



A Chicago Regional Climate Plan

Climate Risk and Vulnerability at the Nexus of Equity, Health, Public Works, and Planning

Adaptation Webinar 3

June 5, 2020





Welcome

Kevin Burns, Mayor, City of Geneva

Chairman, Metropolitan Mayors Caucus Environment
Committee and Energy Sub Committee



 Metropolitan
Mayors
Caucus



U.S. Climate Resilience Toolkit Speakers



Ned Gardiner, PhD

Engagement Manager
NOAA Climate Program Office &
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Jim Fox

Sr. Resilience Analyst
NEMAC-Fernleaf & U.S. Climate
Resilience Toolkit
jfox@nemacfernleaf.com



Practical Guidance for

Chicago Region Climate Planning

Using the Steps to Resilience



Impacts of Greatest Concern

- Heat & Health
- Flooding & Homes
- Flooding & Infrastructure
- Flooding & Businesses



Can you accept the
vulnerability and risk to your
assets?

1 Explore Hazards

2 Assess Vulnerability & Risks



3 Investigate Options

4 Prioritize & Plan

5 Take Action



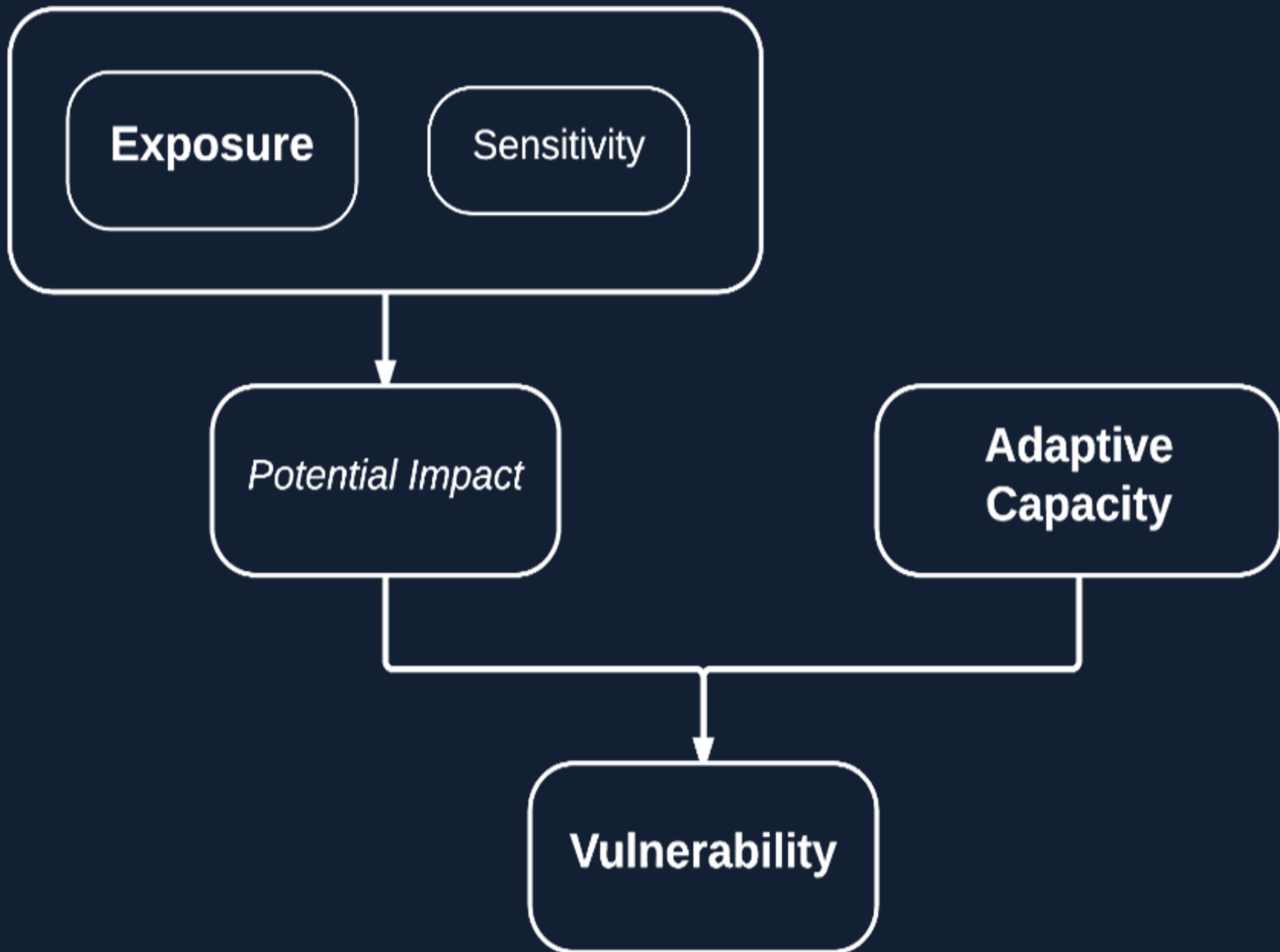
Exposure

Sensitivity

Potential Impact

**Adaptive
Capacity**

Vulnerability



A quantifiable assessment of exposure, sensitivity, adaptive capacity, vulnerability, and risk.

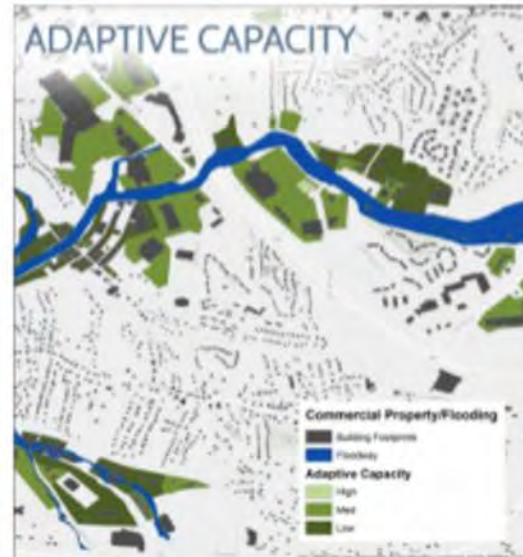
EXPOSURE:

The presence of societal assets, including people, infrastructure, property, or services, that are adversely impacted by a potential threat.

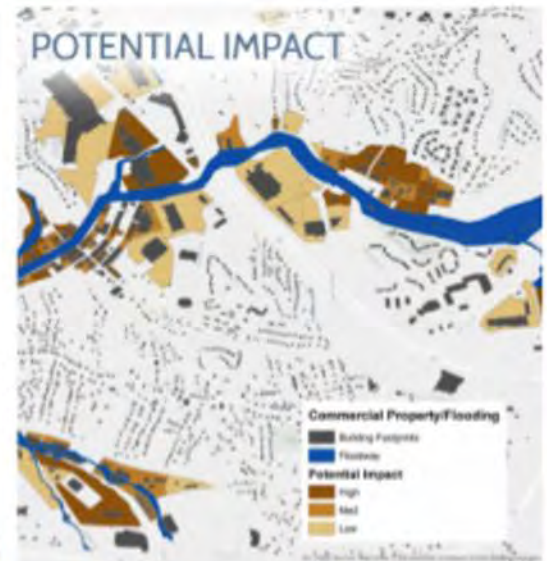


ADAPTIVE CAPACITY:

The ability that people, assets, or services have to cope with a climate-related impact.



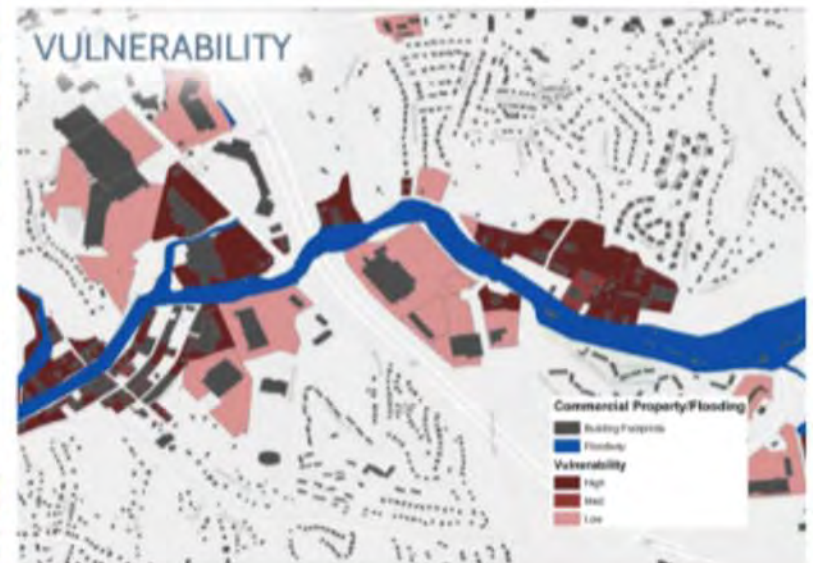
POTENTIAL IMPACT



POTENTIAL IMPACT:

The degree to which societal assets are adversely impacted by a potential threat.

VULNERABILITY



VULNERABILITY:

The susceptibility of assets based on their level of potential impact and adaptive capacity.



Heat & Health

Climate Stressor : Temperature Variability and Change

Non-Climate Stressor : Blacktop (albedo)

Hazard : Heat Wave

Asset : People

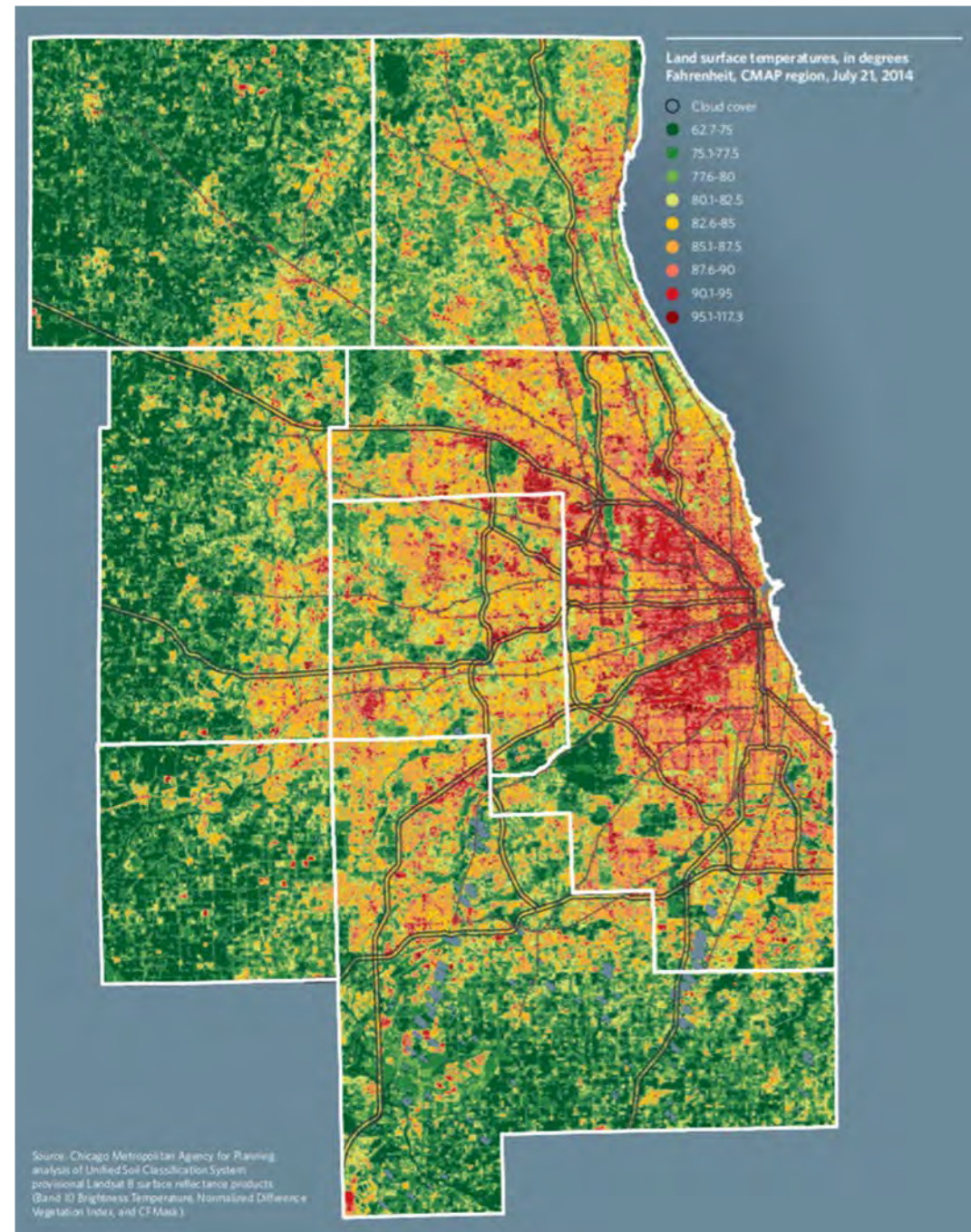
Measurable Impact : Respiratory health

Vulnerability

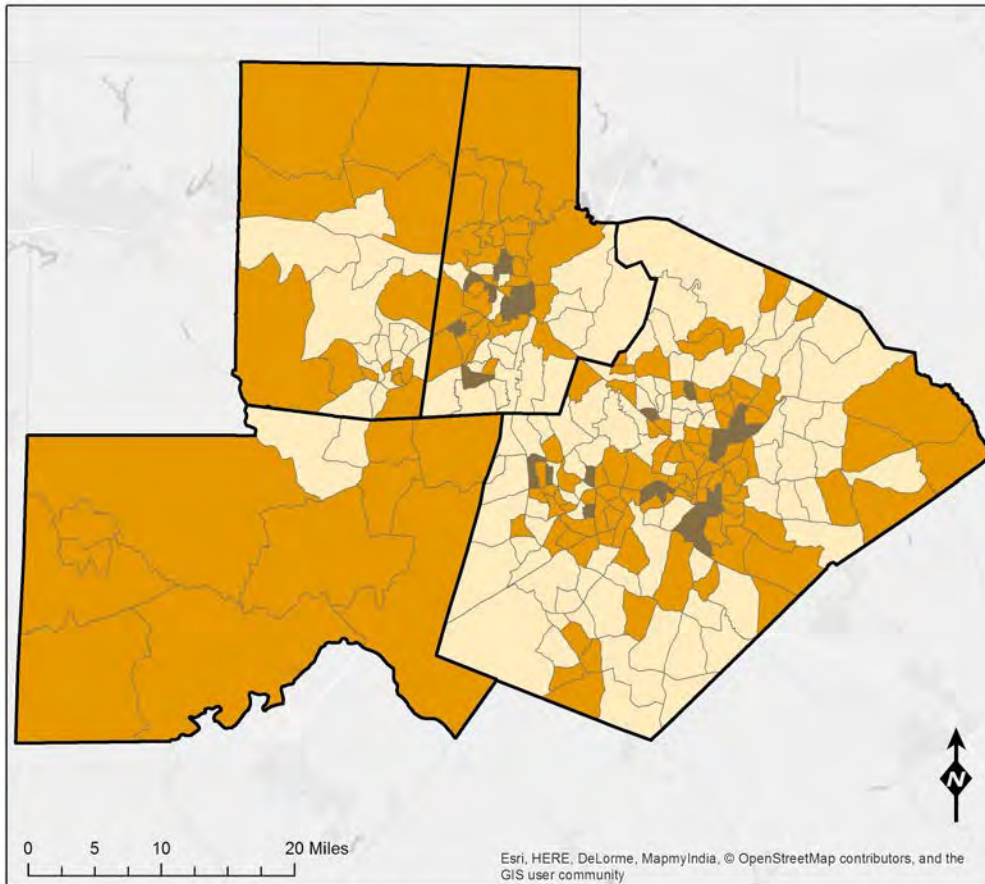
- Sensitivity - Age of people, type of house
- Adaptive Capacity - Ability to cool structure or person

Extreme heat

- Heat island is closely linked to develop intensity and design
 - Impervious surfaces
 - Dark surfaces
- Occurs in the summer and the winter



People and Human Health/Extreme Heat



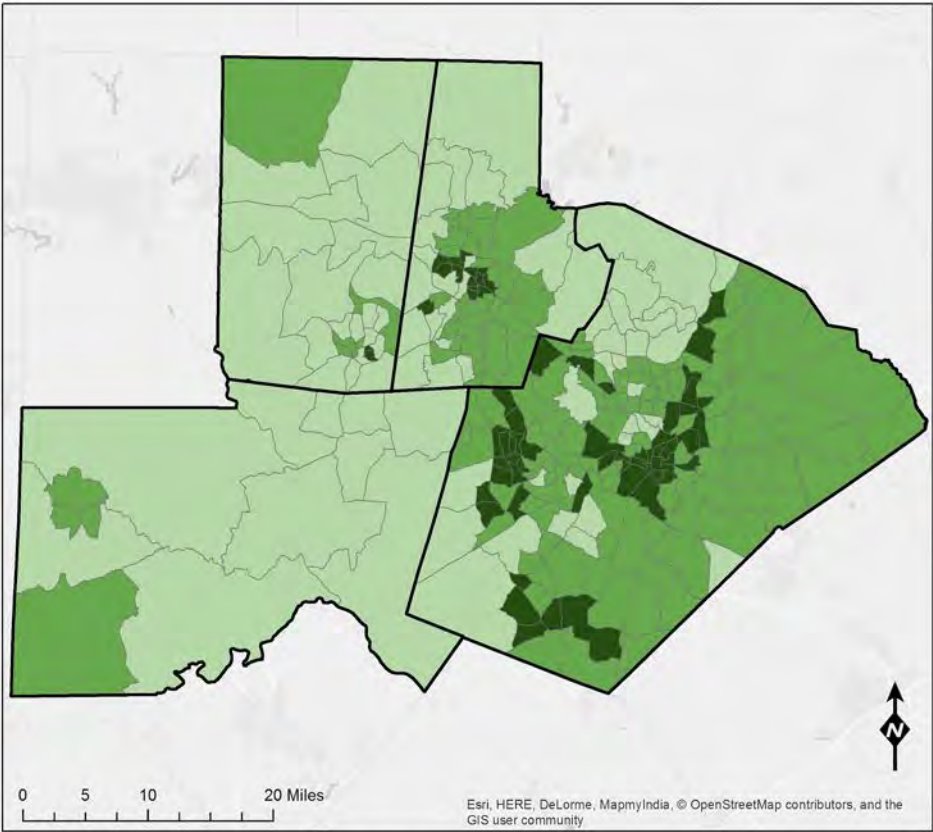
People and Human Health Sensitivity to Extreme Heat

Note: this is a preliminary analysis and should not be used for any official purposes

Levels of Sensitivity - Census Tracts

	High — High sensitive populations and high amount of developed land cover
	Med — High sensitive populations or high amount of developed land cover, not both
	Low — Low sensitive populations and low amount of developed land cover

People and Human Health/Extreme Heat



People and Human Health Adaptive Capacity to Extreme Heat

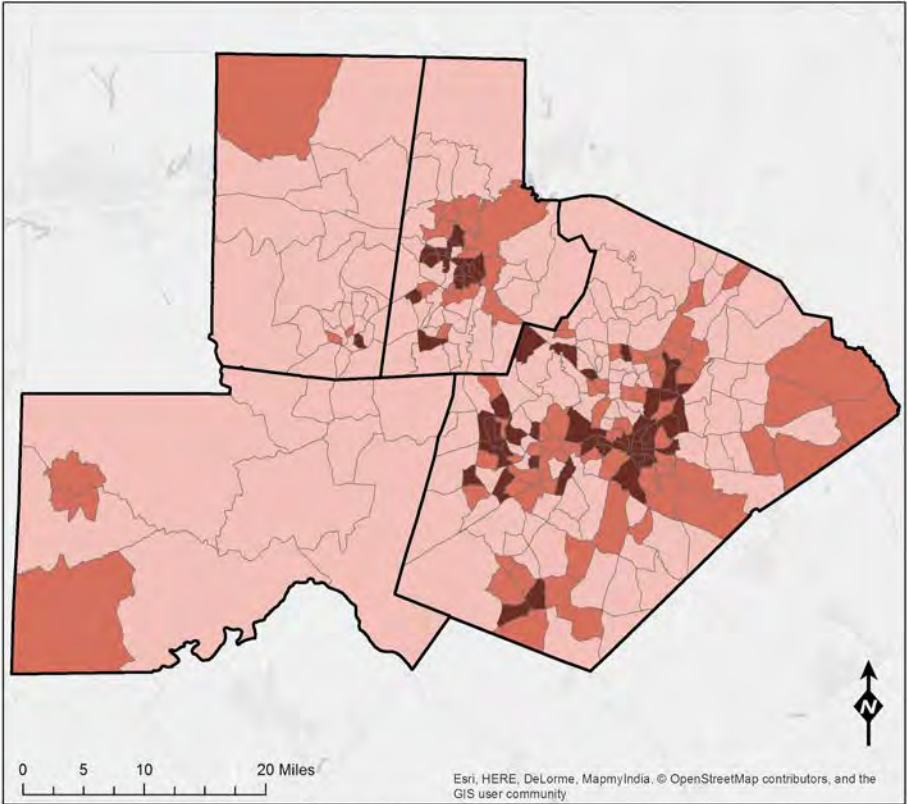
Tree Canopy Coverage

- High
- Med
- Low

Note: this is a preliminary analysis and should not be used for any official purposes

Levels of Adaptive Capacity - Census Tracts	
	High — High amount of tree canopy coverage
	Med — Moderate amount of tree canopy coverage
	Low — Low amount of tree canopy coverage

People and Human Health/Extreme Heat



People and Human Health Adaptive Capacity to Extreme Heat



Note: this is a preliminary analysis and should not be used for any official purposes

		Levels of Vulnerability - Census Tracts		
		Sensitivity		
		Low	Med	High
Adaptive Capacity	Low	M	H	H
	Med	L	M	H
	High	L	L	M



Flooding & Homes

Climate Stressor : Extreme Precipitation

Non-Climate Stressor : Old Stormwater Systems

Hazard : Flooding

Asset : Homes

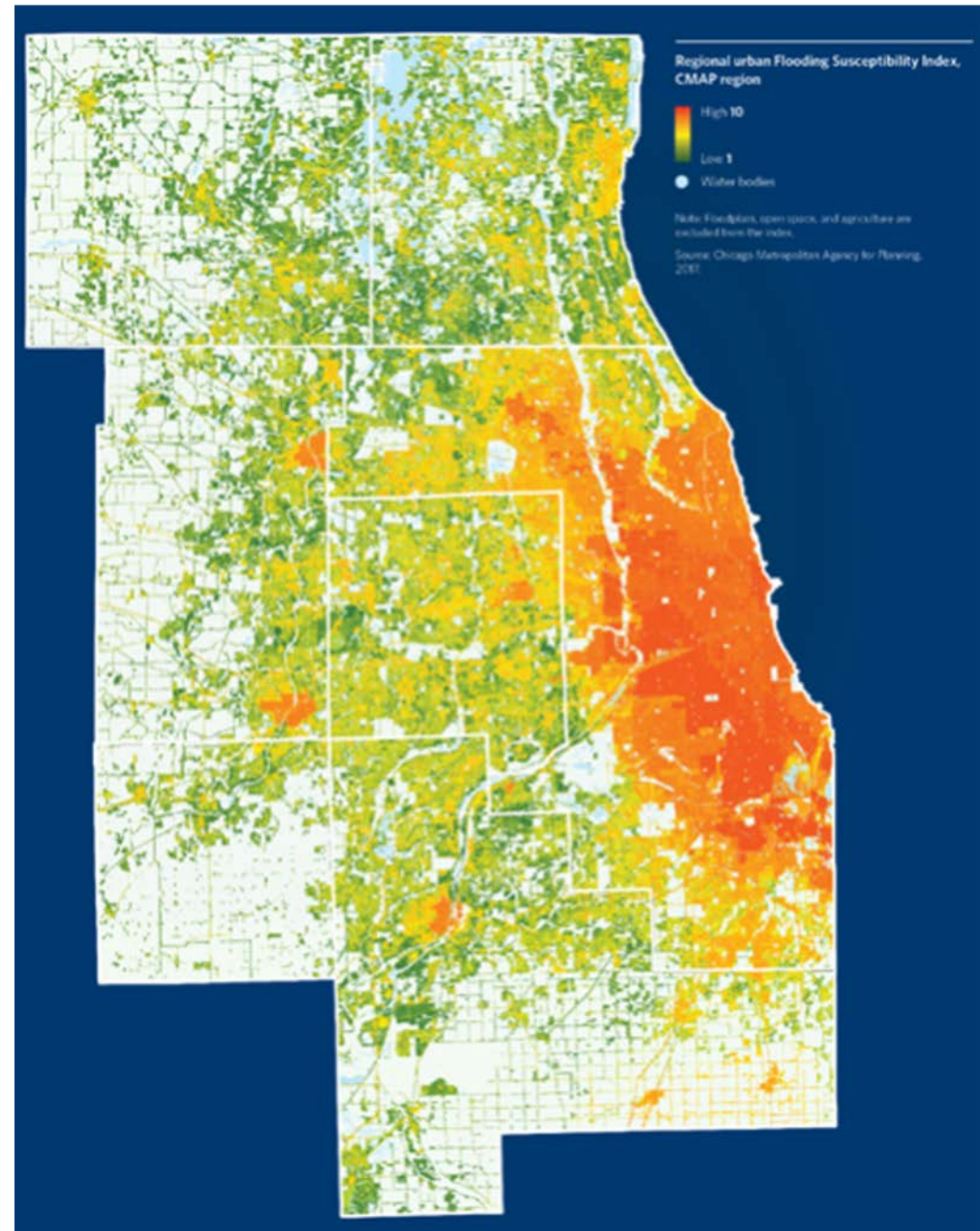
Measurable Impact : Flooded Basement

Vulnerability

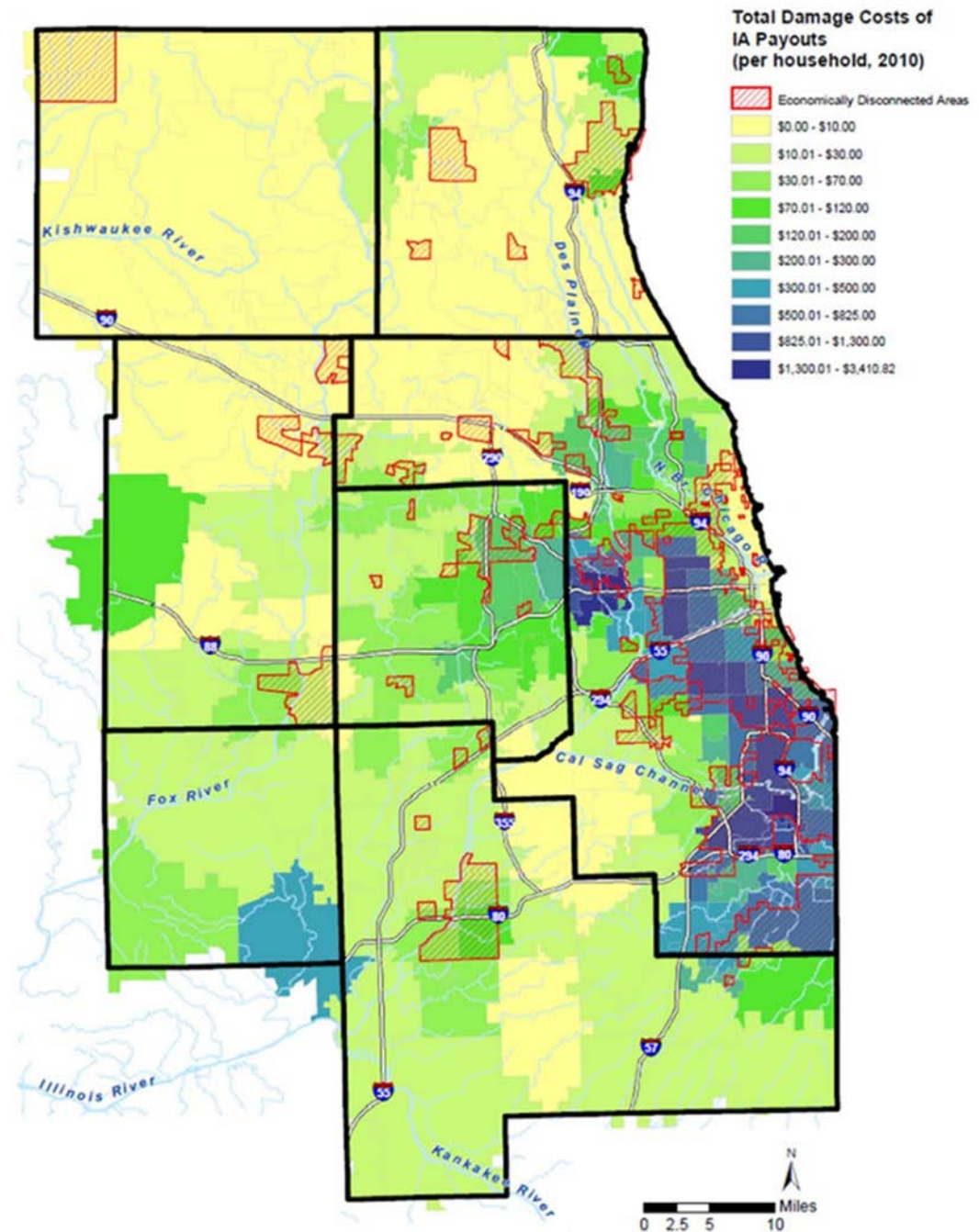
- Sensitivity - Type of home and basement
- Adaptive Capacity - Ability to retrofit stormwater

Urban Flood Susceptibility Index (FSI)

- *Topography*
- *Soils*
- *Land cover*
- *Reported flood damages*
- *Development patterns*



The most vulnerable communities often have the least ability to adapt and recover



Source: Chicago Metropolitan Agency for Planning, 2017.





Can you accept the vulnerability
and risk that climate presents to
your assets?



Please open mentimeter on your smart device or another tab

Go to menti.com

Enter the code 97 99 25



Chicago Region Climate Risk and Vulnerability Panel

Vernard Alsberry, Jr., Mayor, Village of Hazel Crest

Elena Grossman, MPH, University of IL BRACE

Katrina Thompson, Mayor, Village of Broadview

*Sean O'Dell, PE, Director, Region V - American Public Works Association &
Vice President & Region Manager - Baxter & Woodman, Inc*

Brian Daly, Senior Planner, CMAP



Climate Risk and Vulnerability

Village of Hazel Crest



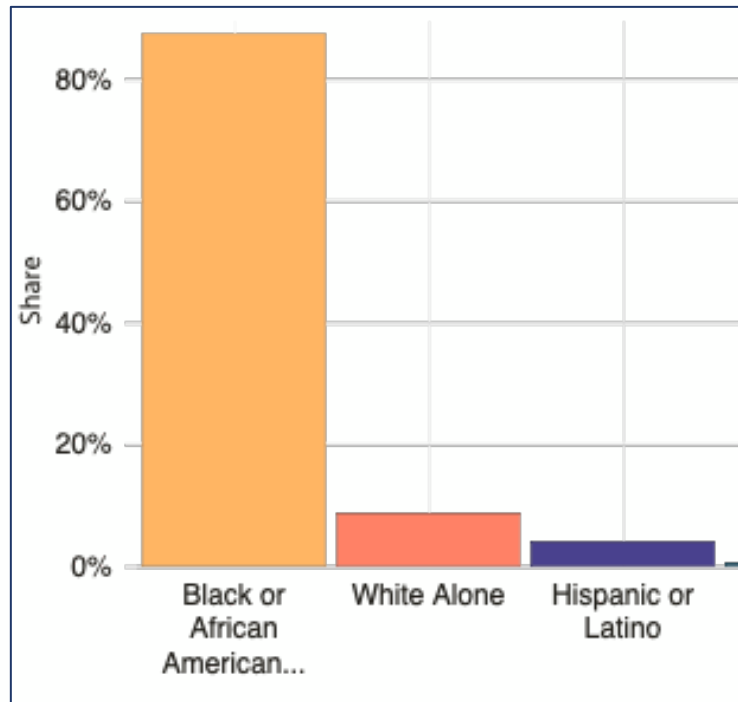
Vernard Alsberry, Jr.

Village President

Village of Hazel Crest

Hazel Crest & the Southland

Population - 13,935



Median Household income \$54,196

(Cook County \$59,426)*

2017 Data USA <https://datausa.io/profile/geo/hazel-crest-il#economy>



Climate change threatens the most vulnerable

Seniors



Extreme heat – threatens those without access to air conditioning



Flooding

Infrastructure



Catch basin appears to be too high for the stormwater to drain to it. Over time, powerful rainstorms have eroded ground around catch basin.



Backyard Flooding



Village Drive Bridge Creek Erosion



Orange caution net placed on decorative bridge that is not level due to the erosion of the creek.

Looking at the downstream end of the culvert at the discharge creek and erosion on the sides of the creek.



Trees & Open Space – a solution



Hazel Crest Open Lands





Climate Risk & Vulnerability

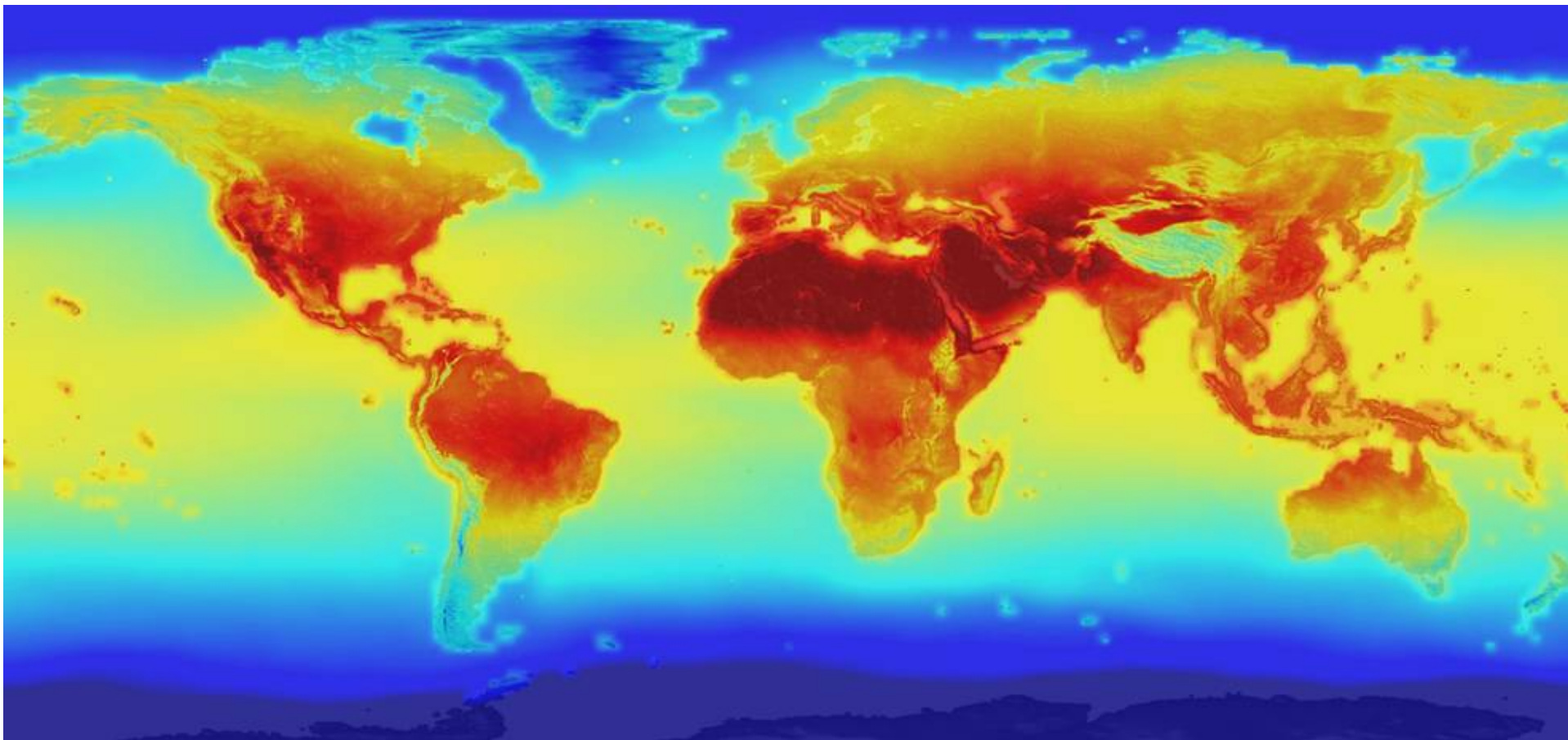
Climate Change and Health in Illinois



Elena Grossman, MPH

BRACE-Illinois Program Director
UIC School of Public Health





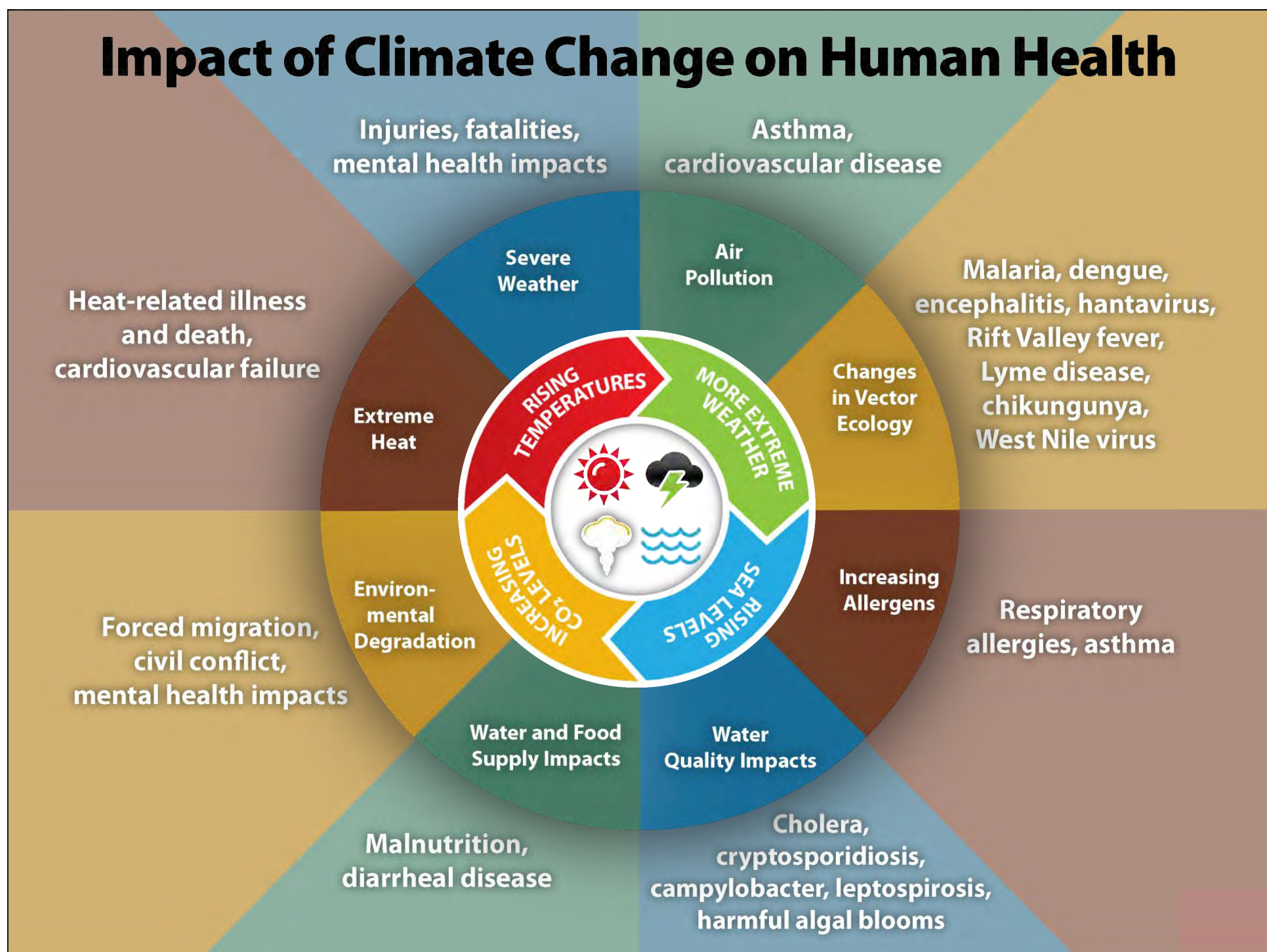
Credit: NASA, Global temperatures in 2100 based on historic temperatures & GHG emissions

Climate change and health in IL

Elena Grossman, MPH
BRACE-Illinois Program Director
UIC School of Public Health



Impact of Climate Change on Human Health



CLIMATE CHANGING HEALTH

in Illinois

Environmental Changes



Heat Waves



Floods



Droughts



Worsening Air Quality

Health Conditions



Tick and Mosquito Diseases



Injuries and Infections



Respiratory Problems from Mold



Heat Stroke and Exhaustion



Contaminated Drinking Water



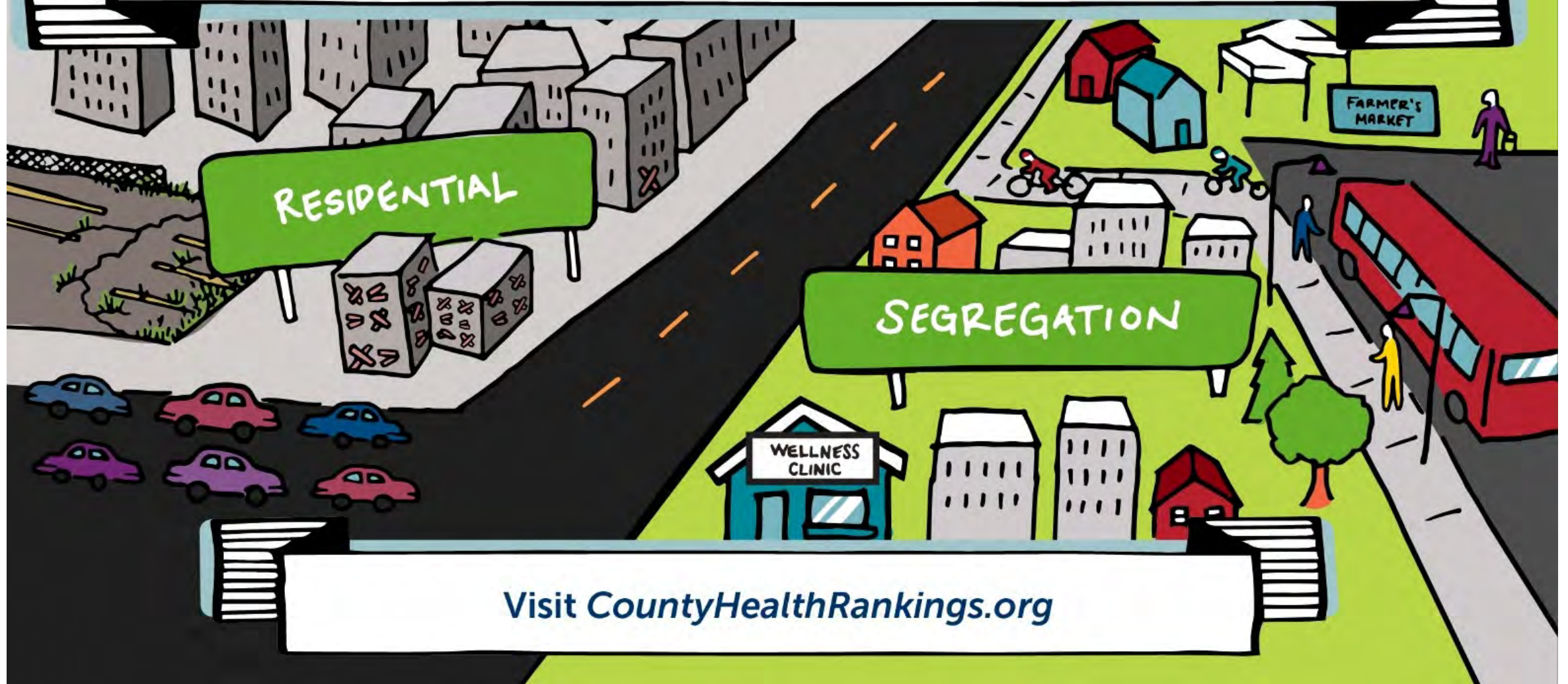
Mental Health



Worsening Allergies and Asthma



Not everyone has the same opportunity to be healthy



Where you live affects your health

INFORMATION FOR: Prospective Students Current Students Alumni Faculty & Staff Friends & Supporters A to Z Index

HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH

Email People Departments Calendar Careers

ABOUT FACULTY & RESEARCH ADMISSIONS & AID ACADEMICS EXECUTIVE/CONTINUING ED NEWS

Zip code better predictor of health than genetic code

NCBI Resources How To

PubMed.gov US National Library of Medicine National Institutes of Health

PubMed Advanced

Format: Abstract Send to

N C Med J. 2014 Nov-Dec;75(6):394-7.

Is health determined by genetic code or zip code? Measuring the health of groups and improving population health.

athenahealth
December 5, 2016

When it comes to health, your ZIP code is as important as your genetic code. <https://insight.athenahealth.com/zip-code-might-key-health/>



Social determinants of health: how a few miles can be the difference for life expectancy

In Chicago, life expectancy can differ by as much as 16 years between just seven stops on the "L," between the Loop and Washington Park. In Philadelphia, the...

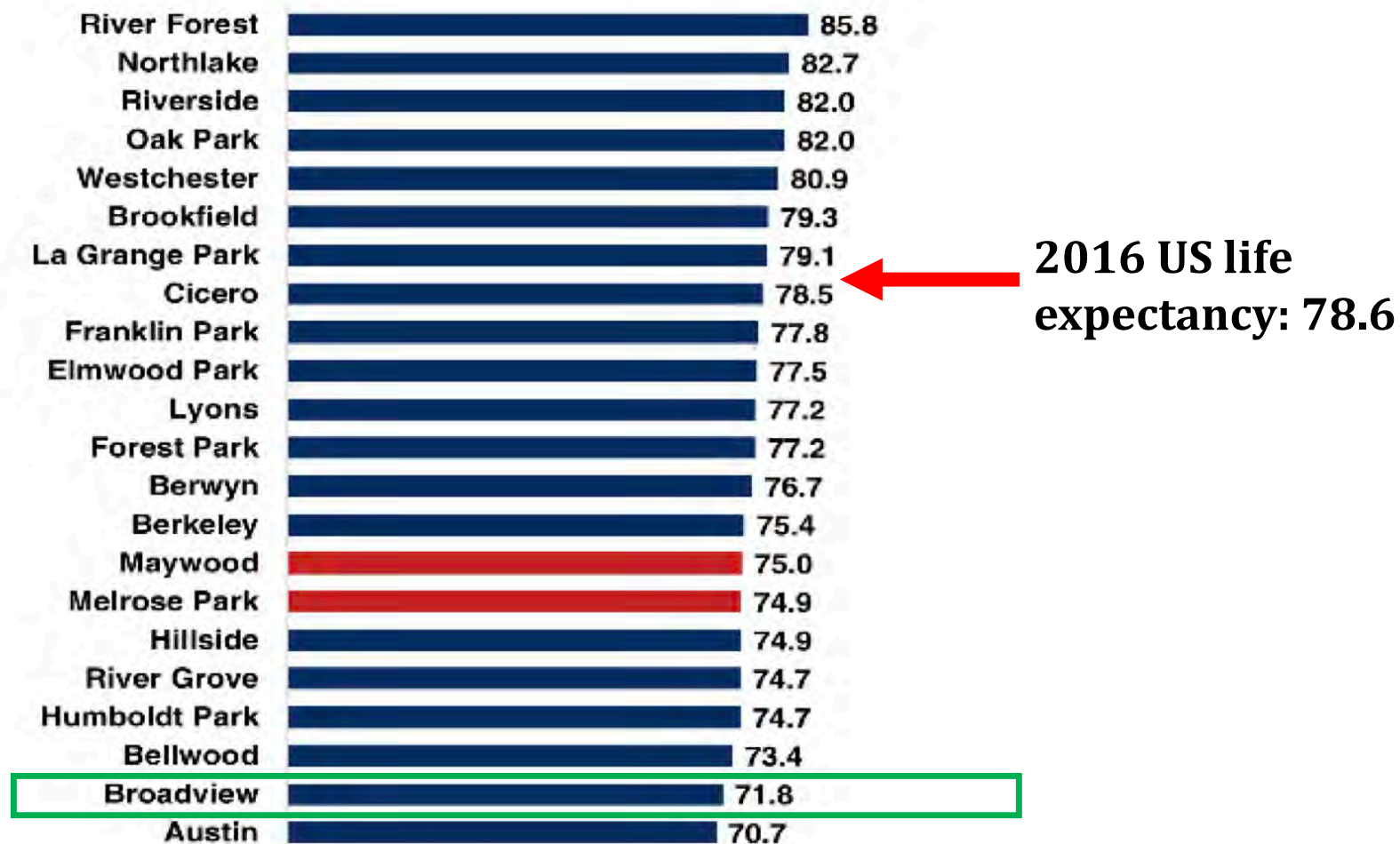
INSIGHT.ATHENAHEALTH.COM

Life expectancy based on where you live

Virginia Commonwealth University's Center on Society and Health: Mapping Life Expectancy



Comparison of highest and lowest life expectancies in LUMC's service areas



Illinois Department of Public Health, Division of Vital Records, 2016

SocioNeeds Index: Another way zip codes indicate health challenges

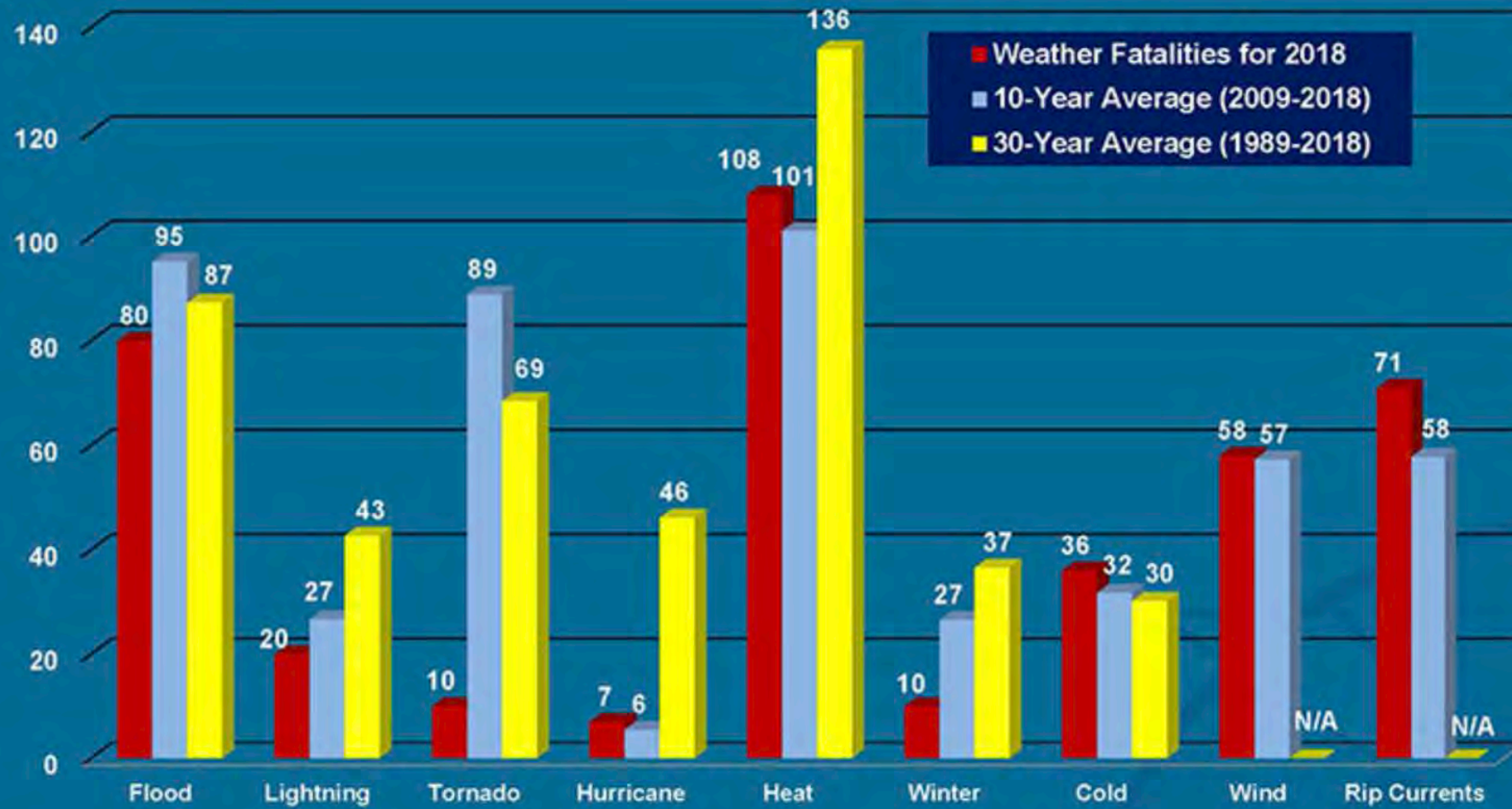
Zip Code	Community	Index	Rank	Population
60426	Harvey	97.4	5	28,292
60411	Chicago Heights	91.1	5	57,257
60428	Markham	90.2	5	12,442
60409	Calumet City	88.0	5	36,212
60419	Dolton	85.7	5	21,810
60429	Hazel Crest	77.2	4	15,461
60466	Park Forest	74.3	4	21,561
60425	Glenwood	66.8	4	9,025



HEAT



Weather Fatalities 2018

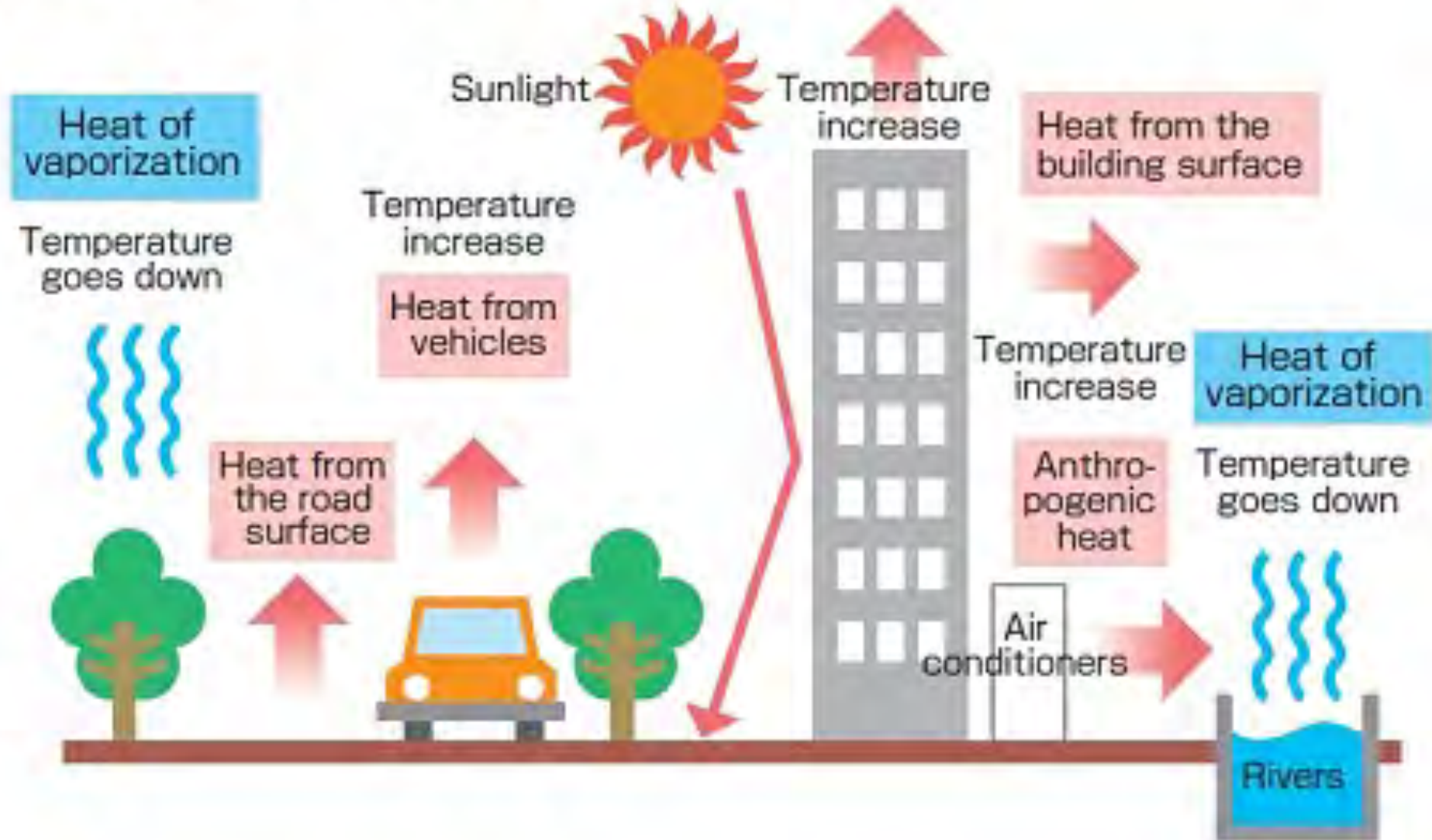


Clinical spectrum of heat stress illness

Syndrome	Features
Heat rash	Erythematous papules or macules
Heat cramps	Muscle cramps
Heat exhaustion	Elevated temperature, warm/hot skin, sweating, lucid
Heat syncope	Fainting due to heat and dehydration
Heat stroke	High temperature (>103 F) *Altered mental status* High fatality rate Persistent cognitive deficits in survivors

Urban Heat Island Effect

● How the Heat Island Phenomenon occurs





FLOODS

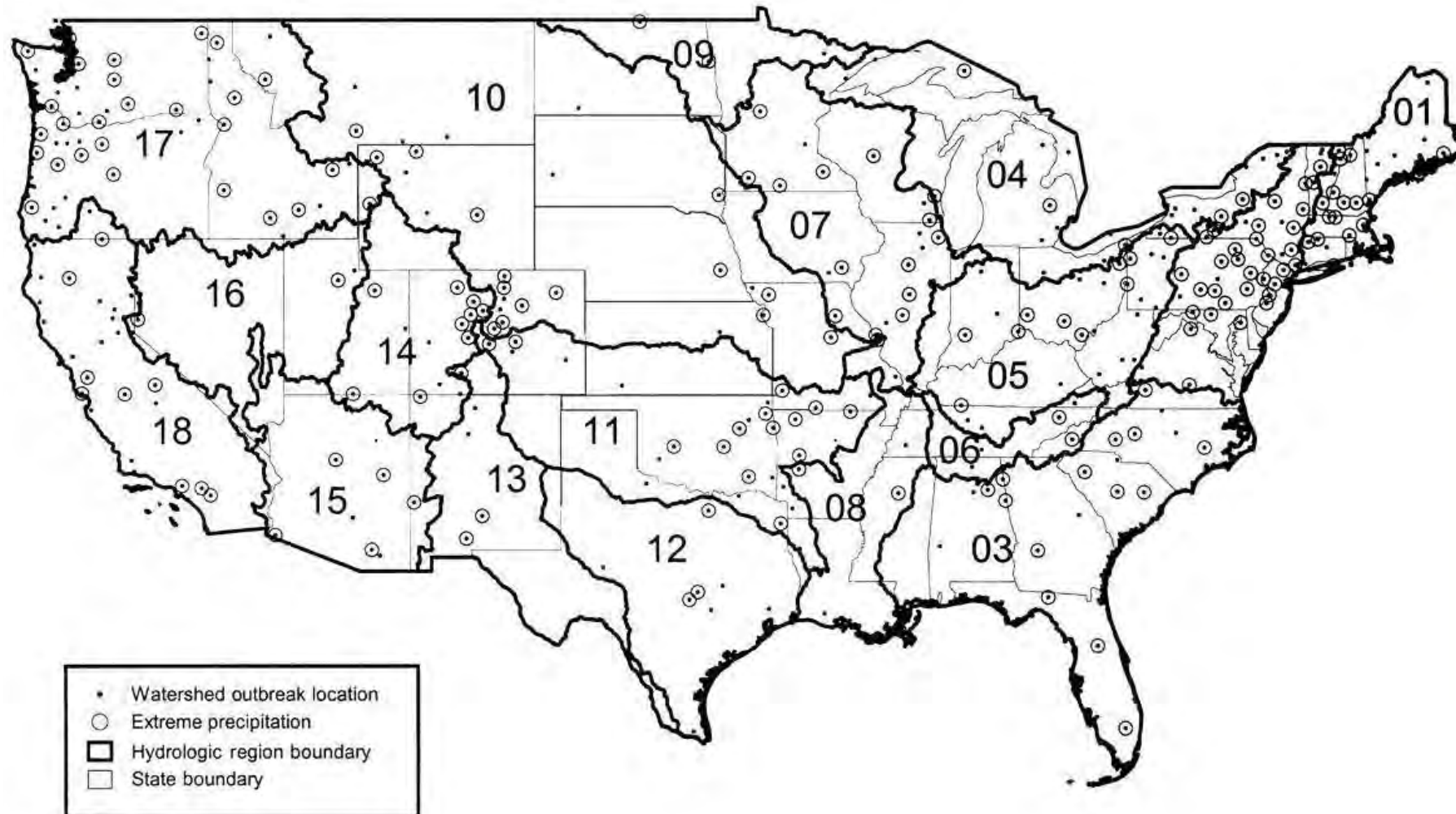
Public Health Implications from Flood

- Mold; respiratory health
- Waterborne diseases
- Injuries
- Property damage
- Mental health (stress of event, property damage, displacement)



Damage in a home from floods in Lake County, IL
July 2017

~70% of waterborne disease outbreaks in US preceded by precipitation events, 1948-1994

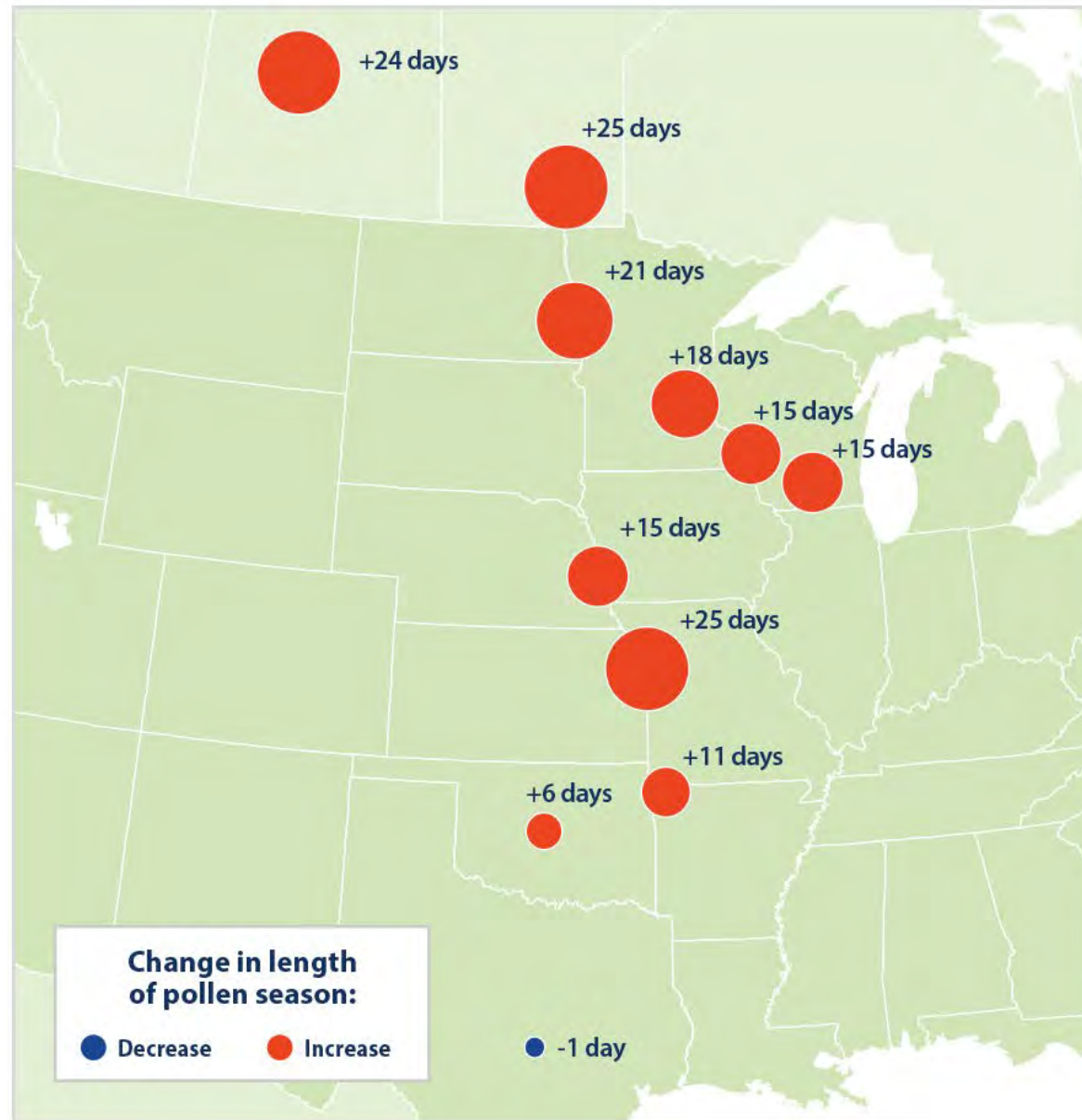


Curriero et al. 2001

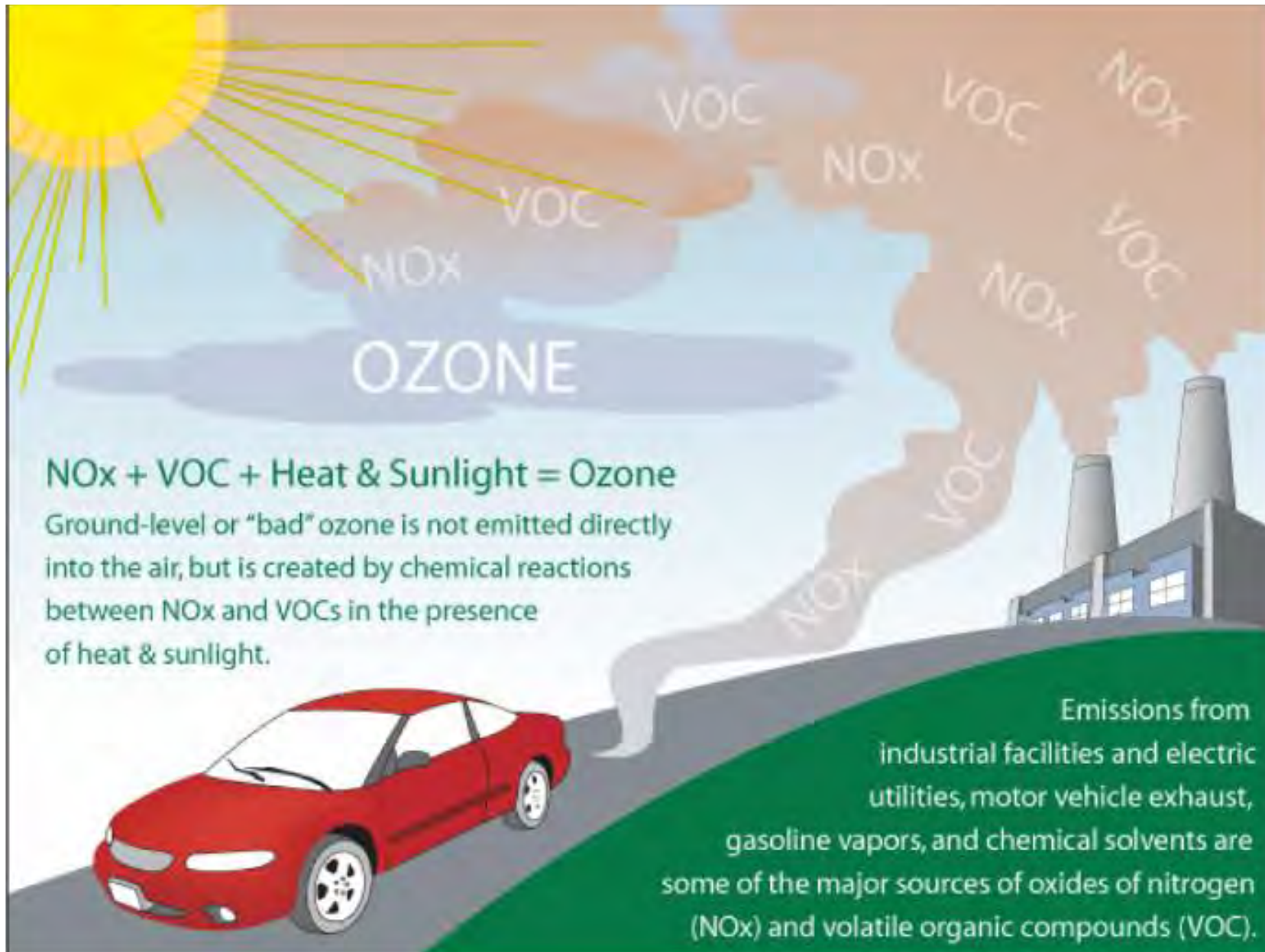
An aerial photograph of a city skyline, likely New York City, heavily obscured by a thick layer of smog or haze. The Empire State Building is the most prominent structure in the center. Other skyscrapers are visible in the background, their details softened by the atmospheric conditions. The overall color palette is muted, with greys, blues, and browns dominating the scene.

RESPIRATORY HEALTH

More allergens and longer allergy seasons



More ozone pollution



VECTORBORNE DISEASES



Vectorborne Diseases

Changing geographic ranges

Reported Cases of Lyme Disease -- United States, 2001



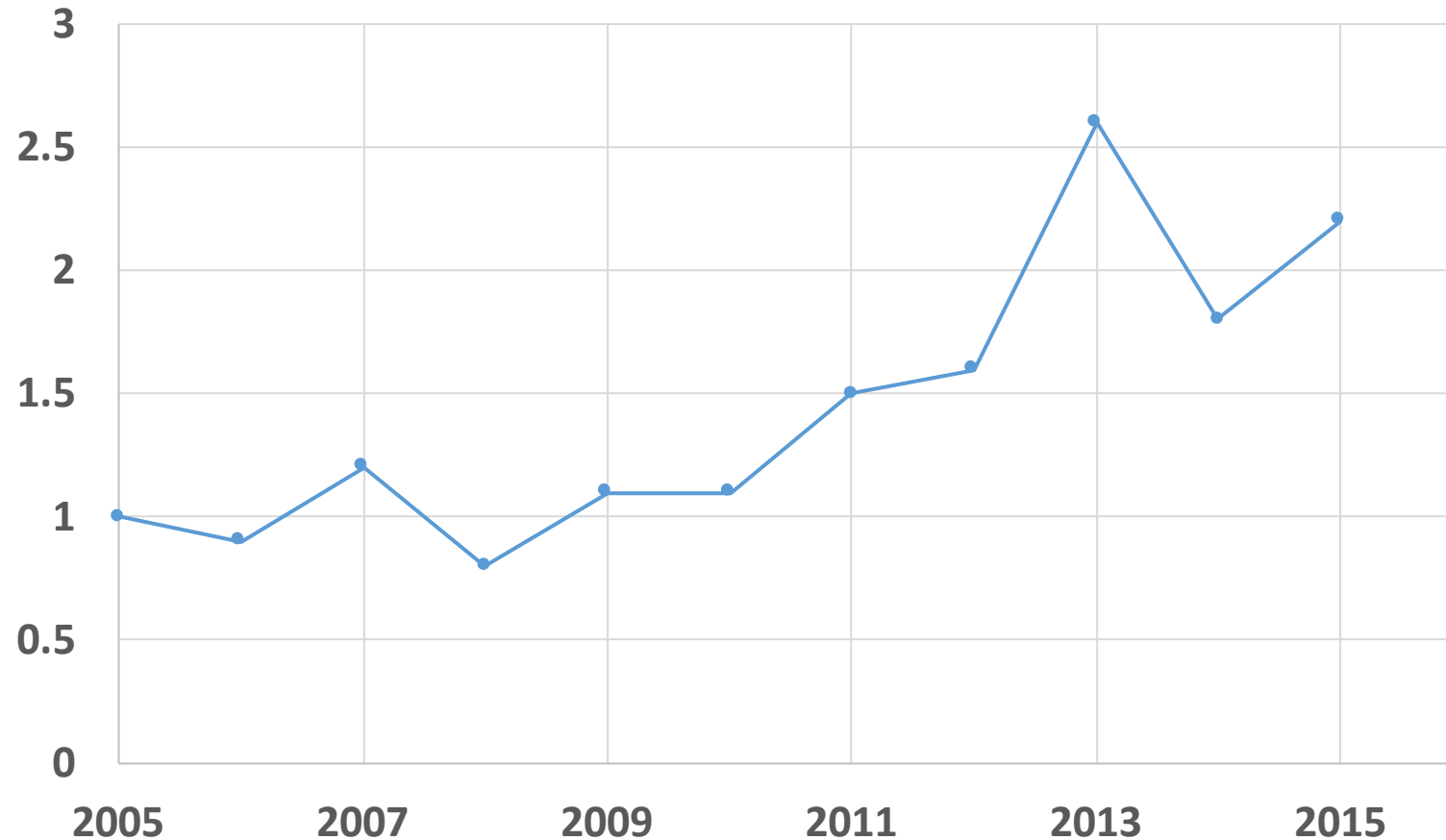
1 dot placed randomly within county of residence for each reported case

Reported Cases of Lyme Disease -- United States, 2018

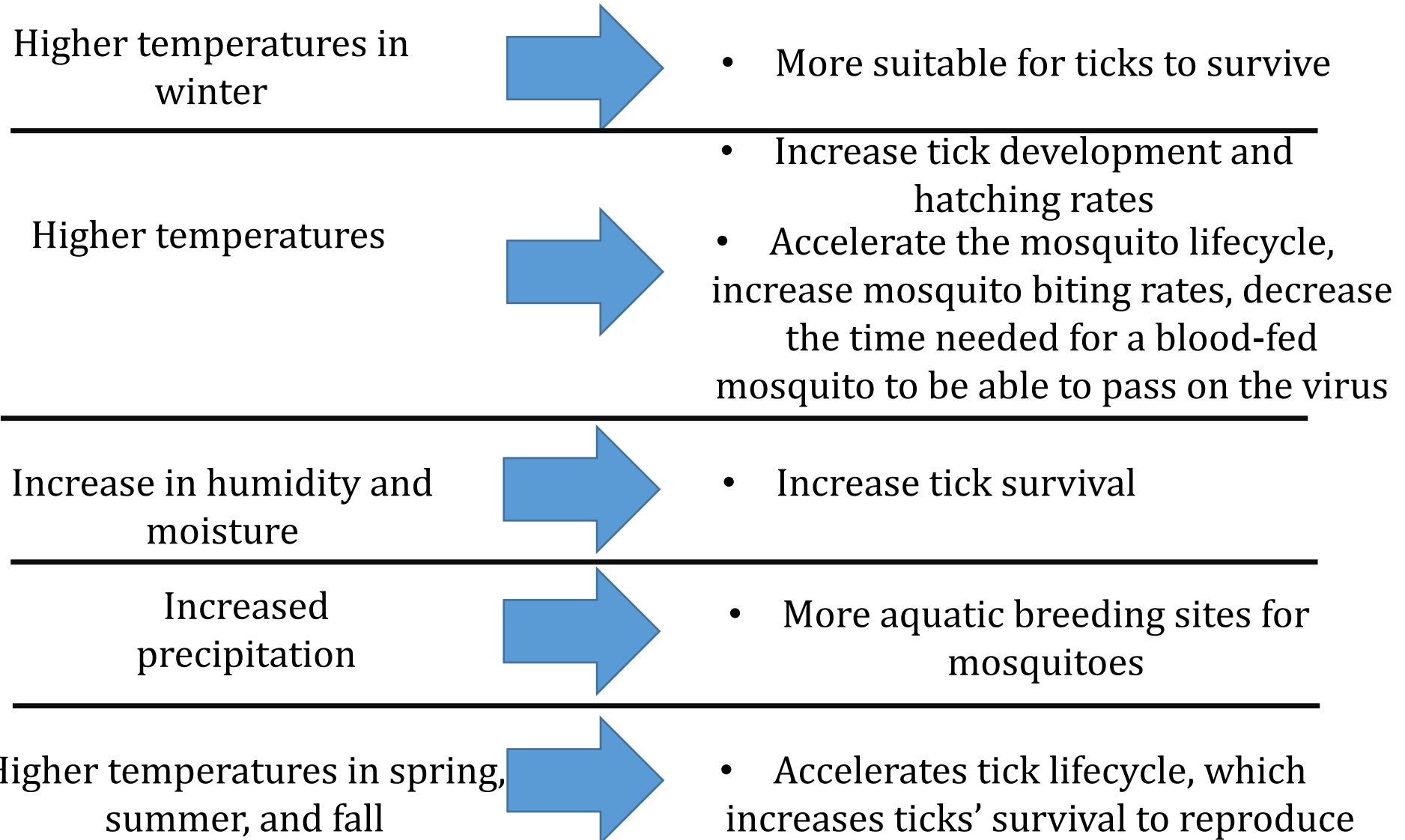


1 dot placed randomly within county of residence for each confirmed case

Lyme Disease incidence in Illinois, Confirmed cases/100,000 2005-2015



Ticks and mosquitoes: Expanding geographic distribution and changing seasons



MENTAL HEALTH



Mental Health: A concern after extreme weather events

- A study of 815 people impacted by Katrina

Condition	5-8 months after Katrina	1 year after Katrina
Post Disaster Mental Disorder	14.9%	20.9%
Serious mental illness	10.9%	14%
Suicidal Ideation	2.8%	6.4%
Suicidal Plans	1%	5%

- Common symptoms include the inability to stop thinking about the hurricane, nightmares and emotional numbness.
- Equal opportunity disaster



The Agenda
AGENDA 2020

'Katrina brain': The invisible long-term toll of megastorms

Long after a big hurricane blows through, its effects hammer the mental-health system.

By CHRISTINE VESTAL | 10/12/2017 05:10 AM EDT

Bryan Tamowski for POLITICO



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NEW ORLEANS — Brandi Wagner thought she had survived Hurricane Katrina. She hung tough while the storm's 170-mph winds pummeled her home, and powered through two months of sleeping in a sweltering camper outside the city with her boyfriend's mother. It was later, after the storm waters had receded and Wagner went back to New Orleans to rebuild her home and her life that she fell



Baseline health indicators, without climate change exacerbating them

HAZEL CREST

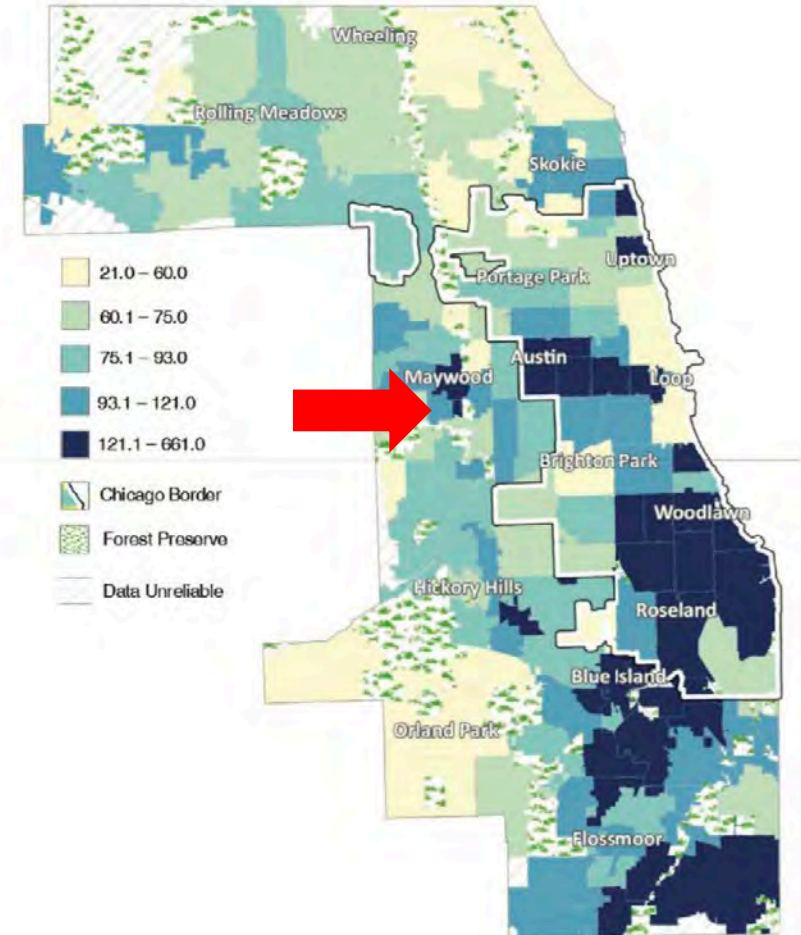
- Stroke Mortality Rate
 - Healthy People 2020 goal: 34.8/100,000
 - South region rate: 40.1
 - Hazel Crest: 67.8
- ED visits for asthma: 76.9/10,000 (4th highest in U of C hospital Service area)
- One of Highest rates of ED visits due to diabetes in service area
- ED visits for asthma for children and youth under 18: 164.8 per 10,000 (2nd highest in service area)

Advocate South Suburban Hospital Community Health Needs Assessment 2014-2016 <https://www.advocatehealth.com/assets/documents/chna/so-suburban-chna-rpt-final.pdf>

2018-2019 Community Health Needs Assessment - UChicago Medicine Ingalls Memorial <https://issuu.com/communitybenefit-ucm/docs/ucm-ingalls-2019-chna>

BROADVIEW

. Age-adjusted mental health emergency department visit rates per 10,000 in Cook County, Illinois (Adults)

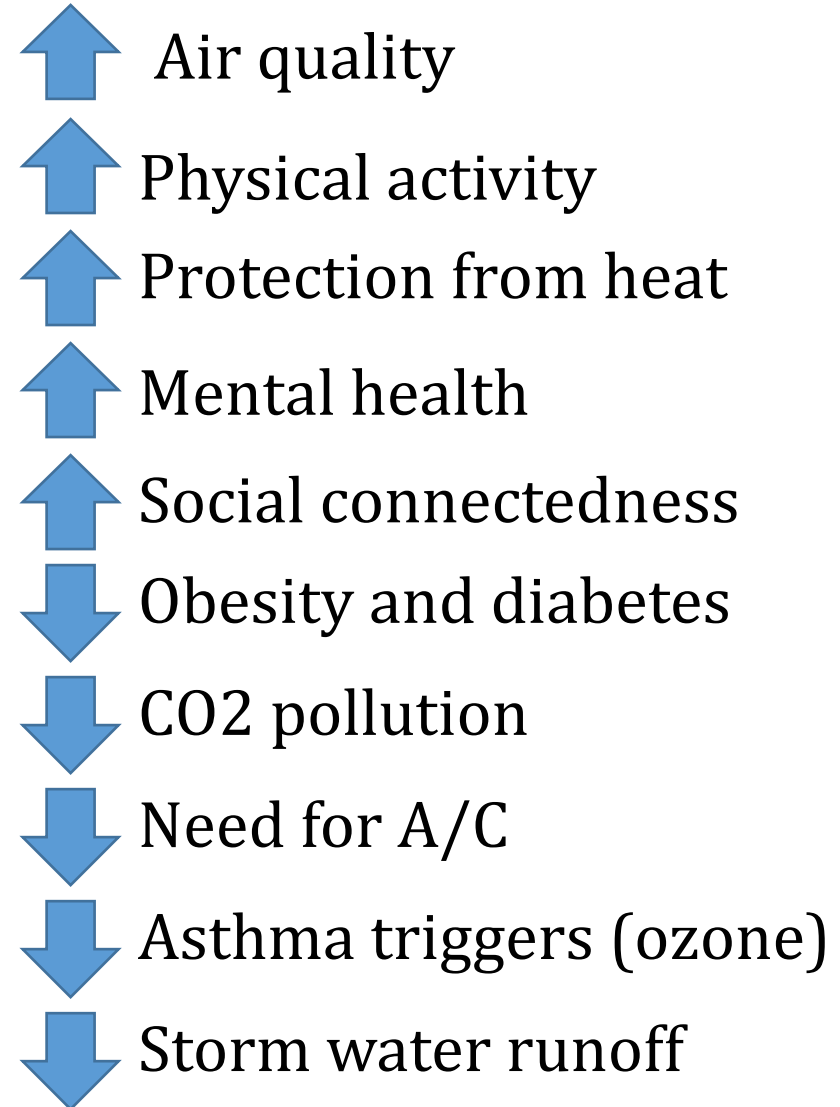


Illinois COMPdata, 2015-2017, Analysis conducted by Conduent Healthy Communities Institute

Loyola University Medical Center Community Health Assessment 2019
https://www.loyolamedicine.org/sites/default/files/2019_chna_report_lumc.pdf

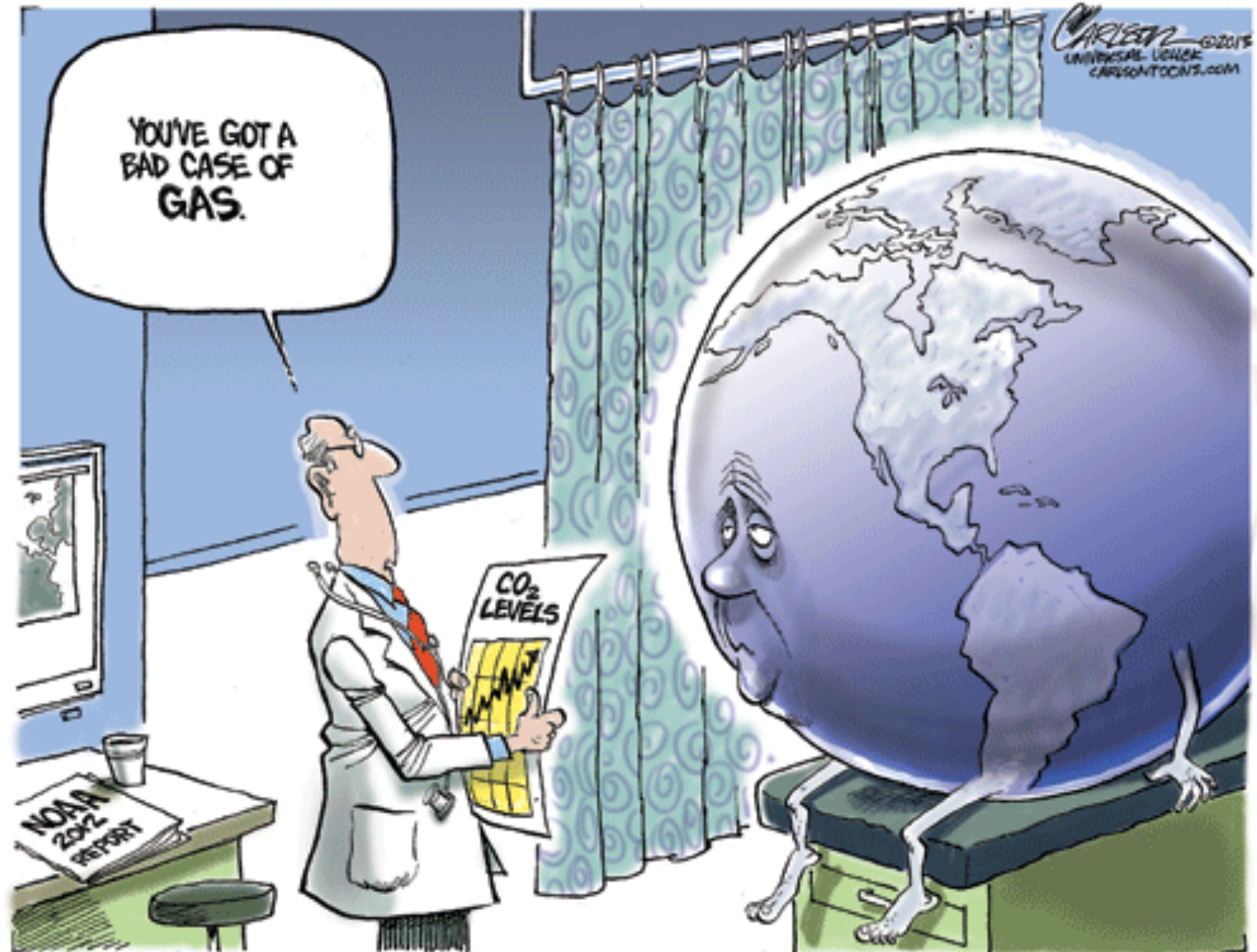
What Can We Do About This?

- Tree canopies
- Green spaces
- Green roofs
- White roofs
- Complete streets
- Rain gardens
- Bioswales
- Water plazas/Watersquares
- “No idling” policies
- Develop a Heat Alert Plan
- Develop an outreach plan to vulnerable populations



Thank you! Questions?

Elena Grossman
UIC School of Public Health
egross5@uic.edu





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Enter the code **97 99 25**



Climate Risk and Vulnerability

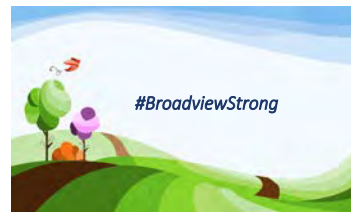
Village of Broadview



Katrina Thompson

Mayor

Village of Broadview



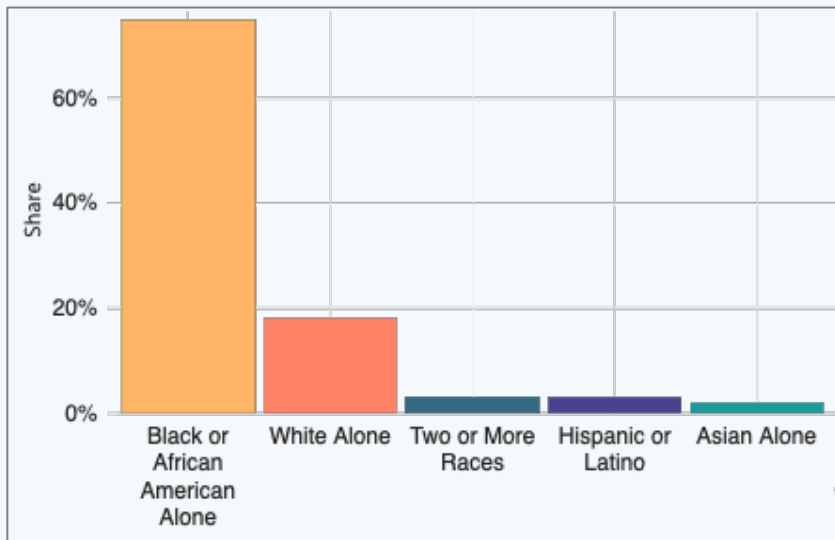
A stylized, colorful illustration of a landscape. The foreground features rolling green hills with a dark brown path winding through them. On the left, there are two trees: one with green foliage and one with purple foliage. A small red bird is flying in the sky above the trees. The background consists of layered, wavy bands of blue and white, suggesting a sky or distant hills.

#BroadviewStrong

*Mayor Katrina Thompson, Village of
Broadview*

Village of Broadview

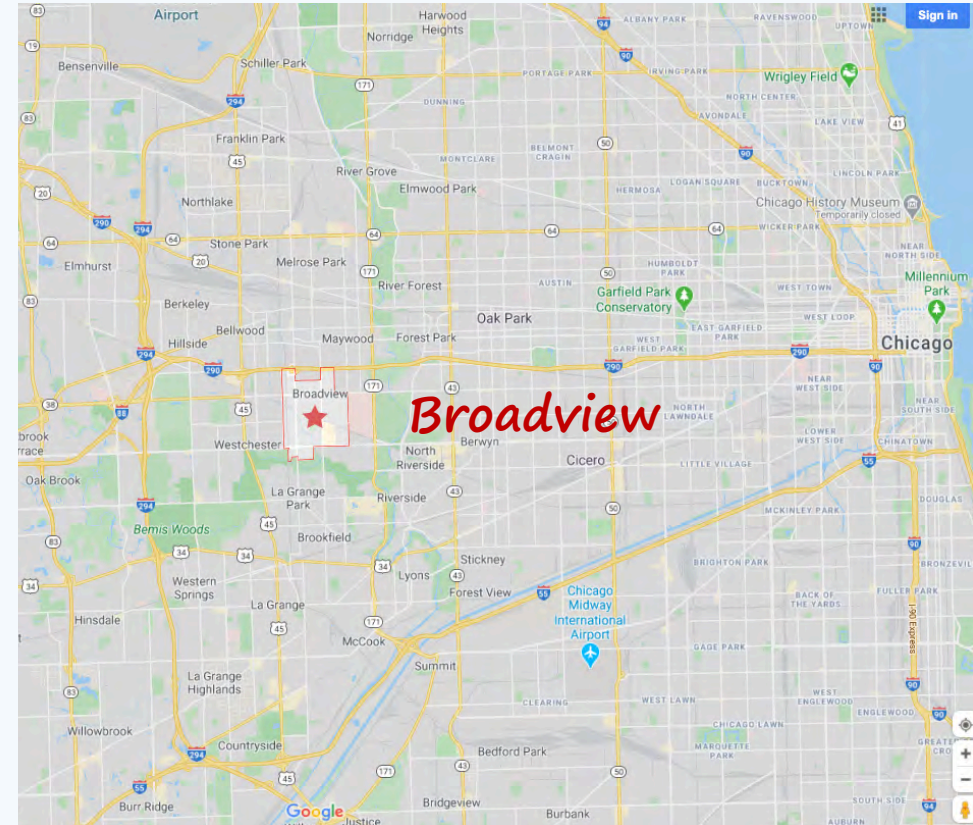
Population – 7,982



Median Household income \$53,100

(Cook County \$59,426)*

2017 Data USA <https://datausa.io/profile/geo/hazel-crest-il#economy>





*Most vulnerable
residents – Youths*

Air pollution

*Asthma &
Respiratory Health*





Social Cohension

Nelson Mendala stated that "It is ordinary people that make the work a special place"

Advocacy

Sustainability

Implementation





Recreation for All

Make sure everyone enjoys a quality of life!



Public Works – Operations & Infrastructure



Sean O'Dell, P.E.

Director, Region V - American Public Works Association

Vice President Water & Mokena Region Manager

Baxter & Woodman



Public Works Challenges

- Climate change is increasing the number & severity of public works emergencies
- More pressure on public works staff, equipment, infrastructure, systems
- Aging infrastructure and workforce
- Many unfunded regulatory mandates

Bright Side:

Public Works Loves to Adapt

Public Works Solves Problems

Public Works Will Keep us Safe

3 things

- Where is Public Works today?
- Where will Public Works be tomorrow?
- What Actions can we take today?

Public Works Today

- Reactive Mode - Failing Infrastructure & Squeaky Wheel
- Improving Communications & Managing Expectations
- Making Energy Efficiency a Priority
- Risk, Resilience & Vulnerability are Making a Comeback
- Rates & Affordability

Public Works Tomorrow

- Proactive Mode
- Comprehensive Planning & Prioritization
 - Water, Wastewater, Stormwater, Energy, Transportation, Fleet, Facilities
- Improved Asset Management & Assessment
- Regionalization of Utilities
- Data Driven Decisions
- Automation Improved Operations
- Quicker to Innovate

Call to Action

- Regional Planners – Arm us with Data, Benefits & Comp plans
- Elected Officials – Set the Priorities & Give the Resources
- Public Works – Listen to Leaders & Execute on the Vision
- Engineers – Promote & Innovate Sustainable Solutions
- Innovators & VC – Invest in Sustainable Tech & Bring Ideas to all Levels
- Regulators – Understand the Conflicting Priorities
- Everyone – Educate Themselves & Communicate with the Public



Climate Risk and Vulnerability

Planning for Climate risk in the Chicago region



Brian Daly

Senior Planner

CMAP



CMAP



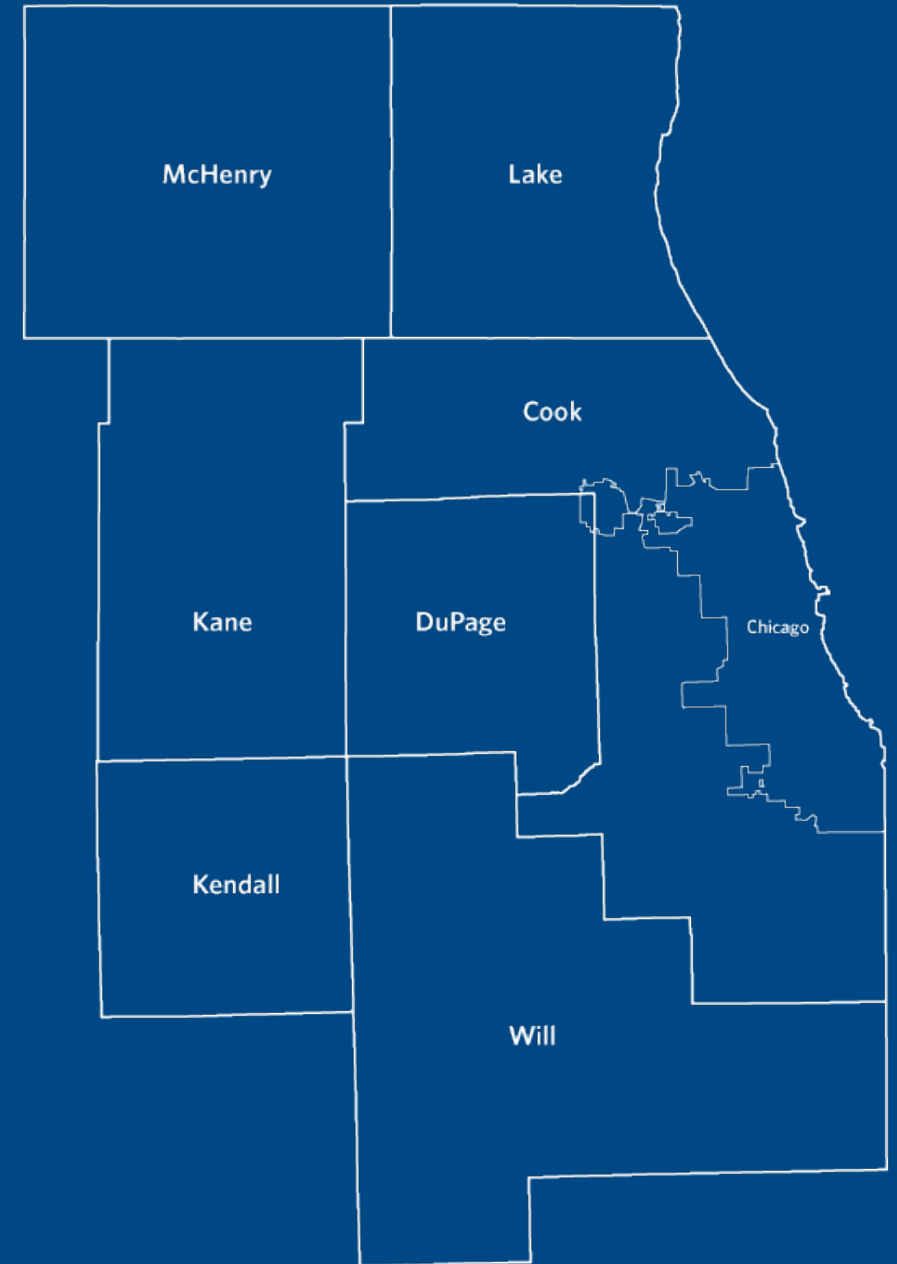
Planning for Climate risk in the Chicago region

**MMC Webinar: Climate Risk and
Vulnerability**

June 5, 2020



Our region today



ON

TO

2050

Integrating Climate Science

- Three-year project
- Funded by NOAA's Sectoral Applications Research Program





Vulnerability Analysis

Key Findings

Climate and Natural Hazards

Vulnerability and Risk Assessment

1.Critical Infrastructure

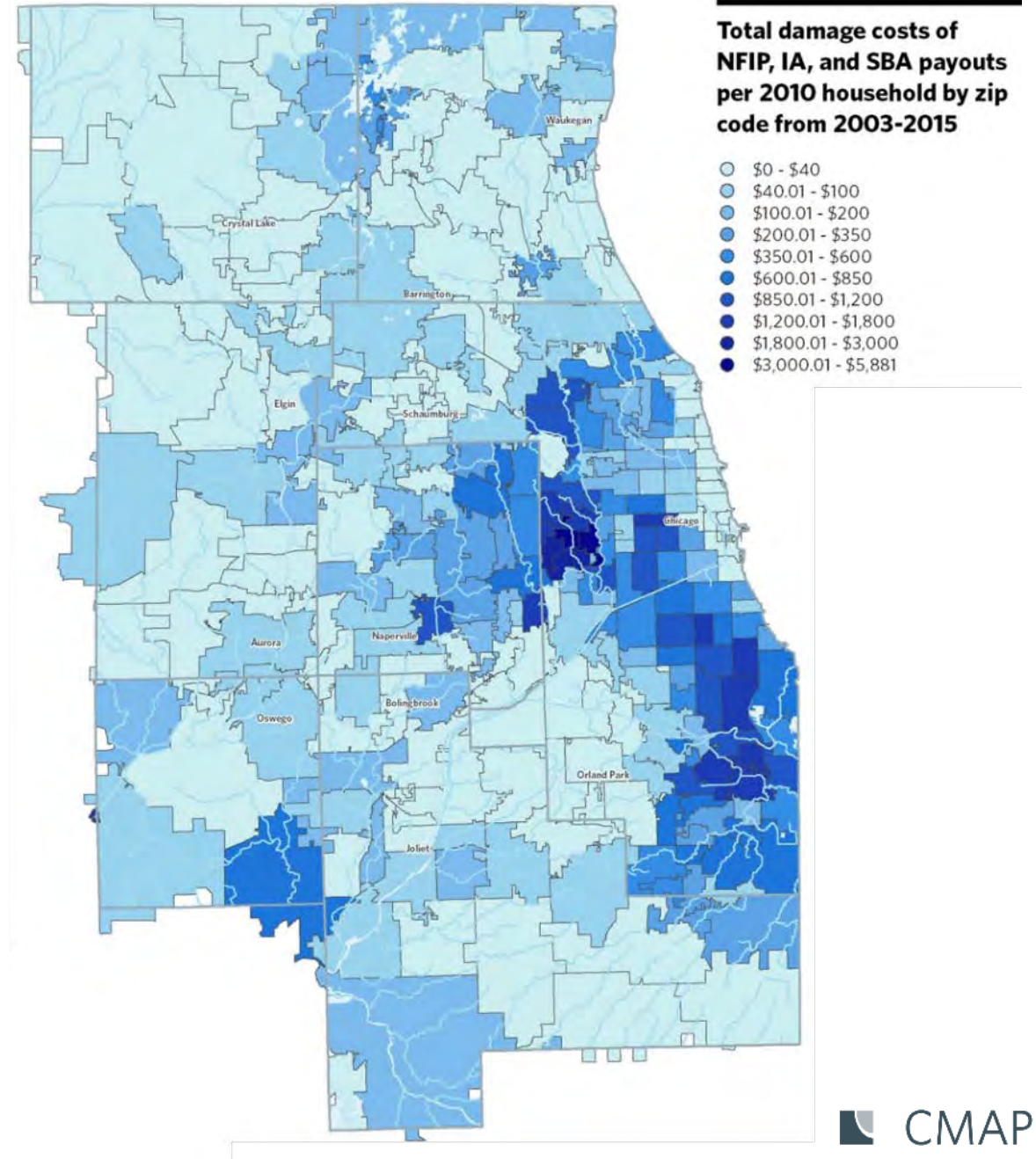
2.Social Vulnerability

3.Economic Impacts

Flood damages

~\$1 billion in damages

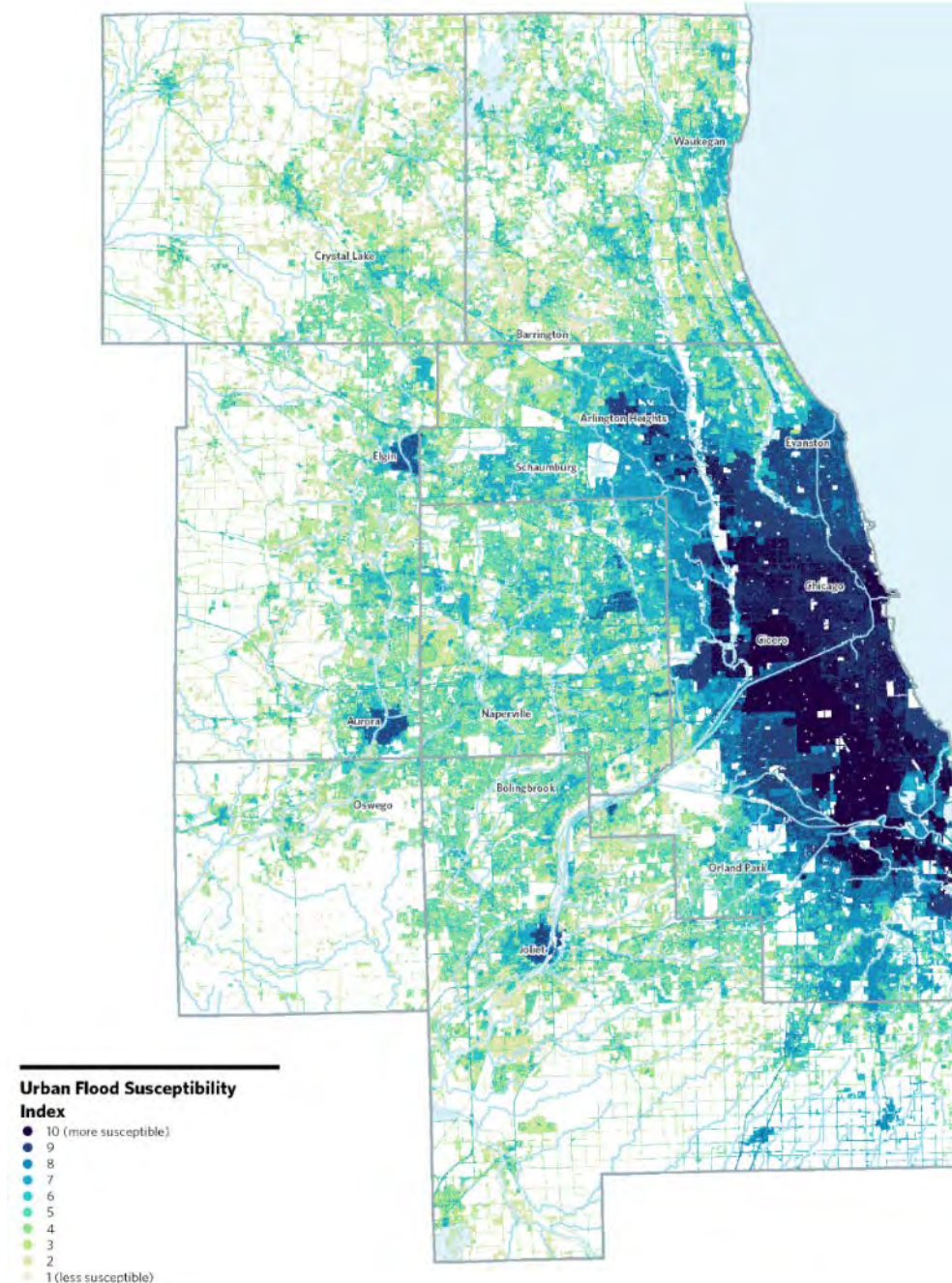
+70% outside of 100-year floodplain



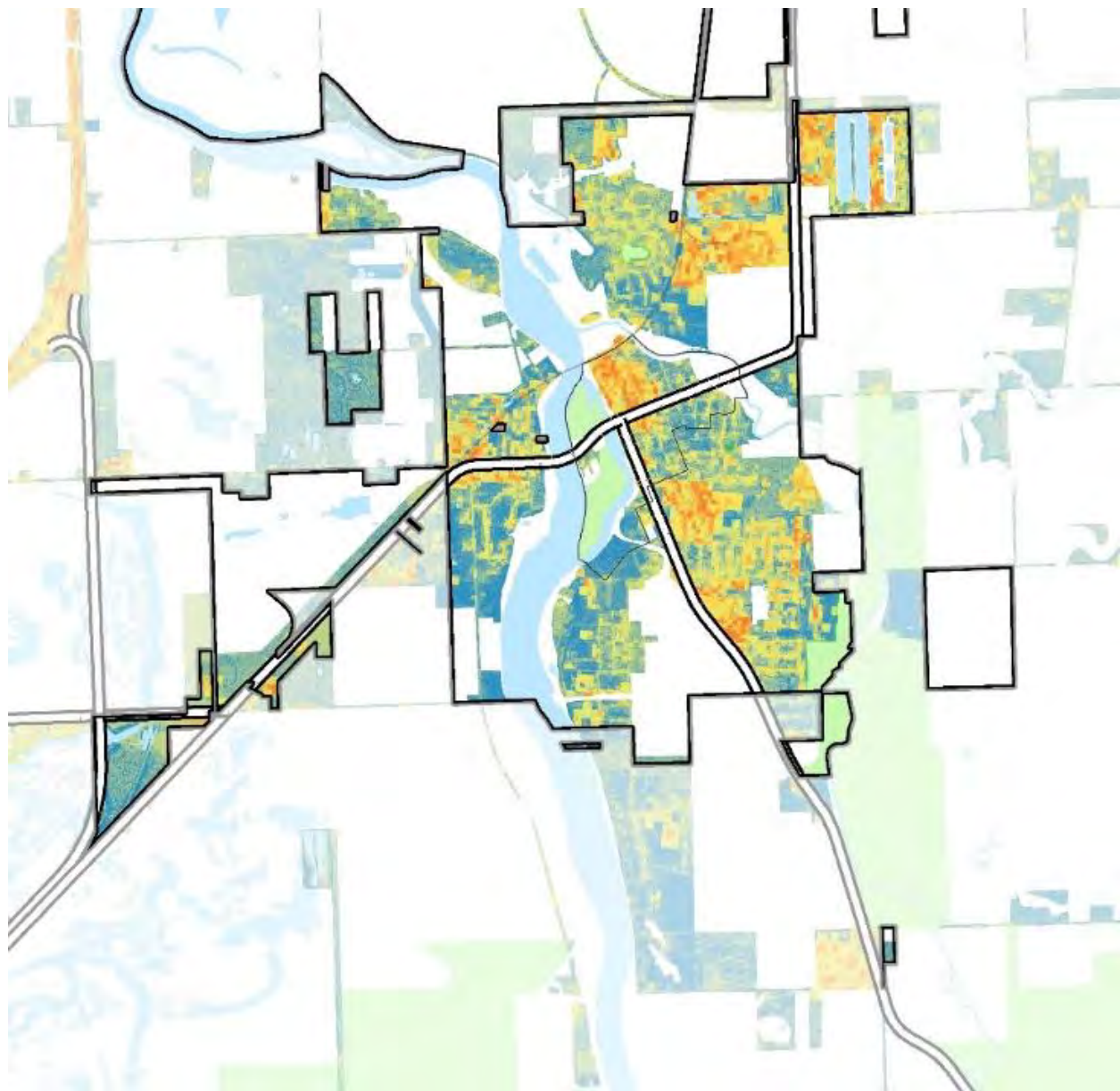
Urban flood susceptibility

Based on the relationship between reported flood locations and the following factors:

- Combined Sewer Service Area
- Elevation and topography
- Impervious Cover
- Age of Development
- Precipitation



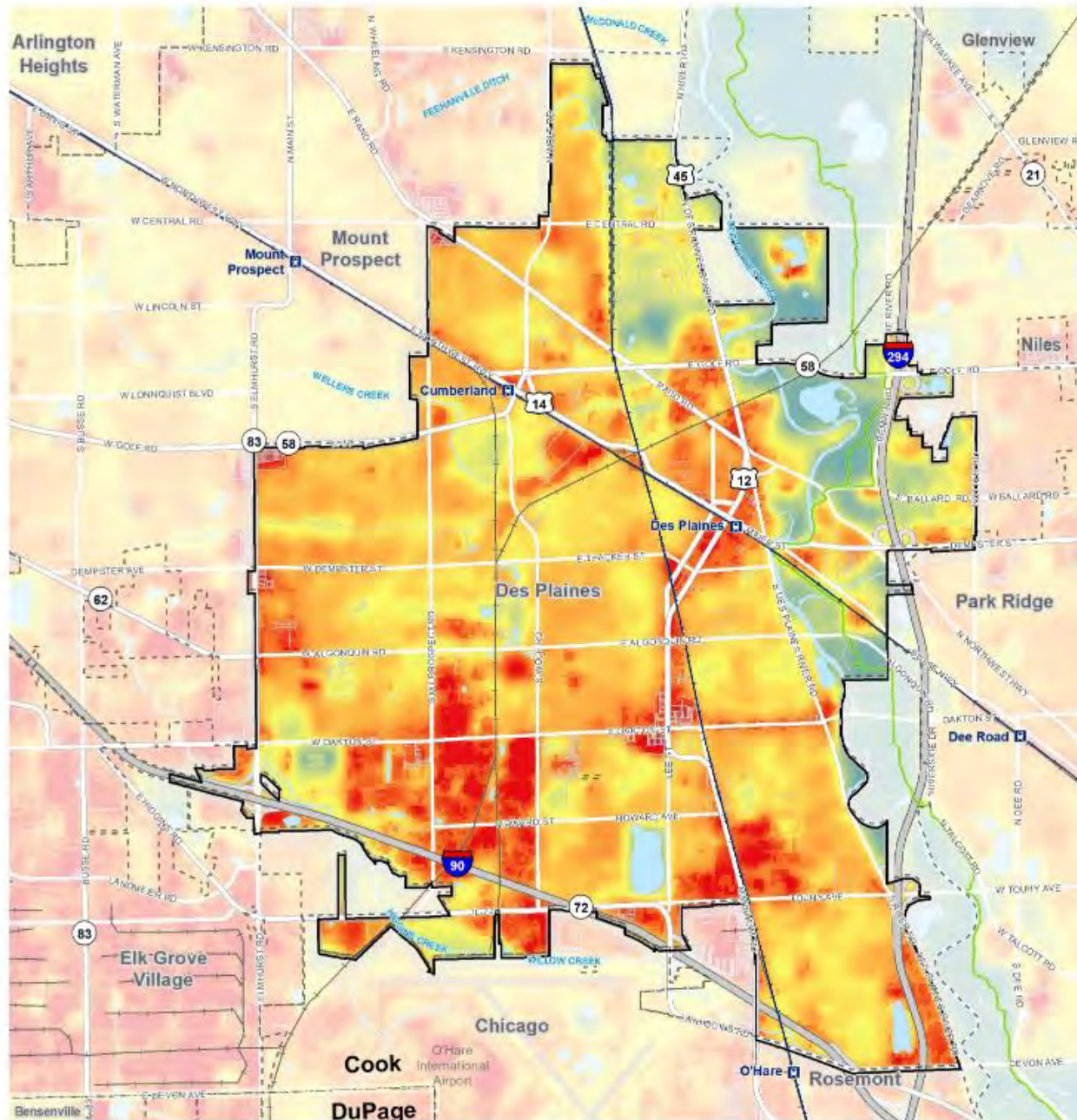
Vulnerability Analysis Flood Impacts



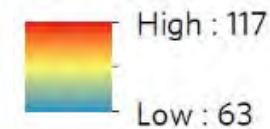
**Wilmington Downtown -
Urban Flood Susceptibility Index**



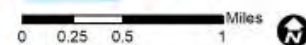
Vulnerability Analysis Heat Impacts



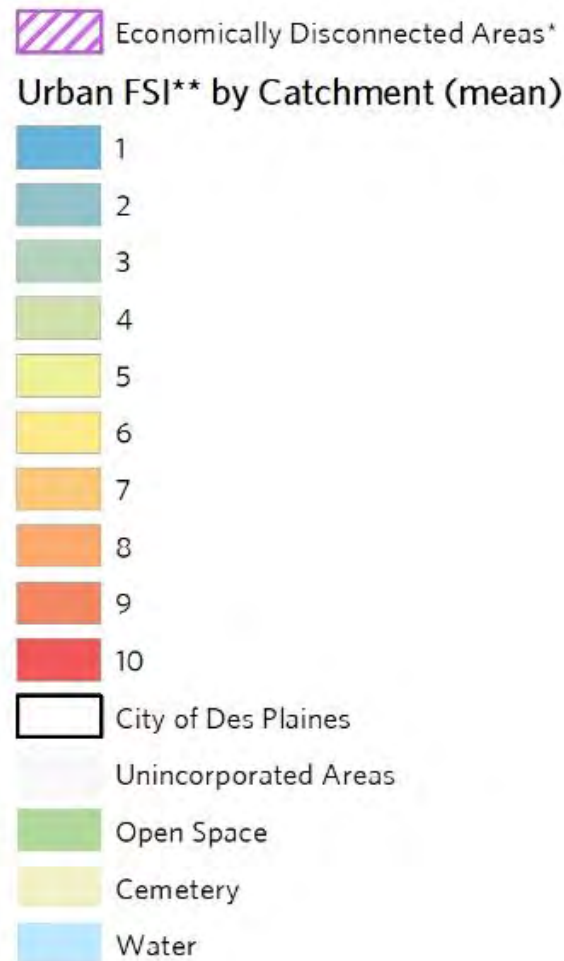
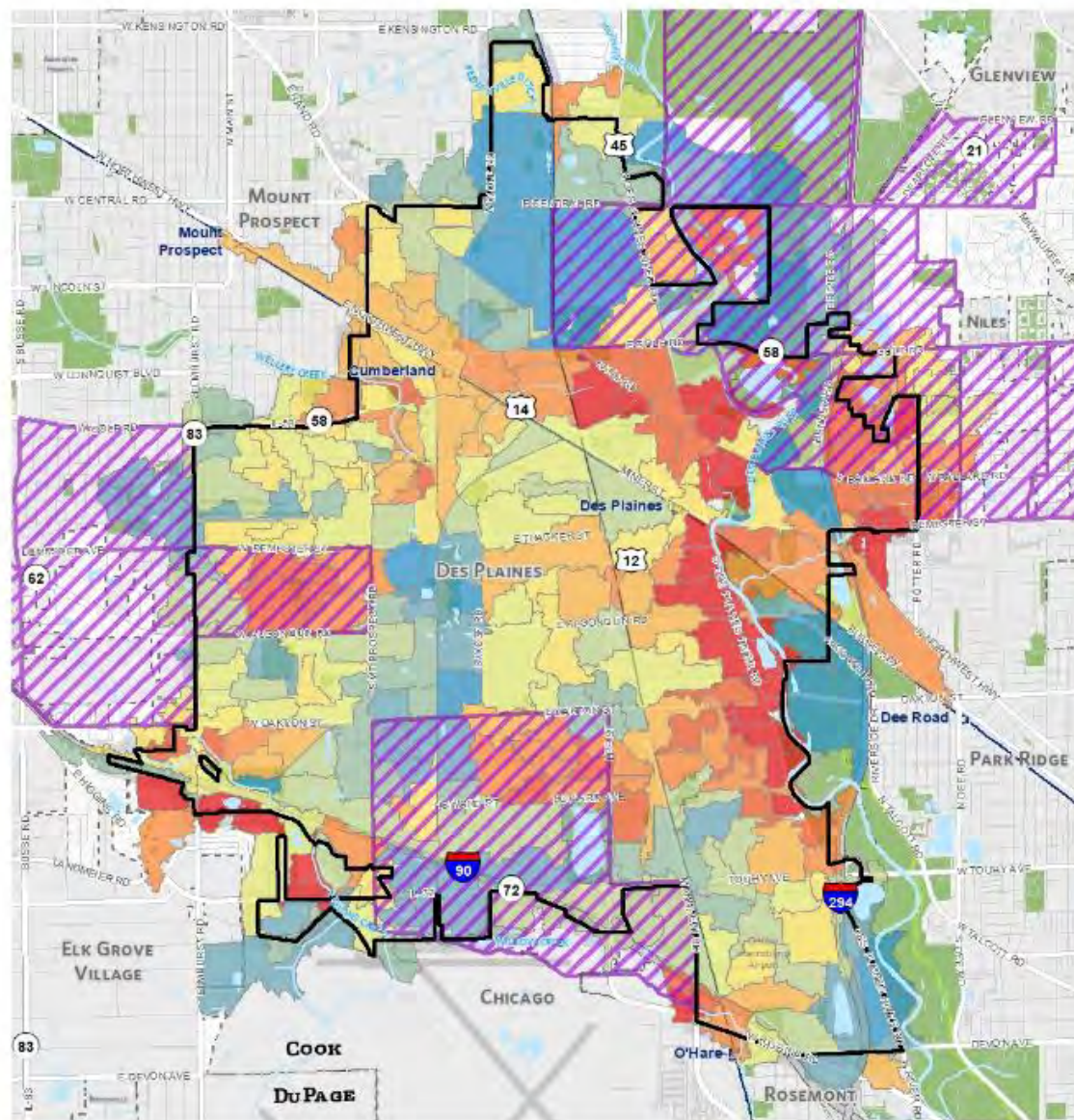
Land Surface Temperature



- City of Des Plaines
- Unincorporated Areas
- County Boundary
- Open Space
- Cemetery
- Water



Chicago Metropolitan Agency for Planning, 2018.



Chicago Metropolitan Agency for Planning, 2018.

* Based on ACS 2014 tracts.

** Variables in Urban FSI (Flood Susceptibility Index):
 Age of First Developed, Combined Sewer Service Areas,
 Base Flood Elevation, and Impervious Cover.

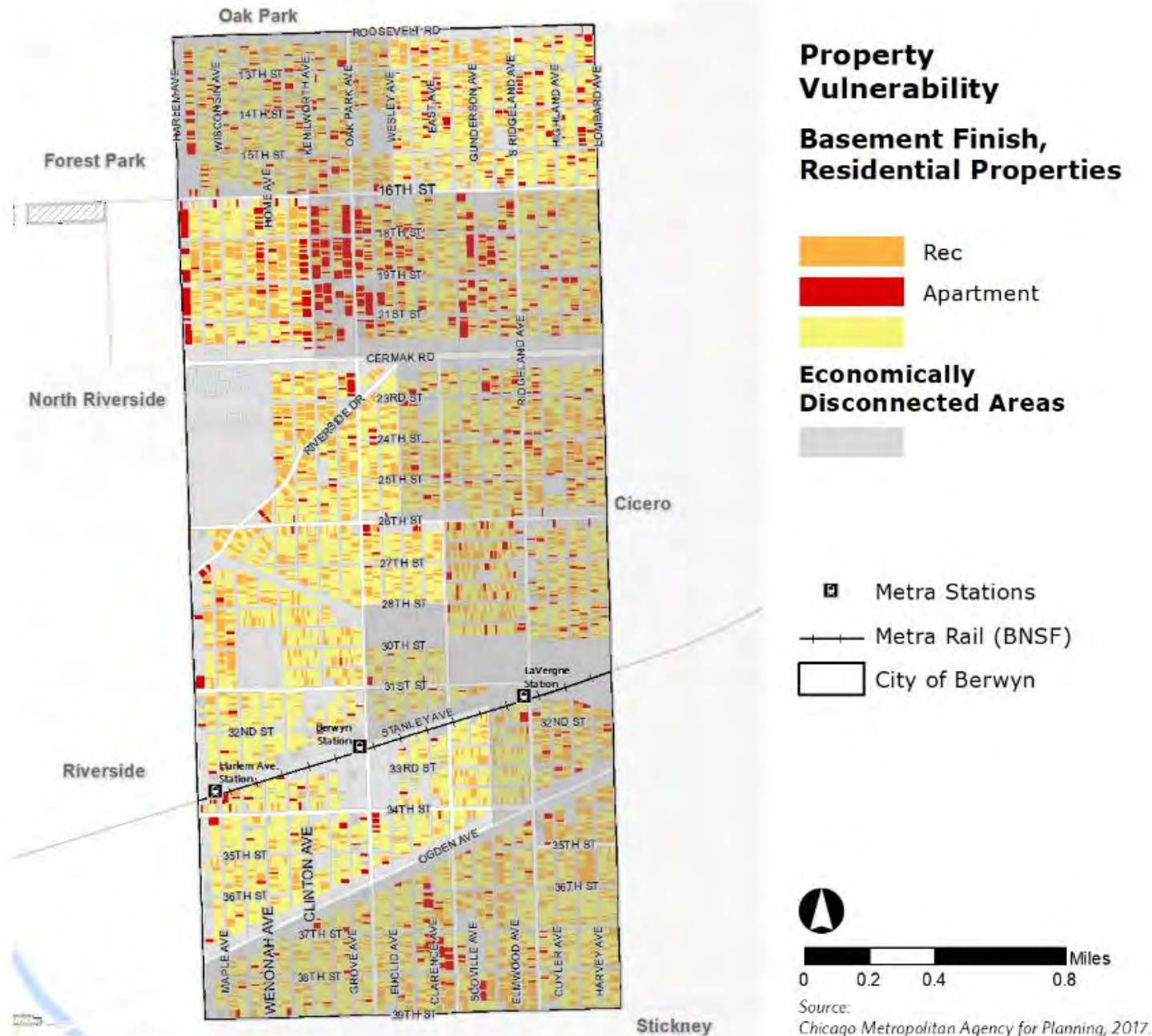


Vulnerability Analysis

Social Vulnerability

Vulnerability Analysis

Social Vulnerability





American Planning Association
Creating Great Communities for All

Using Climate Information in Local Planning: A Guide for Communities in the Great Lakes



An American Planning Association Report

Guidebook

Regional Climate Overview

Data Analysis Guide

Capacity Building

Making the Case

Lessons learned

Work with trusted partners to understand data

Frame uncertainty as part of planning

There is enough data to be informative

Be flexible

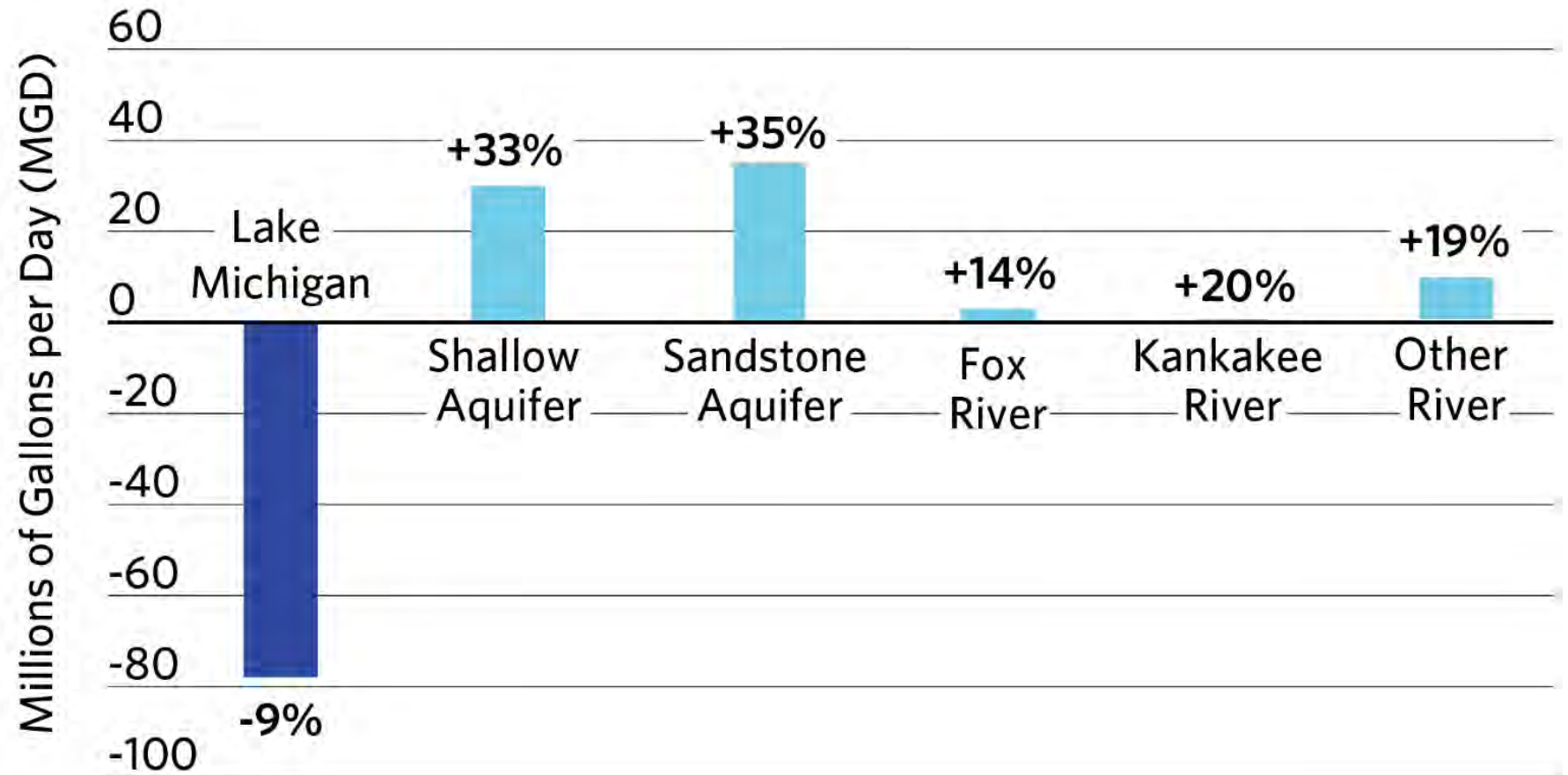


Water Demand Forecast

Forecasted demand exceeds groundwater supplies

Projected changes in water demand by water source, 2011-50

Source: CMAP ON TO 2050 Regional Water Demand Forecast.





Brian Daly

bdaly@cmap.illinois.gov

<https://www.cmap.illinois.gov/programs/sustainability/climate-science>

<https://datahub.cmap.illinois.gov/>



Please open mentimeter on your smart device or another tab

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AMERICAN SOCIETY OF ADAPTATION PROFESSIONALS

www.adaptationprofessionals.org

ASAP Justice, Equity, Diversity, and Inclusion Statement

“We will not allow the actions of the past to dictate our future and we commit to leveraging our network and resources to promote justice, equity, diversity, and inclusion in the climate adaptation field and beyond.”

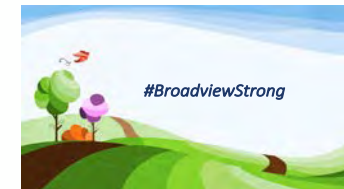
QUESTIONS?

Please join us for the last climate adaptation webinar

4. Adaptation Planning & Prioritization Workshop - June 12, 2020, 1:00 – 3:00 pm

<https://mayorscaucus.org/climatewebinars/>

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