Climate Change and Human Health: The Public Health Response

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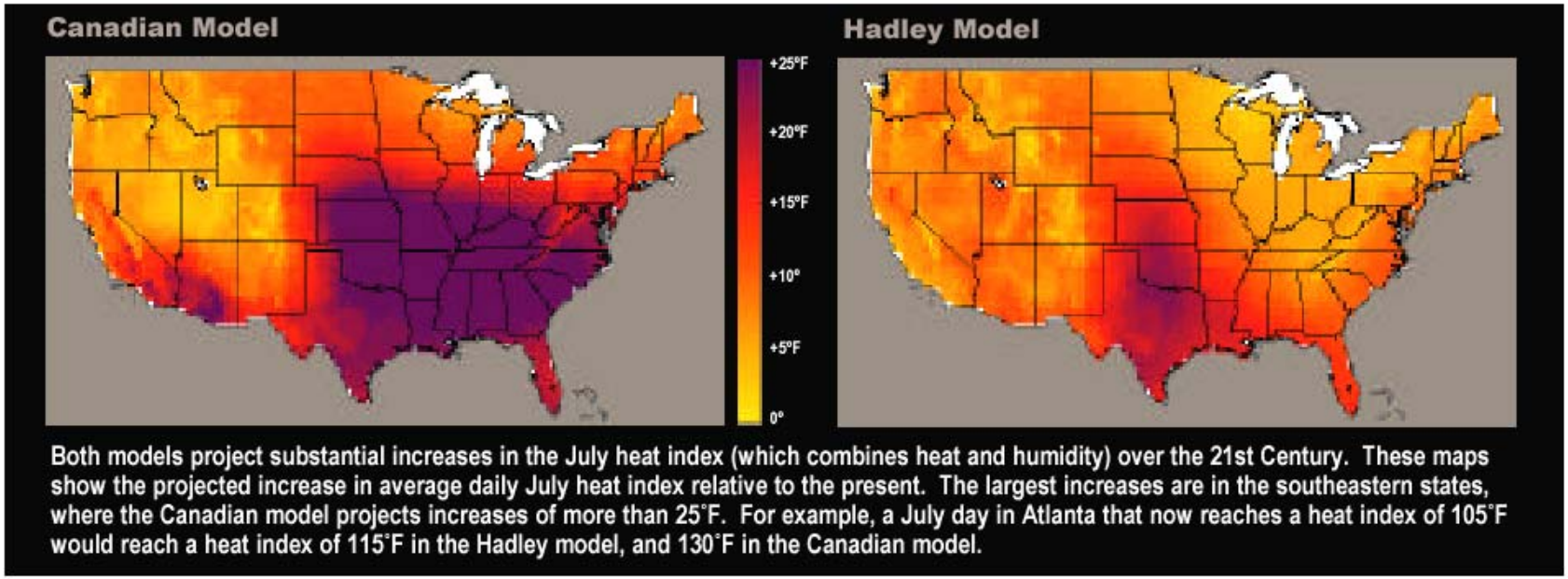
Predicted Change in Heat Indices – 21st Century

July Heat Index Change - 21st century



Both models project substantial increases in the July heat index (which combines heat and humidity) over the 21st Century. These maps show the projected increase in average daily July heat index relative to the present. The largest increases are in the southeastern states, where the Canadian model projects increases of more than 25˚F. For example, a July day in Atlanta that now reaches a heat index of 105˚F would reach a heat index of 115˚F in the Hadley model, and 130˚F in the Canadian model.

Potential Health Effects of Climate Change

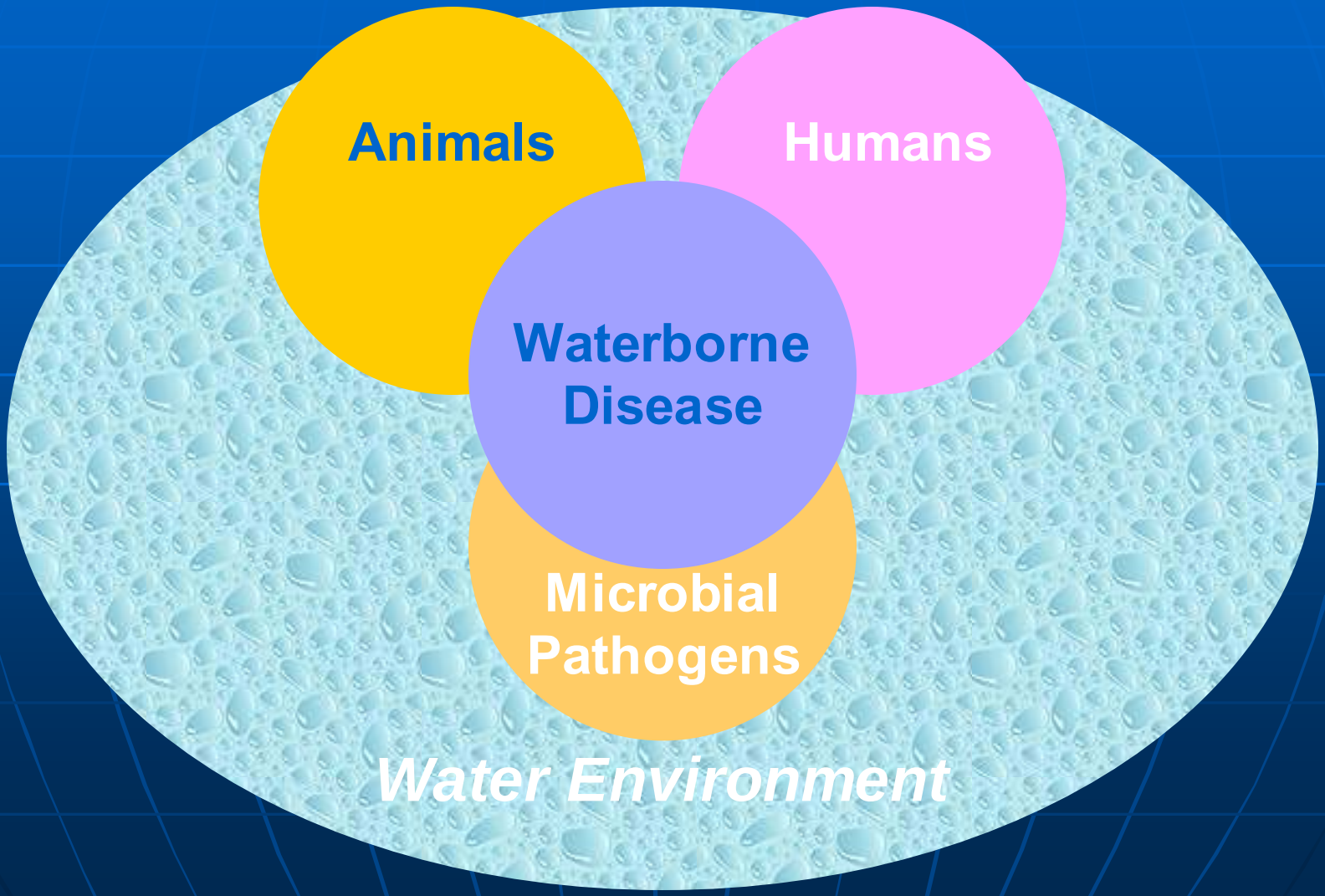
Climate change:

- **Temperature rise**
- **Sea level rise**
- **Hydrologic extremes**

HEAT	Heat stress, cardiovascular failure
SEVERE WEATHER	Injuries, fatalities
AIR POLLUTION	Asthma, cardiovascular disease
ALLERGIES	Respiratory allergies, poison ivy
VECTOR-BORNE DISEASES	Malaria, dengue, encephalitis, hantavirus, Rift Valley fever
WATER-BORNE DISEASES	Cholera, cryptosporidiosis, campylobacter, leptospirosis
WATER AND FOOD SUPPLY	Malnutrition, diarrhea, harmful algal blooms
MENTAL HEALTH	Anxiety, despair, depression, post-traumatic stress
ENVIRONMENTAL REFUGEES	Forced migration, civil conflict

Adapted from J. Patz

Waterborne Zoonoses



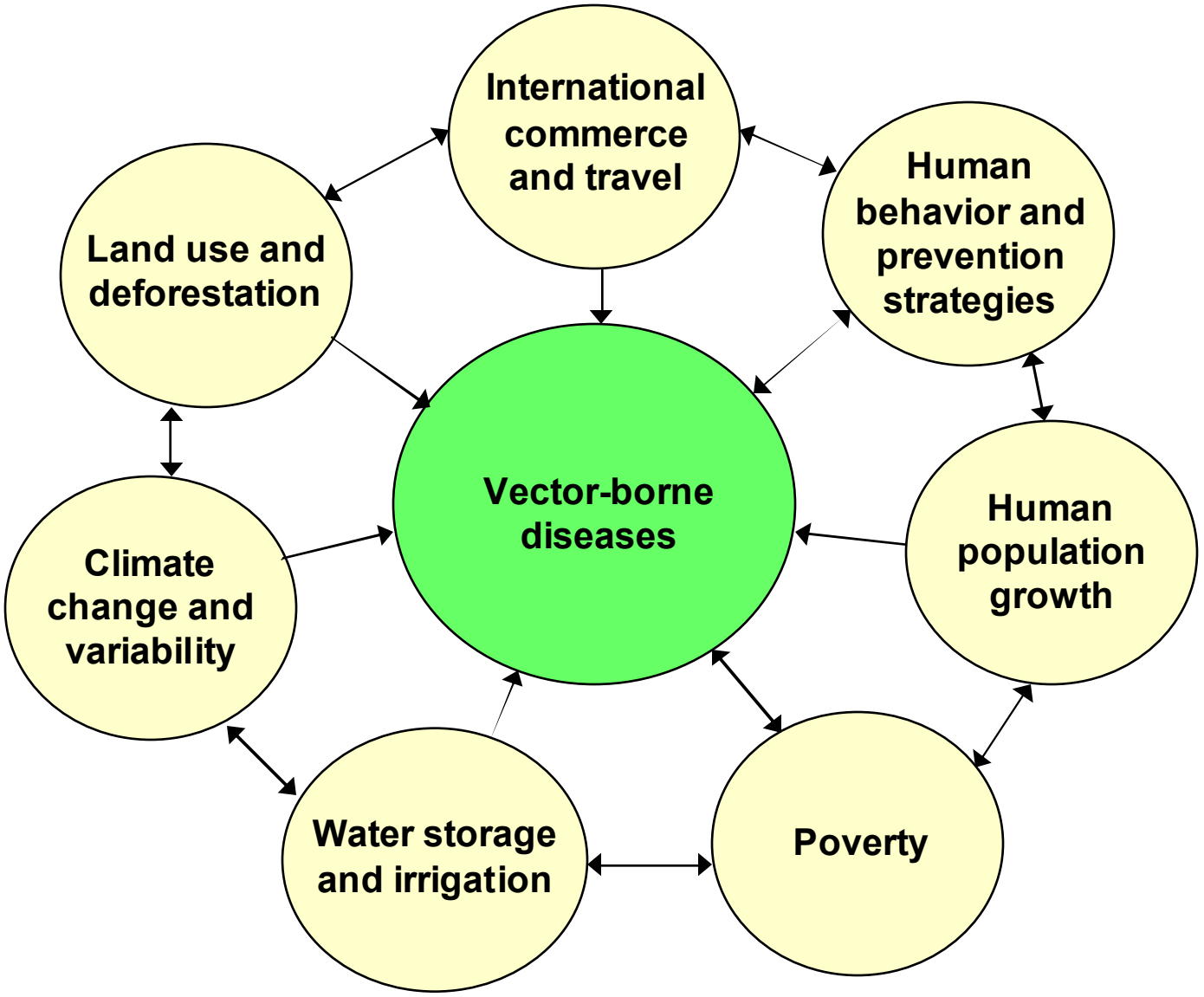
World's Most Dangerous Animals

Climate is one determinant of vector-borne disease incidence

Dr. Paul Reiter:

"The natural history of mosquito-borne diseases is complex, and the interplay of climate, ecology, vector biology, and many other factors defies simplistic analysis."

Environmental Health Perspectives, Vol. 109, 2001. pp. 141-161.



Modified from Sutherst R.W. Clin Micribiol Rev 2004;17:136-73

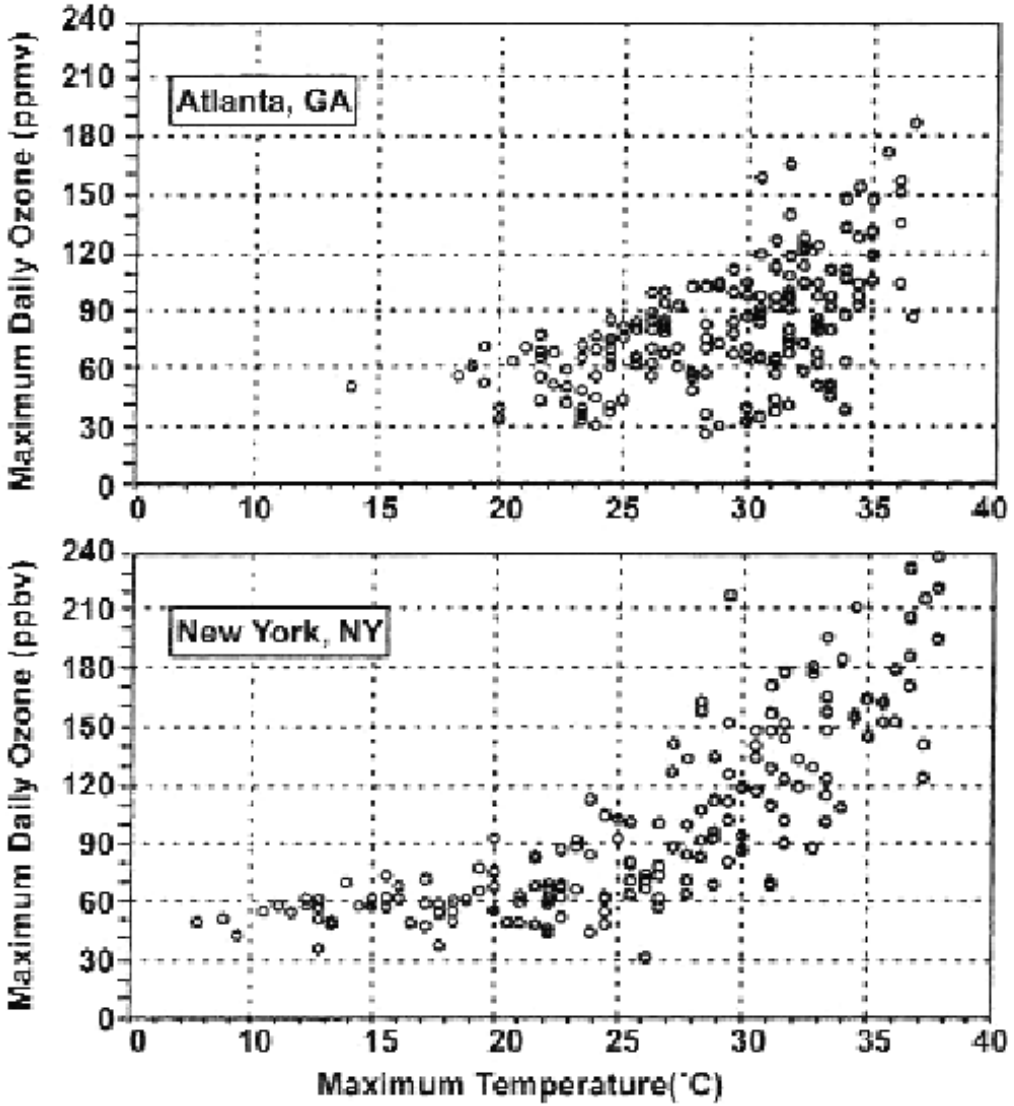
Health Effects of Air Pollution

- Damages lung tissue
- Exacerbates respiratory disease
- Reduces lung function
- Aggravates cardiovascular disease

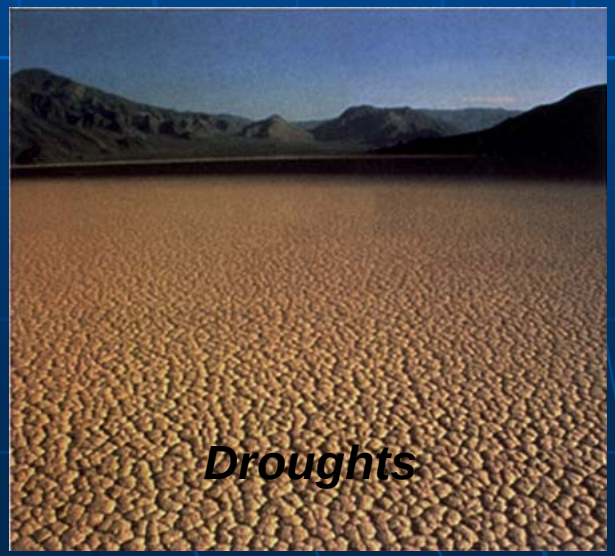
Maximum Daily Ozone Concentrations vs. Maximum Daily Temperature

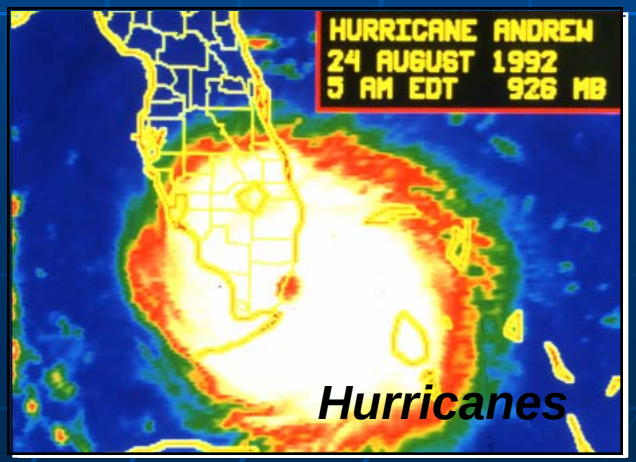
Atlanta

New York

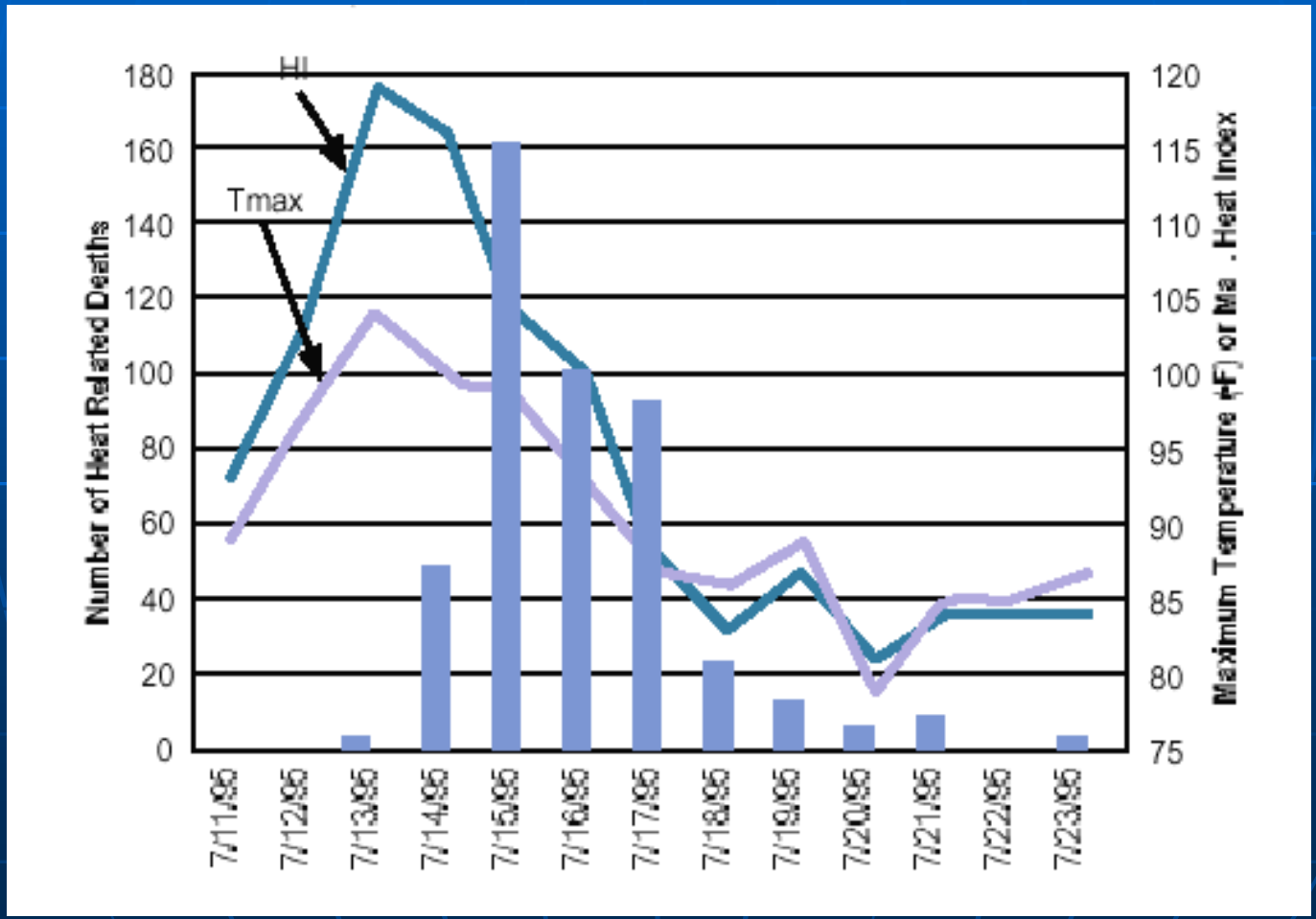


Extreme Weather Events





Heat Related Deaths – Chicago, July 1995



Heat stalks city elderly

Tribune photo by Phil Greer

A body is placed in a refrigerated truck outside the Cook County medical examiner's office after heat deaths overloaded the facility.

Deaths climb; officials warn risk not over

Thousands hit by power outages

By Jeremy Manier and John Chase
Tribune Staff Writers

In a frightening echo of 1995's heat disaster, the hottest days in the Chicago area in four years claimed as many as 57 lives Friday and early Saturday, amid power outages that at times left up to 100,000 households virtually defenseless against searing temperatures.

The Cook County medical examiner's office said Saturday that 25 deaths had been linked to temperatures that topped 100 degrees and heat indexes that hovered near 120 on Thursday and Friday. Investigators also were looking at 30 additional deaths in Cook County that they believed likely were heat related.

■ Past prepares medical examiner. Page 15.
■ How other cultures cope with heat. In Metro.

In addition, Lake County on Saturday reported two heat-related deaths.

Even with the new victims, the toll trails that of 1995, when 85 heat-related deaths occurred the first day after the hottest temperatures, on the way to a total of more than 700 dead.

The danger is not past, Chicago officials said at a news conference.

"Just because it will be cooler today doesn't mean everyone will be able to get through," said Mayor Richard Daley, who called on residents to help city workers

See Outage, Page 14

THE VICTIMS

Fatalities a stark reminder of summer of '95

By Lisa Black and Megan O'Matz
Tribune Staff Writers

At 80, Lillian Mitchell was a self-sufficient widow who still drove her 1995 Toyota Tercel and did her own grocery shopping.

But she was stubborn, her family said, and she resisted efforts to put an air conditioner in her South Side apartment.

On Friday night, her son found her dead in a "very warm" bedroom. Mitchell is one of what Chicago and Cook County officials said were as many as 55 deaths due to heat since Friday.

"She kept telling me her ceiling fan was keeping her cool. Maybe she wasn't aware that it wasn't," said her son Luther Murray.

As in the 1995 heat wave, when more than 700 people died, most of the victims of this summer's heat share a common profile. Most were elderly. Many already suffered from an illness that made them vulnerable to heat.

While others escaped the weather, comfortable in air conditioned homes or seeking temporary respite in movie theaters or city cooling stations, they remained in their homes, clinging to a hard-won independence or simply declining help.

Most died alone, often in homes they believed were cool enough. Most were retired. They died in all sections of the city, though most lived in the city's poorer neighborhoods—on the South or West Sides.

They had been custodians, postal workers, machinists. Some were unemployed, some were homeless, and their deaths were the last chapters of difficult lives.

The oldest ones in Cook County were in their 90s, the youngest about half that, according to the medical examiner's office, which on Saturday after-

See Victims, Page 14

Source: Chicago Tribune 8/1/99

Public Health Role

- Despite existing breadth of organizations and sectors with initiatives on climate change
- Despite the likelihood of anticipated health effects of climate change

Public health effects of climate change remain largely unaddressed

"Because we anticipate that as climate changes, there will be health consequences…We believe there are unpredictable health consequences that will occur and our job is to anticipate what they might be, to make sure that we have systems in place that can detect them, and, most importantly, that we take steps now to be able to help mitigate whatever those harms are.
We're just at the very beginning of this, but we've already convened on climate change and health consequences and we are at the table."

--Dr. Julie Gerberding, Director, CDC

Testimony before the House Appropriations Committee, Subcommittee on Interior, Environment and Related Agencies, Hearing on Fiscal Year 2008 Appropriations: Interior and Environment, March 2, 2007

Toward A Public Health Framework For Addressing Climate Change

Guiding principles: practical and ethical

- Public Health Prevention Framework
- Co-Benefits and synergies
- Environmental Justice
- Complexity/Ecosystems thinking

A Public Health Framework For Addressing Climate Change

Guiding principle: Public Health Prevention Framework

- Primary prevention: aims to prevent the onset of injury or illness
  - Corresponds with *mitigation*—efforts to slow, stabilize, or reverse climate change by reducing greenhouse gas emissions.

- Secondary and Tertiary Prevention: aims to diagnose disease early in order to control its advance and reduce the resulting morbidity
  - Corresponds with *adaptation*—efforts to anticipate and prepare for the effects of climate change, and thereby to reduce the associated health burden.

A Public Health Framework For Addressing Climate Change

Guiding Principle: Co-benefits and synergies

- Efforts to mitigate or adapt to the effects of climate change frequently yield other health benefits, both direct and indirect.

Climate Change Synergies

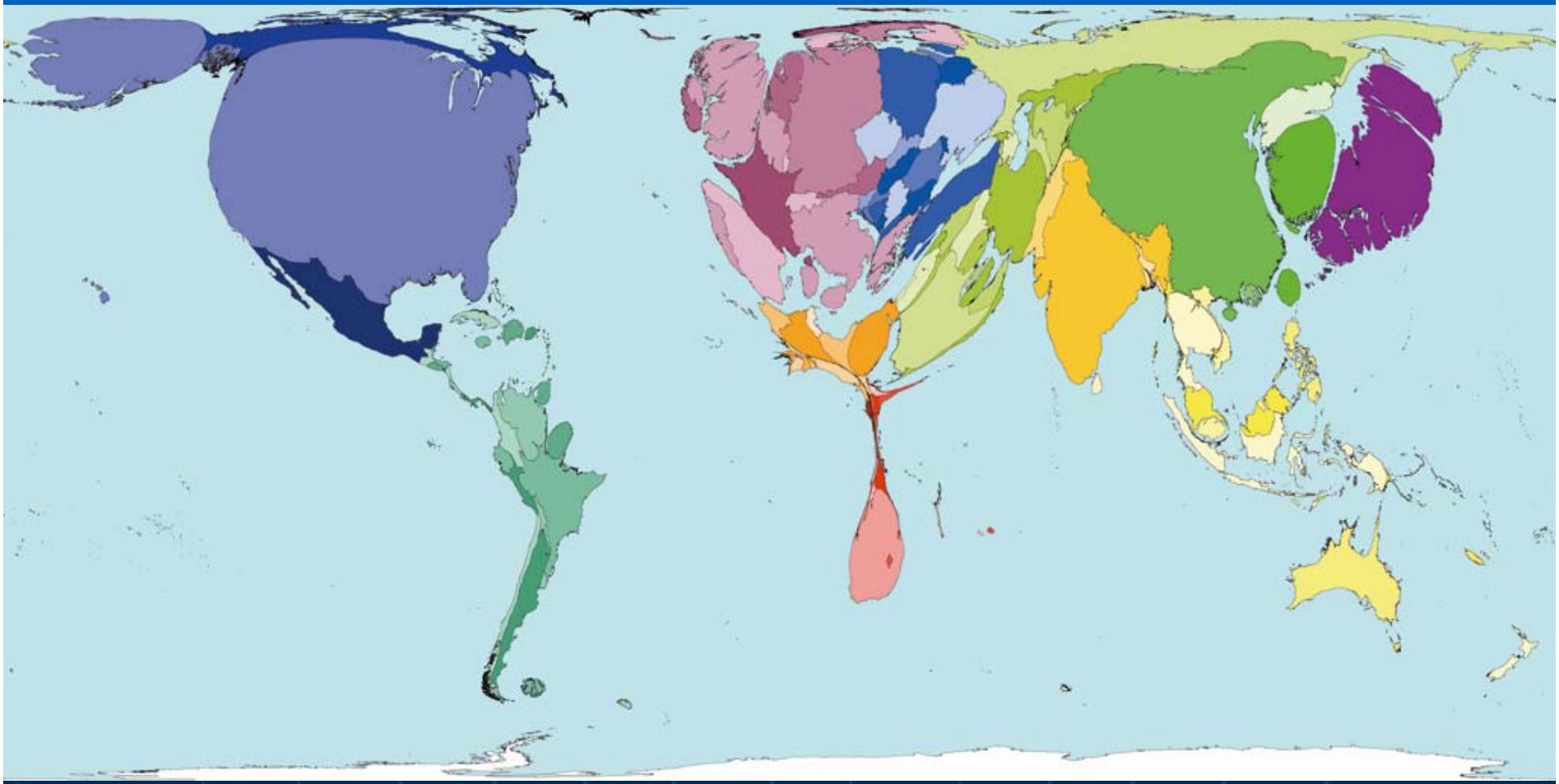
Heat wave plans using "buddy systems"	↑ social capital, ↑ community resiliency
↓ vehicular travel	↓ car crashes, ↓ air pollution
↑ fuel efficiency	↓ air pollution
Locally grown food	↓ pesticide loading
Energy-efficient buildings	↓ operating costs
Alternative energy sources	Business opportunities

A Public Health Framework For Addressing Climate Change

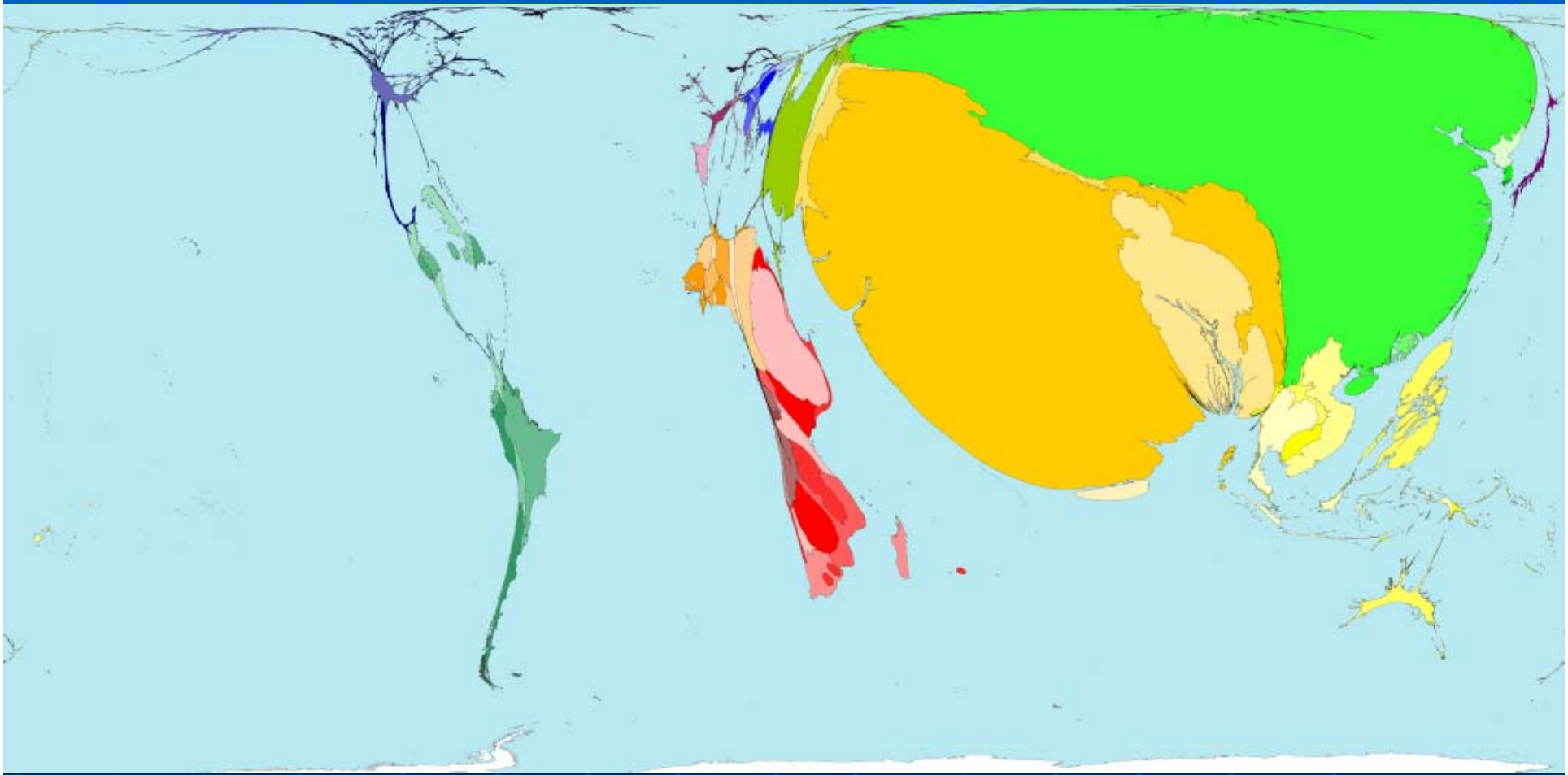
Guiding principle: Environmental Justice

Climate change will disproportionately threaten certain populations, especially poor people and members of ethnic and racial minority groups

Carbon Emissions 2000

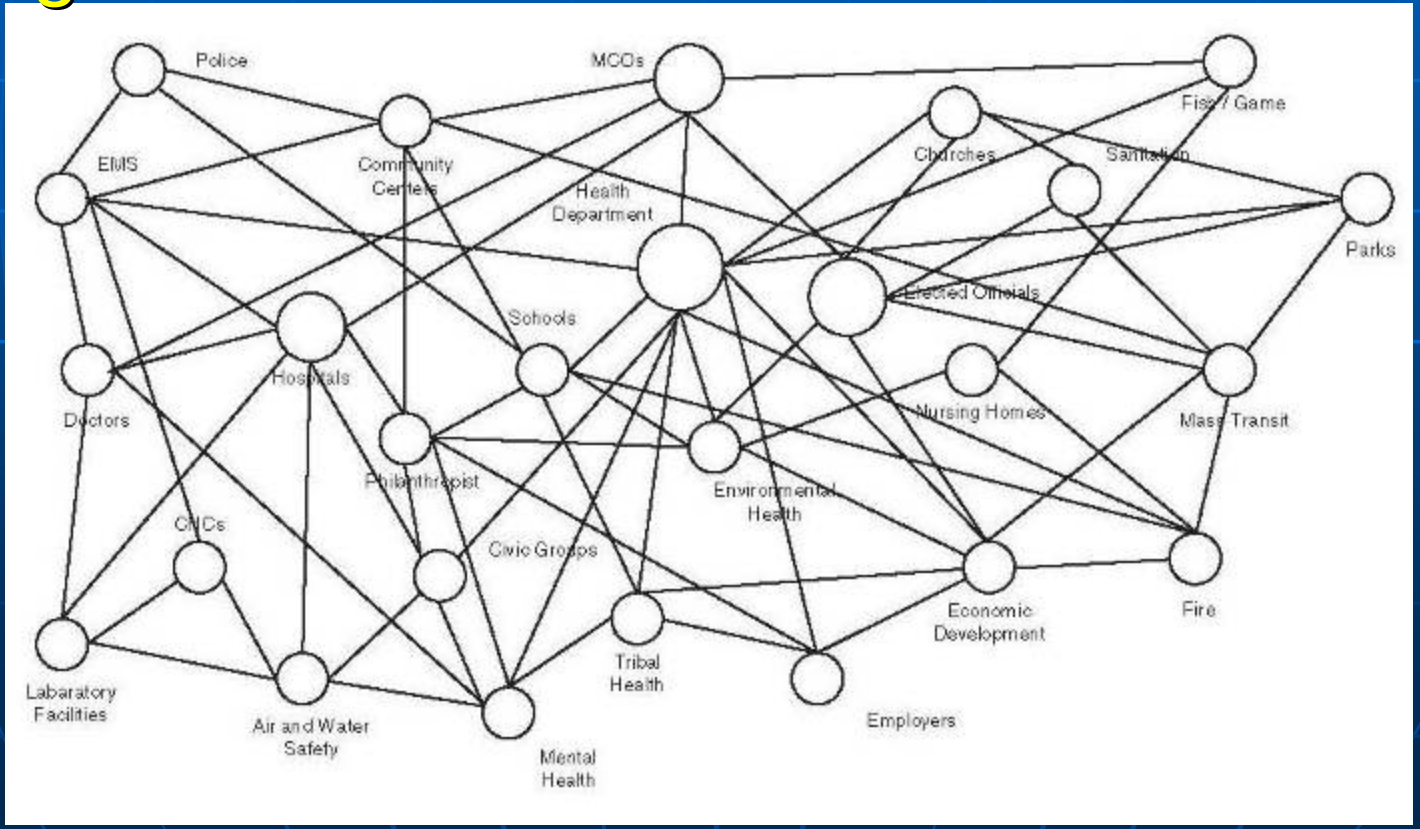


Persons affected by disasters



A Public Health Framework For Addressing Climate Change

Guiding Principle: Complexity and Ecosystems thinking



CDC's Priority Actions for Climate Change

- A set of "priority actions" that guide the public health approach
- Emerged from recommendations to the CDC Climate Change Workgroup during the January 2007 meeting
- Forms the cornerstone for CDC's policy on Climate Change
  http://www.cdc.gov/nceh/climatechange/

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CDC's Priority health actions for climate change

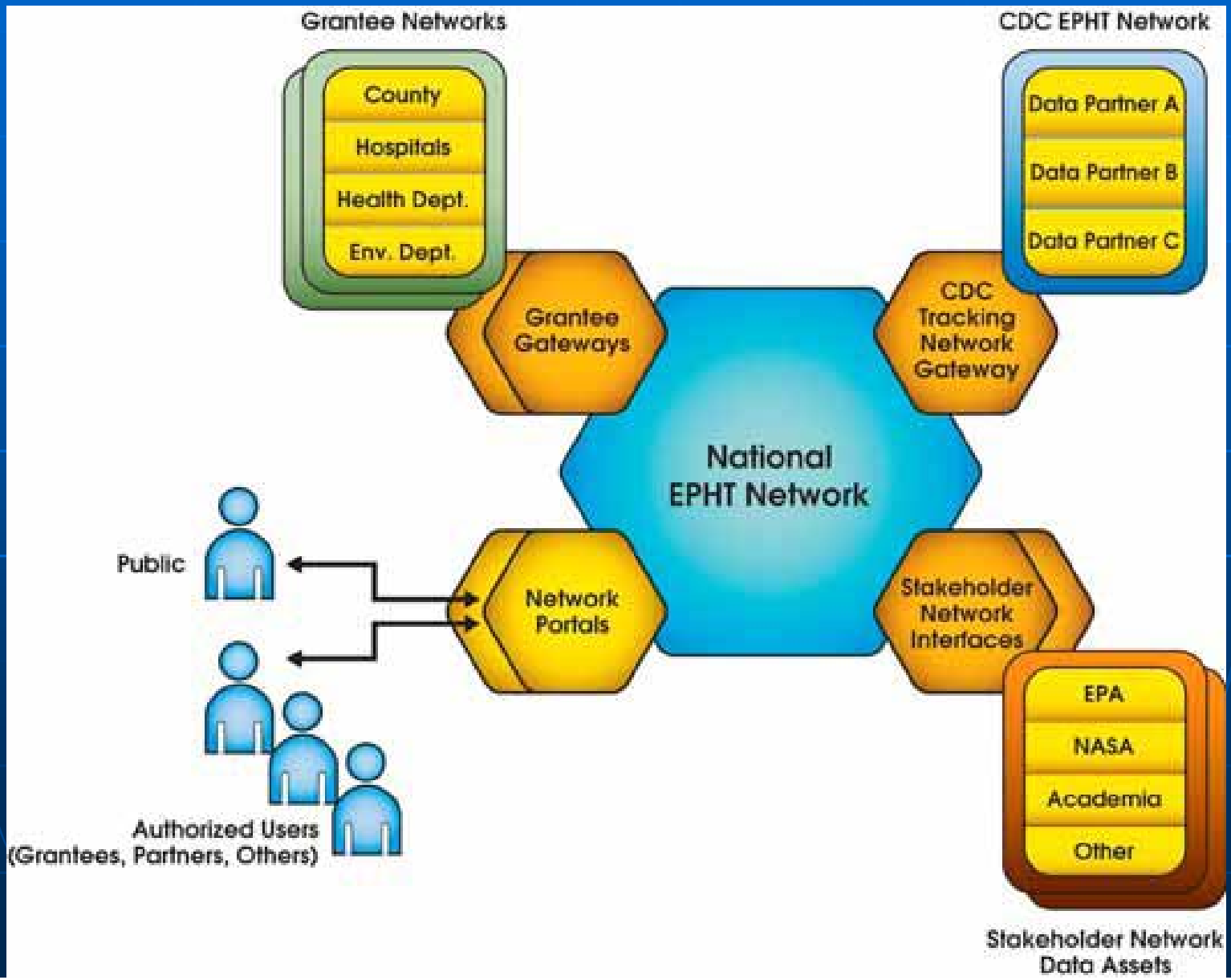
#1 Serve as a credible source of information on the health consequences of climate change

CDC's Priority health actions for climate change

#2 Track data on environmental conditions, disease risks, and disease occurrence related to climate change.

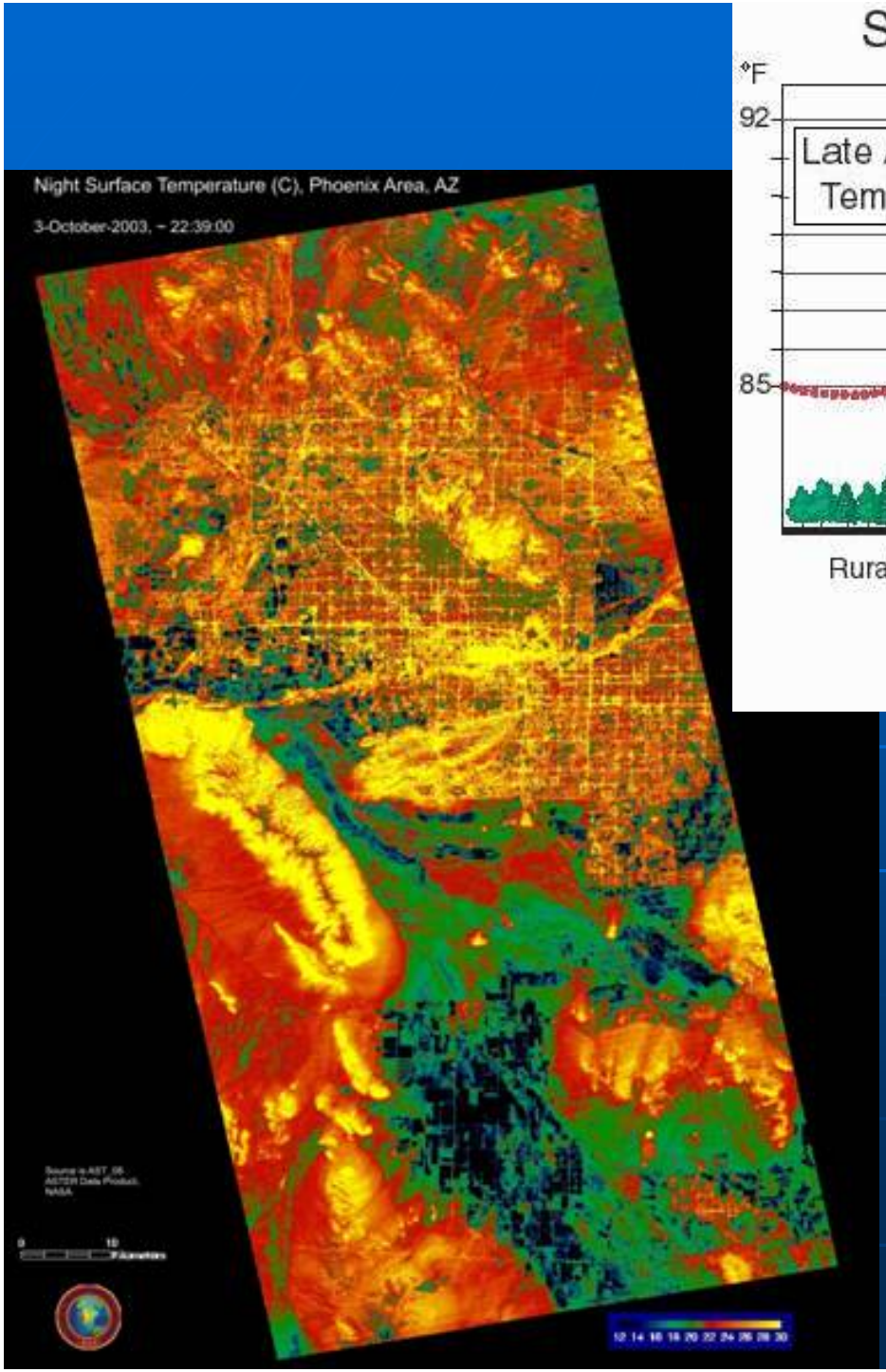
- Will require *enhancement and expansion* of national disease surveillance systems and the *integration* of infectious and environmental disease information systems

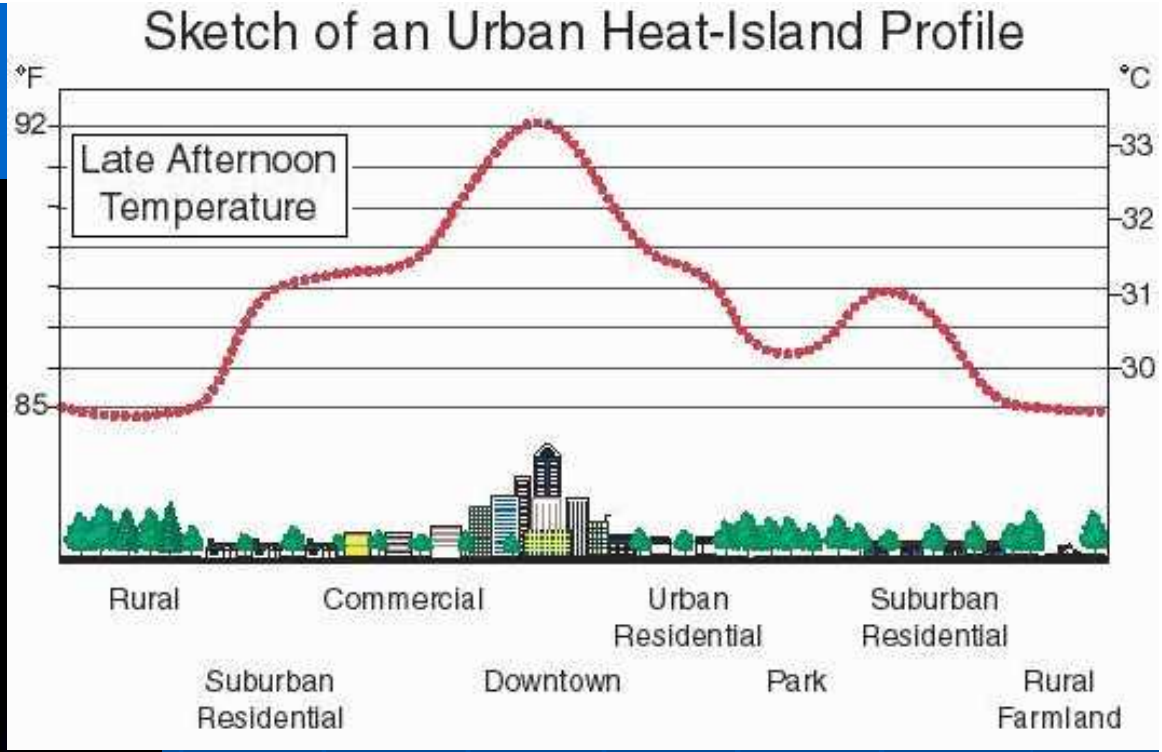
CDC's National Environmental Public Health Tracking Program



CDC's Priority health actions for climate change

#3 Expand capacity for modeling and forecasting health effects that may be climate-related.





Thermal Satellite Image of Phoenix, AZ Night Surface Temperature

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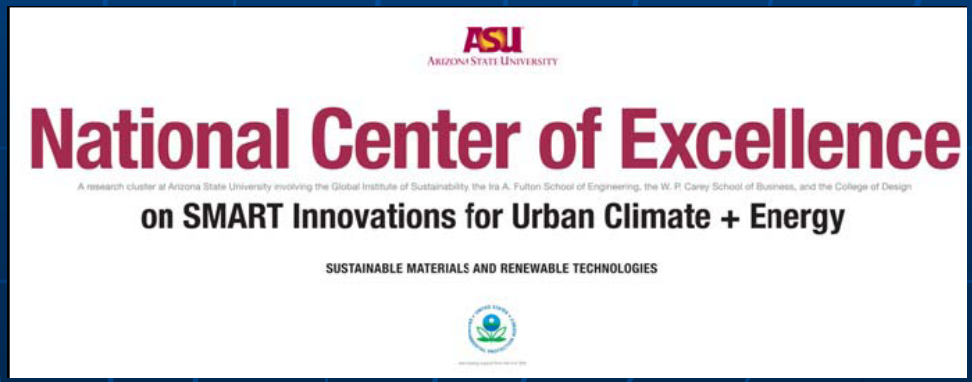
CDC's Priority health actions for climate change

#4 Enhance the science base to better understand the relationship between climate change and health outcomes.

Sponsor extramural research,

Centers of Excellence in Climate Change



CDC's Priority health actions for climate change

#5 Identify locations and population groups at greatest risk for specific health threats, such as heat waves.

Epidemiologic investigations

Vulnerability mapping

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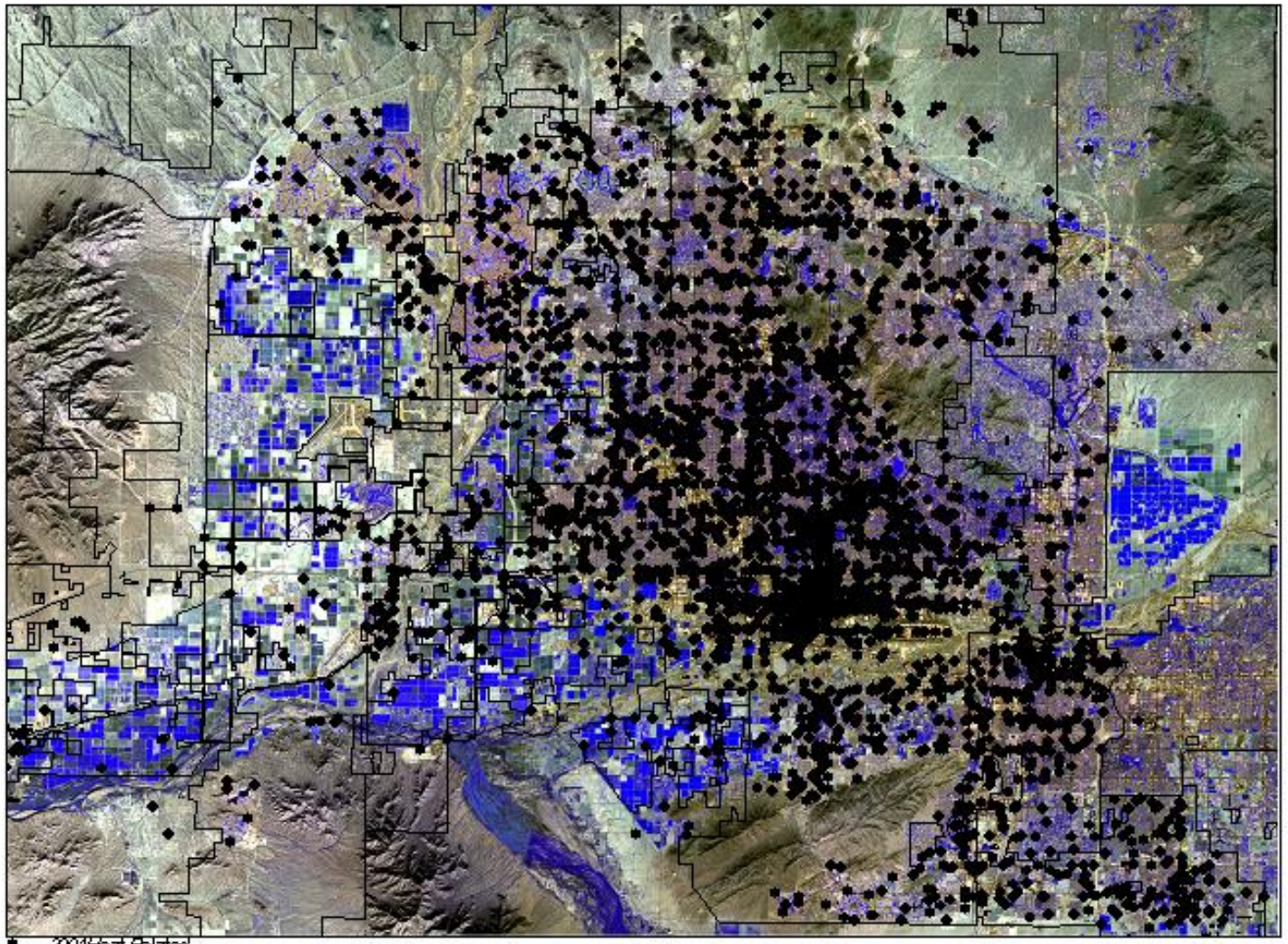
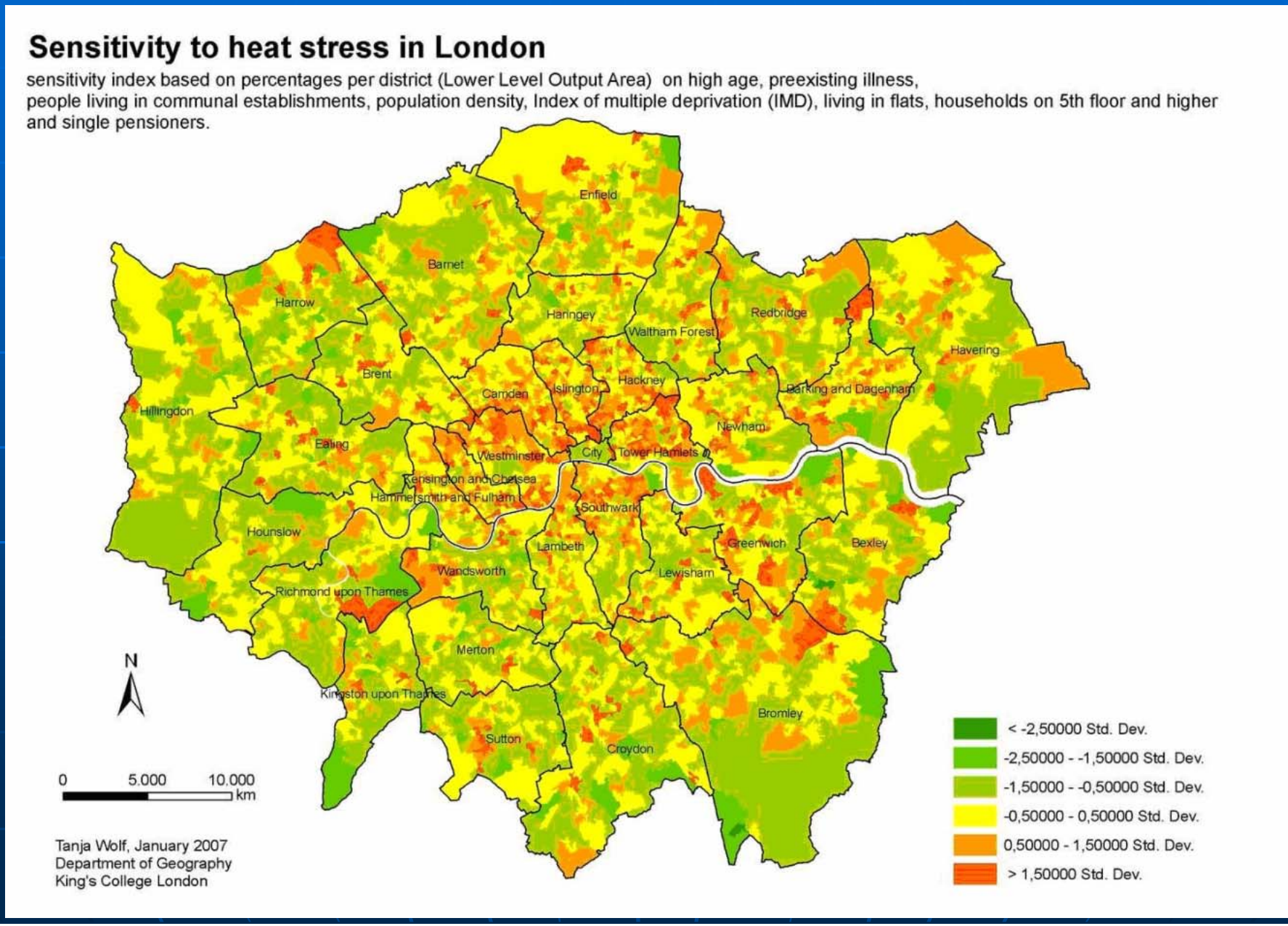
Location of Heat-related medical incidents



Composite Vulnerability Map



CDC's Priority health actions for climate change

#6 Communicate the health-related aspects of climate change, including risks and ways to reduce them, to the public, decision makers, and healthcare providers.

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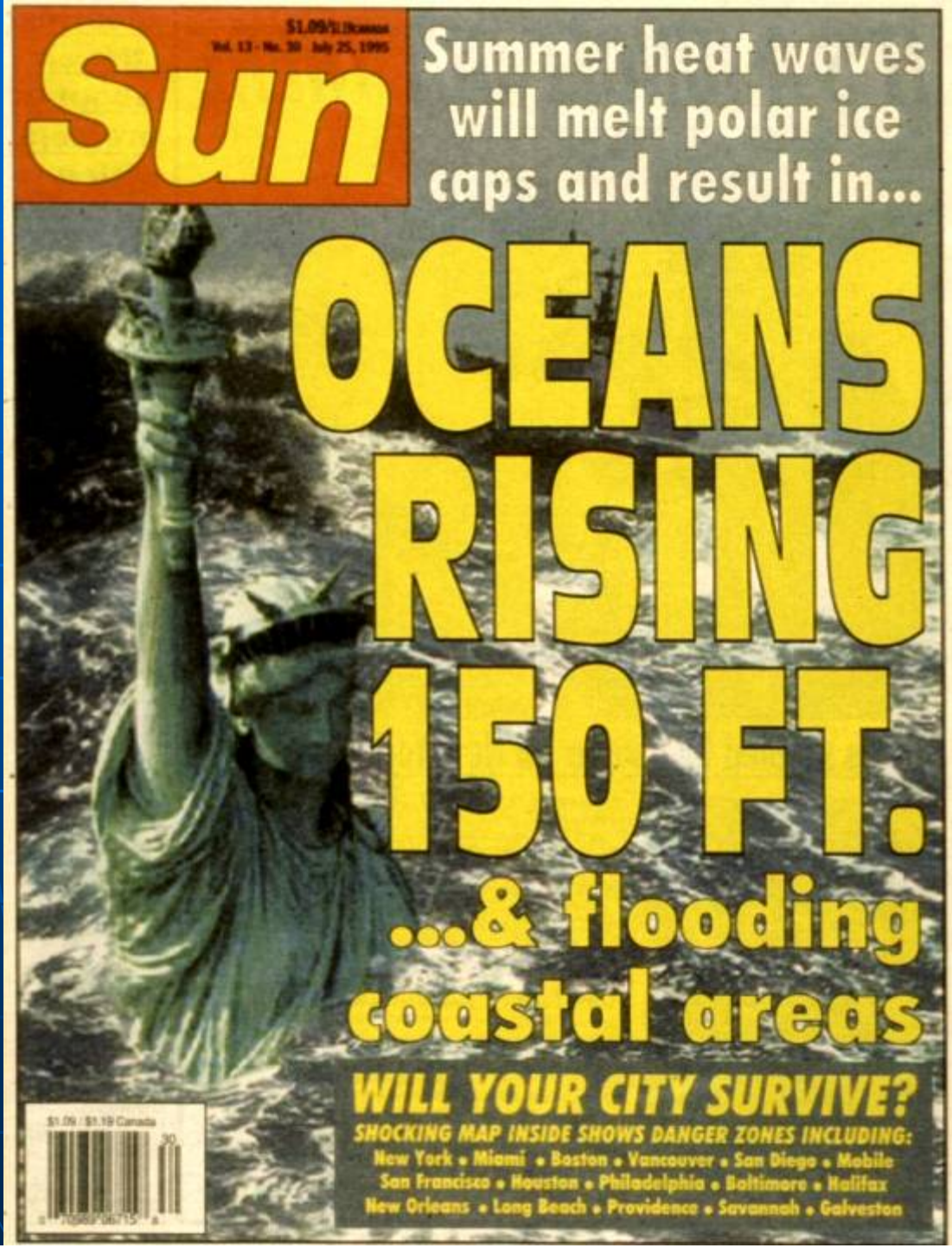

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July 2007

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CENTERS FOR DISEASE CONTROL AND PREVENTION

Health Warning

Heat Wave

Go to an air conditioned place during a heat wave.

Heat waves can kill you. A heat wave is when the temperature is over 90 degrees for 3 days or longer. During heat waves, many people die or get very sick. Your body may not be able to stay cool if you do not have air conditioning or your electricity goes off. People who are over 65 with other health problems are in the most danger. Going to a cooler place, even for 2 or 3 hours a day, gives your body a chance to cool down. **This can save your life.**

If you are over 65, you may be in danger even if you do not feel hot.

- Look at a thermometer to see the temperature in your home or apartment.
- Some prescription drugs make it harder to stay cool or know when you are too hot.
- Check on your older neighbors and relatives to make sure their home is cool.

Spend two to three hours in air conditioning during the hottest part of the day. Cool places include:

- public libraries
- malls
- senior centers
- air-conditioned homes of friends/relatives
- emergency cooling centers

If you need a ride,

- Ask for help. Call your local bus service or health department for information on getting to an Emergency Cooling Center.
- You may also ask a friend, relative, or church for help.
- In an emergency, always call 911.

Protect Yourself and Your Family

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Priority health actions for climate change

#7 Develop partnerships with other government agencies, the private sector, nongovernmental organizations, universities, and international organizations

Priority health actions for climate change

#8 Provide technical advice and support to partners in developing and implementing response plans for health threats such as heat waves, severe weather events, and infectious diseases.

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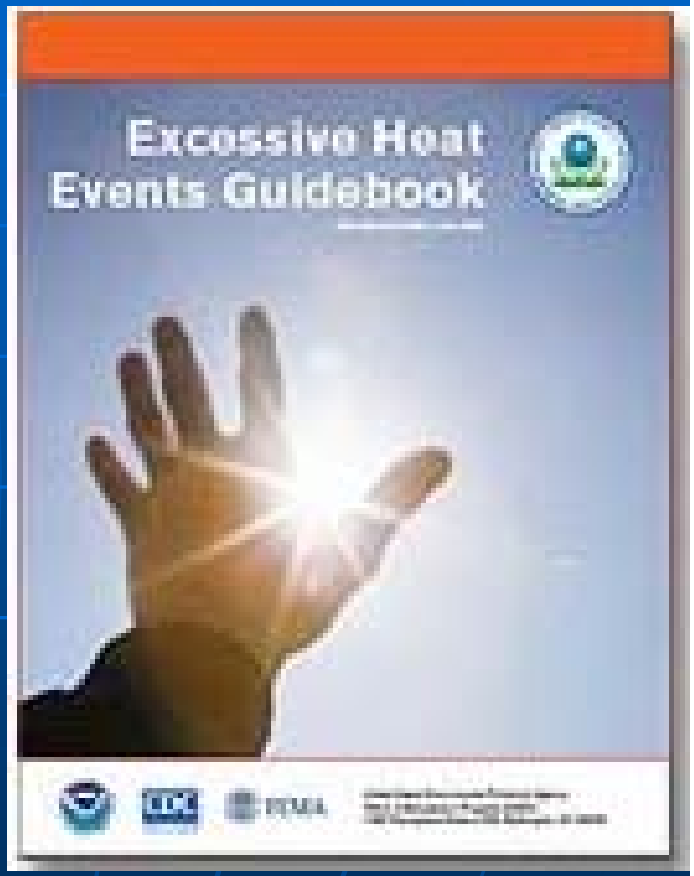
Excessive Heat Events (EHE) Guidebook

- Assists in the development of city-specific heat response plans

- Provides guidance on:
  - Options for defining EHE conditions
  - How to assess local vulnerability
  - EHE notification and response actions that work



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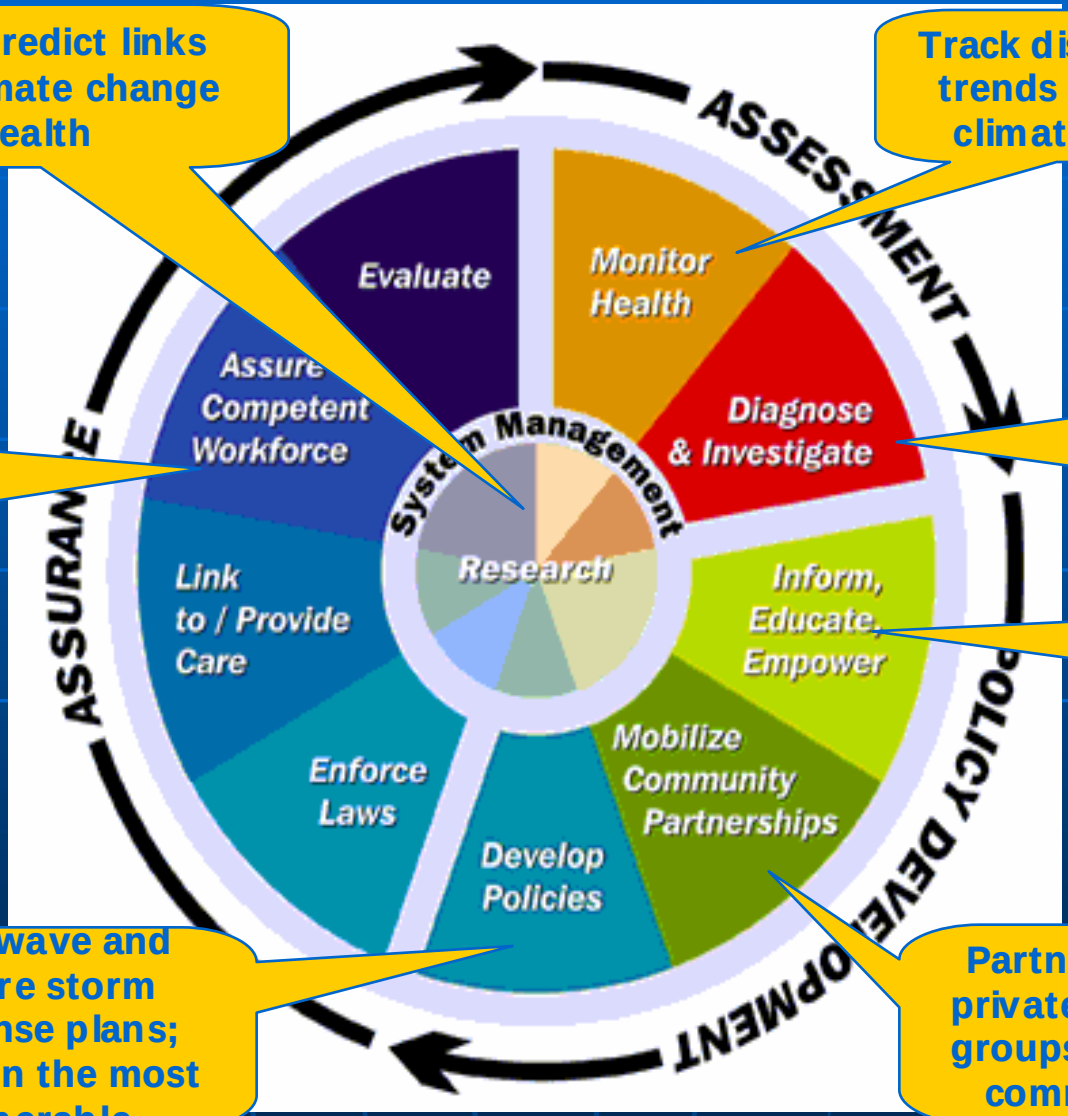
Priority health actions for climate change

#9 Promote workforce development by ensuring the training of a new generation of competent, experienced public health staff to respond to the health threats posed by climate change.

Adaptation strategies for health

Study and predict links between climate change and health

Track diseases and trends related to climate change



Public health workforce prepared to respond

Investigate infectious water-, food-, and vector-borne disease outbreaks

Communicate effectively on climate change

Heat wave and severe storm response plans; focus on the most vulnerable

Partnerships with private sector, civic groups, NGOs, faith community, etc.

Conclusions

- Climate change is a mainstream issue
- Climate change is a public health issue
- Opportunity costs of not taking action are high
- There are effective, science-based activities and messages for public health to conduct and deliver