



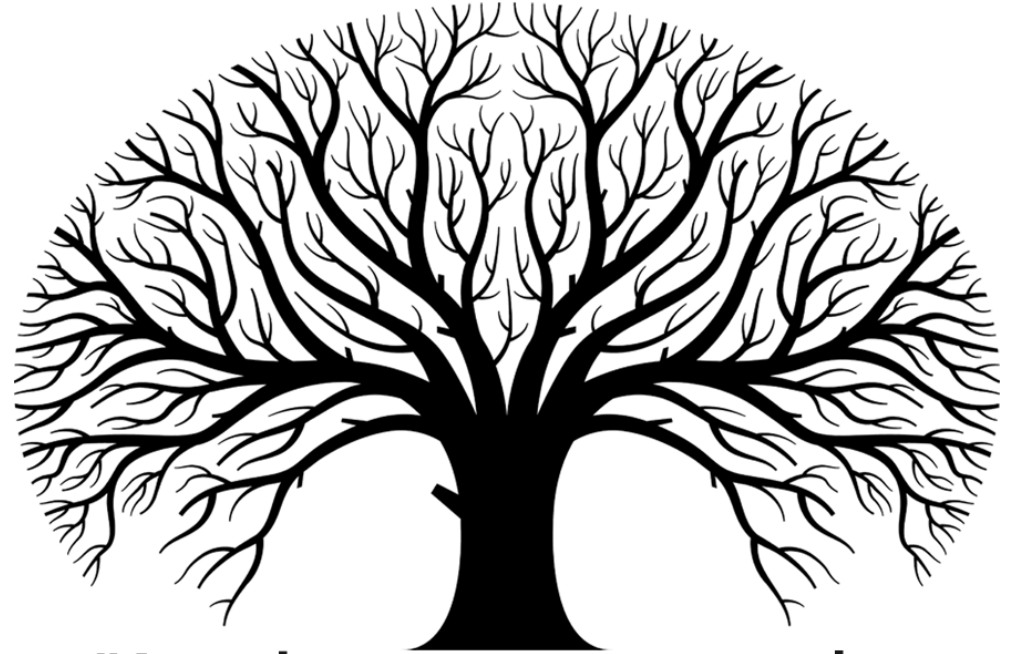
# An Overview of Adaptation Planning

Eric Mielbrecht



# Key need to incorporate climate change into near-, medium-, and long-term planning

- Minimize risk of wasting time, money, and effort
- Maximize likelihood of success

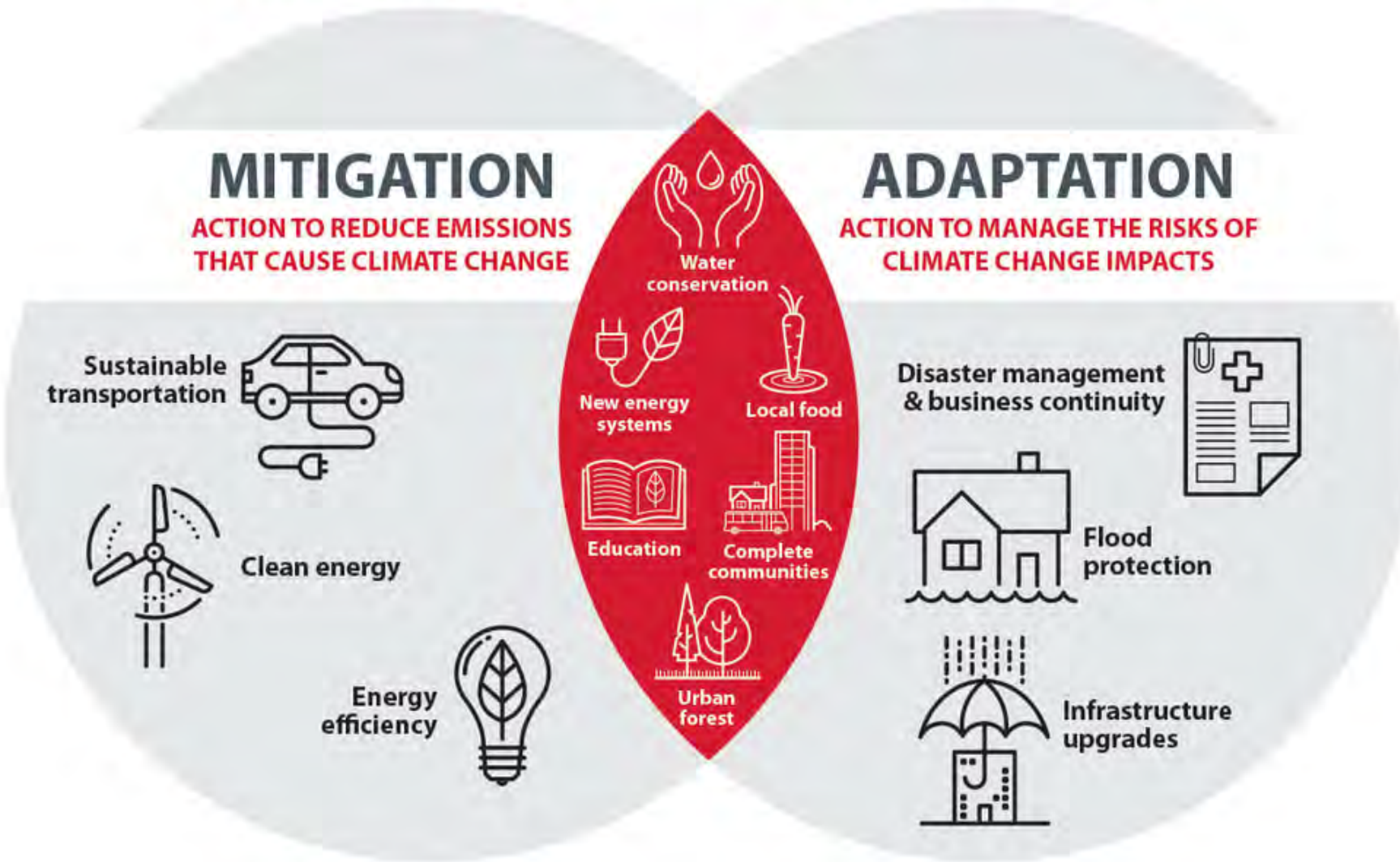


**"A society grows great when old men plant trees whose shade they know they shall never sit in." Greek Proverb**





# Responding to Climate Change



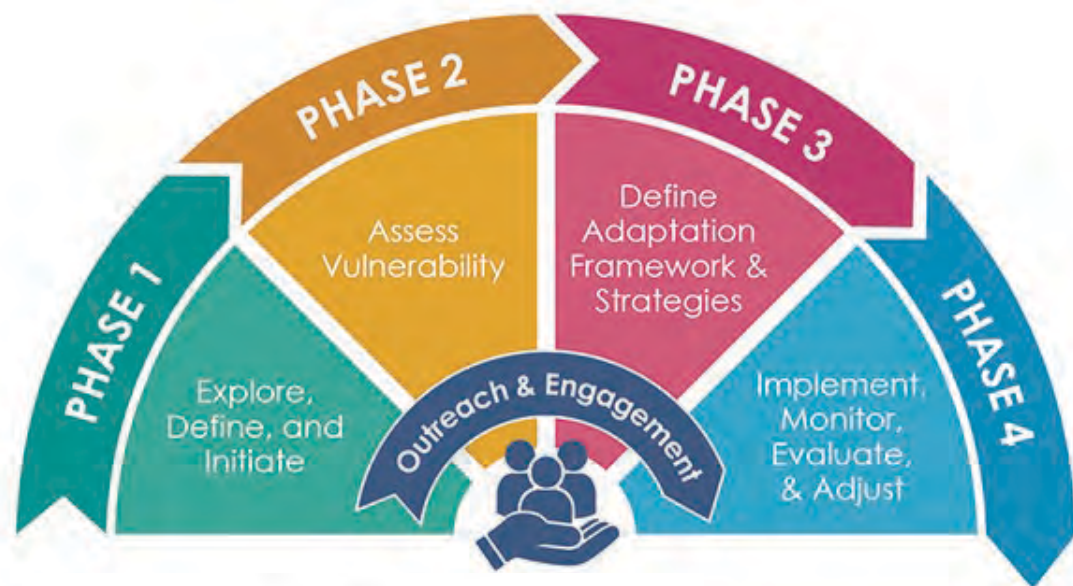
**Adaptation** is how we prepare for, respond to, and recover from the changes that we are already experiencing/expected to experience.

- ✓ Addresses the impacts of climate change with a focus on managing change

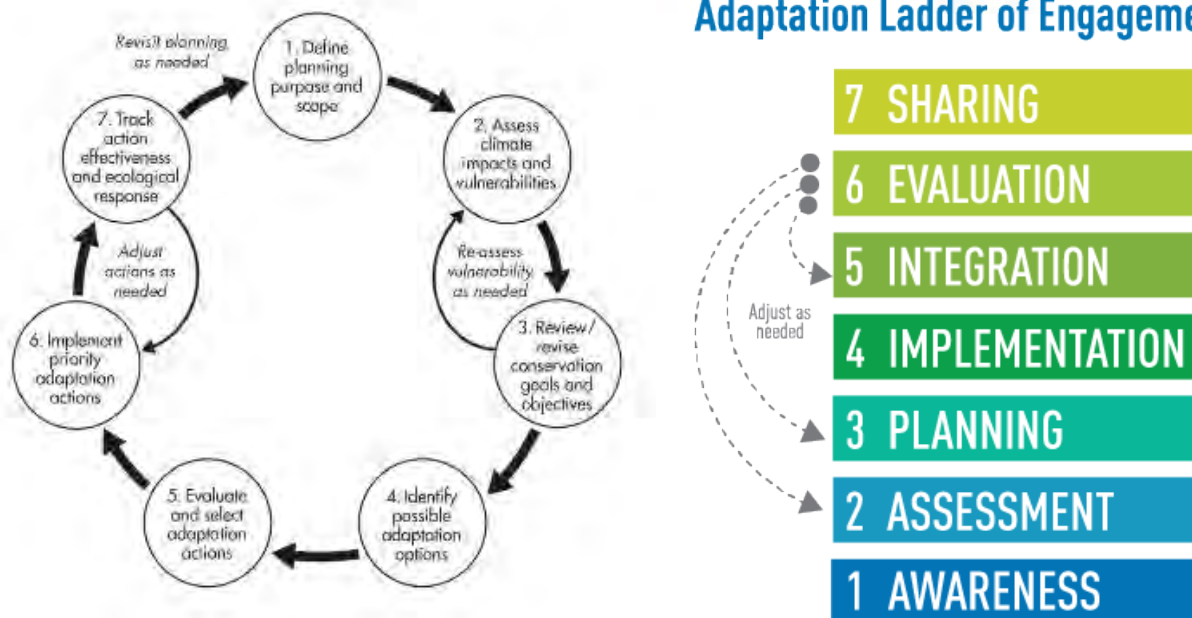
**Mitigation** is what we do to decrease the potential of climate change itself.

- ✓ Addresses the causes with a focus on reducing greenhouse gas emissions

# Many Adaptation Planning Processes



## Adaptation Ladder of Engagement®



## Steps to Resilience:

- 1 Step 1: Identify the Problem
- 2 Step 2: Determine Vulnerabilities
- 3 Step 3: Investigate Options
- 4 Step 4: Evaluate Risks & Costs
- 5 Step 5: Take Action



# Many Adaptation Planning Processes



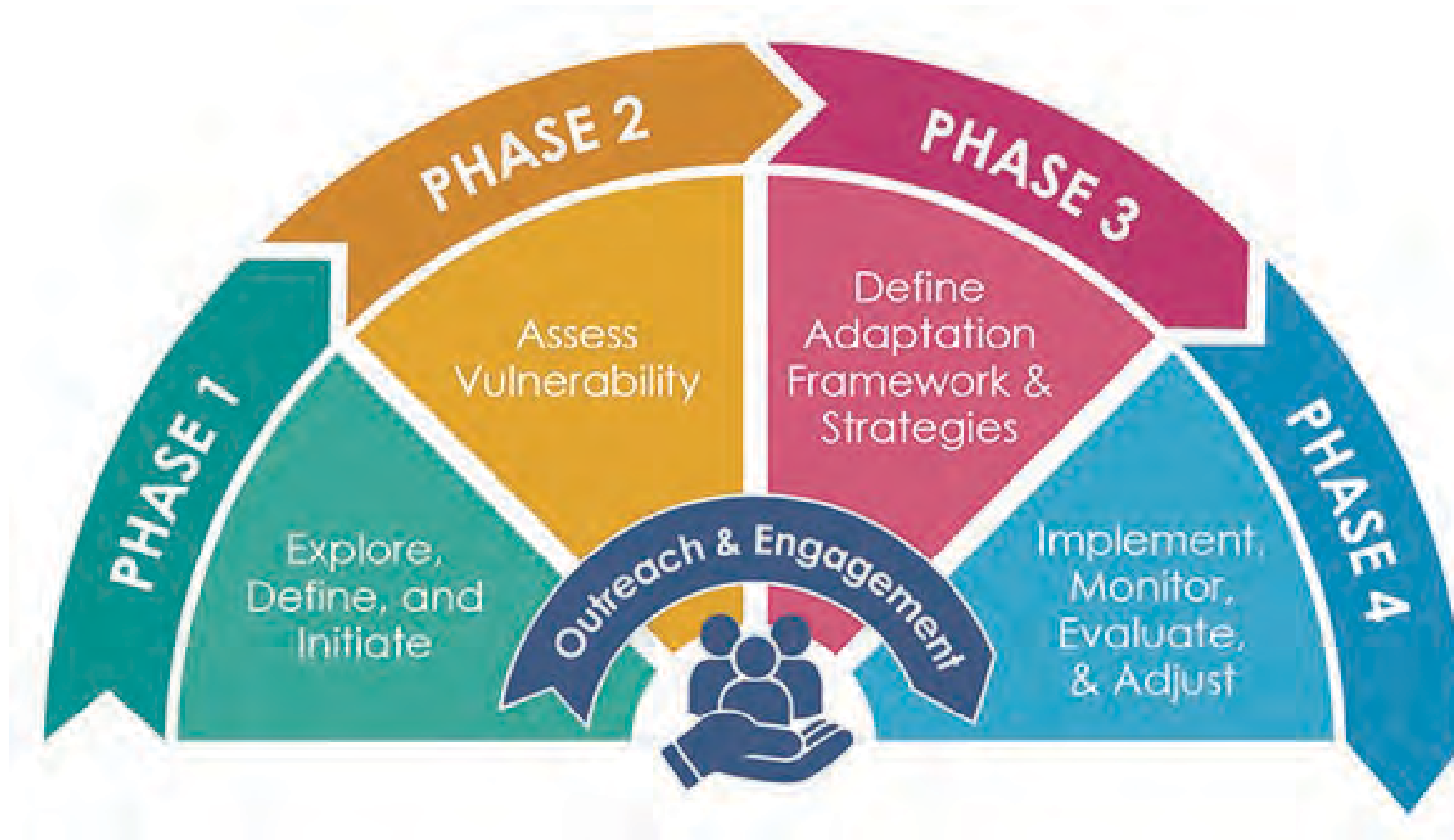
Adaptation Ladder of Engagement®

- Processes generally consist of same steps
- Participatory and iterative
- Generate place-based adaptation strategies



**No right or wrong way – the most important thing is to get started!**

# Adaptation Planning Process





## PHASE 1. Project Scoping

- Identify goals, desired outcomes of process
- Set geographic boundaries and timeframe
  - Near (e.g., length of a plan: 10-20 years)
  - Mid (25-50 years)
  - Long (e.g., lifespan of infrastructure: 50-100 years)
- Identify key stakeholders
- Identify key pre-existing conditions and climate stressors
- Identify important community assets

# Adaptation Planning Process: Phase 2

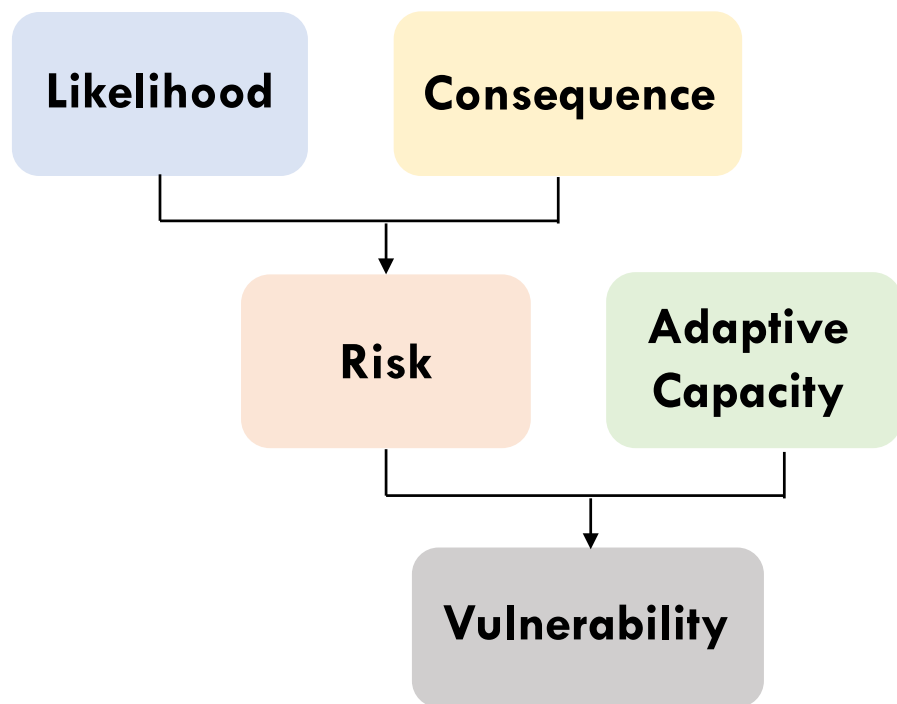


## Vulnerability =

*The degree to which natural, built, and human systems are susceptible to harm*



# Adaptation Planning Process: Phase 2



## Vulnerability =

*The degree to which natural, built, and human systems are susceptible to harm*

*A function of the likelihood of **exposure** to climate changes, the **consequence** of those changes, and the **capacity** to adapt to changes*

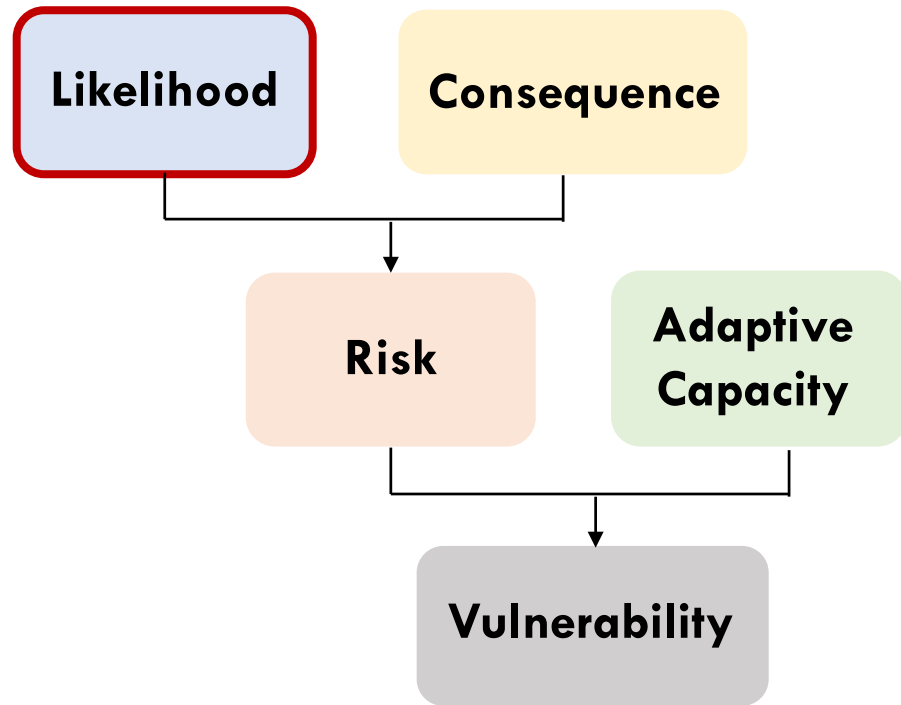
# Why Assess Vulnerability?



- Identify **what** is most vulnerable (e.g., people, places, assets, elements) and **why**
- Helps you to develop a range of adaptation responses



# Vulnerability Assessments: Likelihood

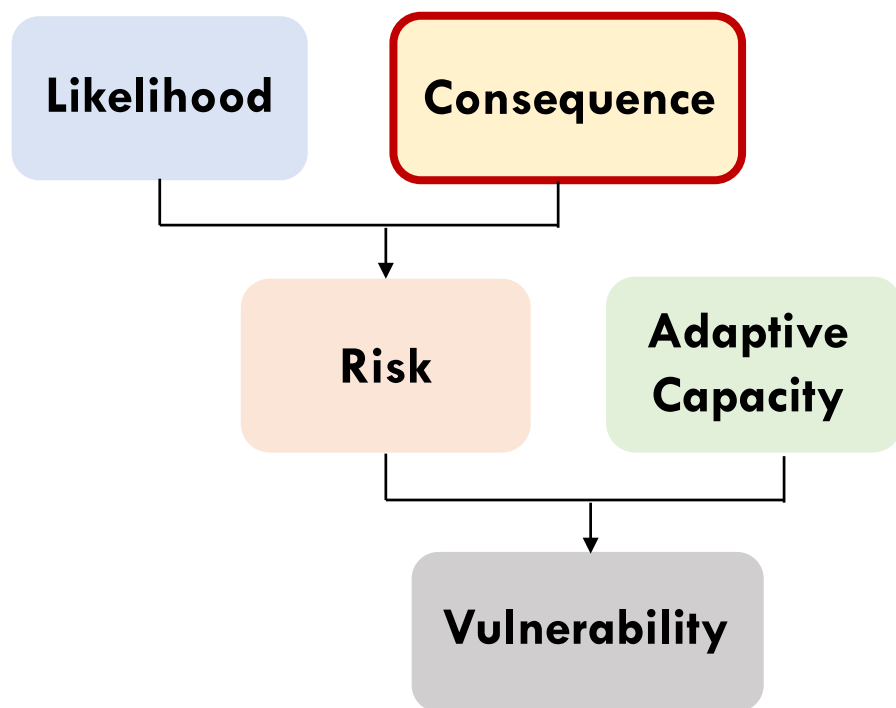


## Likelihood:

*Degree to which an element or asset is exposed to significant changes in climate (i.e. how likely is it that an asset will be exposed to a given climate hazard?)*



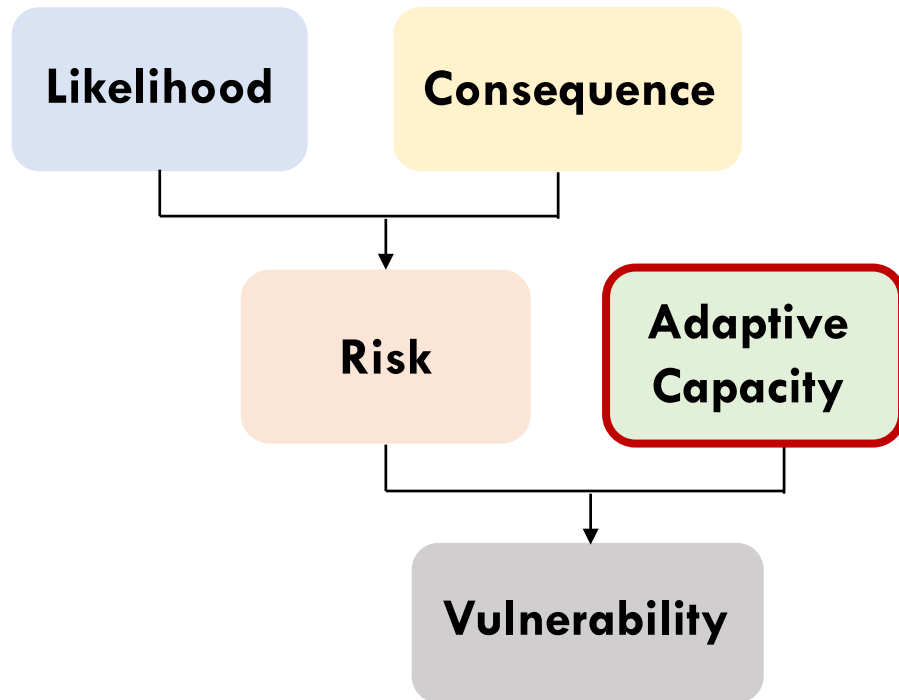
# Vulnerability Assessments: Consequence



## Consequence:

*Degree to which an element or asset is affected by exposure to a changing climate (i.e. how significant is the effect of the climate impact?)*

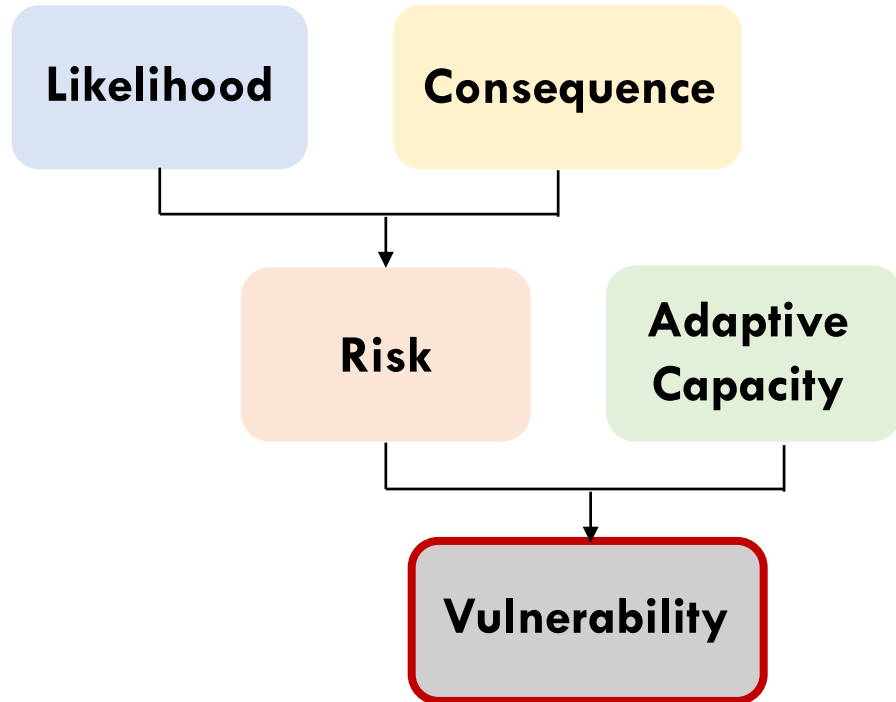
# Vulnerability Assessments: Adaptive Capacity



## Adaptive Capacity:

*The ability to adjust to climate change to moderate potential damages, take advantage of opportunities, or cope with consequences*

# Vulnerability Assessments: Vulnerability



## Vulnerability:

*The degree to which an element or asset is susceptible to harm*

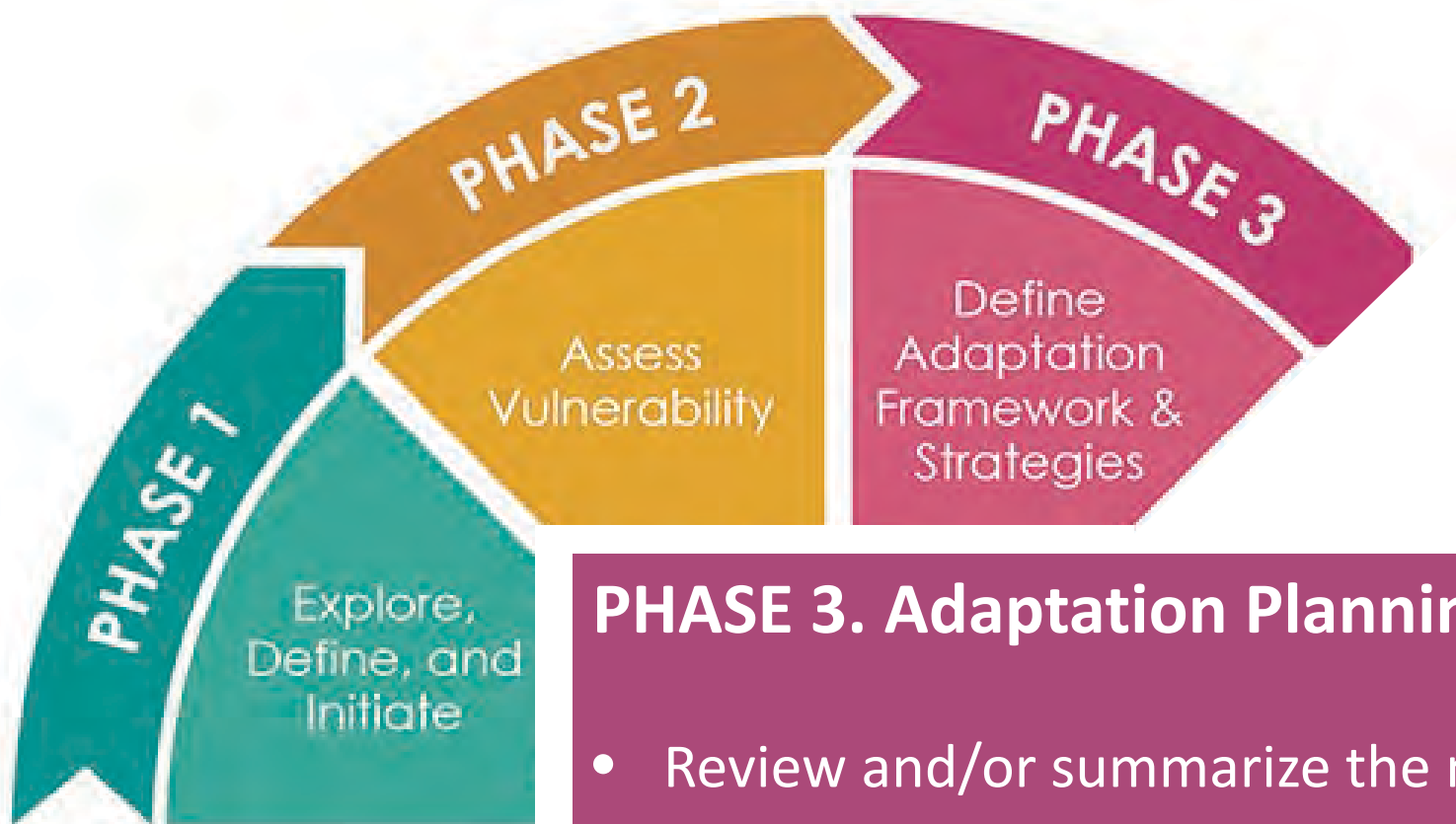




## PHASE 2. Assess Vulnerability

- Identify current and projected future changes in climate factors/hazards (Likelihood)
- Identify impacts of climate change on community elements (Consequence)
- Characterize the current ability to moderate or cope with impacts (Adaptive Capacity)

# Adaptation Planning Process: Phase 3



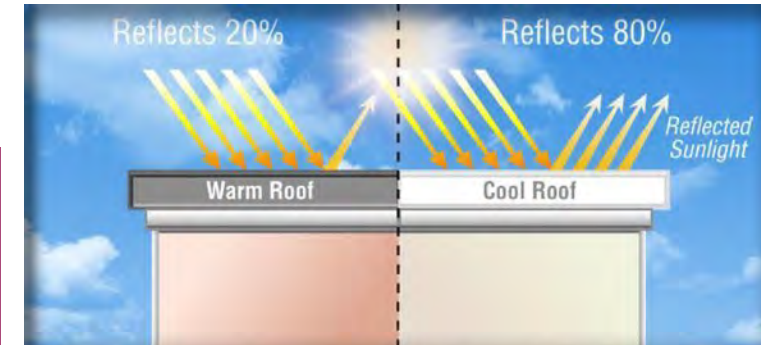
## PHASE 3. Adaptation Planning

- Review and/or summarize the major climate vulnerabilities
- Identify adaptation strategies that reduce vulnerabilities and/or increase resilience
- Prioritize adaptation strategies

# Adaptation Strategies



- Aim to reduce the negative effects or take advantage of the opportunities provided by climate change
- General types:
  - Programmatic
  - Plans, regulations, policies
  - Capital improvement/infrastructure projects
  - Coordination/collaboration
  - Knowledge/evaluation





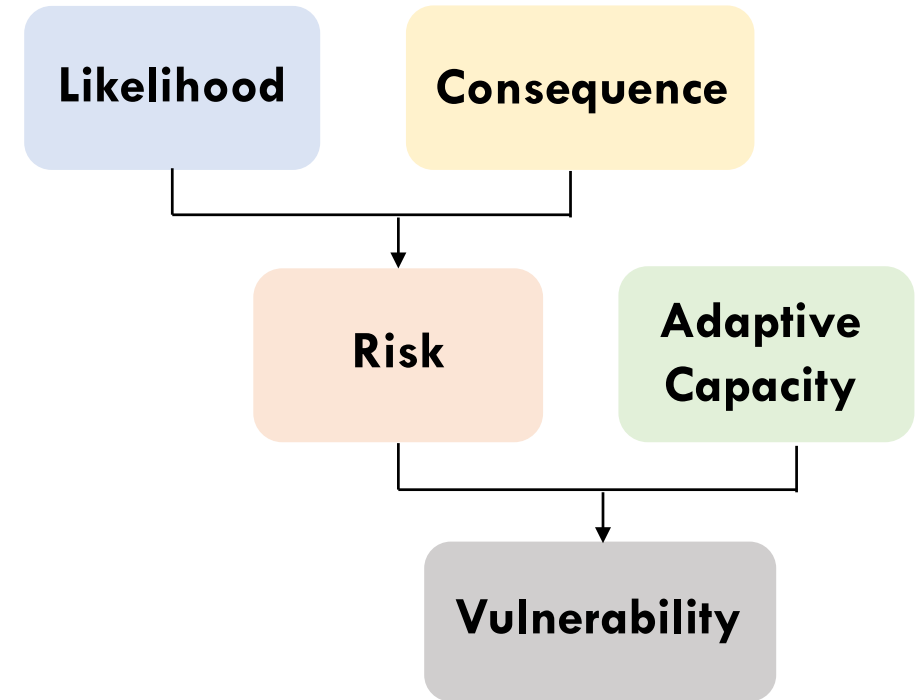
# Using Vulnerability Results in Adaptation Planning



↓ **Likelihood**

↓ **Consequence**

↑ **Adaptive Capacity**



# Using Vulnerability Results in Adaptation Planning



**Impact:** Extreme storm/precipitation events are likely to lead to flooding of developed areas and infrastructure

## ↓ **Likelihood** (limit change)

- Reduce stormwater runoff within residential neighborhoods that flood frequently



## ↓ **Consequence** (minimize effects)

- Site outside the floodplain

## ↑ **Adaptive Capacity** (improve ability to cope w/change)

- Upgrade stormwater and wastewater systems



# Adaptation Planning Process: Phase 4



## PHASE 4. Implement, Monitor, Evaluate

- Put adaptation strategies into action
- Create a monitoring program to track implementation
- Evaluate strategies to determine what is/is not working and adjust, as needed



# Examples?



**Case Study #1: Boston, MA**



**Case Study #2: Louisville, KY**



**Case Study #3: Illinois**

# Case Study #1: Boston, MA



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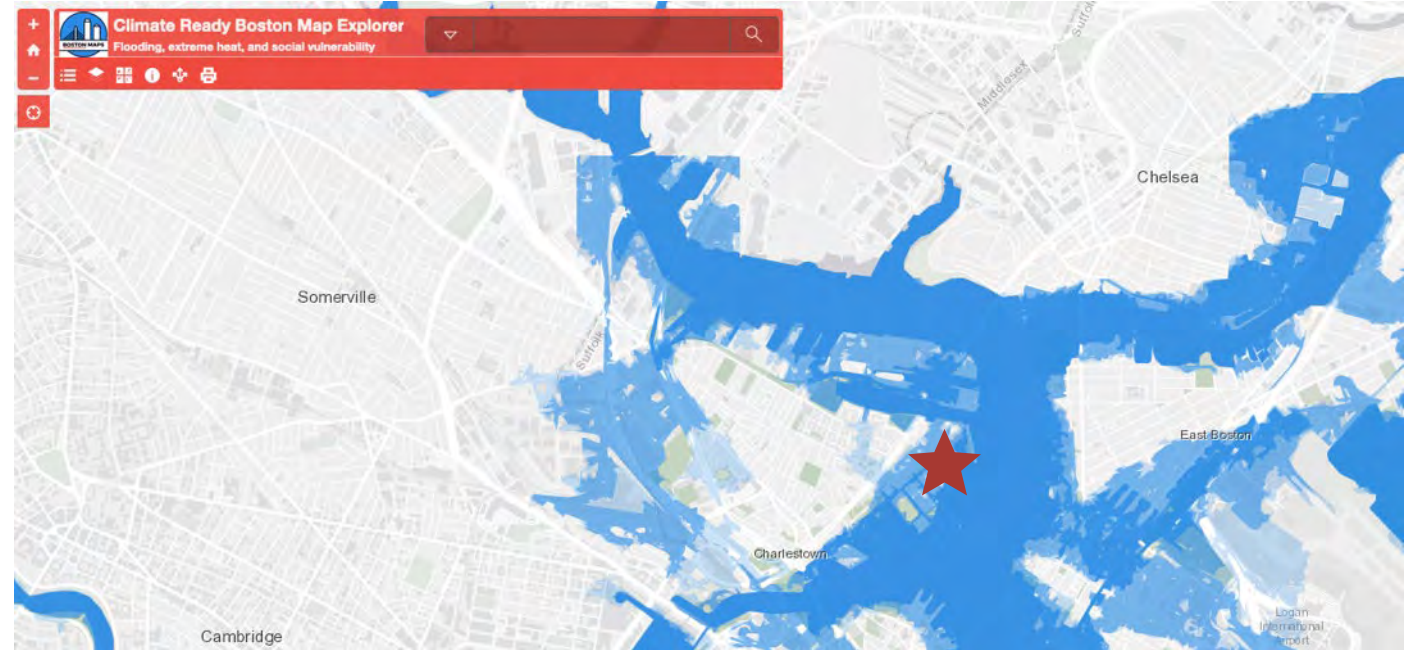
↑ Sea Level Rise, Storm Surge



# Case Study #1: Boston, MA



Photo by Jiaqian AirplaneFan via Wikimedia Commons (CC BY-SA 3.0)



## Adaptation Strategies

- Elevated first floor 30" above FEMA 500-year flood elevation and ensured that critical infrastructure and patient care were above the first floor so hospital could remain fully functional in case of flooding
- Placed mechanical and electrical infrastructure on the roof and installed on-site combined heating/power system to increase energy efficiency and provide redundancy in case of power loss
- Installed berms, extensive drainage network, green roofs, and triple-glazed windows/sunshades to reduce flooding, allow rapid stormwater drainage, and keep building at a comfortable temperature



# Case Study #2: Louisville, KY



↑ High-Intensity Rainfall Events and Flooding



# Case Study #2: Louisville, KY



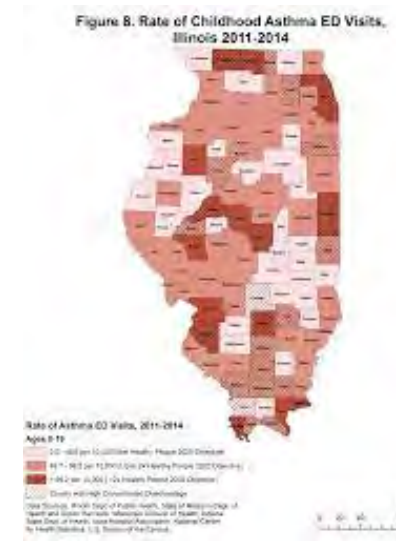
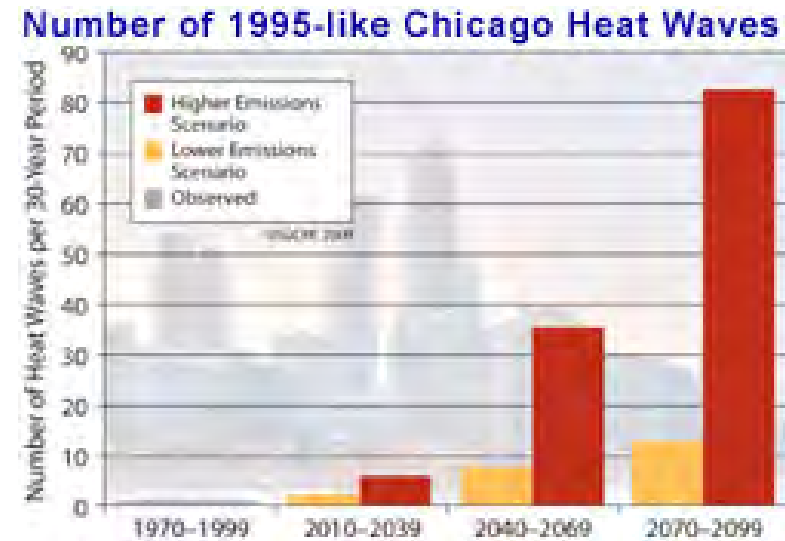
## Adaptation Strategies

- Tested the effectiveness of green infrastructure in reducing stormwater runoff through 19 **demonstration projects**
- **Updated Green Infrastructure Design Manual** based on lessons learned from demonstration projects
- University of Louisville **installed underground infiltration chambers, cisterns, rain barrels, and permeable pavers** to limit stormwater delivery

[https://louisvillemisd.org/sites/default/files/inline-files/Chapter18\\_GreenInfrastructureDesignManual\\_Rev062016\\_0.pdf](https://louisvillemisd.org/sites/default/files/inline-files/Chapter18_GreenInfrastructureDesignManual_Rev062016_0.pdf)

University also created Climate Action Plan, which identifies over 175 options for reducing emissions + enhancing adaptation


*Plant native, deep-rooted species to enhance carbon sequestration and help manage stormwater*





# Case Study #3: Illinois





Rising temperatures cause poor air quality making it harder to breathe.

**Extreme allergies and climate change**

Climate change affects weather patterns, often increasing storm severity and rainfall causing wetter seasons as well as creating warmer weather patterns. Longer, warmer weather patterns provide extended and flourishing growth seasons for pollen, mold and other allergens. This can make the air quality worse, and more likely to trigger attacks.

**How does climate change affect my health?**


These changes extend some of the worst offenders pollen season. Between 1995-2016 ragweed's pollen season increased in 10 of the 11 areas measured by an average of 17 days. Longer allergy seasons and poorer air quality can make asthma worse. Effects go beyond just pollen, an increase in thunderstorms can also contribute to worsening asthma symptoms.


**Asthma Myths**

1. Asthma is all in the mind - Asthma is not a psychological condition. However, emotional triggers can cause flare ups.
2. You will grow out of asthma - You cannot grow out of asthma. In about 50% of children with asthma, the condition may become inactive in the teen years, however it can flare up again at any time during adulthood.
3. Asthma is not serious, and no one dies from it - You can die from asthma if the attacks are not controlled.
4. People with asthma should not exercise - Swimming is an optimal exercise for those with asthma, however exercise in dry or cold air can trigger attacks.
5. Someone with asthma can provoke episodes anytime they want in order to get attention - Asthma attacks cannot be faked

**What can you do?**

1. Check the air quality index before going outside! Air quality and levels of irritants vary daily, keep an eye on it at [www.airnow.gov](http://www.airnow.gov)
2. Stay indoors during thunderstorms.
3. Improve air quality by advocating for a reduction in open burning, and do not expose yourself to it by staying indoors when burning is high.
4. Work with your doctor to learn what your triggers are, and how you can avoid them.
5. Advocate for policy makers to make changes that reduce the negative impact on the environment that can affect your health.



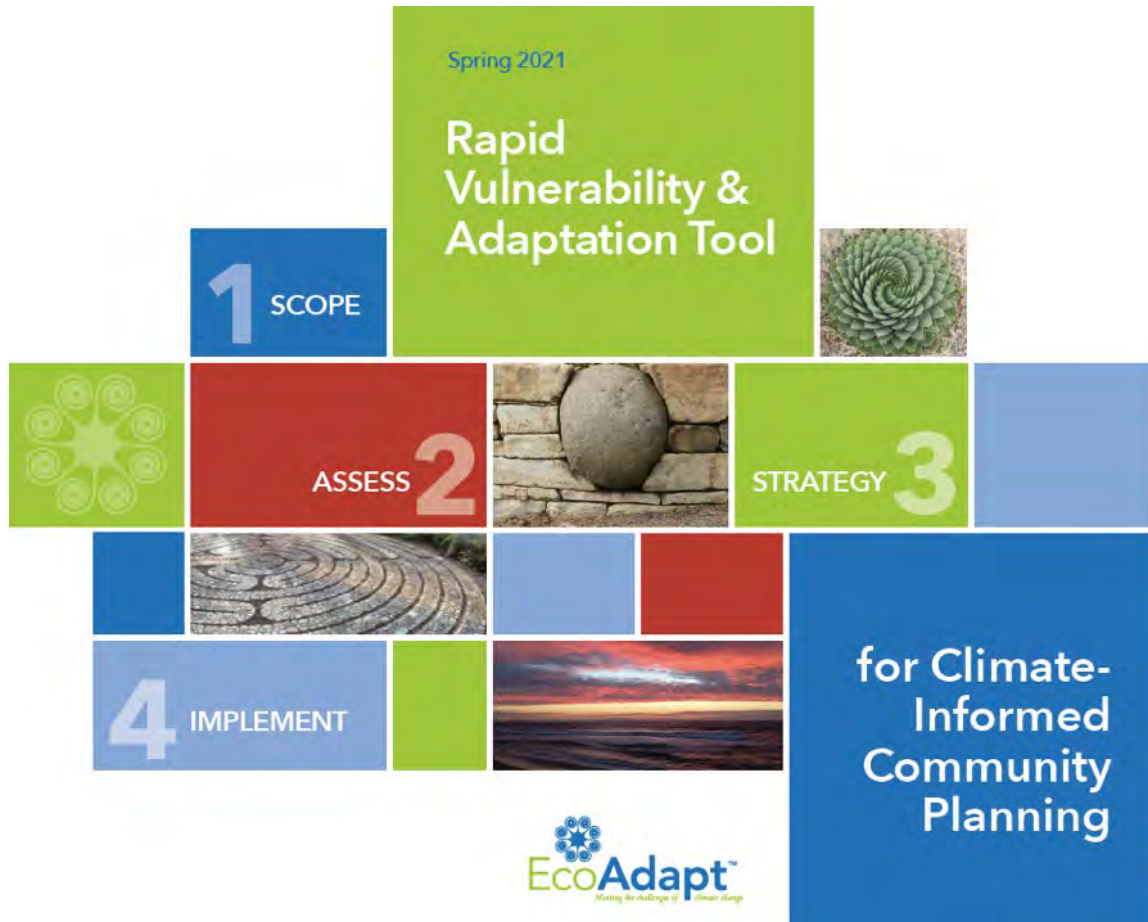


## Adaptation Strategies

- Created an **online heat toolkit** for local health departments
- Developed an online **flood mapping toolkit** for emergency preparedness professionals
- **Targeted education opportunities** for healthcare workers so they are better prepared to address health effects of climate change
- Established a **mini grant program** for local health departments to build their capacity to address the public health effects of climate change

<https://braceillinois.uic.edu/take-action-2/take-action/>

# Tools Used in this Workshop



Use to assess vulnerability across the community and its many sectors and develop adaptation responses



Use to assess the climate readiness of any project or policy



# Questions?



## Building a Climate Savvy Community



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