medium=email&utm\\_term=0\\_92c4225a2f-6cc96b6333-198247133&mc\\_cid=6cc96b6333&mc\\_eid=43928fc173](https://vimeo.com/291968741?utm_source=Climate+for+Health+-+Newsletter&utm_campaign=6cc96b6333-CFH+Newsletter+10+2018&utm_medium=email&utm_term=0_92c4225a2f-6cc96b6333-198247133&mc_cid=6cc96b6333&mc_eid=43928fc173)

4:49 min



# resilient MA

Climate Change Clearinghouse for the Commonwealth

Maps

Data

Documents



<http://resilientma.org>



Together, we must consider our dietary choices, modes of transport, energy sources, norms of production and consumption, political actions, avenues of community engagement, and models of environmental stewardship.

Physicians, physician assistants, nurses, nurse practitioners, midwives, dietitians, counsellors, traditional healers, and other clinicians can make a difference by encouraging action at the individual and community levels focused on lifestyle modifications and forward-thinking policy, innovation, and adaptation measures.

Join us in safeguarding our health and that of future generations by advancing outreach efforts, collaborating and sharing best practices with an international coalition of clinicians, co-generating patient-focused resources in multiple languages, and engaging in other channels of planetary health activism. To get involved, visit the [Clinicians for Planetary Health](#) page on the [Planetary Health Alliance](#) website.

- - Join Clinicians for Planetary Health by signing on to the [email list](#), through which we'll issue updates and opportunities for engagement.
- - Have your organization formally join Clinicians for Planetary Health as a partner, indicating its commitment to planetary health and advancing solutions.  
Email [erikaveidis@g.harvard.edu](mailto:erikaveidis@g.harvard.edu).



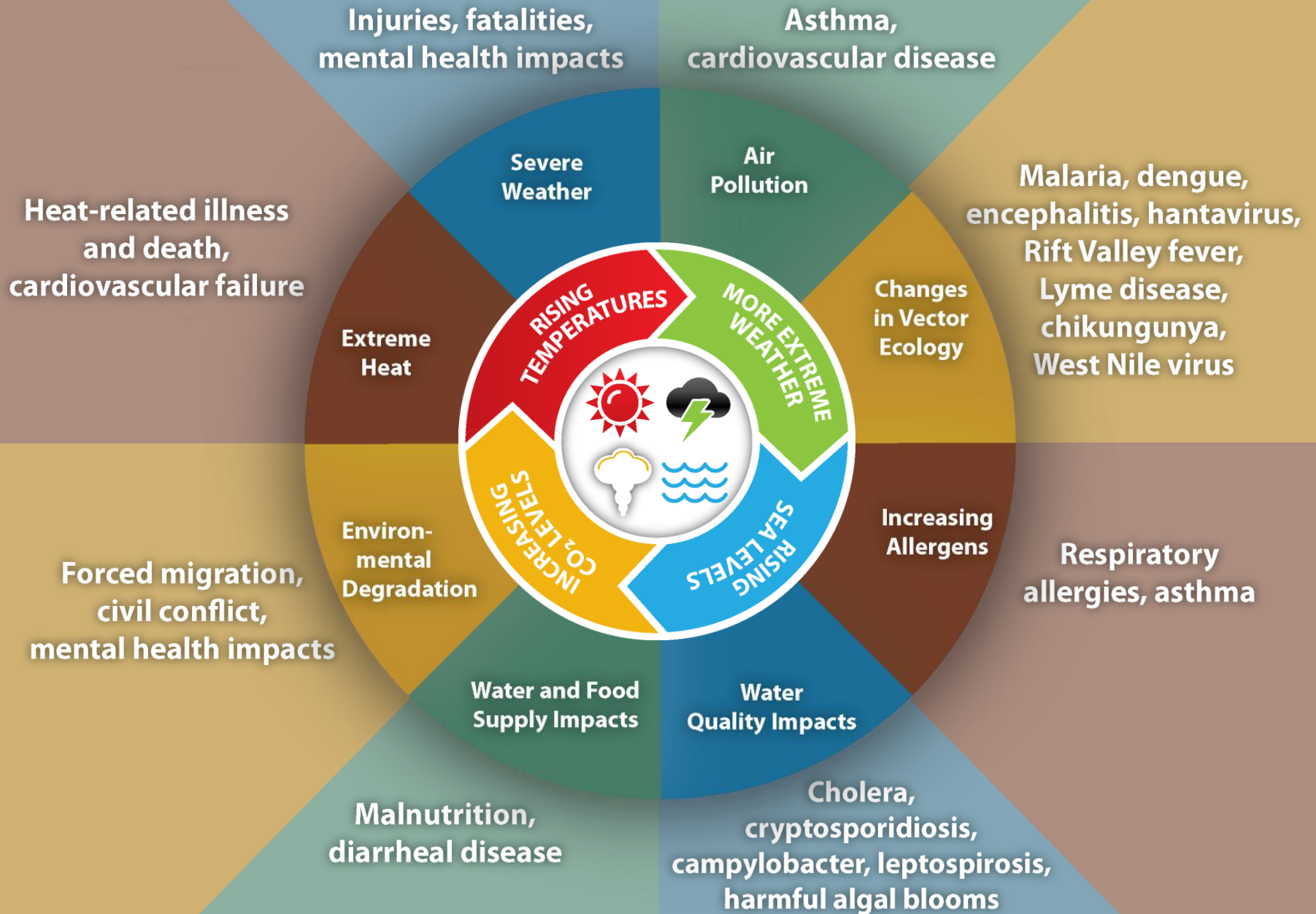
#ClimateChangesHealth



**Thank you!**



# Impact of Climate Change on Human Health



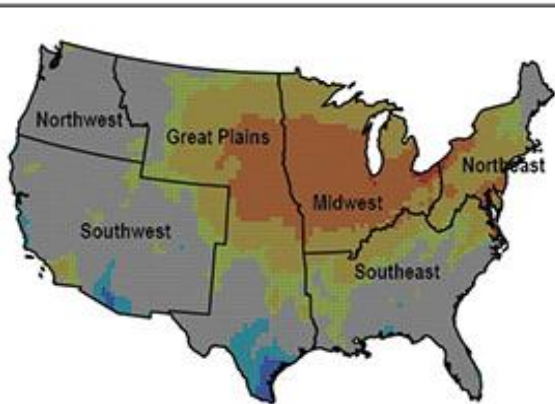
# Projected Changes in Temperature, Ozone, and Ozone-Related Premature Deaths in 2030

Change in Average Daily Maximum Temperature

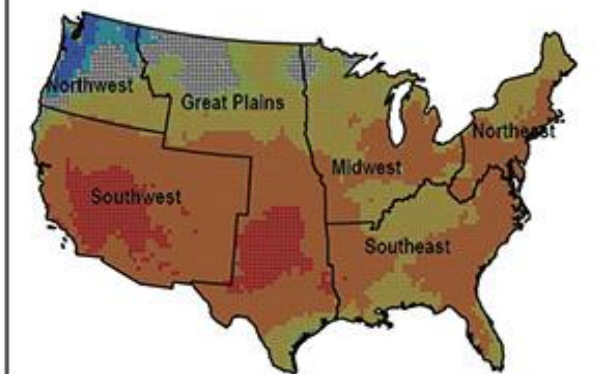
Change in Daily 8-hr Maximum Ozone

Excess Ozone-Related Deaths

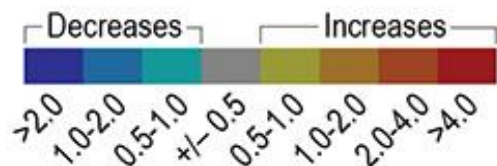
NCAR/DOE CESM  
RCP8.5



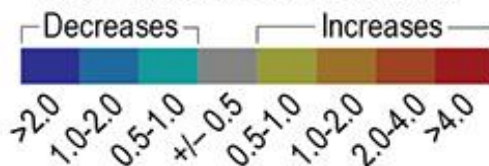
NASA/GISS ModelE2-R  
RCP6.0



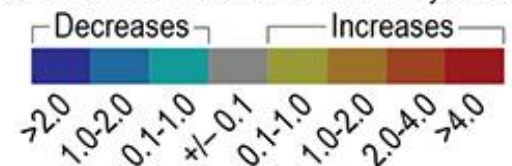
Change in Temperature (°F)



Climate-Attributable Change in Summer Season Daily 8-hr Maximum Ozone (ppb)



Climate-Attributable Change in Ozone-Related Premature Deaths by County



# Opportunities for Action

## See HEFN Script Word

### doc

Stephanie M. Chalupka, EdD, RN, PHCNS-BC, FAOHN, FNAP



# Since 1950

- Human population has increased by nearly 200%
- Fossil fuel consumption has increased by over 550%;
- Marine fish capture has increased by over 350%
- Built dams on about 60% of the world's rivers
- Cleared nearly half of temperate and tropical forests
- *Use nearly half of accessible freshwater every year*
- *Use about half of the planet's liveable surface to feed ourselves.*



# Our environment is changing.

- Atmospheric carbon dioxide levels are rising at a record pace, with the current levels having increased by about 24% since the 1950s.
- 2016 was Earth's warmest year on record
- 2018 was the warmest one for oceans
  - 30% increase in pH since the Industrial Revolution.
- Pollinators, which are needed for plants and crops to grow, are disappearing worldwide.
- Biodiversity is rapidly being lost as an estimated 150 species become extinct each day, which is 1,000 times higher than the "natural" or "background" rate.

# 5 minute video

- [https://vimeo.com/291968741?utm\\_source=Climate+for+Health+-+Newsletter&utm\\_campaign=6cc96b6333-CFH\\_Newsletter\\_10\\_2018&utm\\_medium=email&utm\\_term=0\\_92c4225a2f-6cc96b6333-198247133&mc\\_cid=6cc96b6333&mc\\_eid=43928fc173](https://vimeo.com/291968741?utm_source=Climate+for+Health+-+Newsletter&utm_campaign=6cc96b6333-CFH_Newsletter_10_2018&utm_medium=email&utm_term=0_92c4225a2f-6cc96b6333-198247133&mc_cid=6cc96b6333&mc_eid=43928fc173)