



# A Chicago Regional Climate Plan Overview and Status

## Adaptation Webinar 1

May 22, 2020





# Welcome

Kevin Burns, Mayor, City of Geneva

Chairman, Metropolitan Mayors Caucus Environment  
Committee and Energy Sub Committee



 Metropolitan  
Mayors  
*Caucus*



# Project Overview – GCoM

## Regional and Metro Scale Climate Leaders



Edith Makra



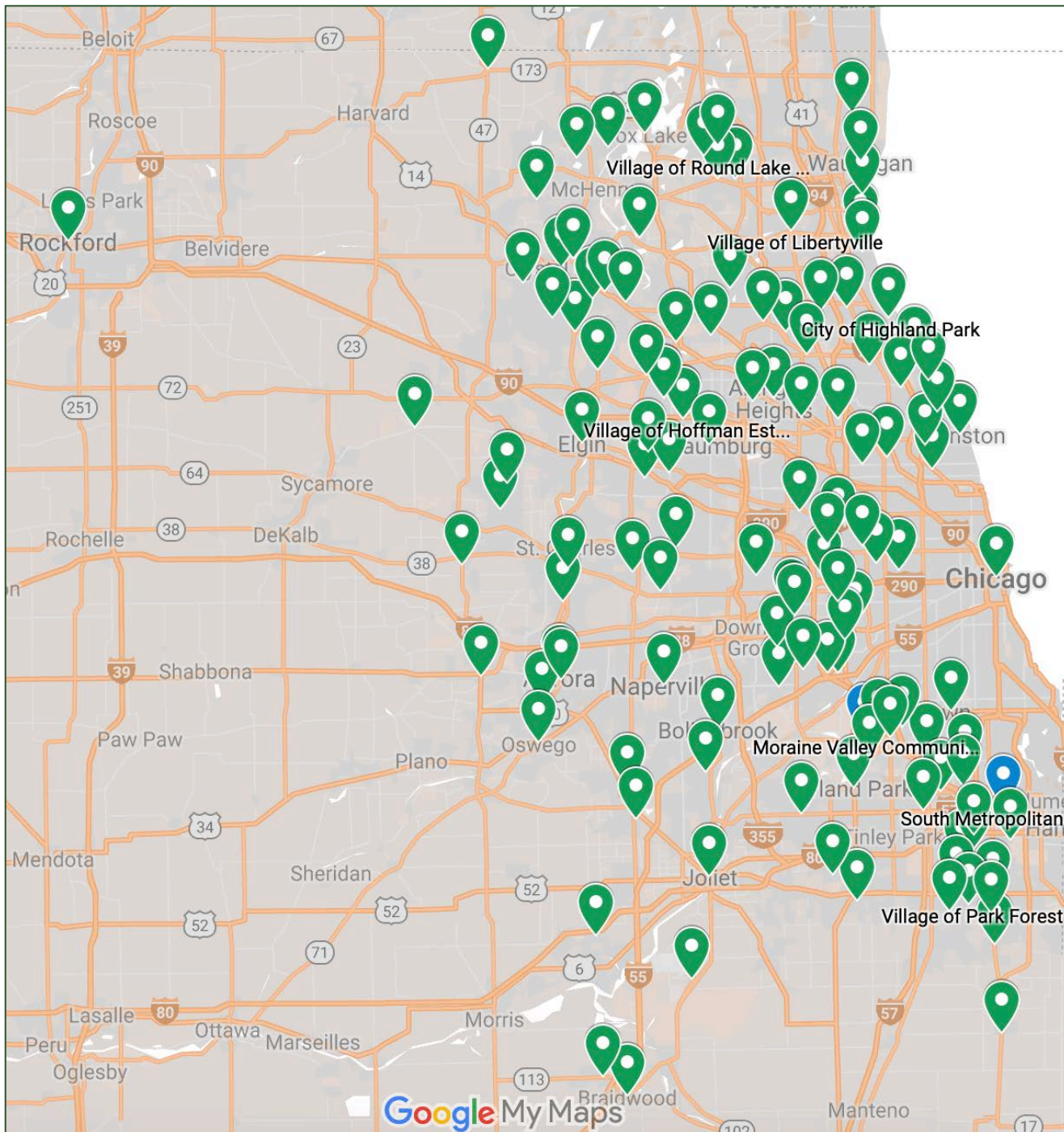
Jared Patton, AICP



CMAP



# Climate Planning - local to global



**Greenest  
Region  
Compact**

**COLLABORATING FOR SUSTAINABLE COMMUNITIES**

127 Municipalities

4 Counties

10 COGS

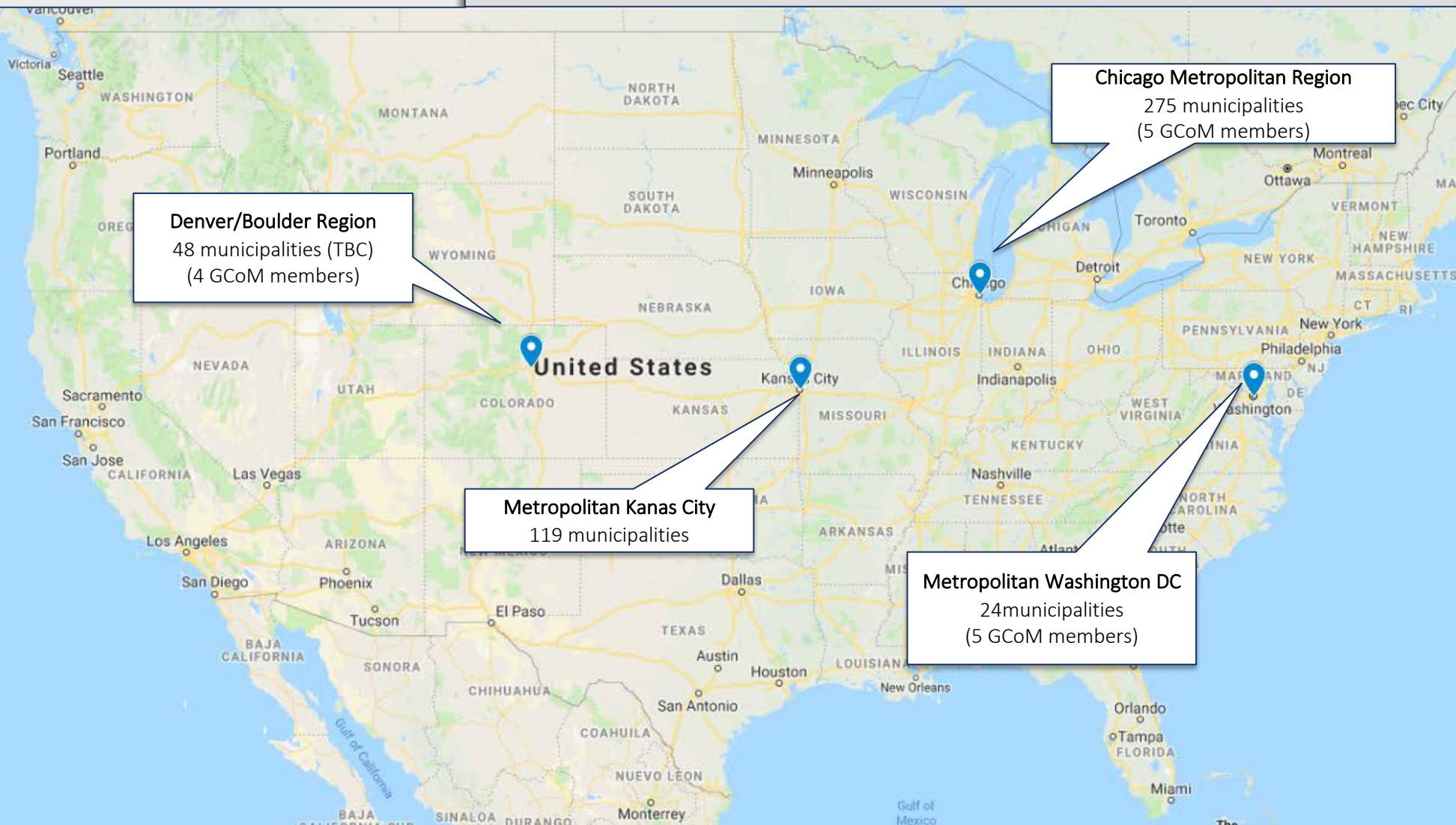
6 MILLION PEOPLE

Supporting consensus goals  
of the GRC





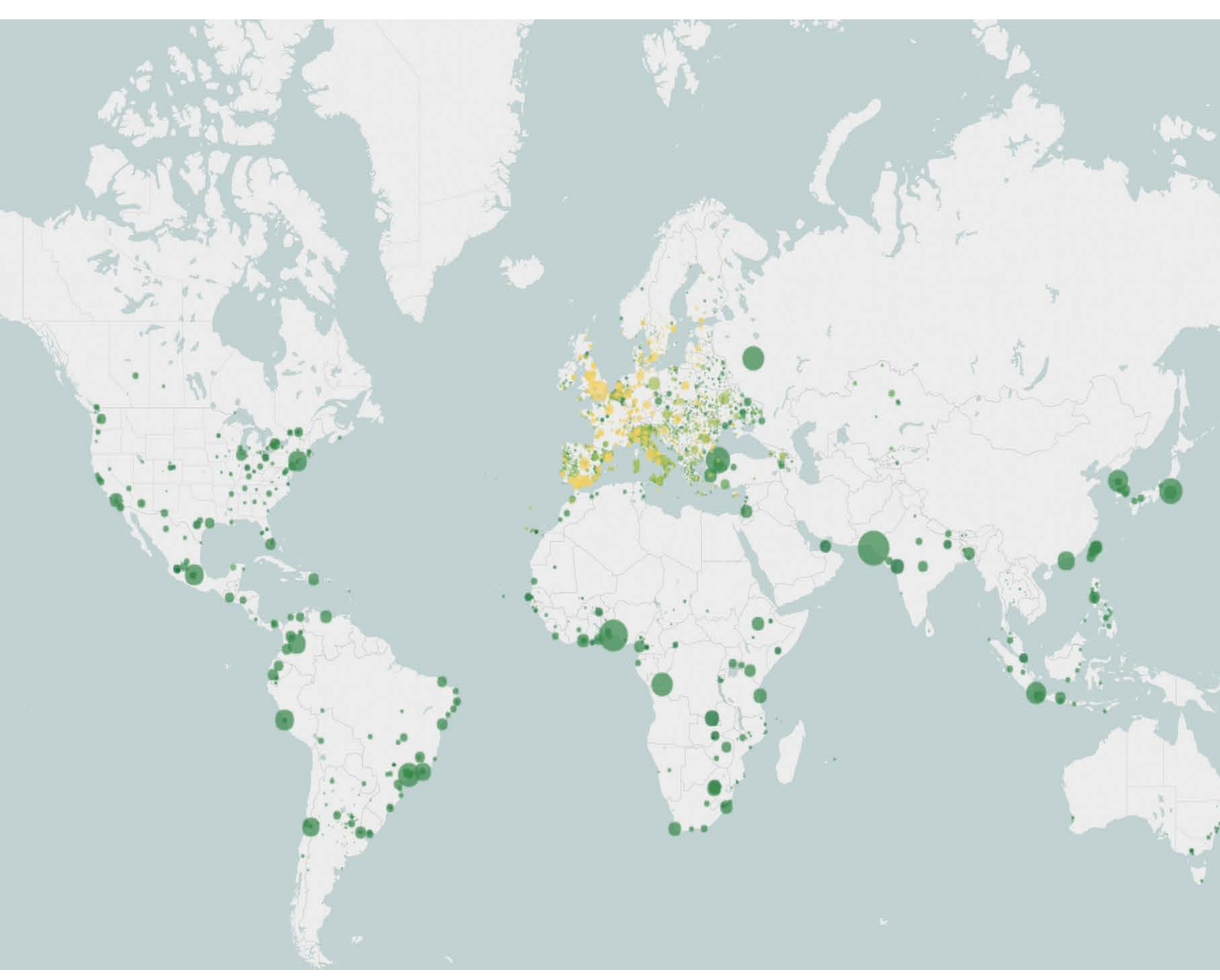
- Technical support
- Knowledge exchange between US regions and other regions
- Promotion of regional case studies through GCoM



Regional cooperation  
works in other countries

Chicago Region chosen as  
a pilot Regional and  
Metro-Scale Climate  
Leader to demo regional  
climate planning in US

# Global Covenant of Mayors for Climate and Energy



9,200+ CITIES

130+ COUNTRIES

800+ MILLION PEOPLE

100+ GLOBAL PARTNERS (city  
networks, private partners, research  
institutions)

10+% OF THE GLOBAL POPULATION

*(only 5 IL municipalities)*

# GCoM Commitment



- ✓ GHG emission inventory;
- ✓ Assess climate risks and vulnerabilities;
- ✓ GHG reduction target thru mitigation;
- ✓ Adaptation vision and goals;
- ✓ Formally adopted plan climate action plan



## Global Covenant of Mayors for Climate & Energy Commitment of

[Name of City or Local Government (please include type of jurisdiction (e.g. city/town/village, etc.))]  
[Name of country/region]  
[Local Government Logo if applicable]

I, [Name], [Mayor and /or title of equivalent mandated representative] of [name of city or jurisdiction] commit to the Global Covenant of Mayors for Climate & Energy (GCoM), joining thousands of other cities and local governments around the world currently engaged in climate leadership.

GCoM envisions a world where committed mayors and local governments – in alliance with partners – accelerate ambitious, measurable climate and energy initiatives that lead to an inclusive, just, low-emission and climate resilient future, helping to meet and exceed the Paris Agreement objectives.

Whatever the size or location, the mayors and local leaders committed to GCoM stand ready to take concrete measures with long-term impact to tackle the interconnected challenges of climate change mitigation and adaptation, as well as access to sustainable energy.

To implement this vision, we pledge to implement policies and undertake measures to (i) reduce / avoid greenhouse gas (GHG) emissions, (ii) prepare for the impacts of climate change, (iii) increase access to sustainable energy, and (iv) track progress toward these objectives.

Specifically, within three years of this commitment<sup>1</sup>, we pledge to develop, adopt<sup>2</sup>, use and regularly report on the following:

- A community-scale GHG emission inventory, following the recommended guidance;
- An assessment of climate risks and vulnerabilities;
- Ambitious, measurable and time-bound target(s) to reduce/avoid GHG emissions;
- Ambitious climate change adaptation vision and goals, based on quantified scientific evidence when possible, to increase local resilience to climate change;
- An ambitious and just goal to improve access to secure, sustainable and affordable energy; and
- A formally adopted plan(s) addressing climate change mitigation / low emission development, climate resilience and adaptation, and access to sustainable energy.

The targets and action plans for mitigation / low emission development must be quantified and consistent with or exceed relevant national unconditional<sup>3</sup> commitments defined through the UNFCCC (Intended) Nationally Determined Contribution (NDC). The targets and action plans should be in line with National Adaptation Plans, where these exist; and should be consistent with the principles around energy access and urban sustainability embodied in the Sustainable Development Goals (SDGs).







*To comply with GCoM  
commitment:*

***Required steps***

- ✓ GHG Inventory
- ✓ • Biz as Usual (BAU) Projections
- ✓ • GHG Reduction Targets
- ✓ GRC to inform actions
- ✓ Mitigation workshop
- ↻ • Climate Risk and Vulnerability Assessment
- ➡ Adaptation Workshop

***To be completed by October 2020:***

- Climate Action Plan

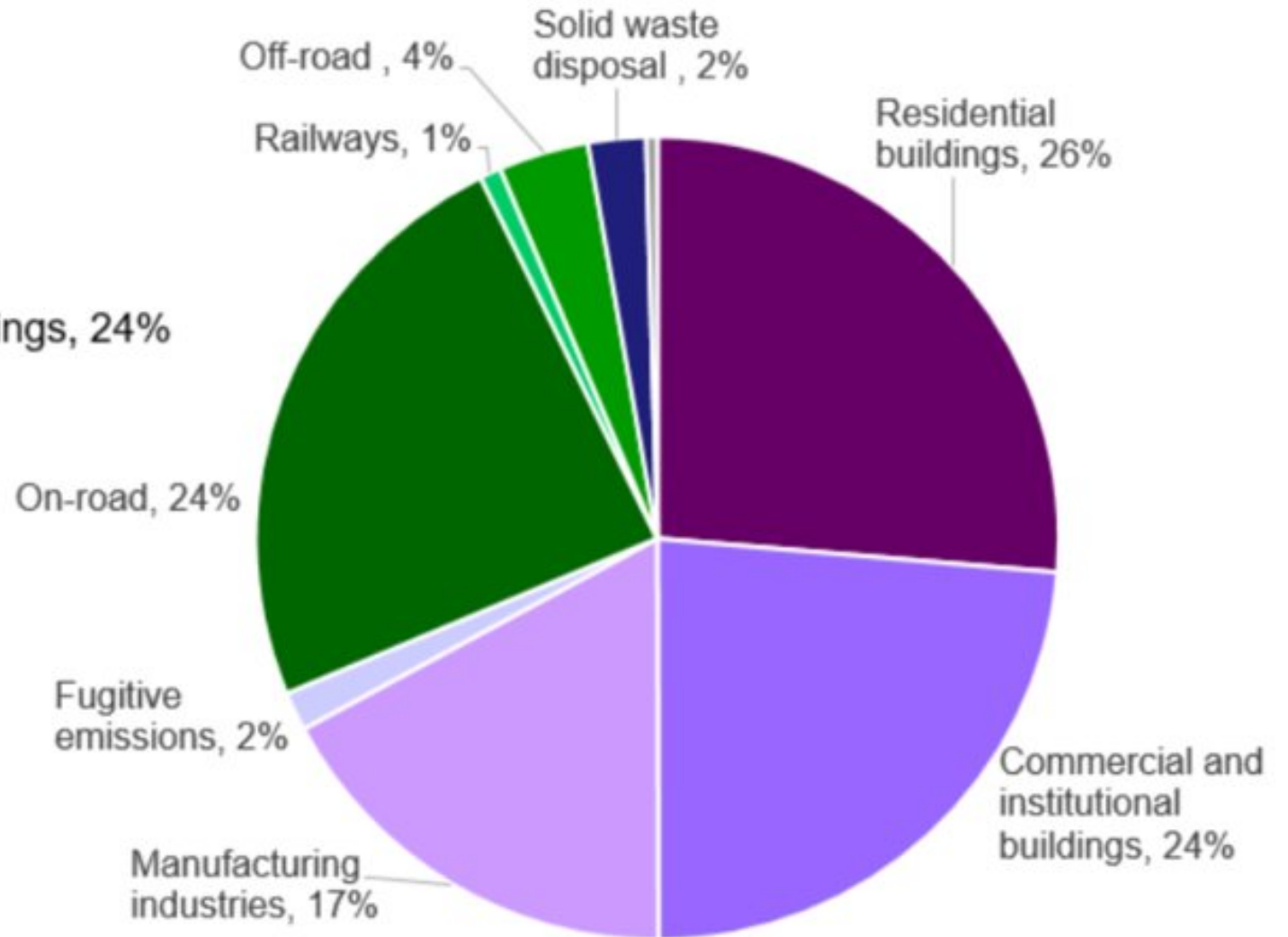
***Ongoing***

- Utilize Common Reporting Framework



## Greenhouse gas emissions by subsector for Chicago region, 2015

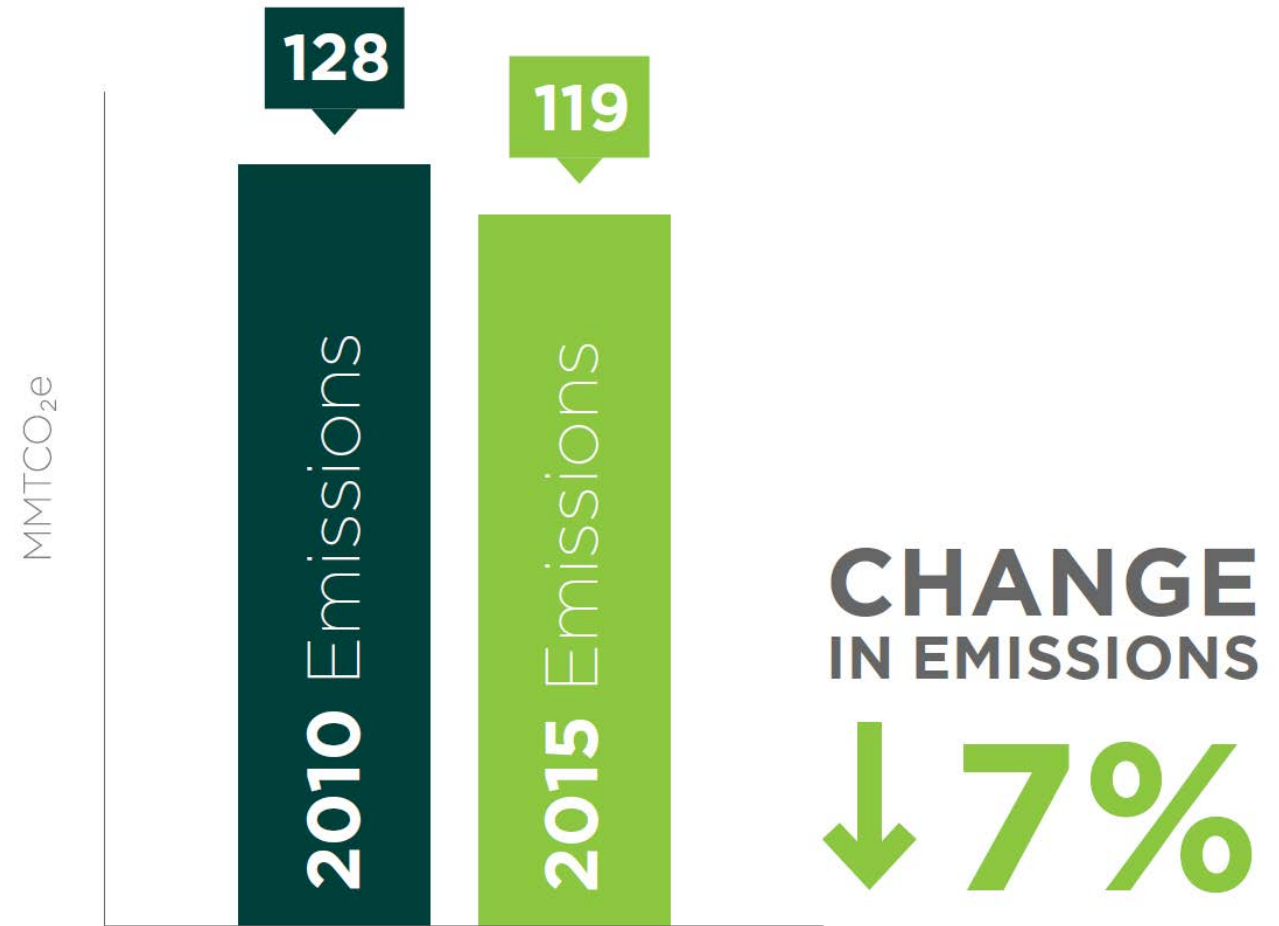
- Residential buildings, 26%
- Commercial and institutional buildings, 24%
- Manufacturing industries, 17%
- Fugitive emissions, 2%
- On-road, 24%
- Railways, 1%
- Off-road, 4%
- Disposal of solid waste, 2%
- Other, 0.43%\*



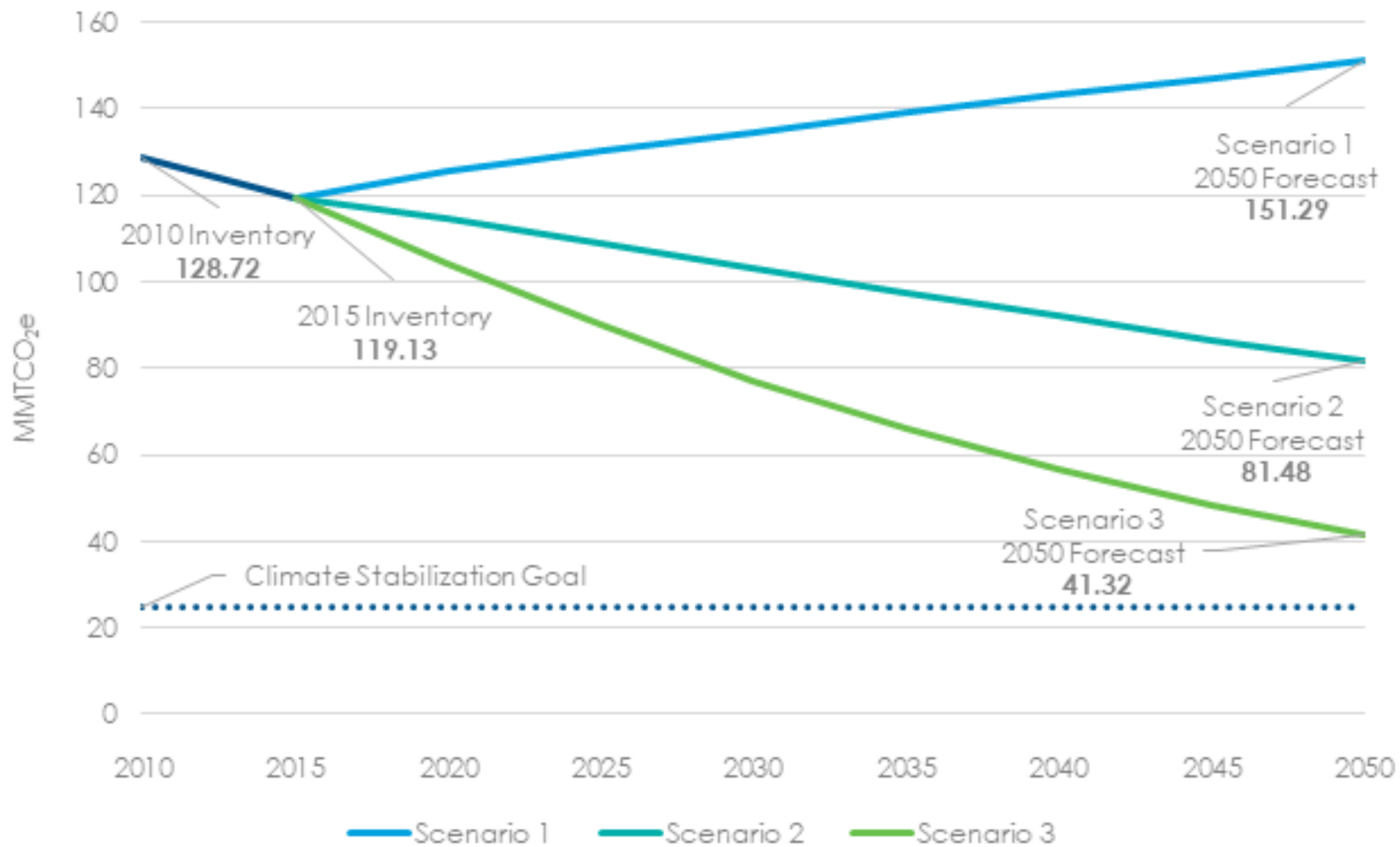


*7% reduction 2010-2015*  
*8.5% reduction per capita*

*Waste: 50% reduction*  
*Buildings: 8% reduction*  
*Transportation: 1% increase*







# Mitigation Planning



Workshop 1: Mitigation

In-person presentations

Virtual presentations and  
discussions

Adaptation webinar series

# What we've heard so far:

## General Feedback

- Strong support
- Desire for climate action
- Empowering to all communities
- Priority strategies emerging

## Regional Needs/Opportunities

- Build support and literacy
- Data, research & dataset management
- Education and advocacy
- Stronger unified voice for policies
- Coordination/facilitation, i.e. SolSmart





## Goal - Use Energy for Public Facilities Efficiently

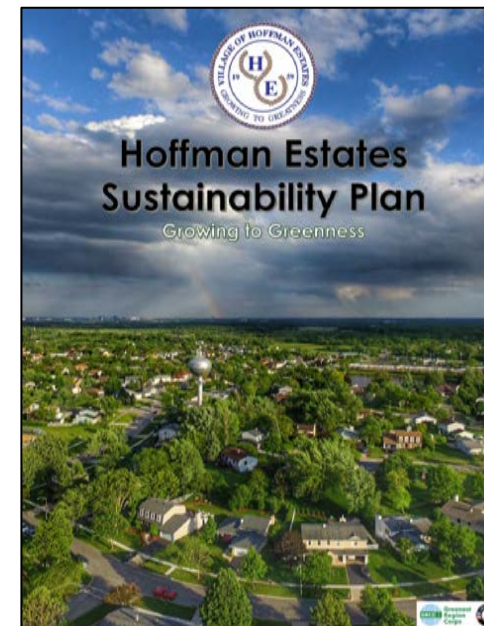
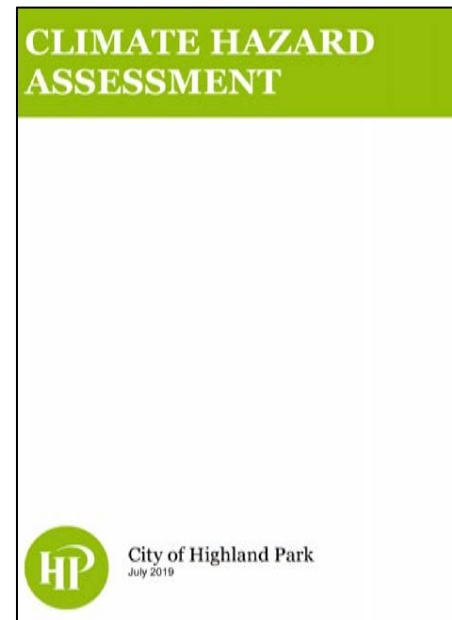
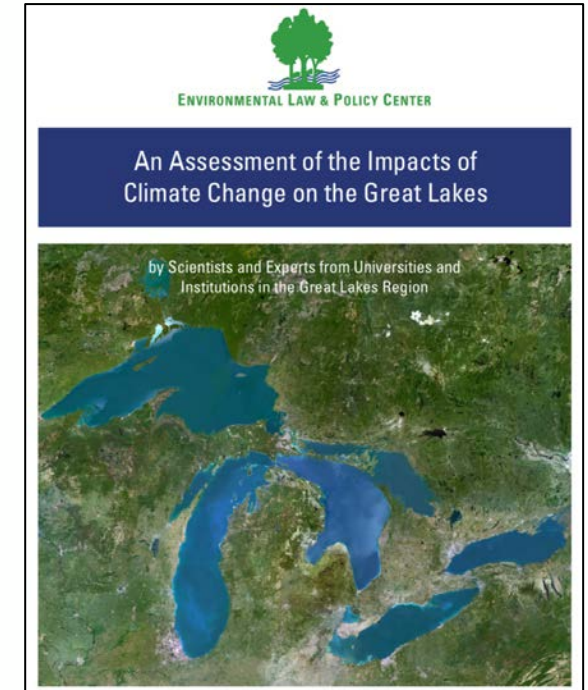
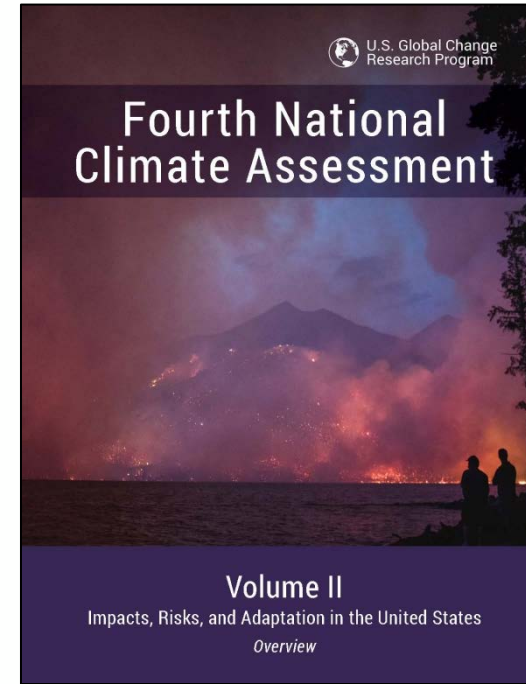
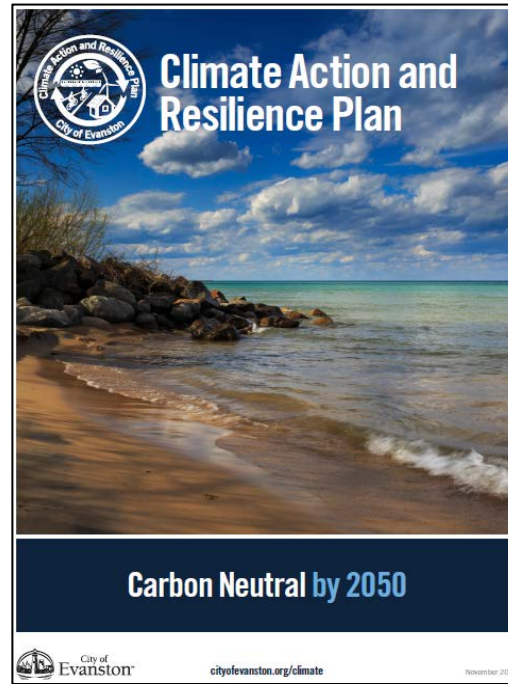
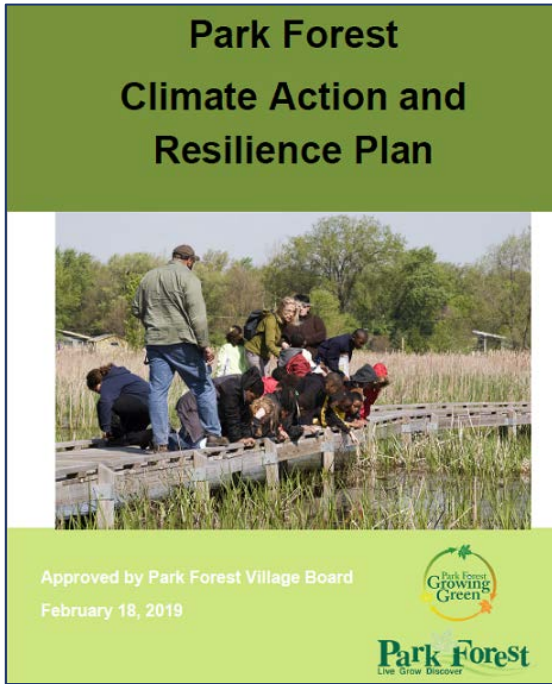
- *283 local governments retrofitted facilities*
- *Use energy efficiently*
- *avoid 76.5 million lbs CO<sub>2</sub>/ yr*

## *Mitigation Strategies*



**Stationary Energy**









How is this regional approach to climate planning useful to you?

Go to **menti.com**

Enter the code **18 86 7**



## Speakers



### Ned Gardiner, PhD

Engagement Manager  
NOAA Climate Program Office &  
U.S. Climate Resilience Toolkit  
[ned.gardiner@noaa.gov](mailto:ned.gardiner@noaa.gov)



### Jim Fox

Sr. Resilience Analyst  
NEMAC-Fernleaf & U.S. Climate  
Resilience Toolkit  
[jfox@nemacfernleaf.com](mailto:jfox@nemacfernleaf.com)



Practical Guidance for

# Chicago Region Climate Planning

Using the Steps to Resilience



# Changes in wildfire, flooding, climate, energy, population, economy, and other realities are stressing our communities, landscapes, and livelihoods



Climate

Hazard

Population or  
Asset







## Hazards

- Events or chronic disruptions that negatively impact community assets (people, infrastructure, services, resources)
- Frequency or severity subject to change due to *climate* or *non-climate stressors*



# What is Resilience?

The ability of the natural, human, built or economic system to recover from and withstand impacts from *hazards*

Business as Usual

Quality of life,  
safety, health  
opportunity

Time



Quality of life,  
safety, health  
opportunity

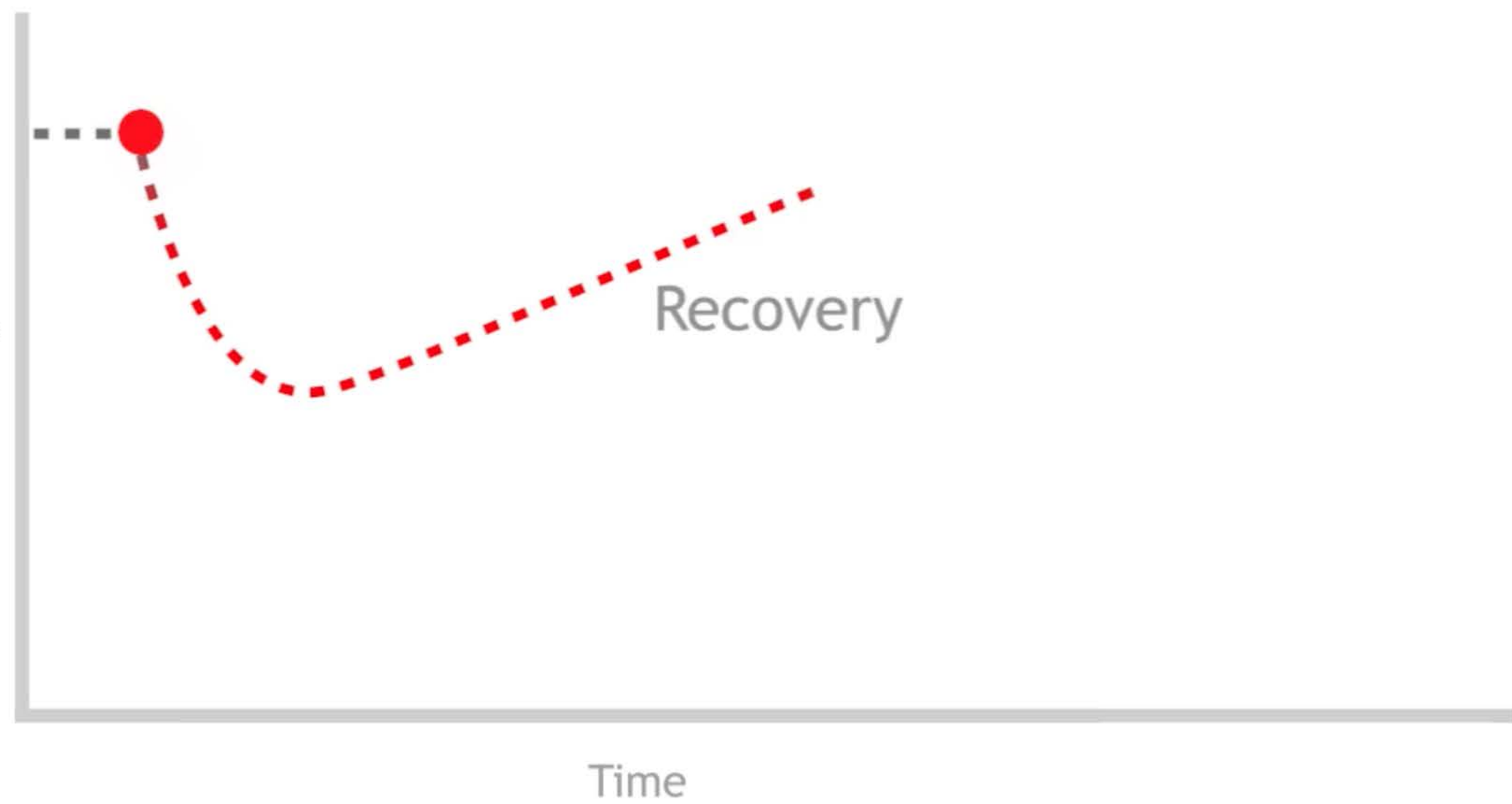
Acute Hazard

Time





Quality of life,  
safety, health  
opportunity



Business as Usual

Quality of life,  
safety, health  
opportunity

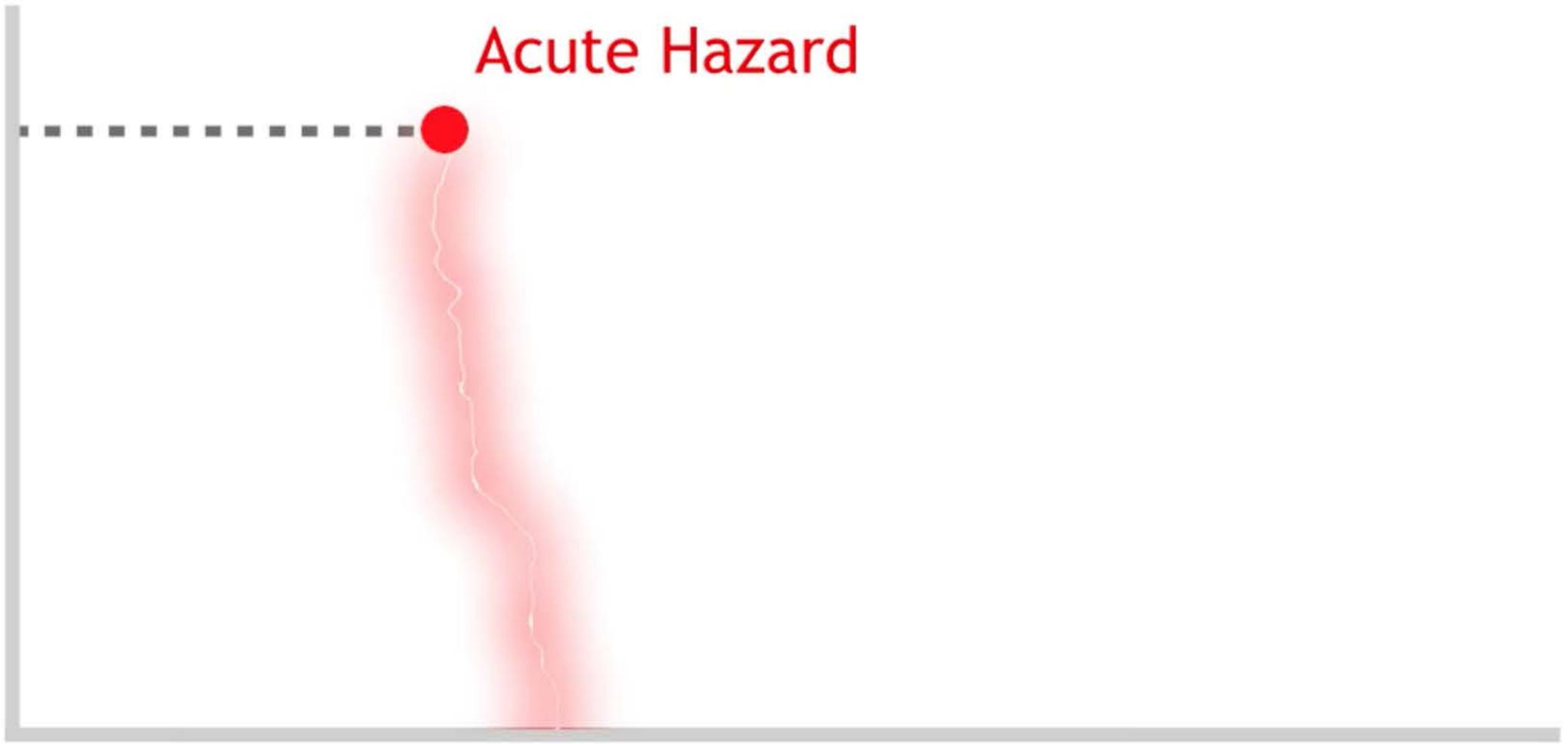
Time



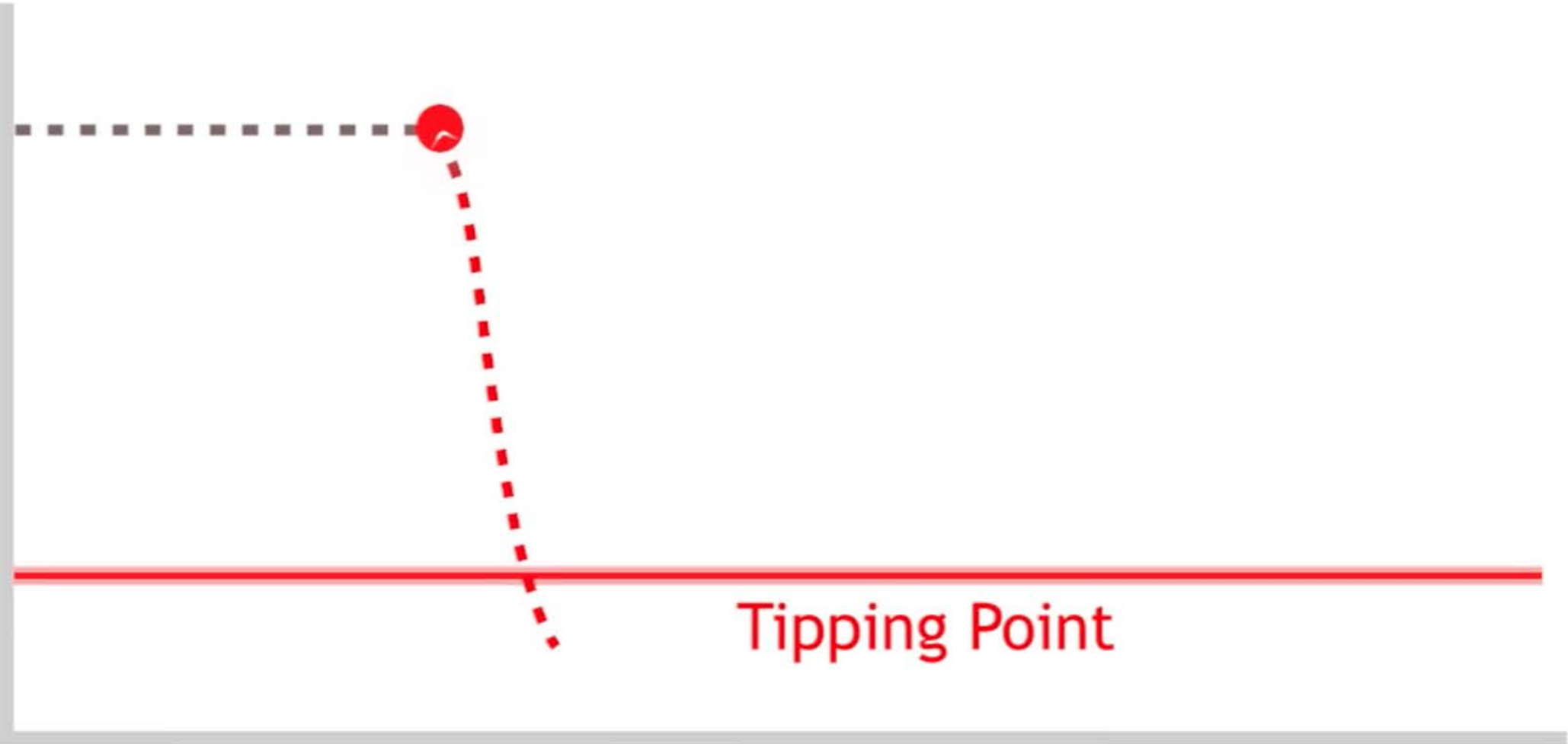
Quality of life,  
safety, health  
opportunity

Acute Hazard

Time



Quality of life,  
safety, health  
opportunity



Tipping Point

Time

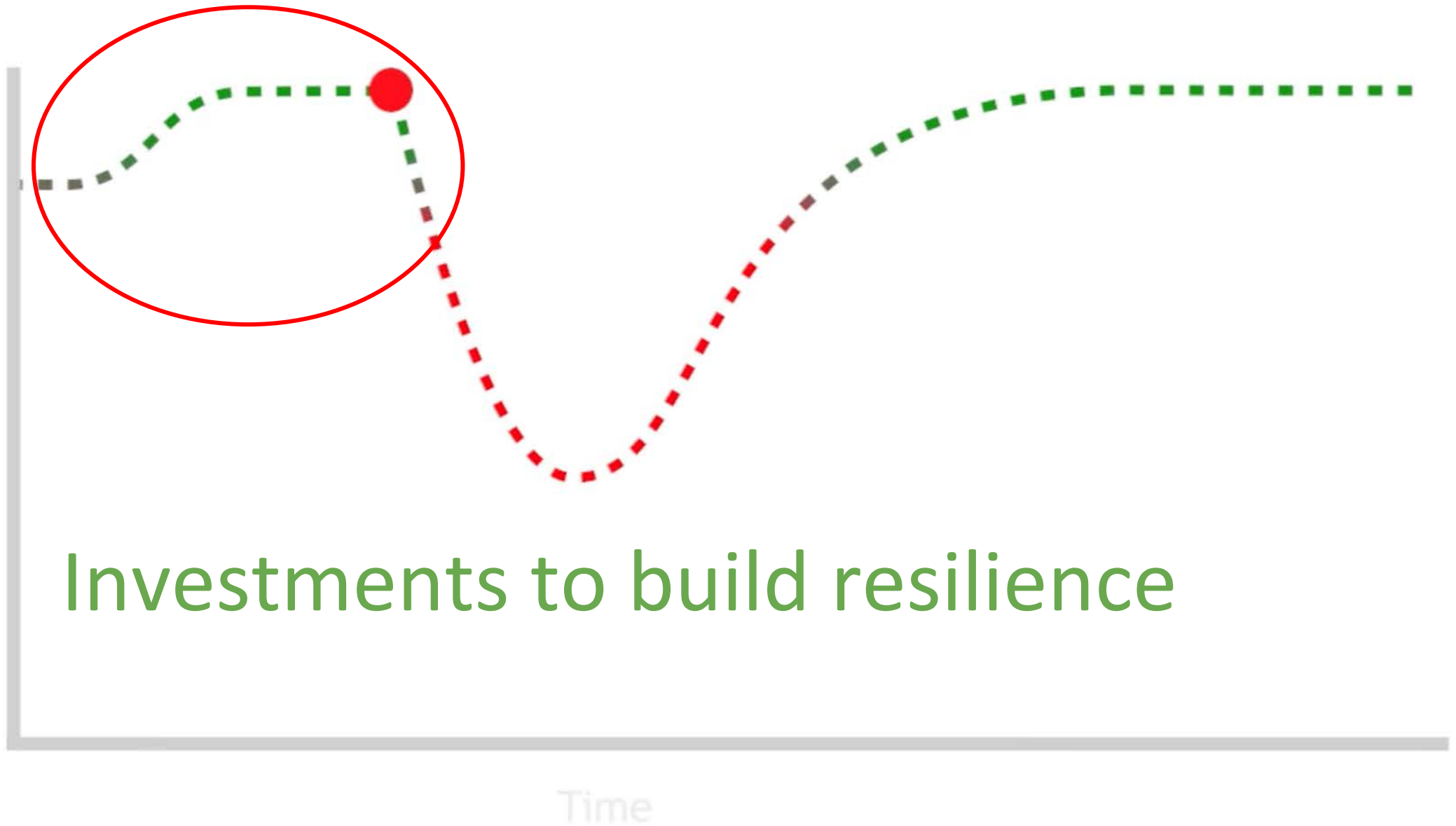


Quality of life,  
safety, health  
opportunity

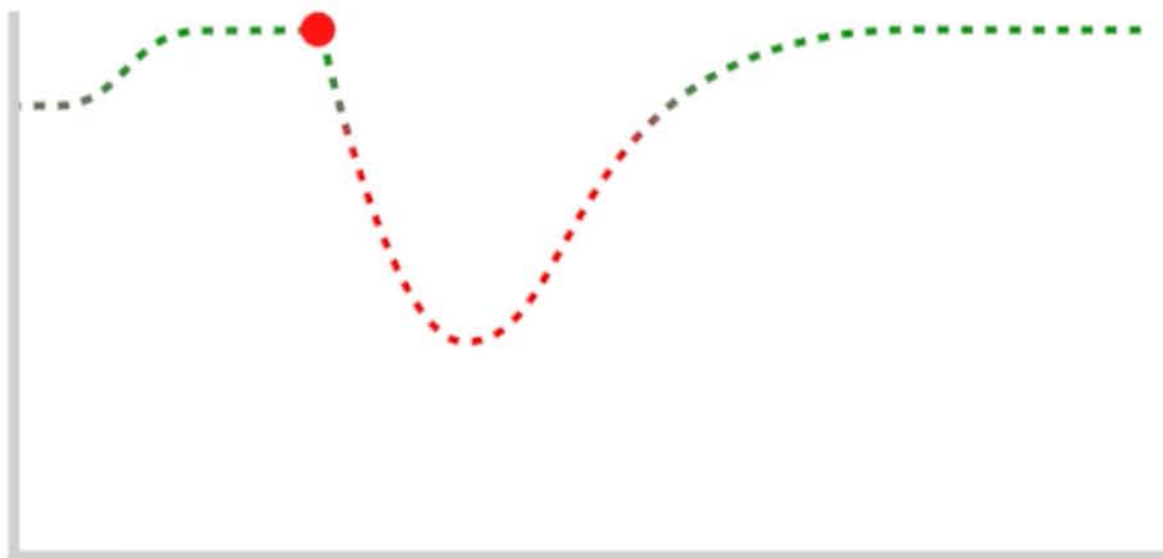


Time

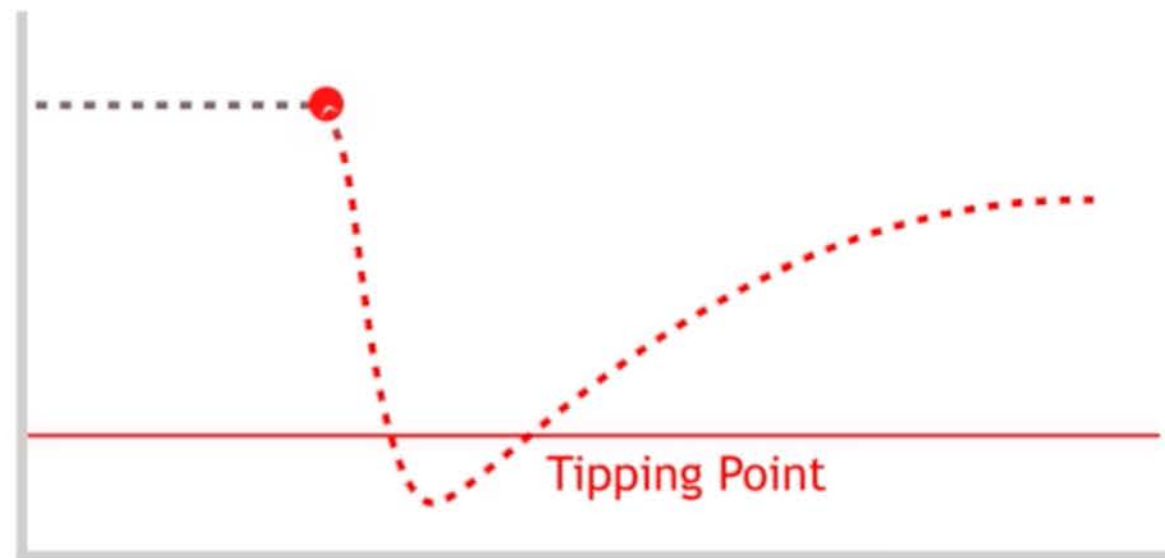
Quality of life,  
safety, health  
opportunity



More Resilient



Less Resilient





Climate resilience complements planning

Non-climate stressors affect community resilience and will be incorporated throughout.

Building resilience means smart investing, not getting a “thicker skin” or “toughing it out.”

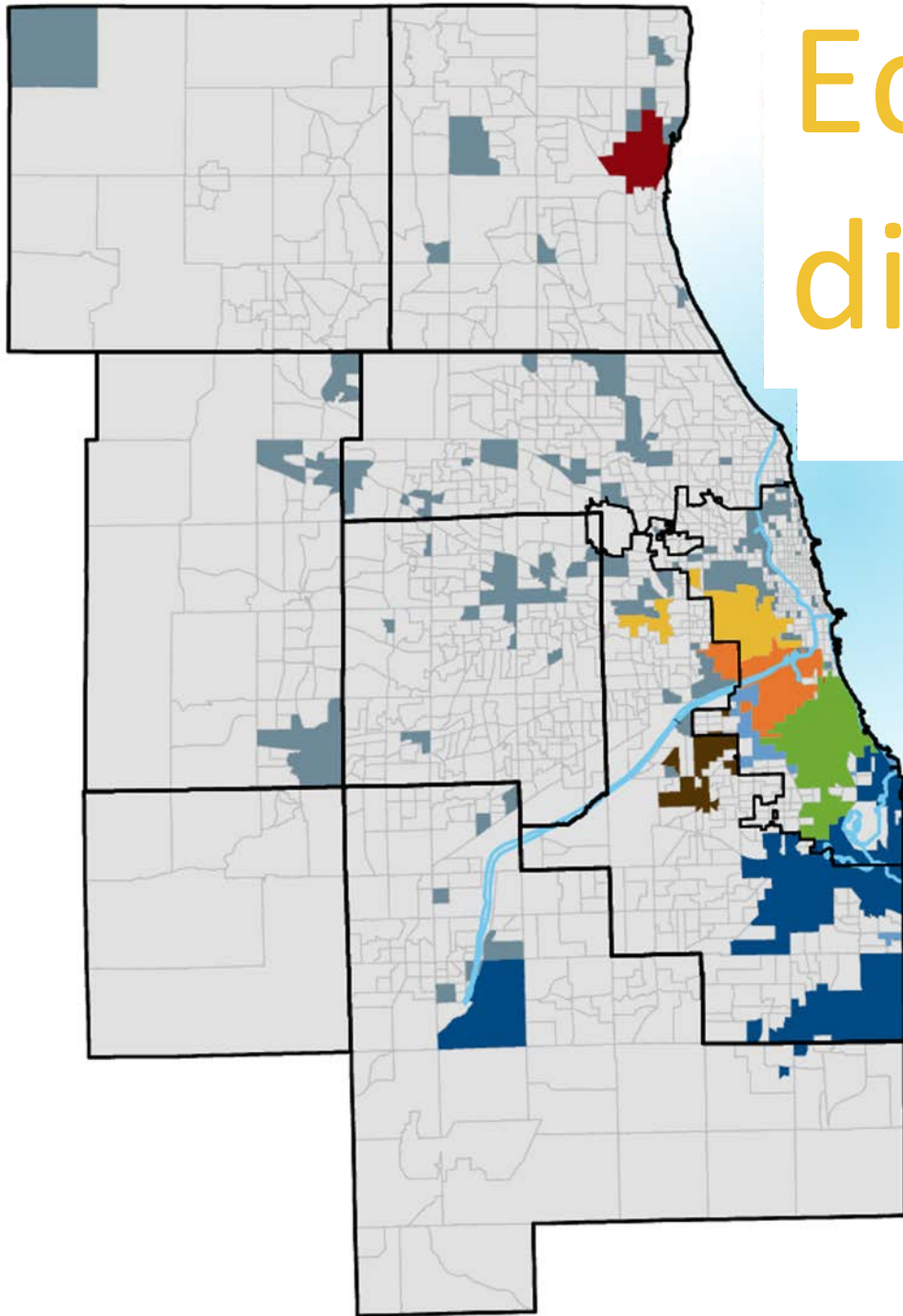




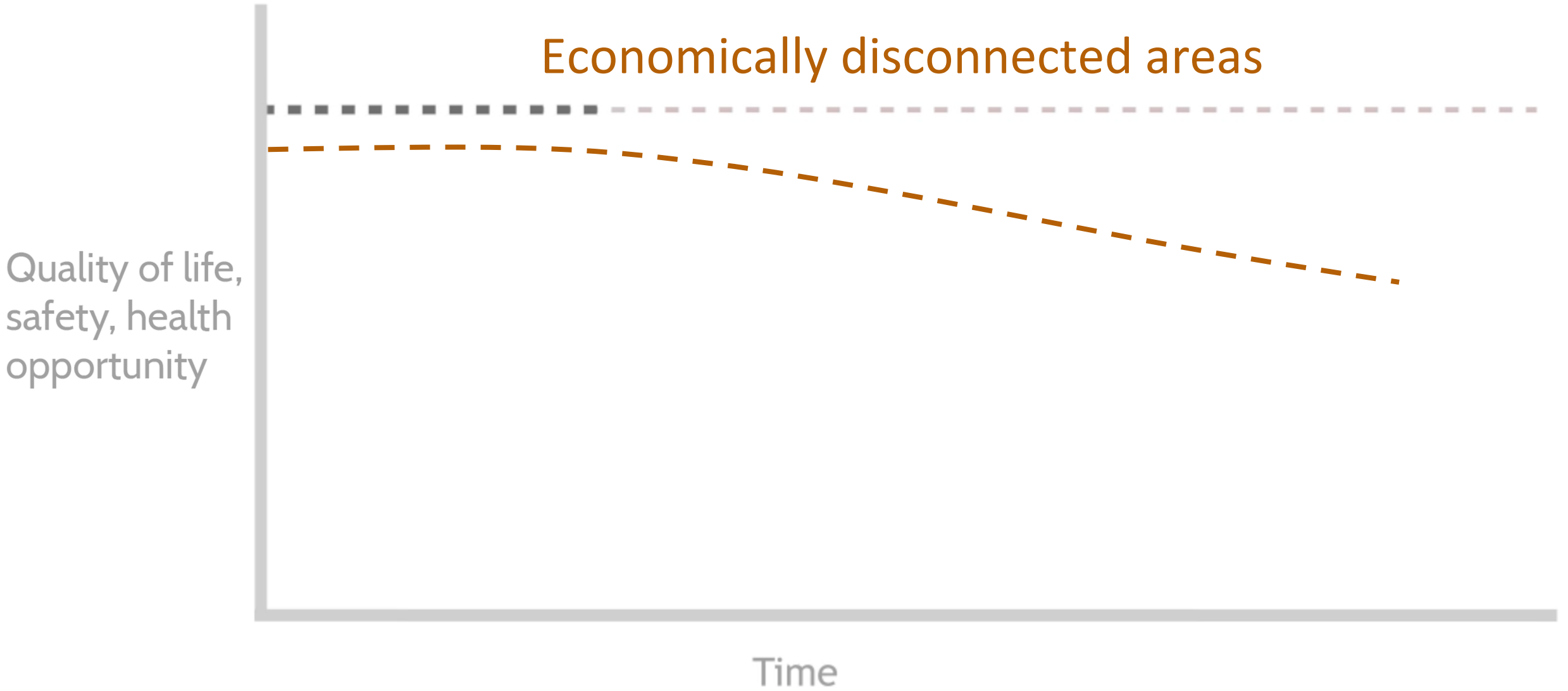
## Chicago region non-climate stressors (from CMAP)

- Gross regional product > population growth
- Racial & economic disparities
- Decreased revenue for government
- Aging infrastructure
- Aging population
- ↑ infrastructure, ↑ sprawl, ↓ open space

# Economically disconnected areas



- Waukegan area (Cluster 1)
- SW suburbs (Cluster 2)
- S. Chicago (Cluster 3)
- SW Chicago (Cluster 4)
- W. Chicago (Cluster 5)
- S. suburbs and Joliet (Cluster 6)
- NW Chicago and remaining collar counties (Cluster 7)
- Tracts





A successful climate plan will:

- Support adaptation strategies within existing plans
- Improve coordination (local, regional, state, federal)
  - prioritization
  - funding
  - measuring
  - improving
- Build capacity to address climate challenges
- Enhance governance





# The Steps to Resilience

1 Explore Hazards

2 Assess Vulnerability & Risks

3 Investigate Options

4 Prioritize & Plan

5 Take Action

Incorporate  
Climate Risk

Traditional  
Decision Making



Understand how climate  
variability and change might  
threaten things you value

1 Explore Hazards

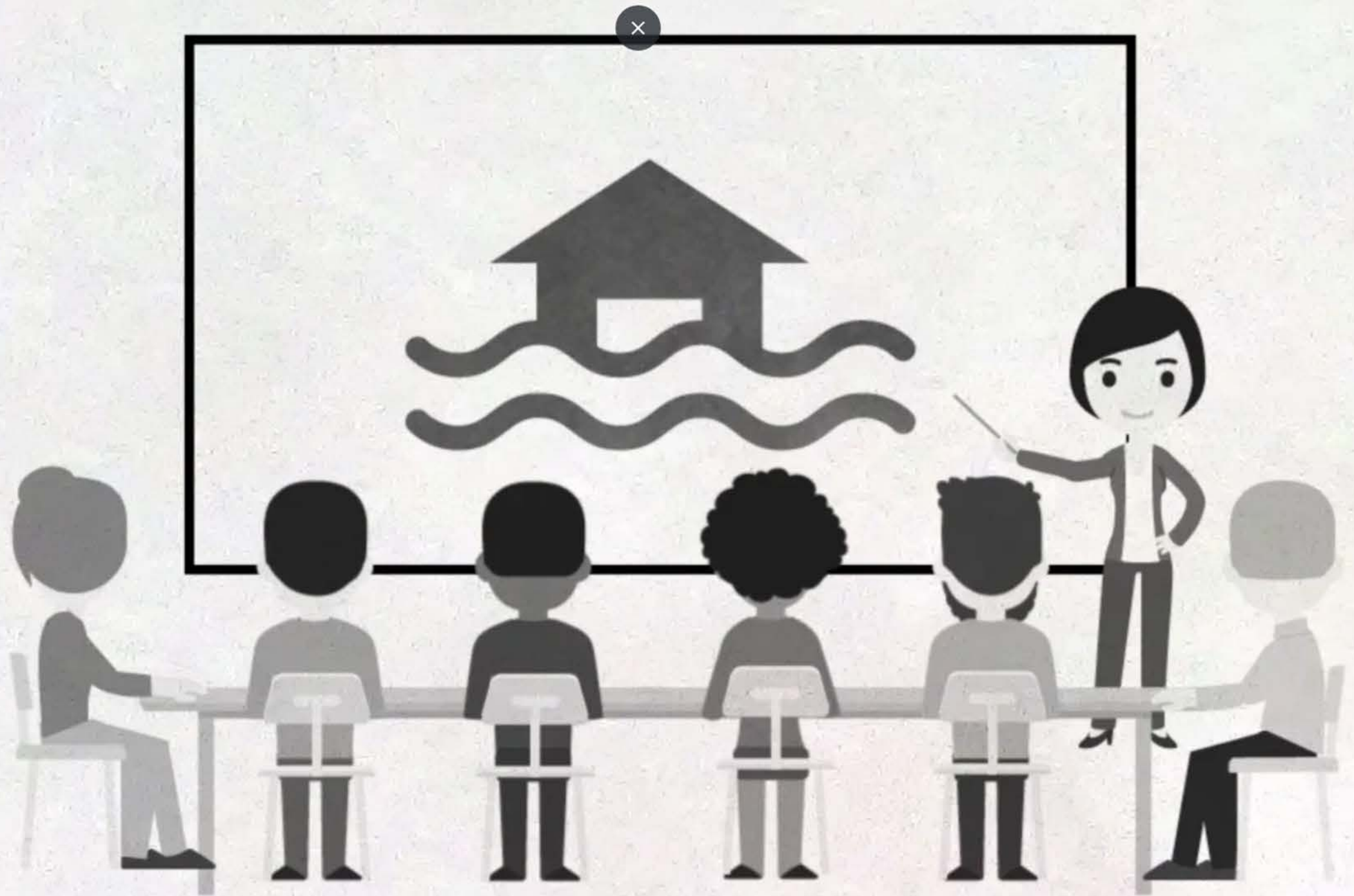


2 Assess Vulnerability & Risks

3 Investigate Options

4 Prioritize & Plan

5 Take Action





# Climate stressors



NOAA National Centers for Environmental Information | State Summaries 149-IL

## ILLINOIS

### KEY MESSAGES

Average annual temperature has increased by about 1°F since the beginning of the 20th century. There has been seasonal variation in this warming, with average spring temperature increasing by about 2°F and average summer temperature increasing very little. Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century.

Precipitation in spring and summer has generally been above average over the past two decades, affecting agriculture in both positive (adequate soil moisture) and negative (delays in spring planting) ways. Precipitation in winter and spring is projected to increase, which poses a continuing risk of spring planting delays.

Severe flooding and drought have occurred periodically in recent years. Future increases in extreme precipitation events and in evaporation rates may increase the intensity of both floods and droughts.







# Climate trajectories



NOAA National Centers for Environmental Information | State Summaries 149-IL

## ILLINOIS

### KEY MESSAGES

- Increased average temperature
- Increased spring temperature
- More spring & summer precipitation
- Winter/spring precip. increase
- Flooding & drought

observed  
observed  
observed  
projected  
observed & anticipated

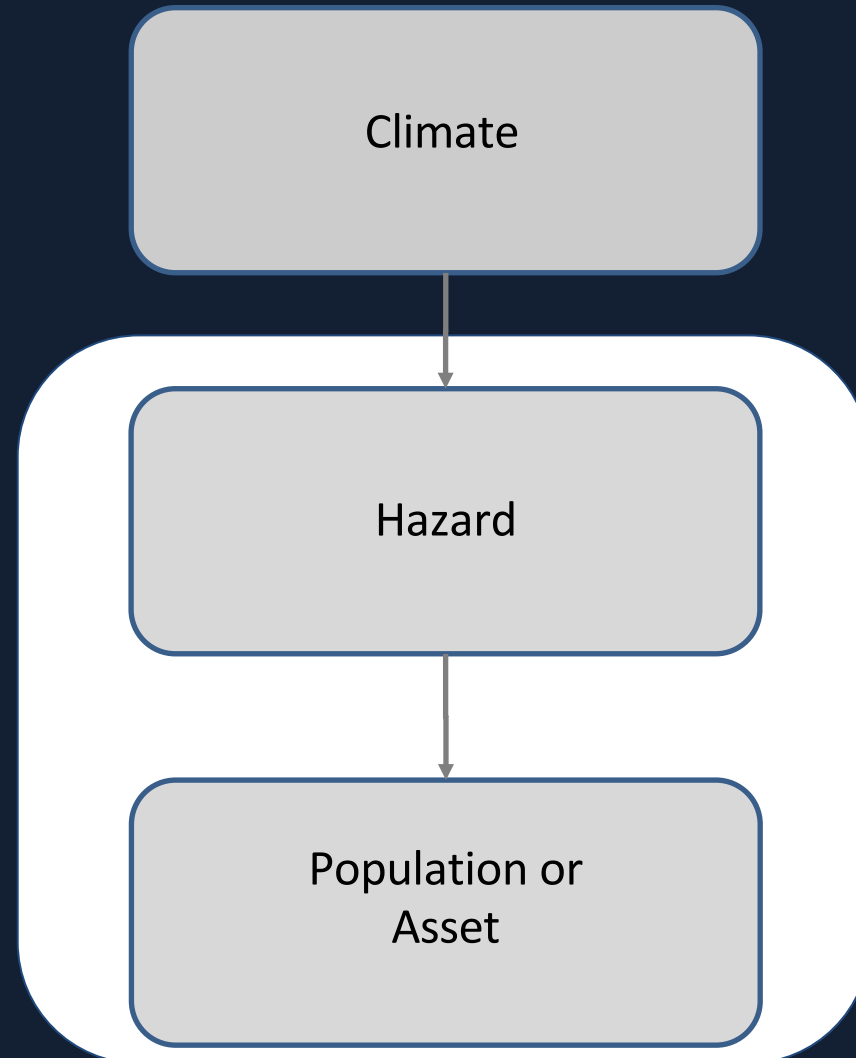
Average annual temperature has increased by about 1.2° since the beginning of the 20th century. There has been seasonal variation in this warming, with average spring temperature increasing by about 2°F and average summer temperature increasing very little. Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21st century. Precipitation in spring and summer has generally been above average over the past two decades, affecting agriculture in both positive (adequate soil moisture) and negative (delays in spring planting) ways. Precipitation in winter and spring is projected to increase, which poses a continuing risk of spring planting delays.

Severe flooding and drought have occurred periodically in recent years. Future increases in extreme precipitation events and in evaporation rates may increase the intensity of both floods and droughts.





Impacts involve both a **hazard** and an **asset**





## Hazards

- Events or chronic disruptions that negatively impact community assets (people, infrastructure, services, resources)
- Frequency or severity subject to change due to *climate* or *non-climate stressors*
- Assessment of stressors and hazards must match in scale
- *Spatial data* may support assessment of *risk* and *opportunity*.



# Days/year temperature $> 95^{\circ}\text{F}$ (Geneva)



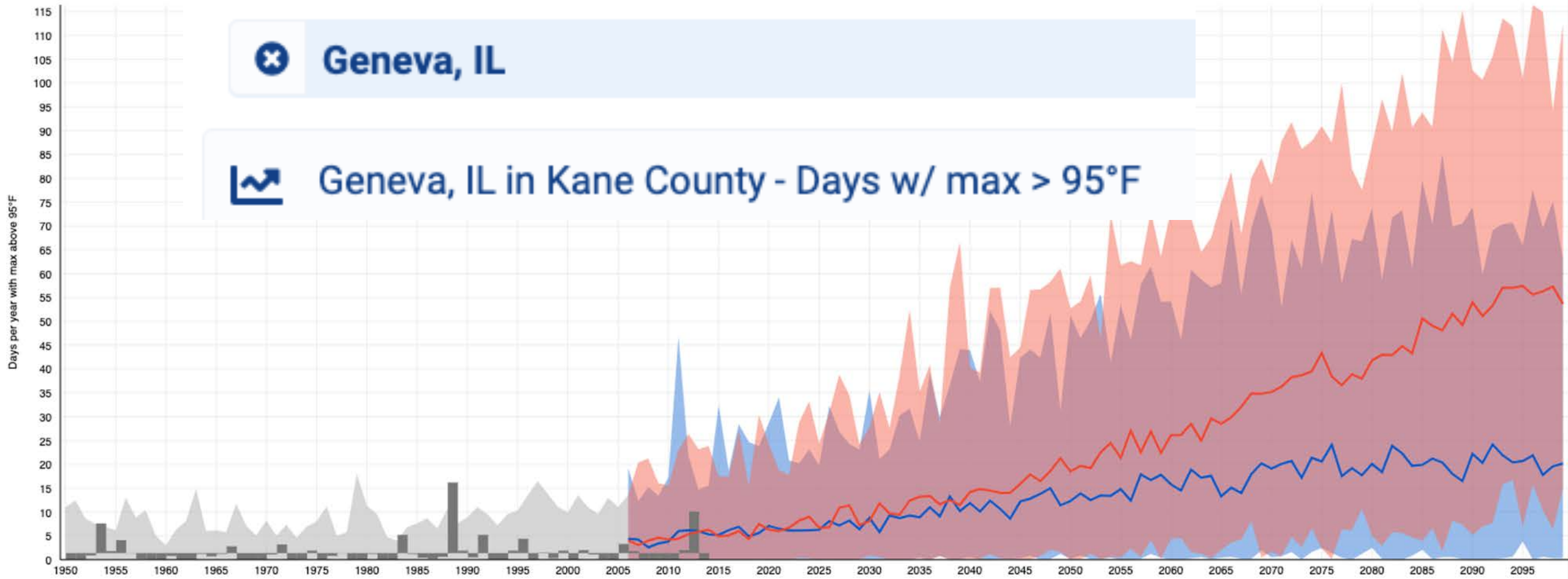
## The Climate Explorer



Geneva, IL



Geneva, IL in Kane County - Days w/ max  $> 95^{\circ}\text{F}$





What impacts are you concerned about?

Go to [menti.com](https://www.menti.com)

Enter the code 18 86 7





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





Same exposure  
different vulnerability



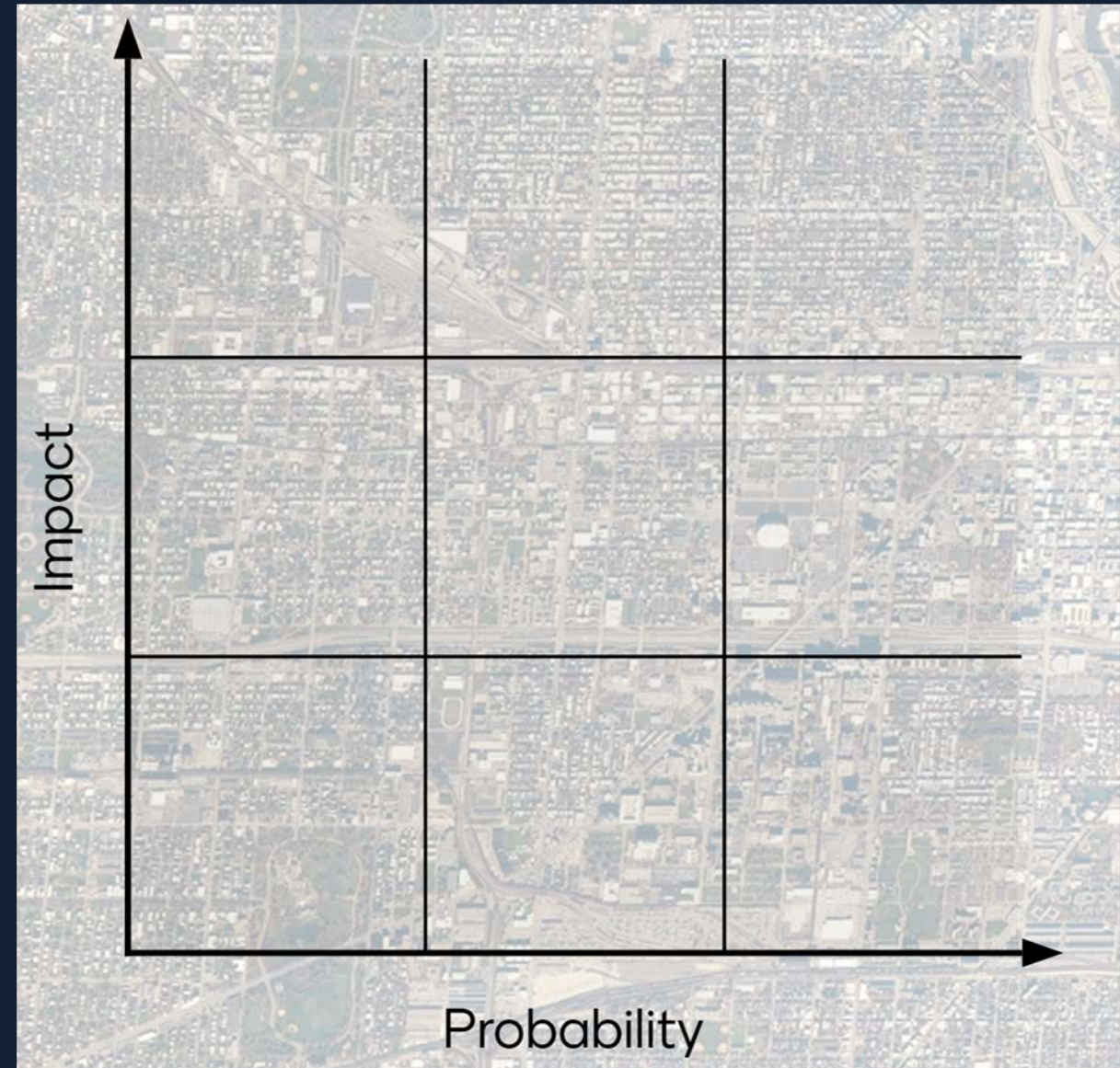


Scope risk

Go to [menti.com](https://www.menti.com)

Enter the code

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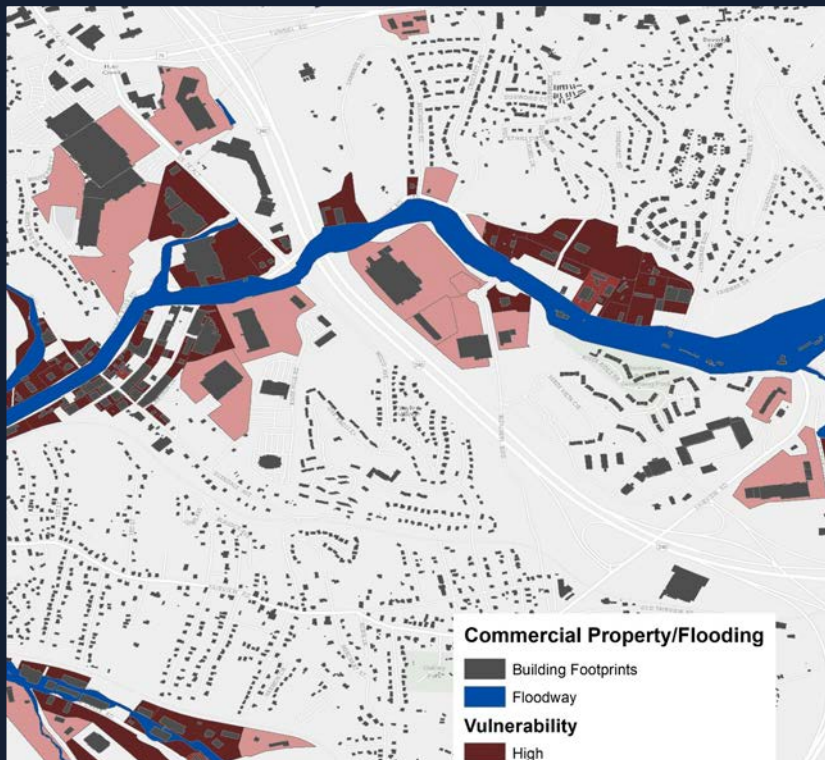
# Climate-Related Hazards

	Probability	Consequence	Risk
<b>Extreme Heat</b>	3	3	9
<b>Drought</b>	2	3	6
<b>Severe Thunderstorms</b>	2	2	4
<b>Flooding</b>	3	3	9
<b>Severe Winter Weather</b>	2	2	4

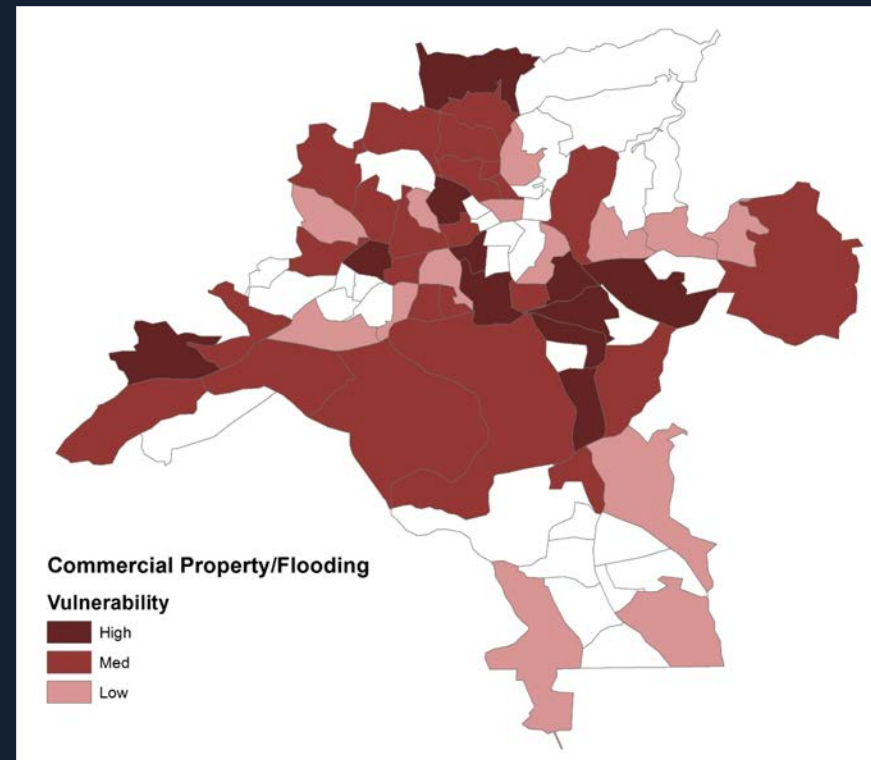


# Scales of assessing vulnerability & risk

## Individual parcels



## Neighborhoods



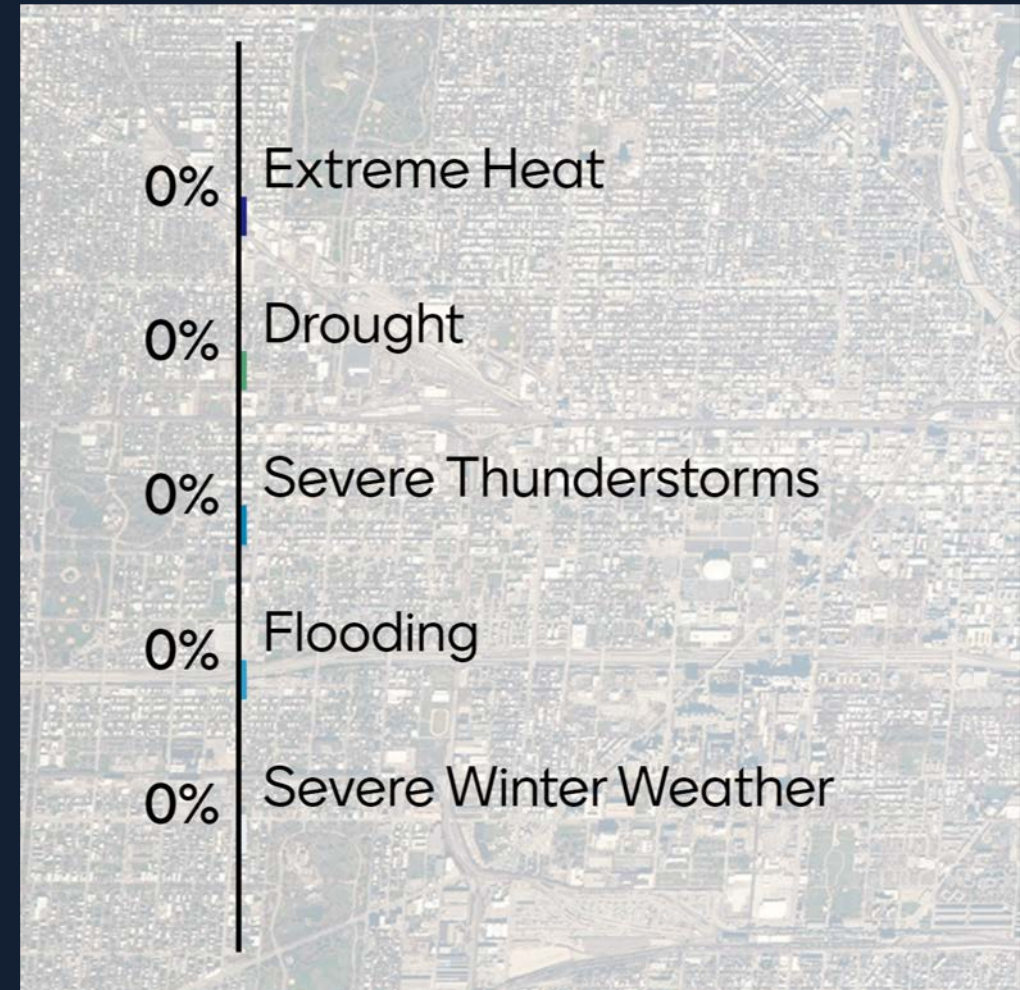




Rank hazards based on impacts to things you care about

Go to **menti.com**

Enter the code **18 86 7**







Address risks with strategies  
that stakeholders support

1 Explore Hazards

2 Assess Vulnerability & Risks

3 Investigate Options



4 Prioritize & Plan

5 Take Action



## Developing options linked to impacts

- Loss avoidance - investing now to better withstand and quickly recover from disruptions caused by current (and future) hazards
- Regional options often consider three linked questions
  - Where do I live?
  - Where do I work?
  - How do I get between the two?
- Are you looking to invest in
  - Assets directly controlled by local governments?
  - All assets that make the Chicago region a great place to live and work?



# Options lie within your sphere of influence

REDUCE EXPOSURE



BUILD ADAPTIVE CAPACITY



REDUCE SENSITIVITY



IMPROVE RESPONSE AND RECOVERY







Improved park access ✕

✕ Improved stormwater management

✕ Expanded tree canopy to lower temperatures



Compile a plan to implement prioritized solutions

1 Explore Hazards

2 Assess Vulnerability & Risks

3 Investigate Options

4 Prioritize & Plan



5 Take Action





# Align with existing recommendations

## Community







Align with existing recommendations

Community

Prosperity







# Align with existing recommendations

**Community**

**Prosperity**

**Environment**







# Align with existing recommendations

Community

Prosperity

Environment

Governance







# Align with existing recommendations

Community

Prosperity

Environment

Governance

Mobility





## Prioritize based on stakeholder metrics (Use of a “traffic light” visualization)

	Increased climate resilience	Environment	Community and Prosperity	Governance and Finance
Option 1	●	● ●	● ●	●
Option 2	●	●	● ●	● ●
Option 3	●	●	●	●
Option 4	●	●	●	●
Option 4 <i>with</i> Option 3	●	●	●	●





Implement, monitor, share  
your story, iterate

- 1 Explore Hazards
- 2 Assess Vulnerability & Risks
- 3 Investigate Options
- 4 Prioritize & Plan
- 5 Take Action





# Decision-making informed by climate

- Governments within the Chicago region will **not** make decisions based on a changing climate alone
- Climate must be integrated with other **hazards** and stressors across multiple sectors, scales and stakeholders
- Decisions are driven by **values** attached to **assets**
- Rather than seek the best predictions, seek the *best decisions*: those that are robust to many futures



# Monitor, Evaluate, Communicate



**Marsha Hilmes-Robinson**  
Floodplain Administrator  
City of Fort Collins, Colorado



A successful climate plan will:

- Support adaptation strategies within existing plans
- Improve coordination (local, regional, state, federal)
  - prioritization
  - funding
  - measuring
  - improving
- Build capacity to address climate challenges
- Enhance governance



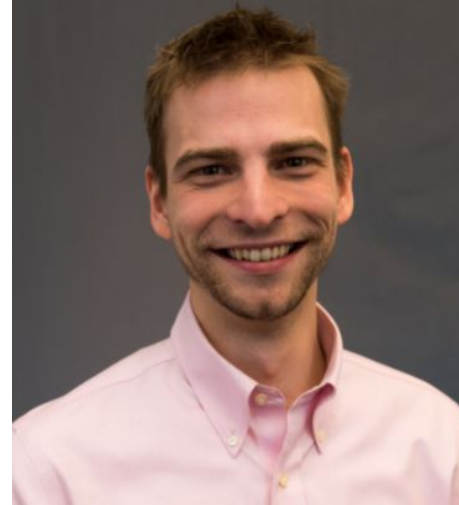
# **Use the Steps to Resilience to Assess the Impacts of Climate Change on Chicago**

... from data to decisions to inform adaptation strategies



# Climate Risk & Vulnerability in the Region

Jared Patton, AICP  
Associate Planner, CMAP







# Climate Risk and Vulnerability Assessment

## *Hazards*

Climate Hazard	Probability	Consequence	Risk
Extreme Heat	3	3	9
Drought	2	3	6
Severe Thunderstorms	2	2	4
Flooding	3	3	9
Severe Winter Weather	2	2	4

## Flooding

Understand how climate variability and change might threaten the region

1 Explore Hazards



2 Assess Vulnerability & Risks

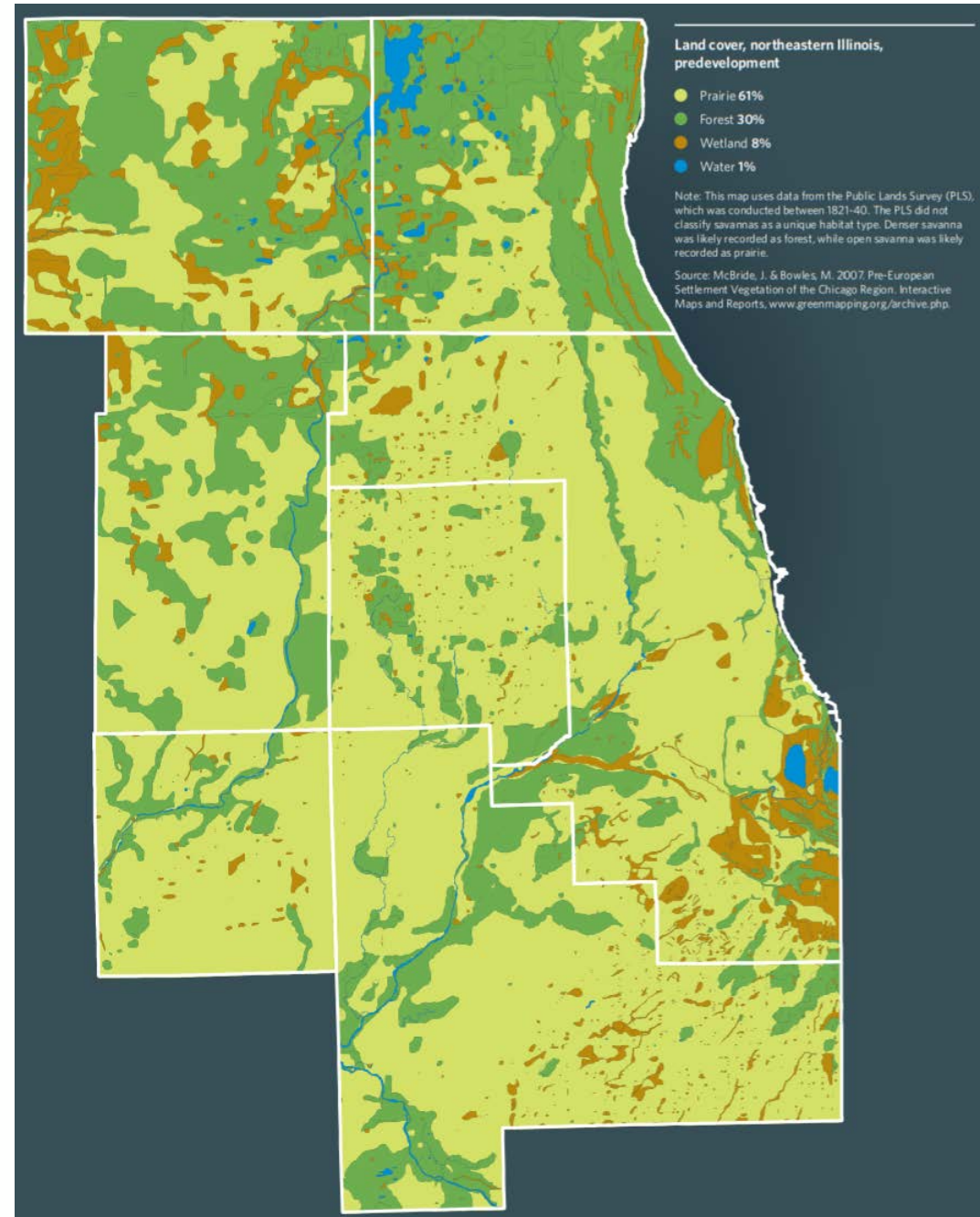
3 Investigate Options

4 Prioritize & Plan

5 Take Action

## *Climate and topography*

- *Four distinct seasons*
- *Variable weather patterns*
- *Precipitation greatest in spring and summer*
- *Limited elevation change*
- *Clay soils*
- *Heavily developed*

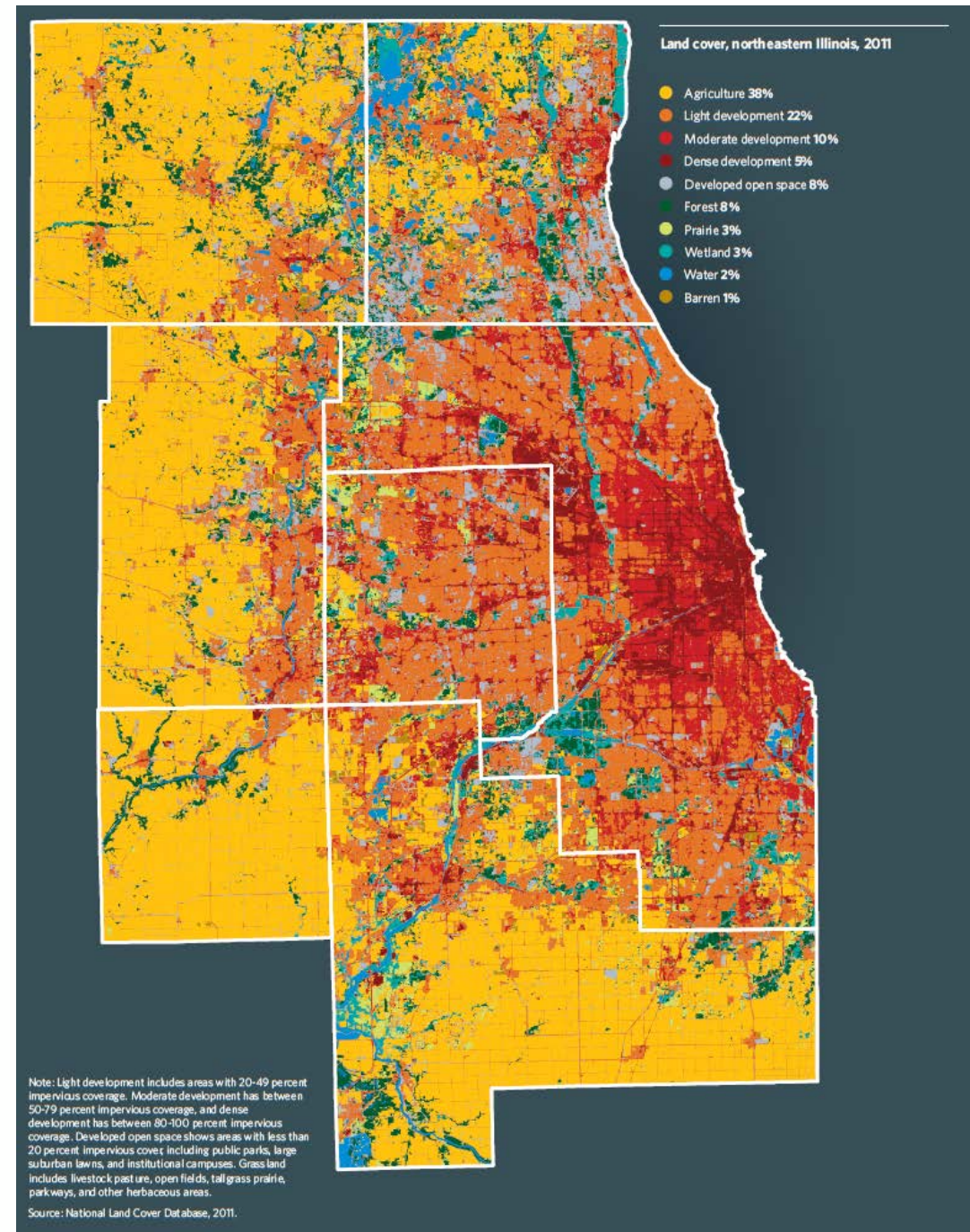






## *Climate and topography*

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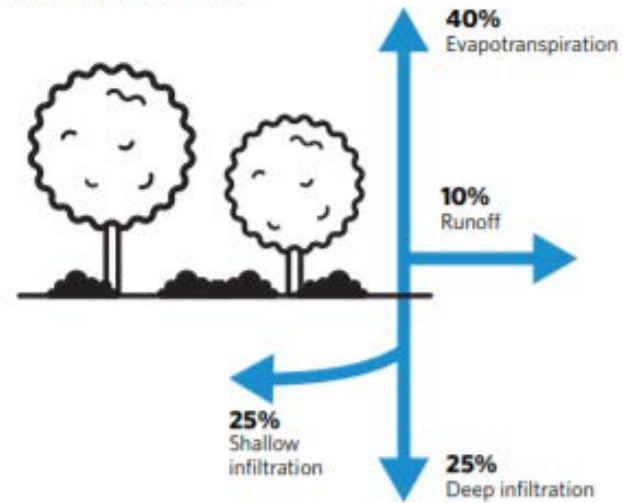




## Effect of imperviousness on stormwater

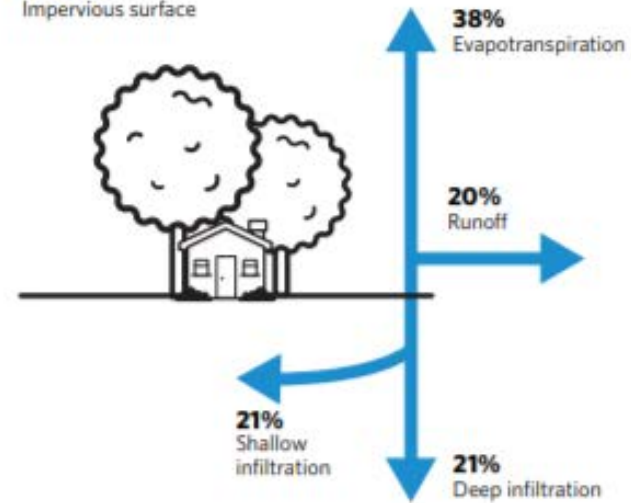
Data source: U.S. Environmental Protection Agency, Impervious Surfaces and the Hydrologic Balance of Watersheds, 1991.

### Natural ground cover



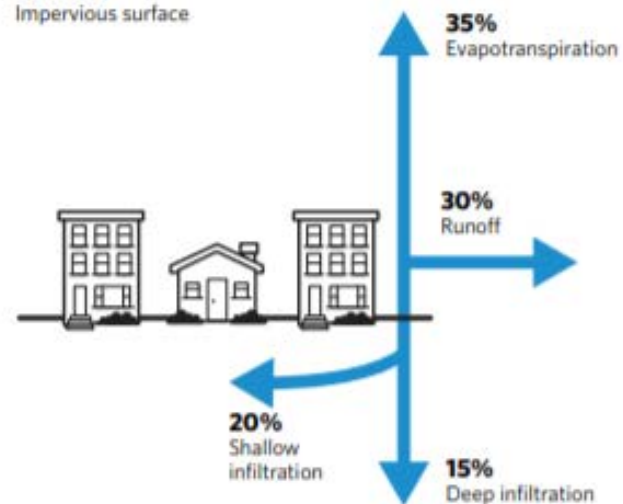
### 10-20%

Impervious surface



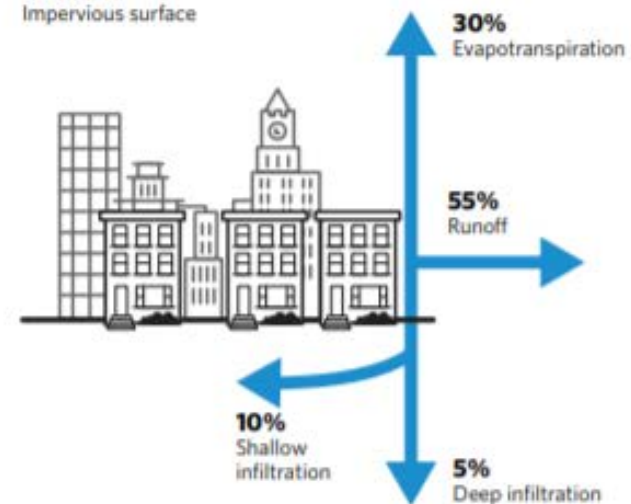
### 35-50%

Impervious surface



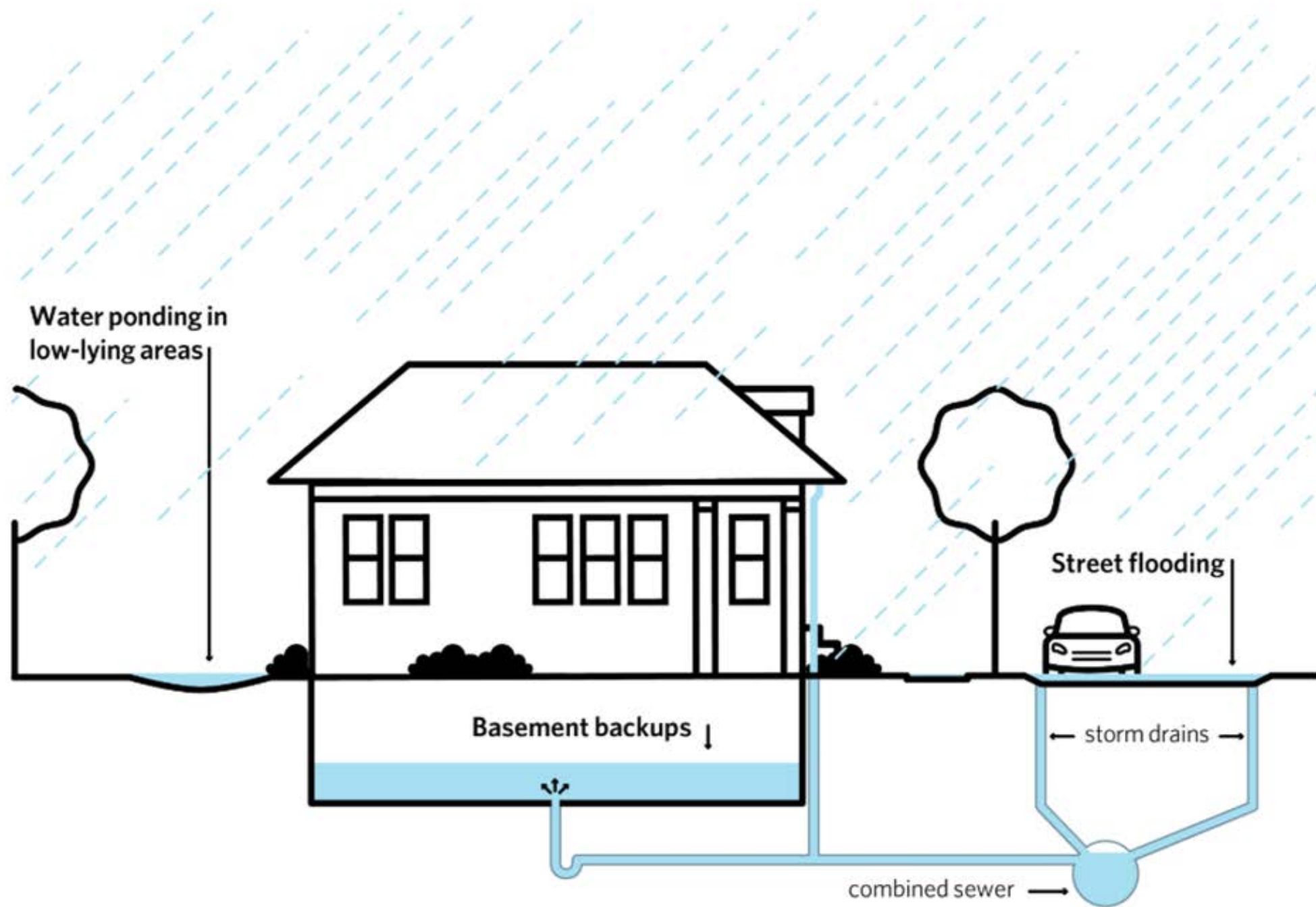
### 75-100%

Impervious surface







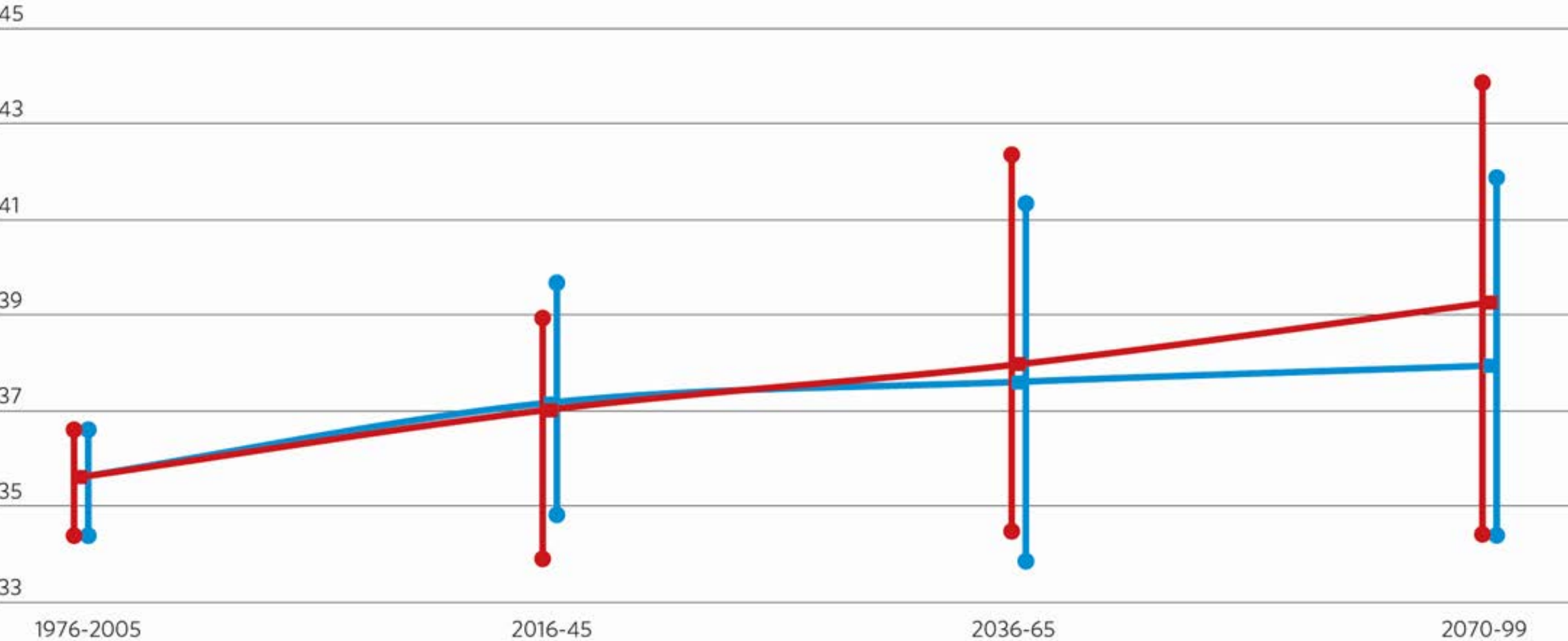




**Range of projected annual total precipitation, in inches,  
in northeastern Illinois**

Source: D.W. Pierce, D. R. Cayan, and B. L. Thrasher, 2014:  
Statistical downscaling using Localized Constructed Analogs  
(LOCA). Journal of Hydrometeorology, 15, 2558-85.

- High-emissions scenario mean
- Low-emissions scenario mean





## Flooding

What is the risk to our region?

1 Explore Hazards

2 Assess Vulnerability & Risks



3 Investigate Options

4 Prioritize & Plan

5 Take Action

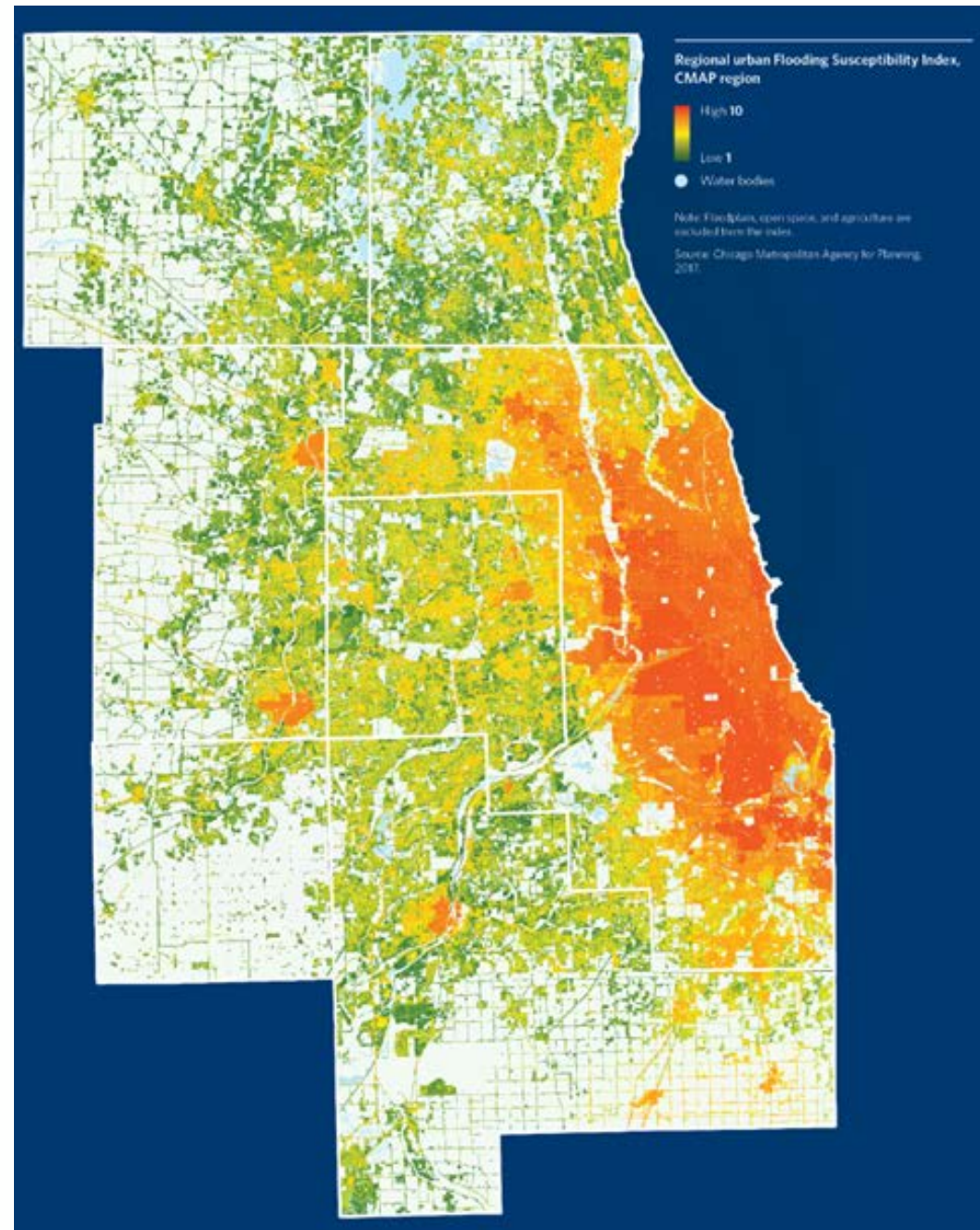






## *Urban Flood Susceptibility Index (FSI)*

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







Source: Chicago Metropolitan Agency for Planning, 2017.

## Extreme Heat

Understand how climate variability and change might threaten the region

1 Explore Hazards



2 Assess Vulnerability & Risks

3 Investigate Options

4 Prioritize & Plan

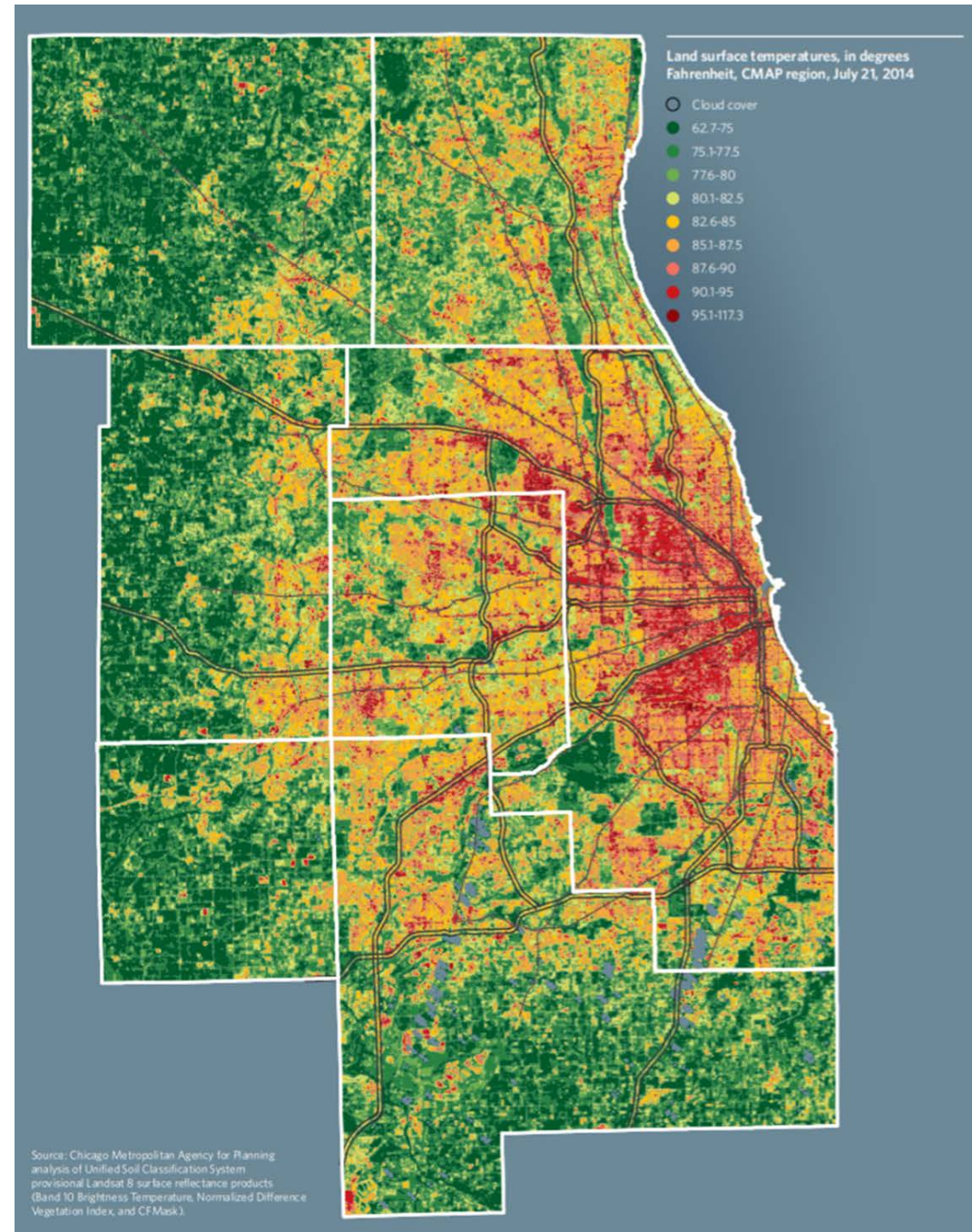
5 Take Action





## Extreme heat

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



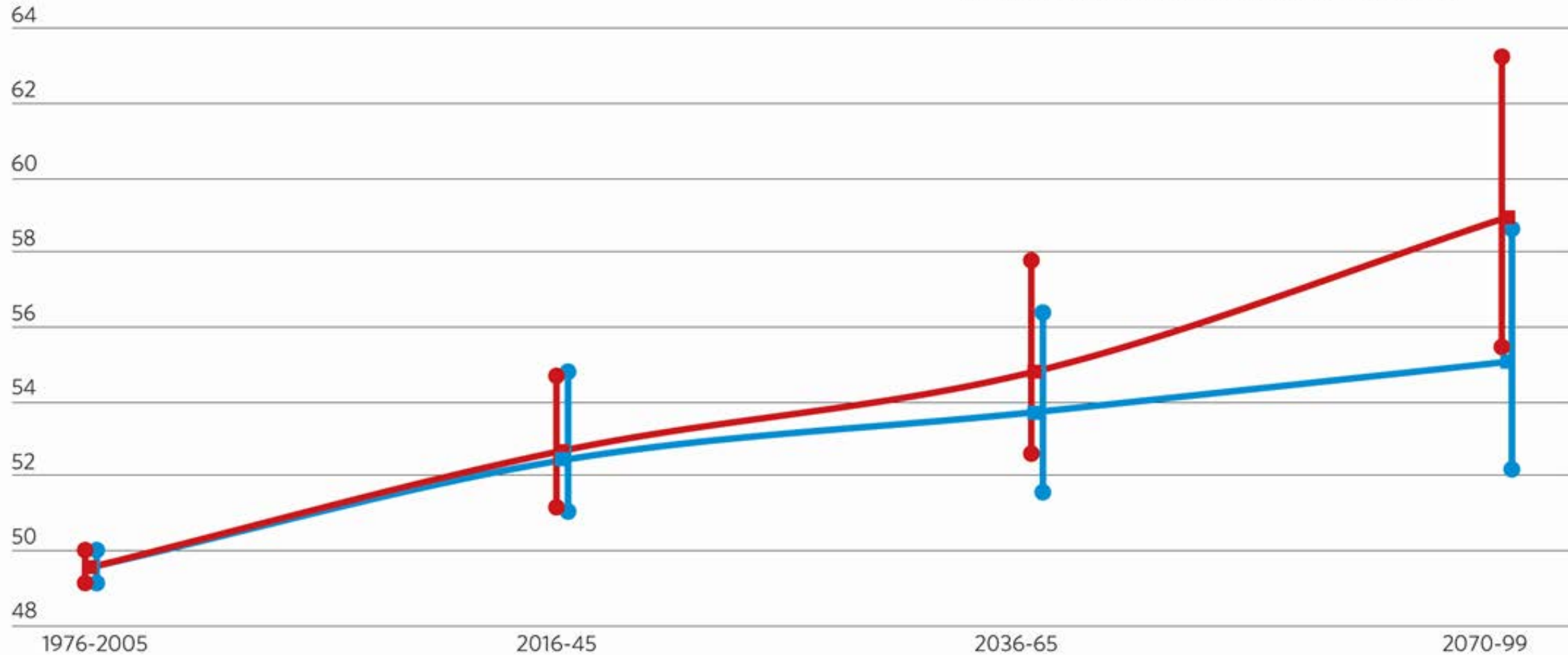


## Range of projected daily average temperature, in degrees Fahrenheit, in northeastern Illinois

- High-emissions scenario mean
- Low-emissions scenario mean

Note: Under a scenario that assumes emissions will continue to increase, regional temperatures are expected to increase by nine degrees Fahrenheit above historical levels. Under a lower emissions scenario, regional temperatures are expected to increase by five degrees above historical levels.

Source: D.W. Pierce, D. R. Cayan, and B. L. Thrasher, 2014: Statistical downscaling using Localized Constructed Analogs (LOCA). Journal of Hydrometeorology, 15, 2558-85.



## Extreme Heat

What is the risk to our region?

1 Explore Hazards

2 Assess Vulnerability & Risks



3 Investigate Options

4 Prioritize & Plan

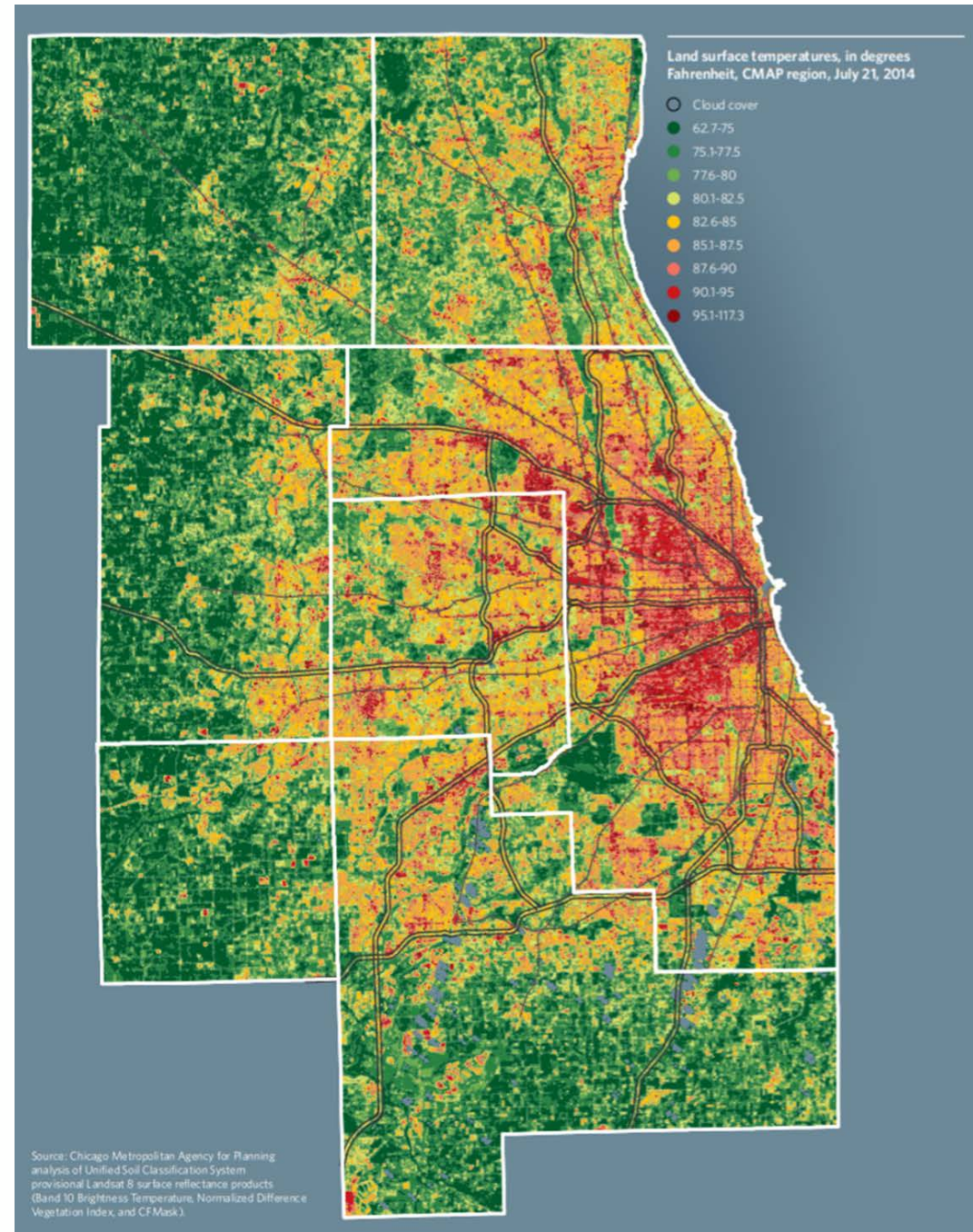
5 Take Action





## Extreme heat

- Infrastructure
  - Road and rail buckling
  - Freeze/thaw (potholes)
- Quality of life
- Health impacts








## Extreme heat

- Infrastructure
  - Road and rail buckling
  - Freeze/thaw (potholes)
- Quality of life
- Health impacts
  - Heat stress
  - Air quality

**Chicago Sun-Times** 35¢  
COOLER Pages 2, 40 MONDAY, JULY 17, 1995 Late Sports Final

# HEAT TOLL COULD HIT 300



LEFT: Refrigerated trucks serve as makeshift mortuaries for heat wave victims outside the medical examiner's office Sunday. ABOVE: Workers place another body in a refrigerated truck.

## 116 Die; Few Using City Cooling Centers

By ALEX RODRIGUEZ and MARK BROWN  
STAFF WRITERS

What began as an insufferably unpleasant turn in summer weather has become one of Chicago's worst disasters, claiming 116 lives as of Sunday.

The toll from the deadly heat wave could reach 300 in Cook County, Medical Examiner Edmund Donoghue said Sunday.

Most of the deaths involved elderly people, many of whom had heart trouble or other chronic health problems. But the common thread, Donoghue said, was "air conditioning, or lack of it."

"When temperatures get up into the hundreds, you have to get into air conditioning," Donoghue said. "The body is not used to it."

Many of those who died had body temperatures of 107 or 108—deadly levels reached after five days of stifling, 90-degree-plus weather, he said.

The climbing death toll raised questions about what the city can do to brace residents for dangerous weather.

Mayor Daley defended his administration's plans for dealing with the heat wave.

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### RELIEF ON THE WAY

**TODAY'S FORECAST**

Partly sunny, breezy and a bit cooler and less humid today with a high of 85 and a low in the 60s. Tuesday and Wednesday will be even cooler, with highs near 80.

**COVERAGE, PAGES 8-11**

## County Morgue Trying to Cope

By TAMARA KERRILL  
STAFF WRITER

A grim procession of grieving family members, masked technicians and police wagons bearing bodies swarmed Cook County morgue Sunday in the hot, dusty wind.

The heat wave of '95 left a trail of dead throughout the city. And most of the victims landed at 2121 W. Harrison.

The Cook County medical examiner's office conducted a record 170 autopsies between 8 a.m. Friday and 5 p.m. Sunday. The morgue's 222 bays were full Sunday, and seven refrigerated tractor-trailers

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## Ford's New Spin On the Taurus

AUTOTIMES

## IRAQ FREES 2 AMERICANS

Page 3

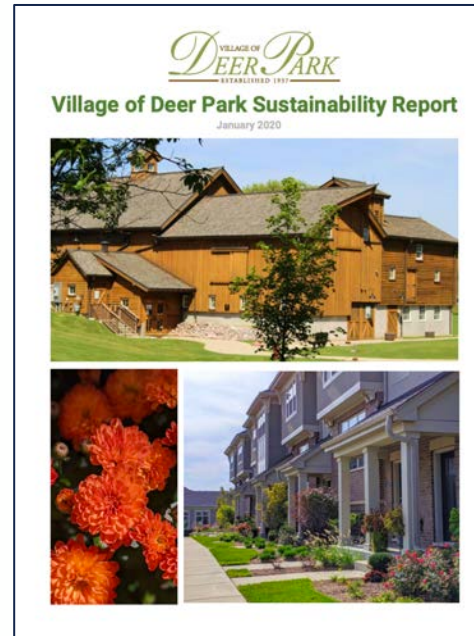
## CUBS BEAT CINCINNATI 7-5

Page 82



# Impacts on Community

Dale Sands, President, Village of Deer Park  
Co-Chair, ARISE, UN Office for Disaster Risk Reduction



# *Sendai Framework 2015-2030: Voluntary Agreement for Substantial DRR (187)*

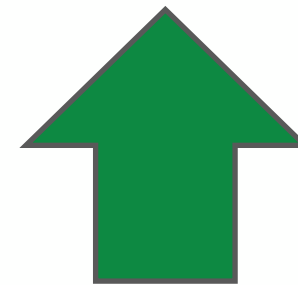
## Substantially Reduce

- Global disaster mortality
- Numbers of affected people
- Economic losses in relation to global GDP
- Disaster damage to critical infrastructure & disruption of basic services



## Substantially Increase

- Number of countries with national & local DRR strategies by 2020
- International Cooperation to developing countries
- Access to multi-hazard early warning systems and disaster risk information and assessments



# Ten Essentials For Disaster Risk Reduction





## Five Stages of Adaptation Progress

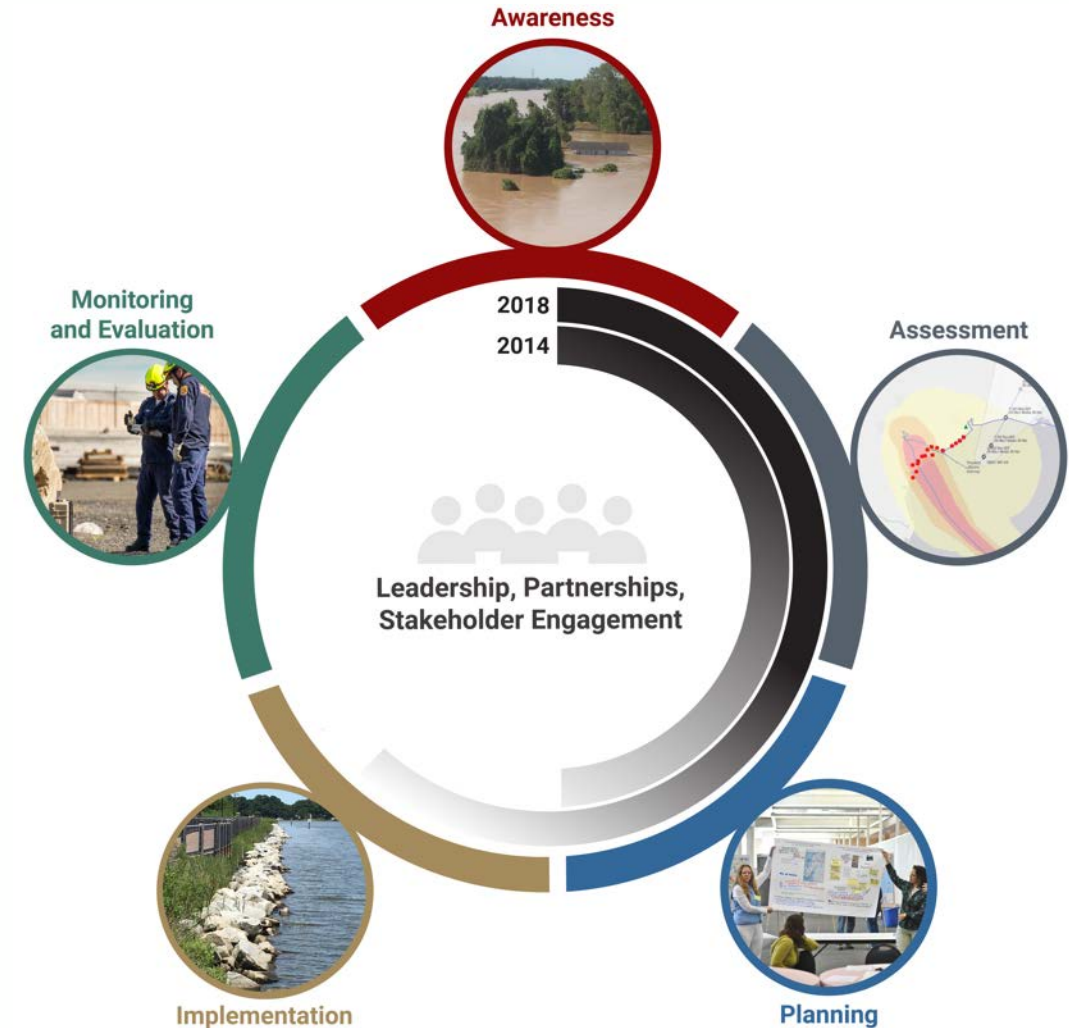
Adaptation entails a continuing risk management process where individuals and organizations become aware of- assess risks & vulnerabilities, take actions to reduce those risks:

National Climate Assessment Report  
Adaptation Summary:

Adaptation Implementation Increasing  
Climate Change Outpaces Adaptation  
Planning

Adaptation Entails Iterative Risk Management  
Benefits of Pro-active Adaptation Exceed  
Costs

New Approaches Can Further Reduce Risk



*From Figure 28.1, Ch. 28: Adaptation (Source: adapted from National Research Council, 2010. Used with permission from the National Academies Press, © 2010, National Academy of Sciences. Image credits, clockwise from top: National Weather Service; USGS; Armando Rodriguez, Miami-Dade County; Dr. Neil Berg, MARISA; Bill Ingalls, NASA).*

## *Adaptive actions at local level*

- To be Sustainable communities must be resilient!
- **Climate Adaptation considerations can begin immediately** with every capital project; For example: Street resurfacing can also address ditch maintenance, drainage issues with culvert replacement/upgrades
- **Threats** include flooding, tornados, extreme temperatures, severe weather; Back up power options, electronic data storage, and communication systems established for critical infrastructure, including emergency notification systems across the Village, Evacuation plans defined
- **Establish communication channels** with critical care and long term care facilities and most vulnerable populations with emergency plans in place and rehearsed
- **Resilience Plans** for businesses within your community to address 'what if' scenarios



How is climate change impacting your community?

Go to **menti.com**

Enter the code **18 86 7**

# QUESTIONS?

*Please join us for the next 3 climate adaptation webinars*

- 2. Climate Impacts & Hazards - May 29, 2020, 1:00 – 2:30 pm
- 3. Climate Risk and Vulnerability - June 5, 2020, 1:00 – 2:30 pm
- 4. Adaptation Planning & Prioritization Workshop - June 12, 2020, 1:00 – 3:00 pm

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





# Chicago Metropolitan Regional Climate Action



Edith Makra [emakra@mayorscaucus.org](mailto:emakra@mayorscaucus.org)

Jared Patton [jpatton@cmap.illinois.gov](mailto:jpatton@cmap.illinois.gov)

Kevin Burns [kburns@geneva.il.us](mailto:kburns@geneva.il.us)

Ned Gardiner [ned.gardiner@noaa.gov](mailto:ned.gardiner@noaa.gov)

Dale Sands [dsands@vodp.net](mailto:dsands@vodp.net)

@MayorsCaucus

@IUC\_NA

@ONTO2050