

# ADAPTING URBAN FORESTS TO CLIMATE CHANGE: APPROACHES FOR ACTION

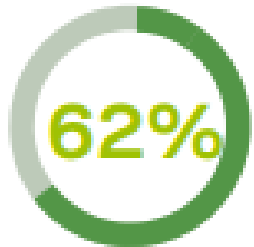
Leslie Brandt



# URBAN FORESTS: A CLIMATE ADAPTATION STRATEGY?



Cities that include trees as part of their climate change/sustainability goals in climate action plans



States that have developed comprehensive Climate Action Plans, using forests to help adapt/mitigate



Cities that view trees as part of their overall sustainability/climate protection efforts

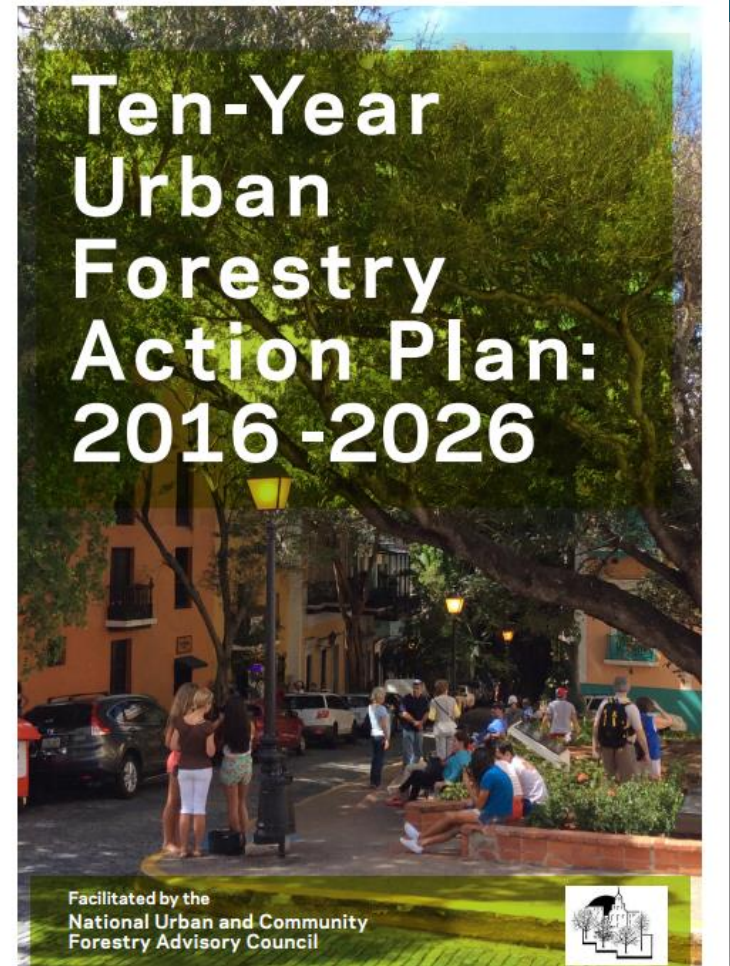
# BUT... URBAN FORESTS FACE CLIMATE CHANGE CHALLENGES





## Goal 4B:

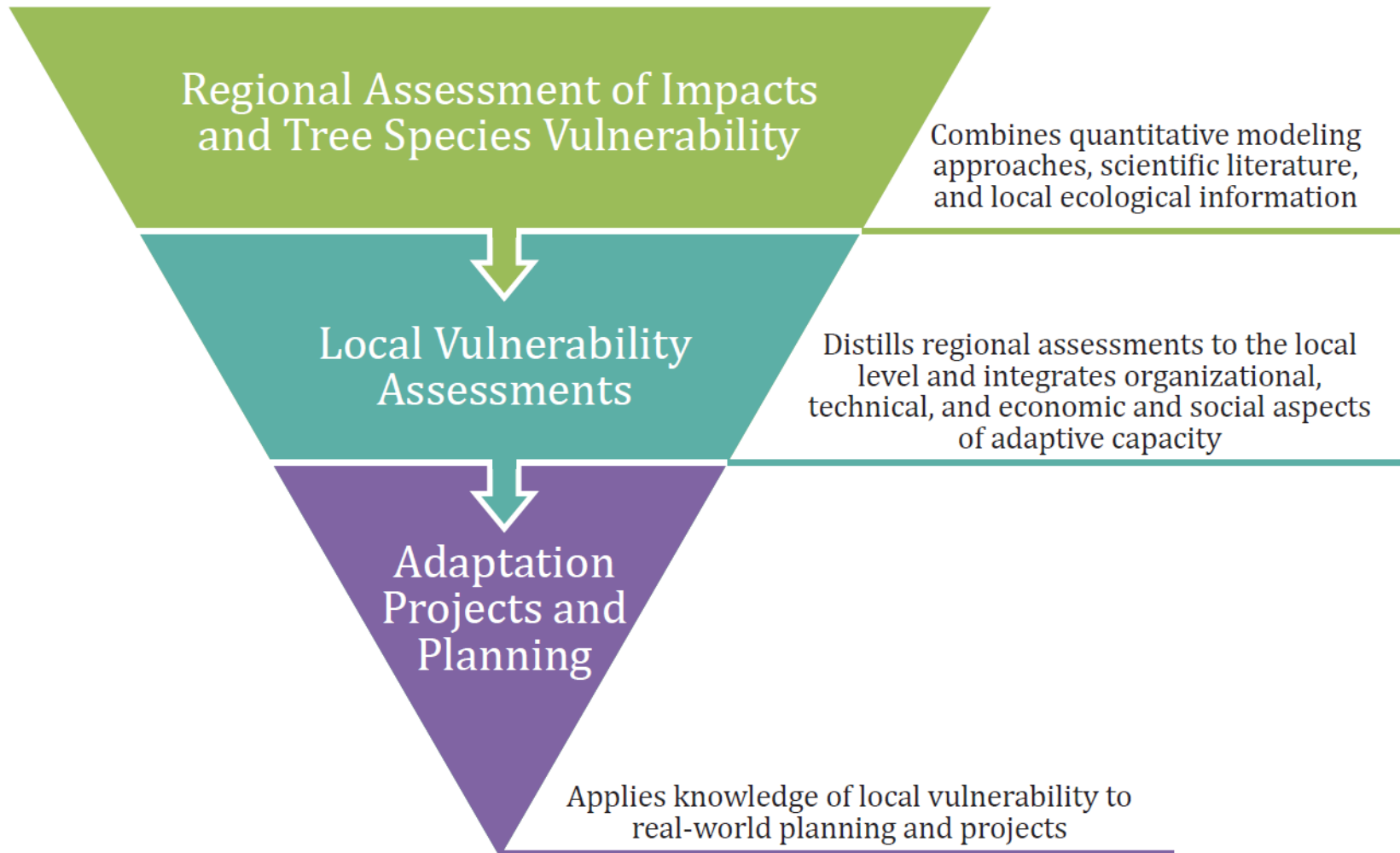
*Foster resilience, restoration, and sustainability of urban and community forests facing climate change challenges.*



HOW?

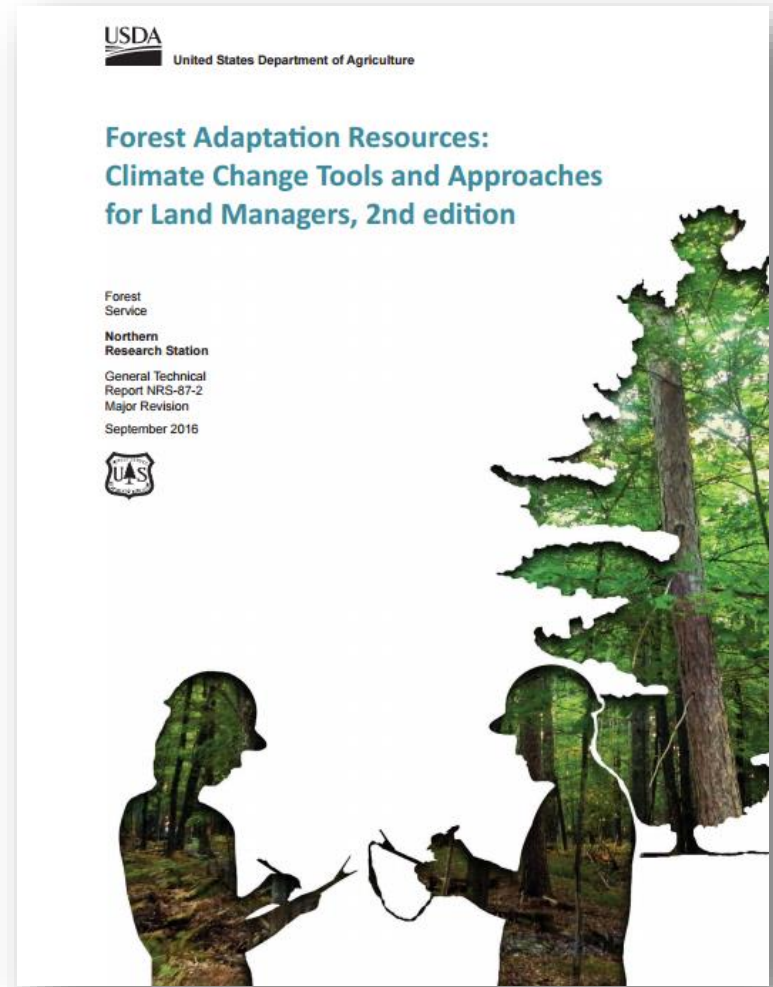


# URBAN FORESTRY CLIMATE CHANGE RESPONSE FRAMEWORK

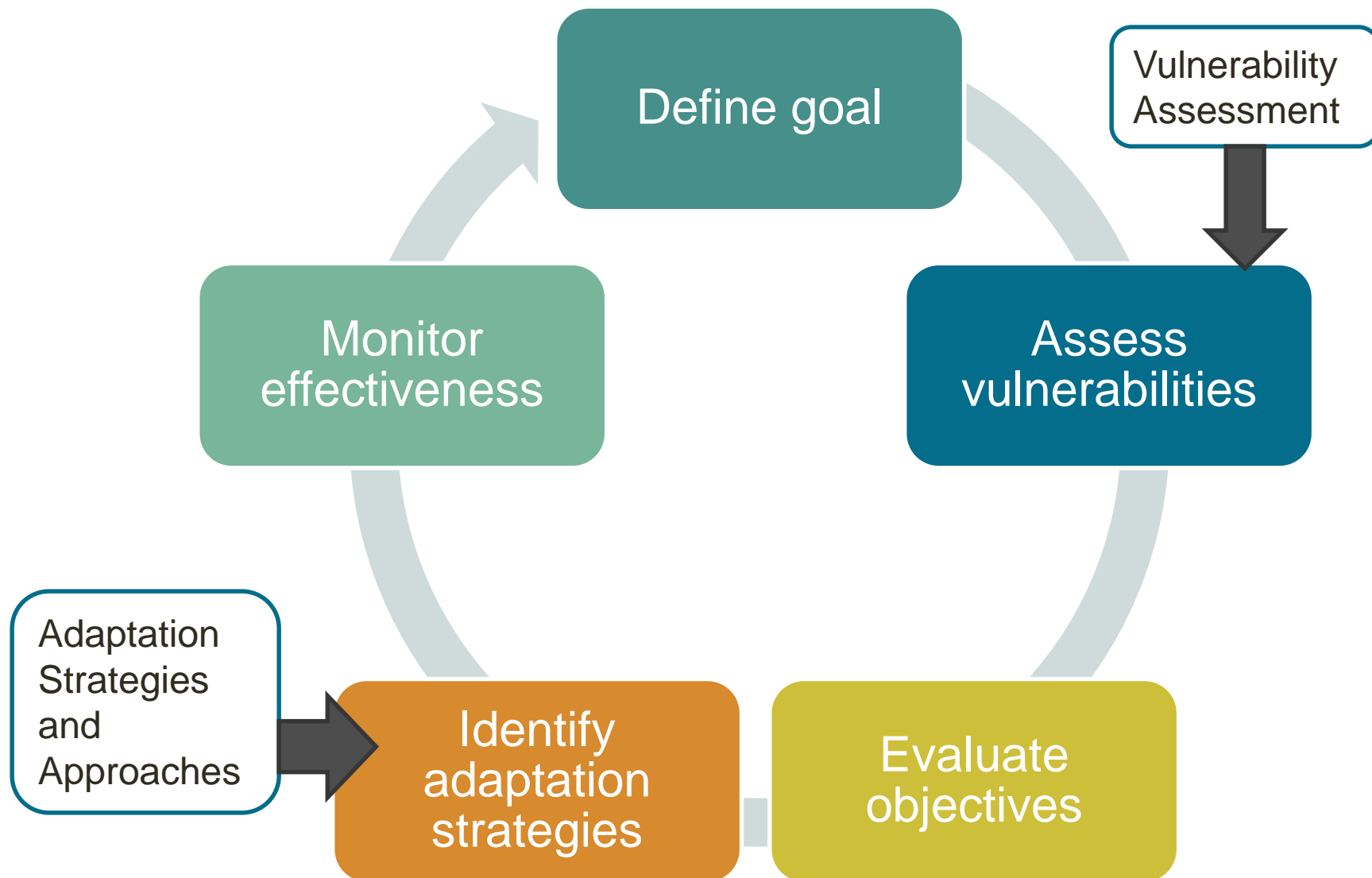


# FOREST ADAPTATION RESOURCES

- Designed for a variety of land managers with **various goals** and **objectives**
- Tailored to **eastern forests in rural and urban areas**
- **Does not make recommendations**
- Two menus of adaptation **strategies & approaches**, including one for urban forest ecosystems



# FOREST ADAPTATION RESOURCES: ADAPTATION WORKBOOK

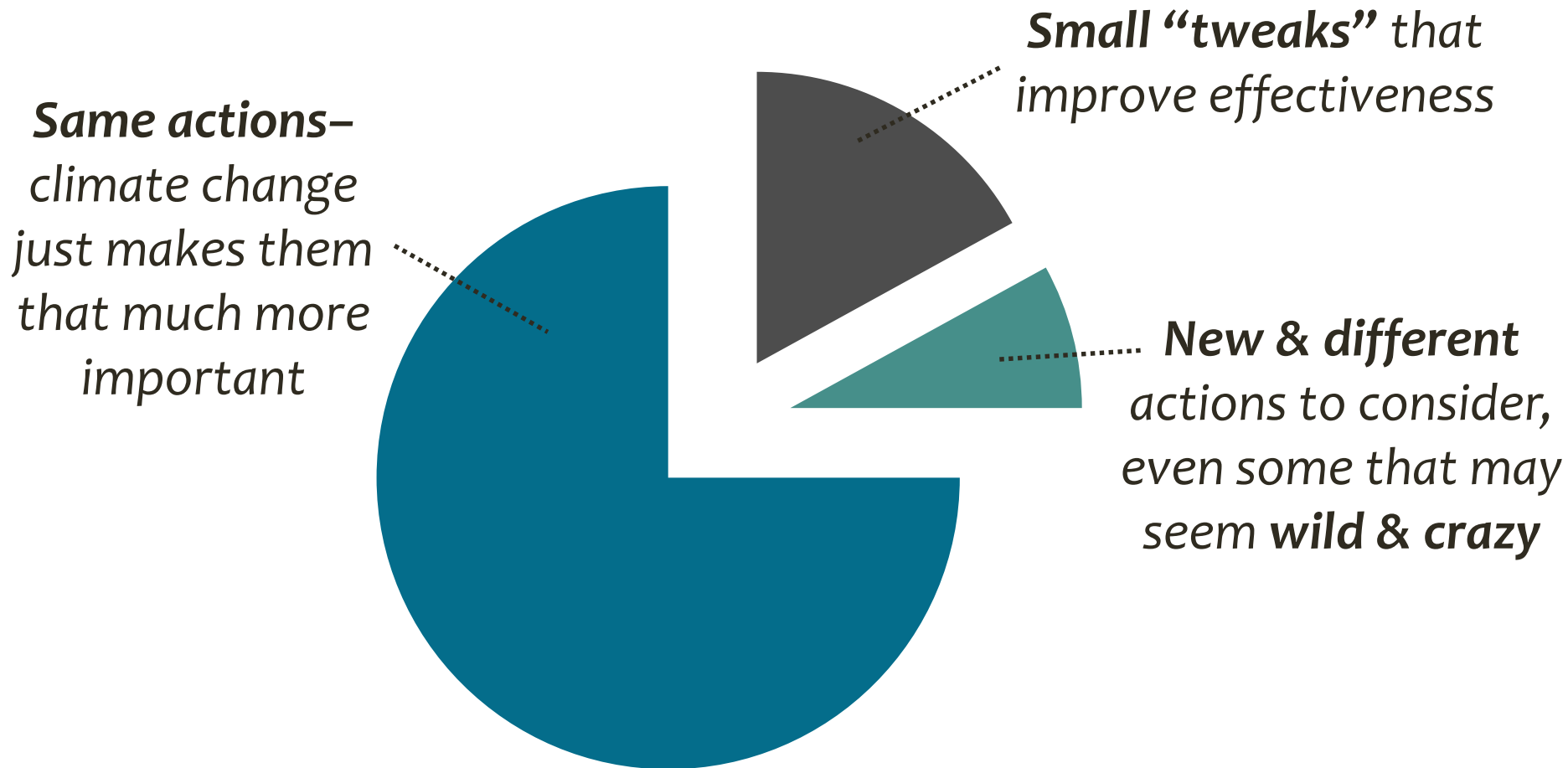




# ACTIONS FOR ADAPTATION

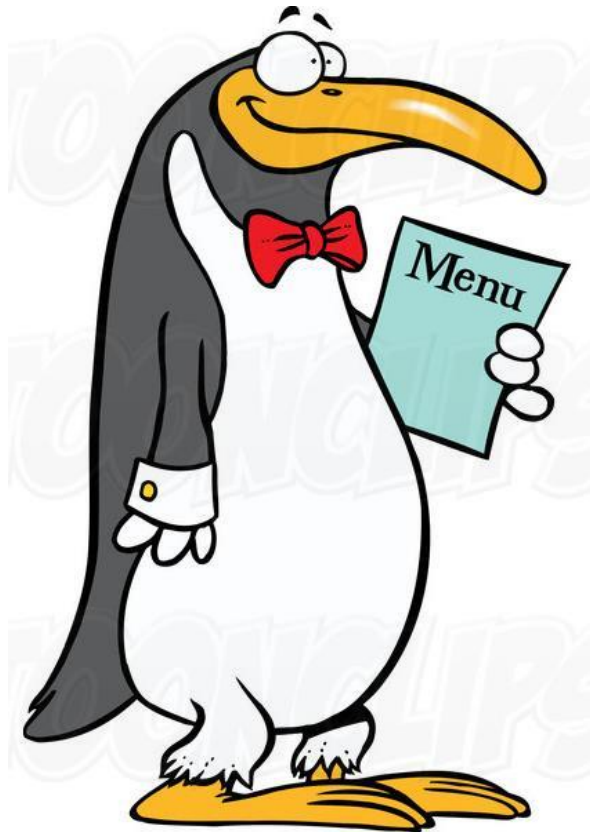
*Adaptation actions are designed to specifically address climate change impacts & vulnerabilities in order to meet climate-informed goals/objectives.*

# ADAPTATION ACTIONS CAN BE...



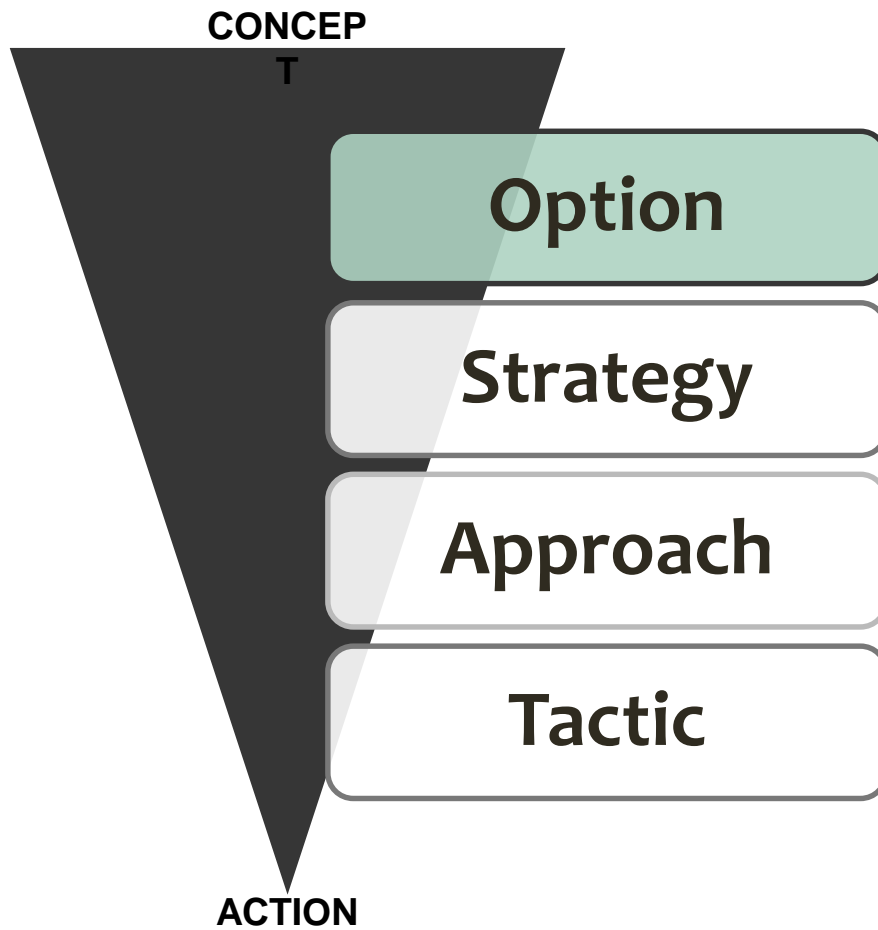
*\*individual results will vary*

# ADAPTATION STRATEGIES & APPROACHES



A “menu” of possible actions that allows you to decide what is most relevant for a particular location and set of conditions.

# ADAPTATION STRATEGIES AND APPROACHES

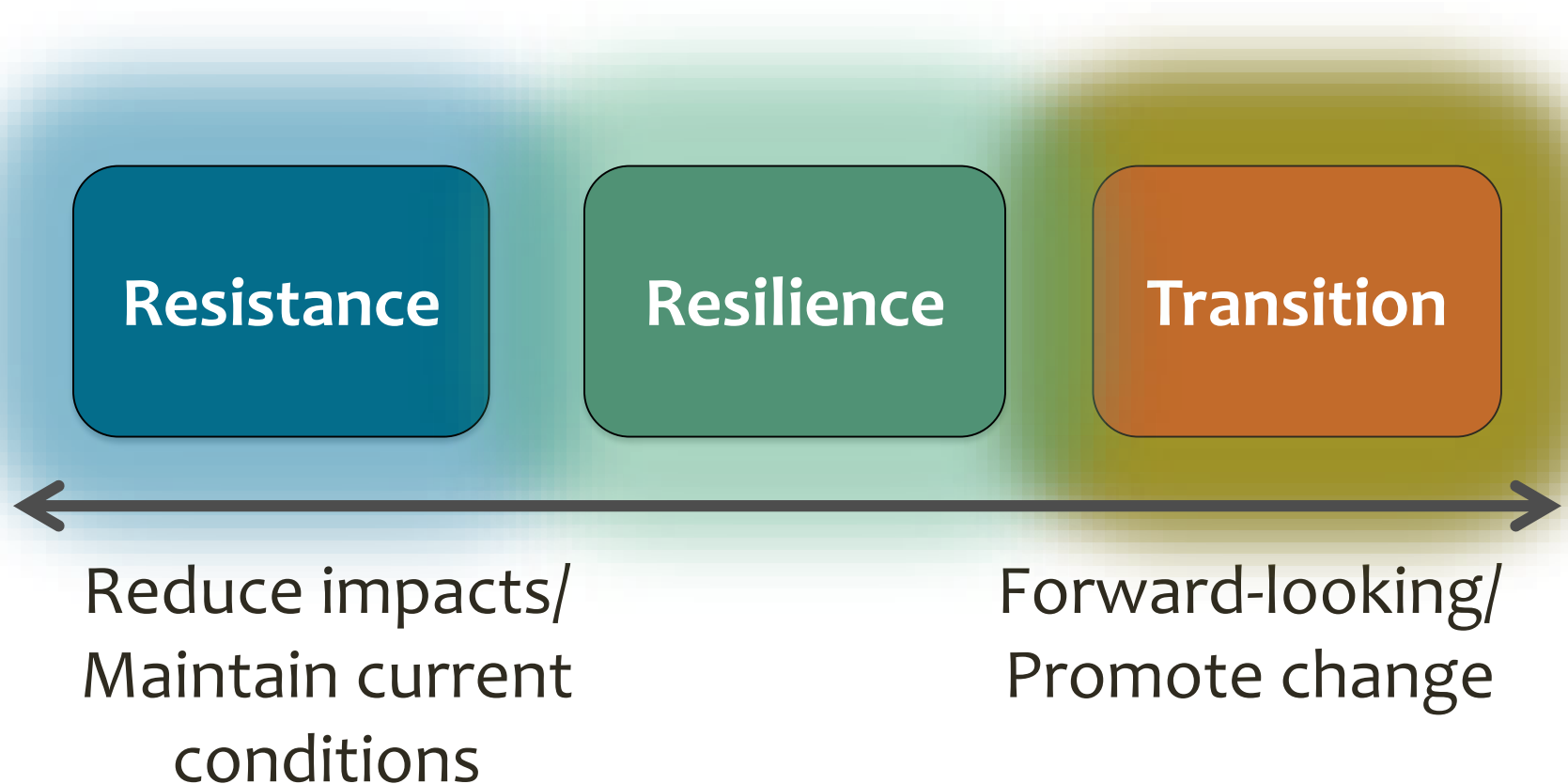


**Manage for Change:**  
System fundamentally  
becomes something  
different



**Manage for Persistence:**  
Still be recognizable as  
being the same system

# ADAPTATION OPTIONS





# RESISTANCE EXAMPLES



Preventing herbivory



Preventing winterburn



Controlling flooding with french drains



Watering



# RESILIENCE EXAMPLES



Enhancing biodiversity



Installing rain gardens



Prescribed fire



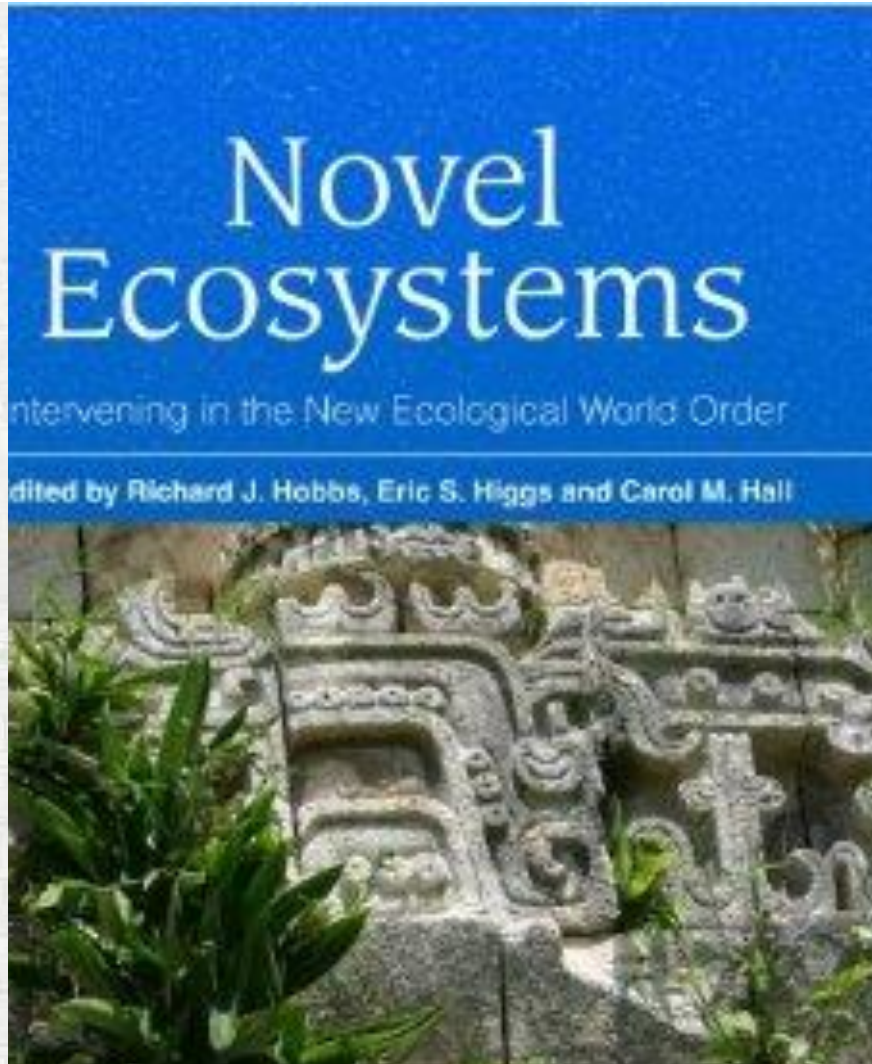
Pruning



# TRANSITION EXAMPLES



Enhance  
connectivity for  
migration

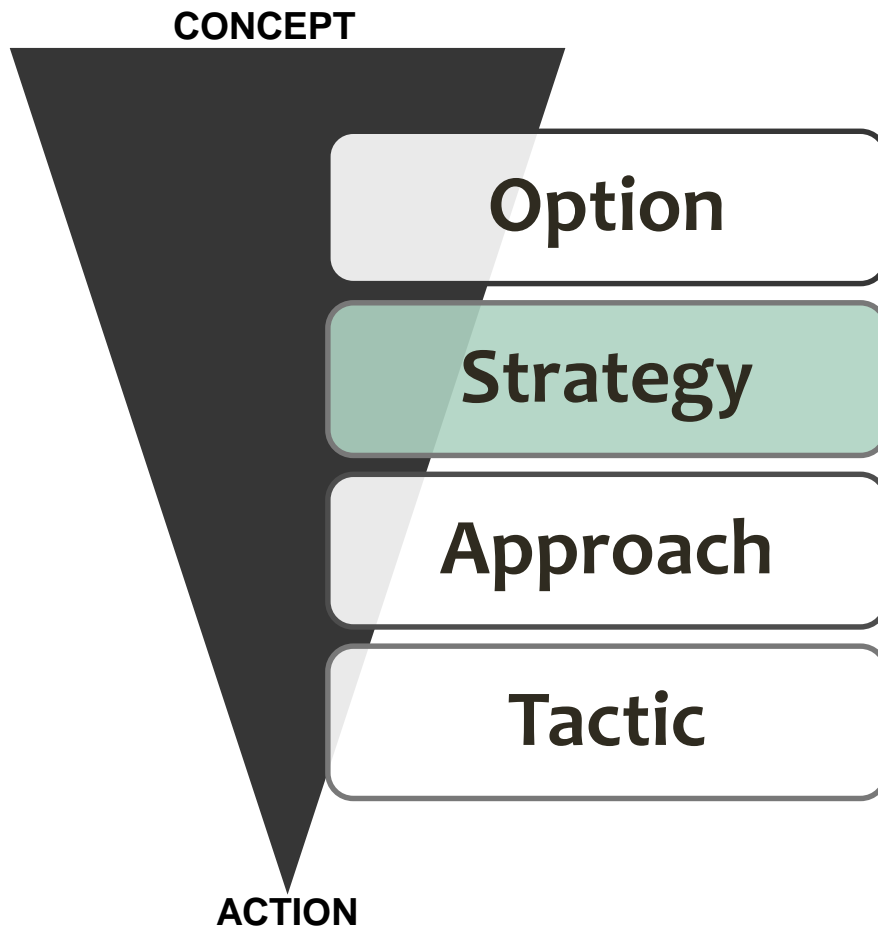


Promoting New species  
assemblages



Planting future-  
adapted seedlings

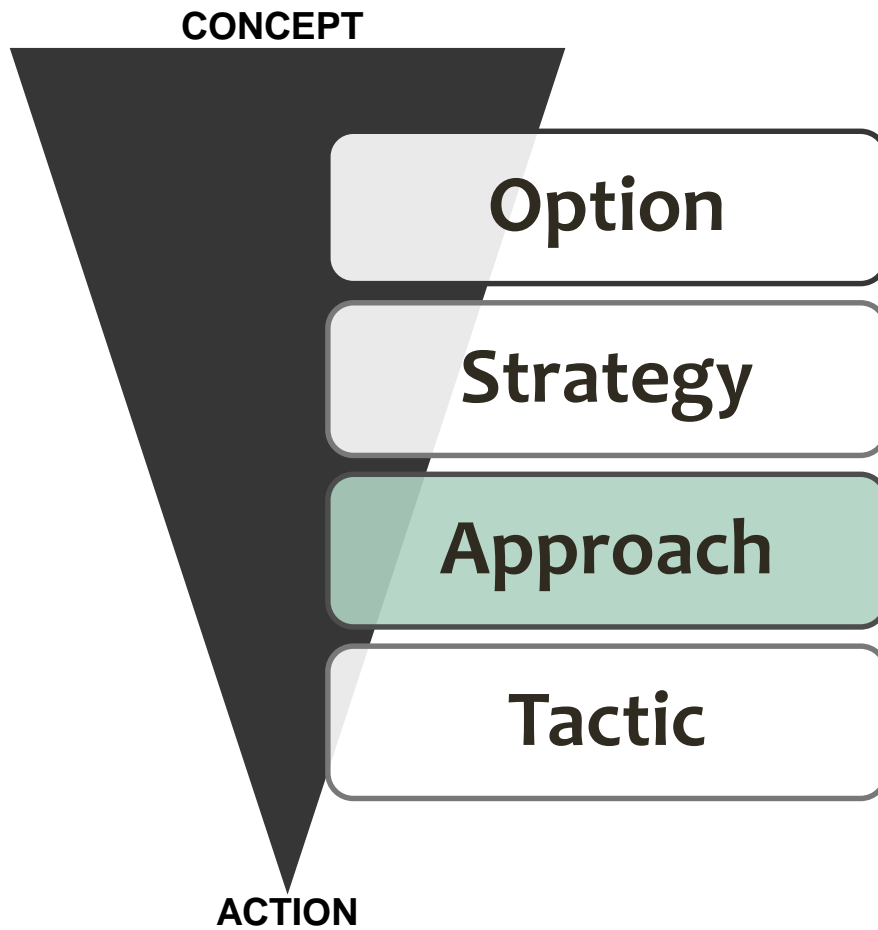
# ADAPTATION STRATEGIES AND APPROACHES



Broad adaptation responses

- Sustain fundamental ecological functions
- Reduce the impact of existing biological stressors
- Reduce the risk and long-term impacts of severe disturbances.
- Facilitate community adjustments through species transitions

# ADAPTATION STRATEGIES AND APPROACHES

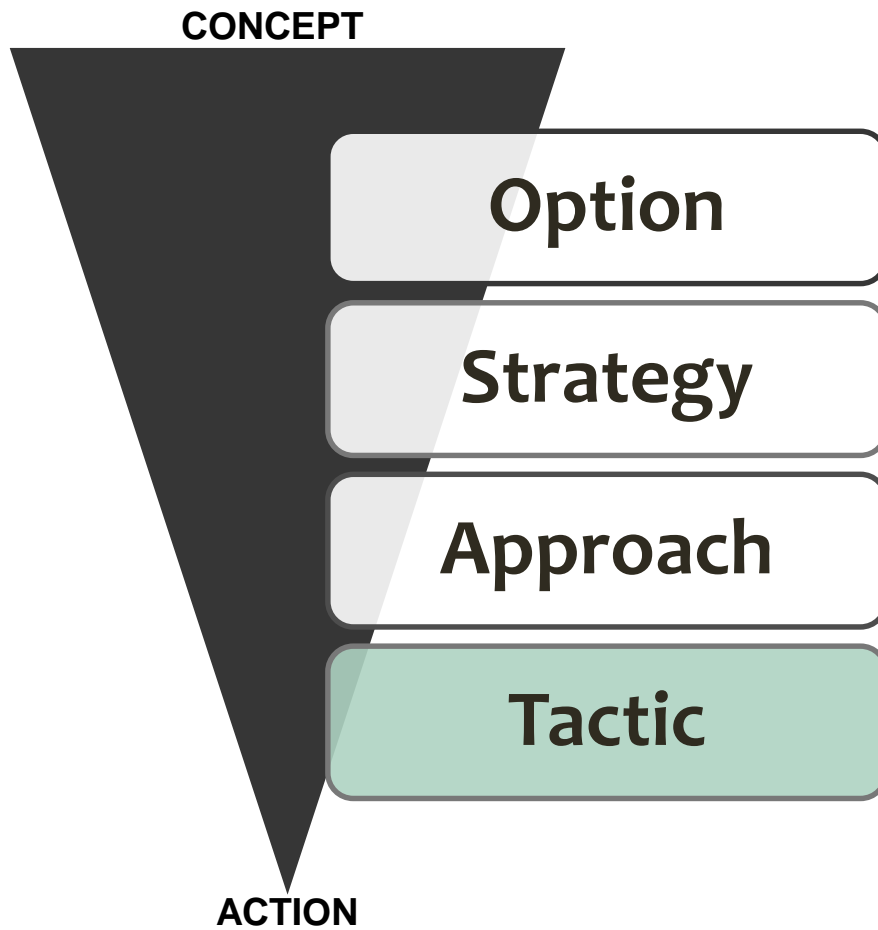


More specific actions

- Manage for species or genotypes with wide moisture and temperature tolerances.
- Introduce species that are expected to be adapted to future conditions.
- Move at-risk species to locations that are expected to provide habitat.

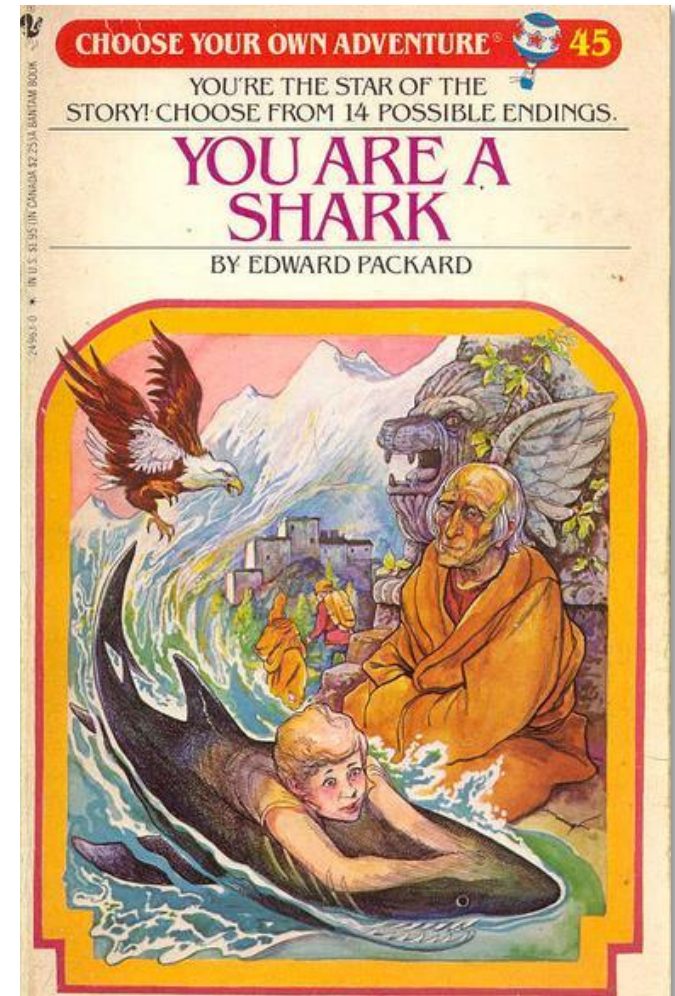
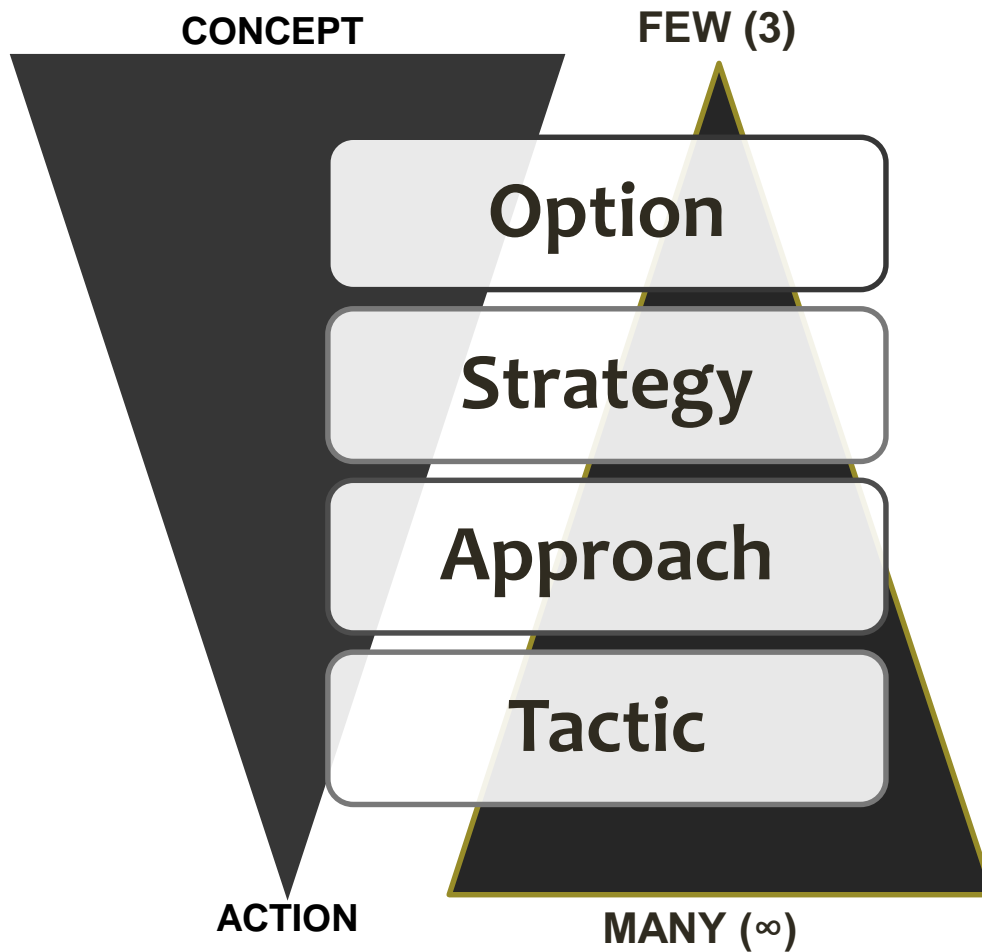


# ADAPTATION STRATEGIES AND APPROACHES



Prescriptive actions selected by producer that are designed for individual site conditions and management objectives

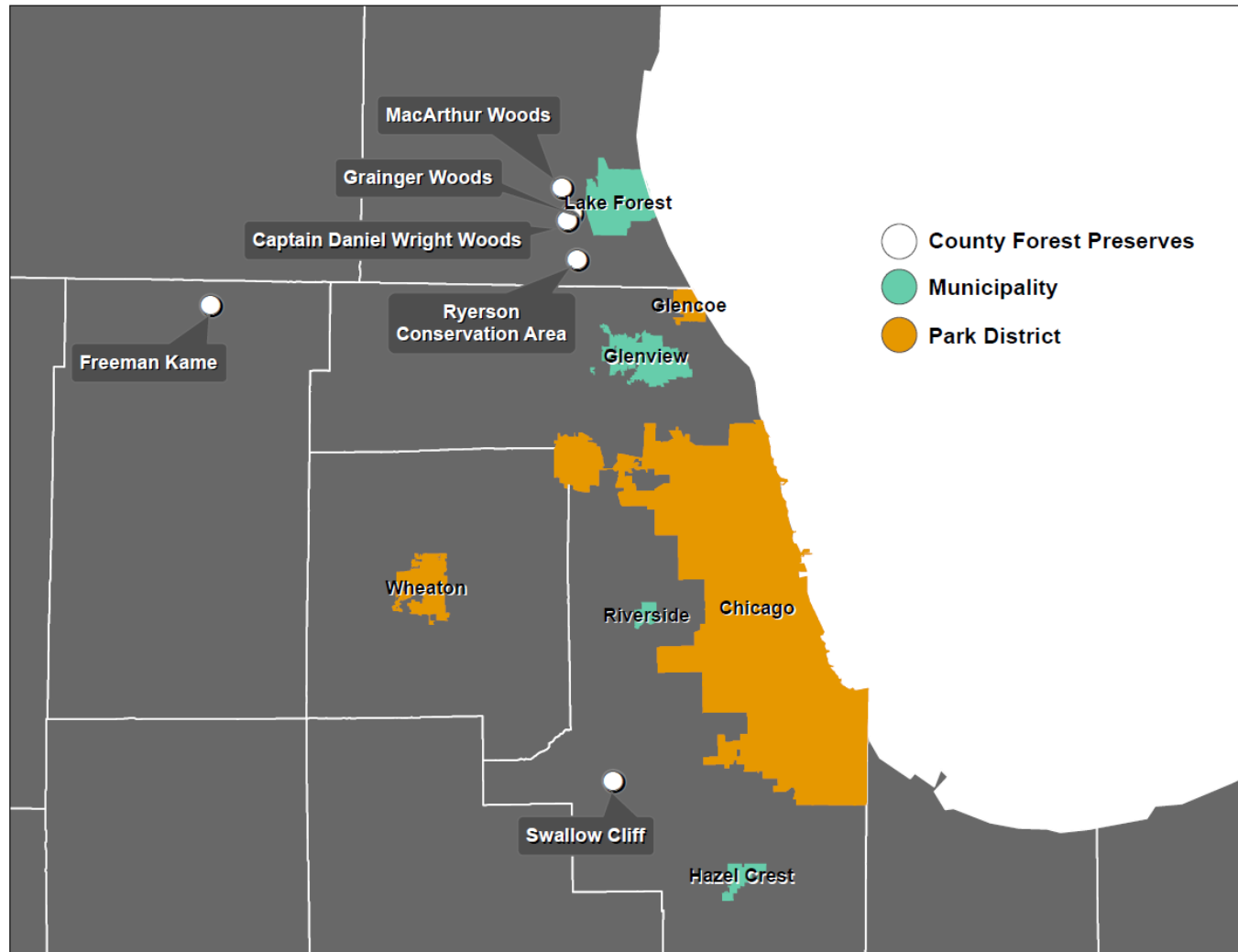
# ADAPTATION STRATEGIES AND APPROACHES



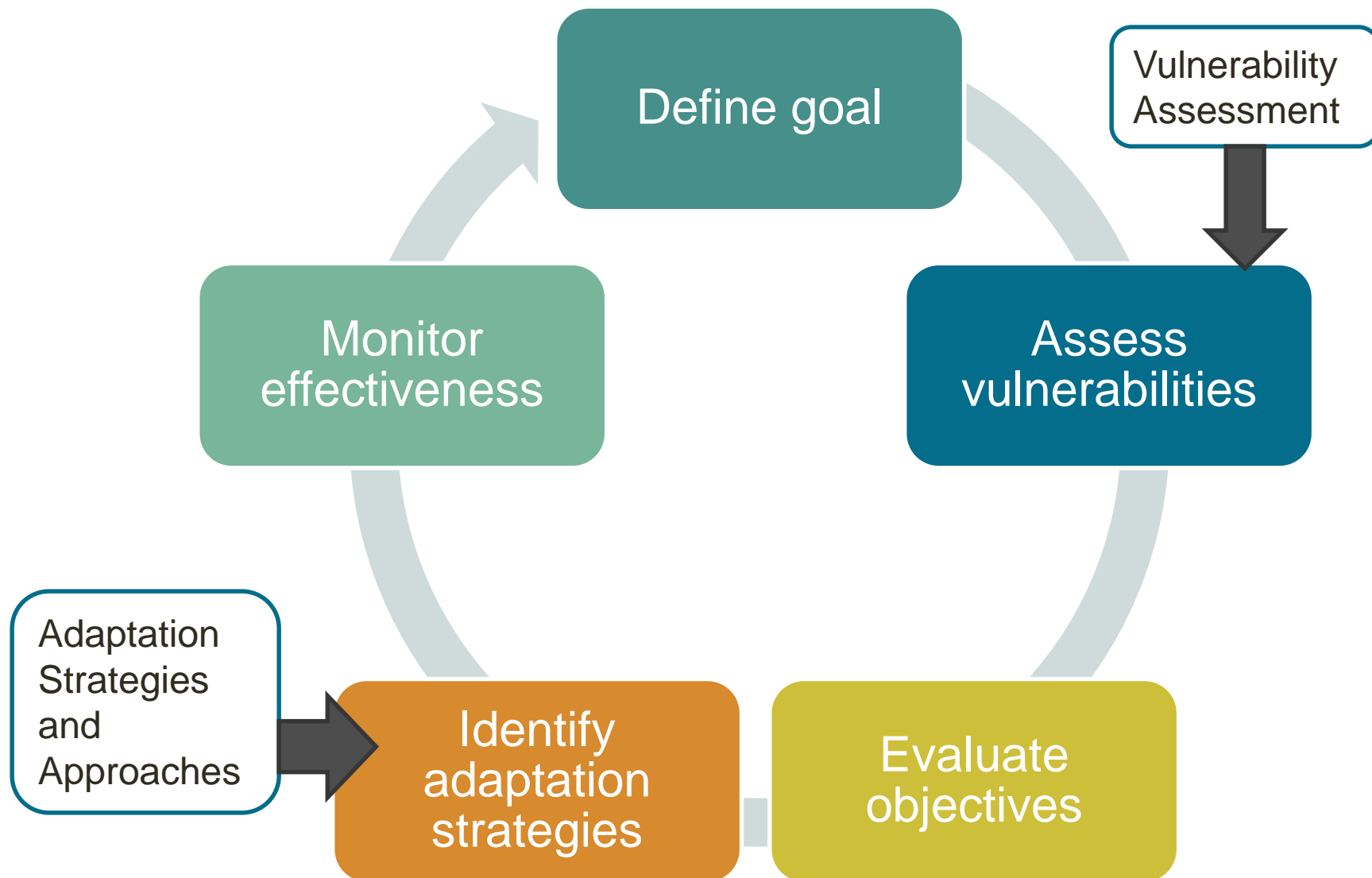
# EXAMPLES

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# PILOT COMMUNITIES

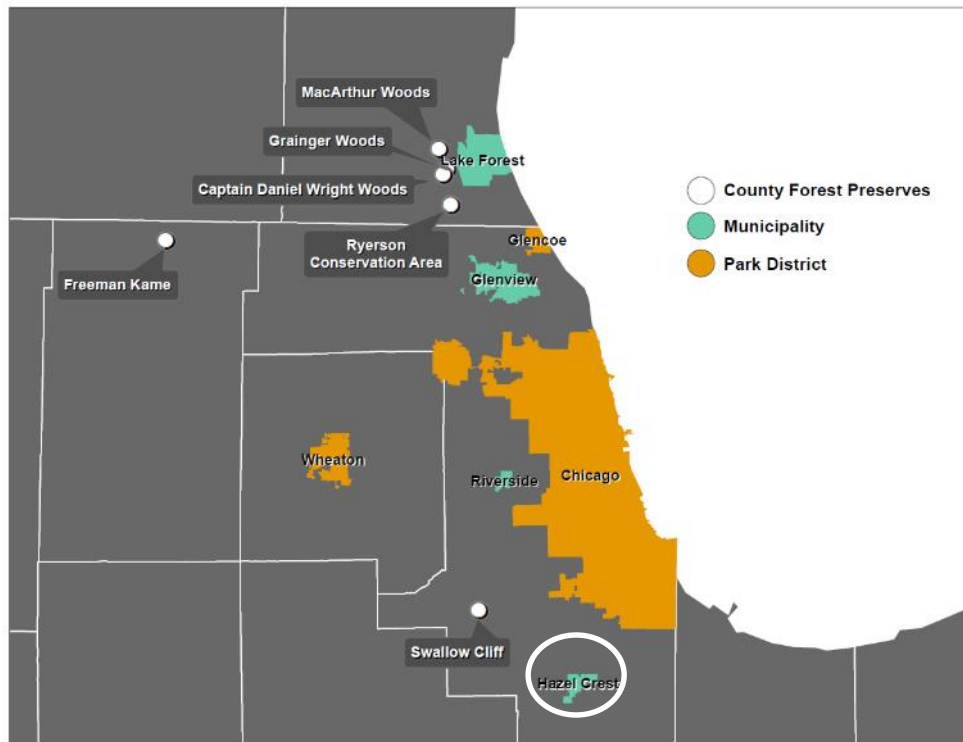


# FOREST ADAPTATION RESOURCES: ADAPTATION WORKBOOK



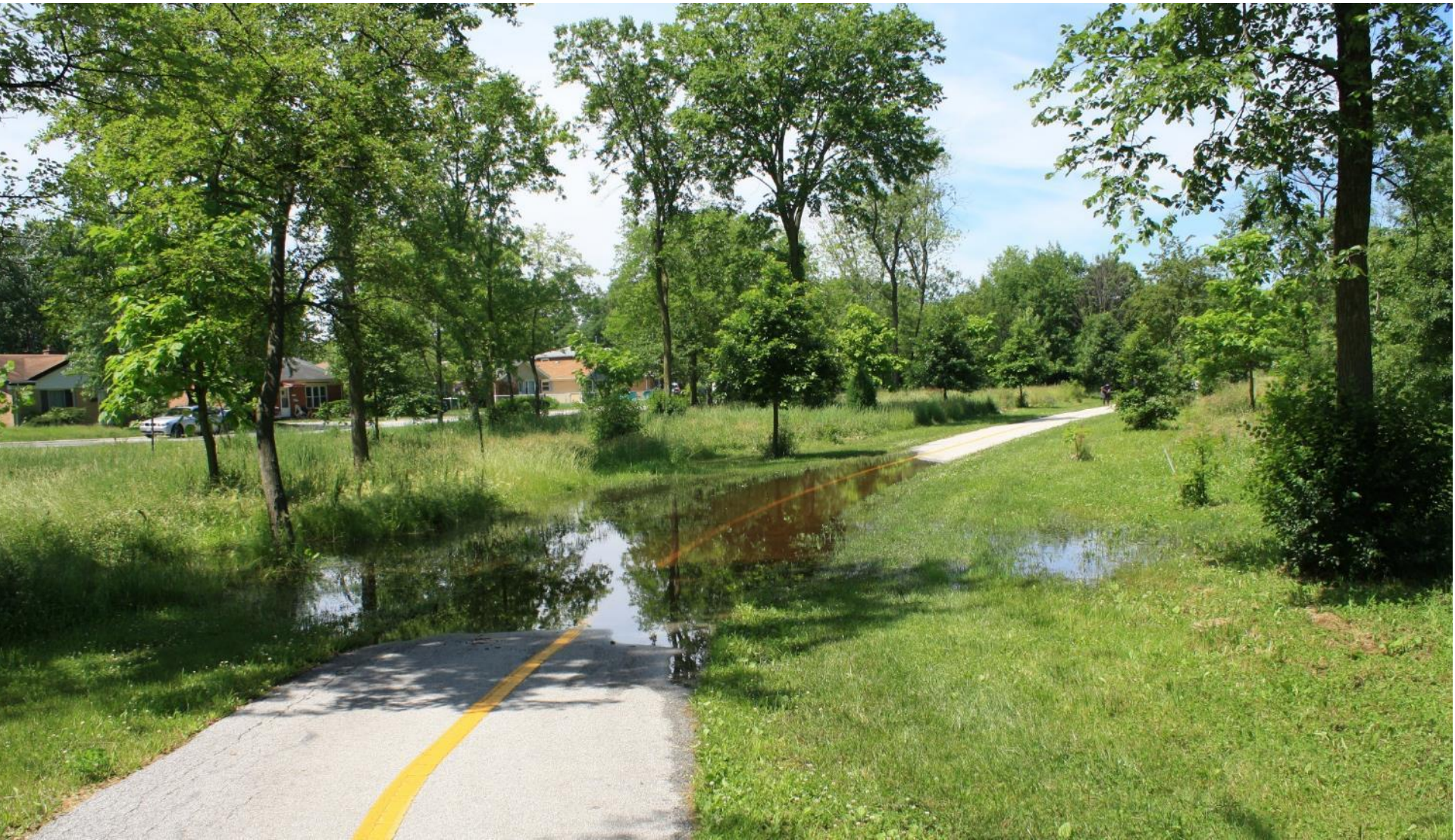
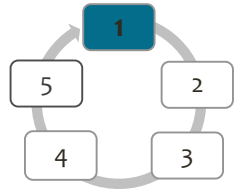


# HAZEL CREST



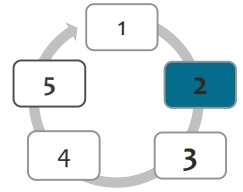


# GOAL: CONTROL FLOODING IN FLOOD-PRONE OPEN LANDS





# HAZEL CREST



## Moderate-High Vulnerability

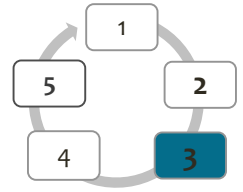
### Impacts:

- Well-drained soils in most areas-drought susceptible. -
- Silver maple-dominated (vulnerable to wind storms). -
- Open lands in low-lying areas (flood prone). -

### Adaptive Capacity:

- ISA-certified arborist on staff. +
- Low canopy diversity. -
- Lower financial resources (relatively low-income area). -
- Not a lot of community support for tree care, planting. -

# HAZEL CREST: CHALLENGES AND OPPORTUNITIES



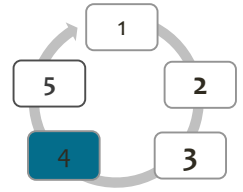
## Challenges

- More heavy rain events could increase flooding, making it more difficult to manage
- Summer droughts could make seedling establishment difficult.

## Opportunities

- May be able to plant a wider variety of species from further south

# ADAPTATION TACTICS



Minimize or  
eliminate flooding

Increase  
biodiversity

Select  
future-adapted  
tree species

**Resistance**

**Resilience**

**Transition**



Reduce impacts/  
Maintain current  
conditions

Forward-looking/  
Promote change



# CONTROLLING FLOODING WITH DRY WELLS



Planting Shumard  
Oak over Dry Well

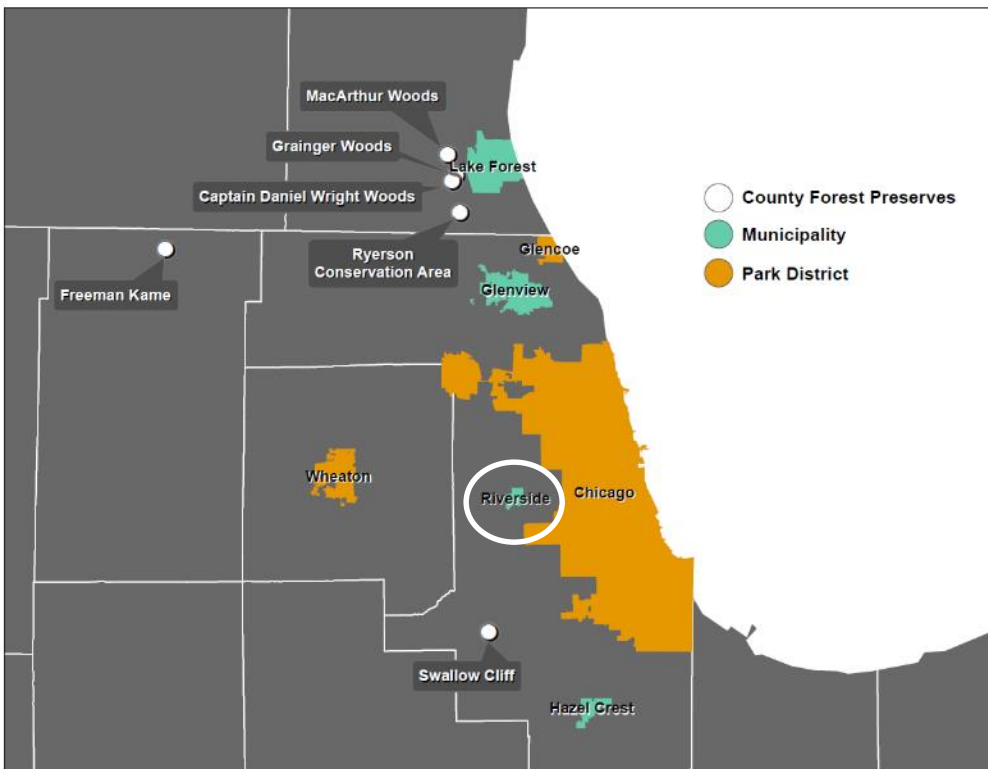


# PLANTING FLOOD-TOLERANT TREES

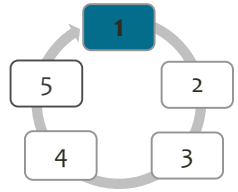




# RIVERSIDE

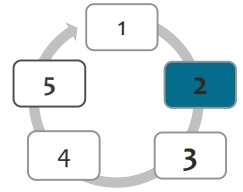


# GOALS: REPLACE SPECIES LOST TO EAB RESTORE RIPARIAN FORESTS





# RIVERSIDE



## Low-Moderate Vulnerability

### Impacts:

- Divided into two distinct areas:
  - South side: well-drained soils, trees more vulnerable to wind storms -
  - North side: compacted soils with high clay content -
- Deer herbivory and invasive species are both problematic.-
- Many oak species that could be susceptible to increased pest and disease pressure. -

### Adaptive Capacity:

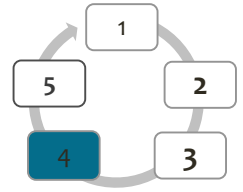
- National Historic Landscape District, Frederick Law Olmsted Design. +
- Trained forestry staff with planting list and long-term plan. +
- Diverse species, genotypes, age classes. +

# ADAPTATION TACTICS

Remove  
invasive  
buckthorn

Incorporate  
prescribed fire

Plant  
tree species from  
southern climates



**Resistance**

**Resilience**

**Transition**

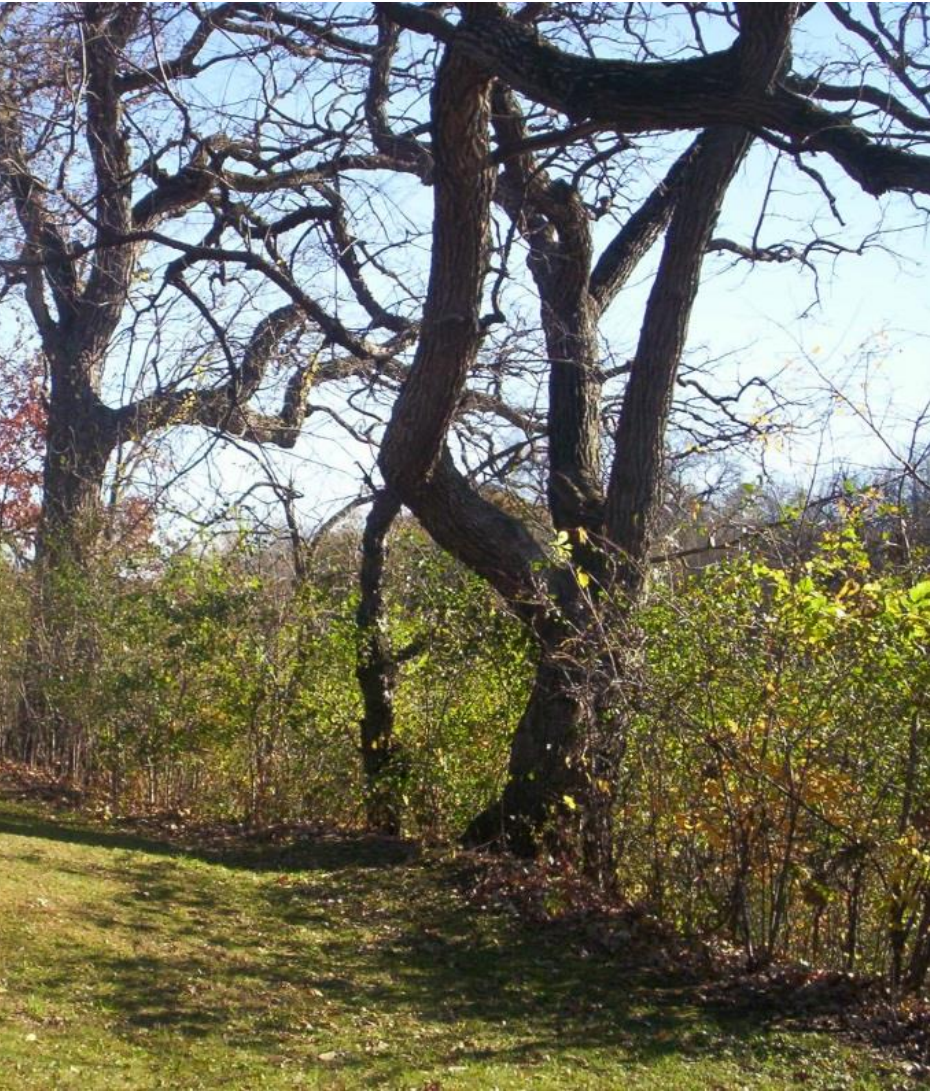
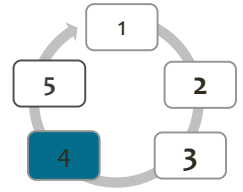


Reduce impacts/  
Maintain current  
conditions

Forward-looking/  
Promote change

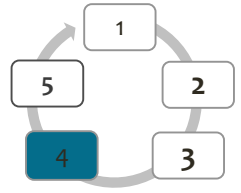


# REMOVE INVASIVE BUCKTHORN



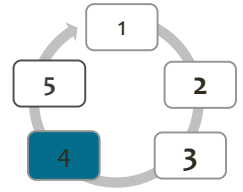


# INCORPORATE FIRE INTO SYSTEM TO REDUCE INVASIVE SPECIES AND PROMOTE NATIVE SEED BANK





# PLANT FUTURE-ADAPTED SPECIES




Pecan

Bald Cypress





# ONLINE WORKBOOK: BEING UPDATED FOR URBAN FORESTS

**Adaptation Workbook**  
A Climate Change Tool for Forest Management and Conservation


Log InContact

HomeGet startedAboutHow to UseResources


Build a custom adaptation plan using your expertise, your judgment, and your land.

**Get Started**  
Create an account to use the workbook.


Already have an account? Log In




Tailored to  
your location



Peer-reviewed  
resources



Structured  
process



Take it  
with you

# SELECT YOUR LOCATION

## Property Location

Click on the map to drop a marker that indicates the center of your property. After the marker is placed on the map, you can click and hold to drag the marker to a new location.



## Property Details

**Name**

Give your property a short, recognizable name.

**Description**


Provide a short description of the property here. You can also add details such as whether the property has an existing management plan, or whether you're using the Adaptation Workbook to consider only a portion of a single property, a collection of properties, or a larger landscape.

**Acres**

How large is your project?

**Ownership**

# PRE-POPULATED LIST OF REGIONAL IMPACTS

Potential Climate Impacts - Regional 



Identified 15 Potential Climate Impacts

**Northern Minnesota temperatures will increase between 3 °F and 9 °F by the end of the century, with more warming during winter.**

Show Evidence



Evidence: Robust | Agreement: High

How might this affect your property?

Think specifically about the forest conditions, soils, landforms, and other specific information about your project area that might modify this general climate impact.

**Northern Minnesota's winter snowpack will be reduced from 40-80% by the end of the century.**

Show Evidence



Evidence: Robust | Agreement: High

How might this affect your property?

Think specifically about the forest conditions, soils, landforms, and other specific information about your project area that might modify this general climate impact.

**Northern Minnesota will have 20-40 fewer days of frozen ground during the winter by the end of the century.**

Show Evidence



Evidence: Medium | Agreement: High

How might this affect your property?

Think specifically about the forest conditions, soils, landforms, and other specific information about your project area that might modify this general climate impact.



# DEVELOP ADAPTATION TACTICS FROM MENU OF BROAD STRATEGIES

## Tactical Details

Describe specifically the action you can take. These details should ideally answer what, when, how, and where you will implement the actions.

## Timeframe ⓘ

Time Frame

## Benefits

List any benefits associated with using this tactic. For example, note if a tactic addresses multiple challenges, has important side benefits, or is already part of your business as usual management.

## Practicability ⓘ

## Drawbacks and Barriers

List any drawbacks associated with this tactic, such as harmful ecosystem impacts, potential conflicts with other management goals, or institutional barriers.

## Strategy

Strategy 1: Sustain fundamental ecological

## Approach

Maintain or restore riparian areas

## Strategy

## Approach

Add Strategy/Approach +

Save

# FINAL THOUGHTS

**Uncertainty is guaranteed.**

Management will be most effective if it integrates uncertainty, rather than pushing against it.

**There is not a shiny new tool for climate change.**

Rather, we have the same old tools but will need to use them in new ways.



## IMPORTANT LINKS

- Online workbook:  
[adaptationworkbook.org](http://adaptationworkbook.org)
- Order a print copy of Forest Adaptation Resources:  
<http://www.nrs.fs.fed.us/pubs/order/52760>