

ESTABLISHING AN URBAN FORESTRY CLIMATE CHANGE RESPONSE FRAMEWORK

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US Forest Service



www.forestadaptation.org



NORTHERN INSTITUTE OF APPLIED CLIMATE SCIENCE

Climate

Carbon

Bioenergy

NIACS is a regional multi-institutional partnership

Forest Service

- Northern Research Station
- Eastern Region
- Northeastern Area S&PF

Non-FS partners

- Michigan Technological University
- National Council for Air & Stream Improvement
- Trust for Public Land



www.nrs.fs.fed.us/niacs/

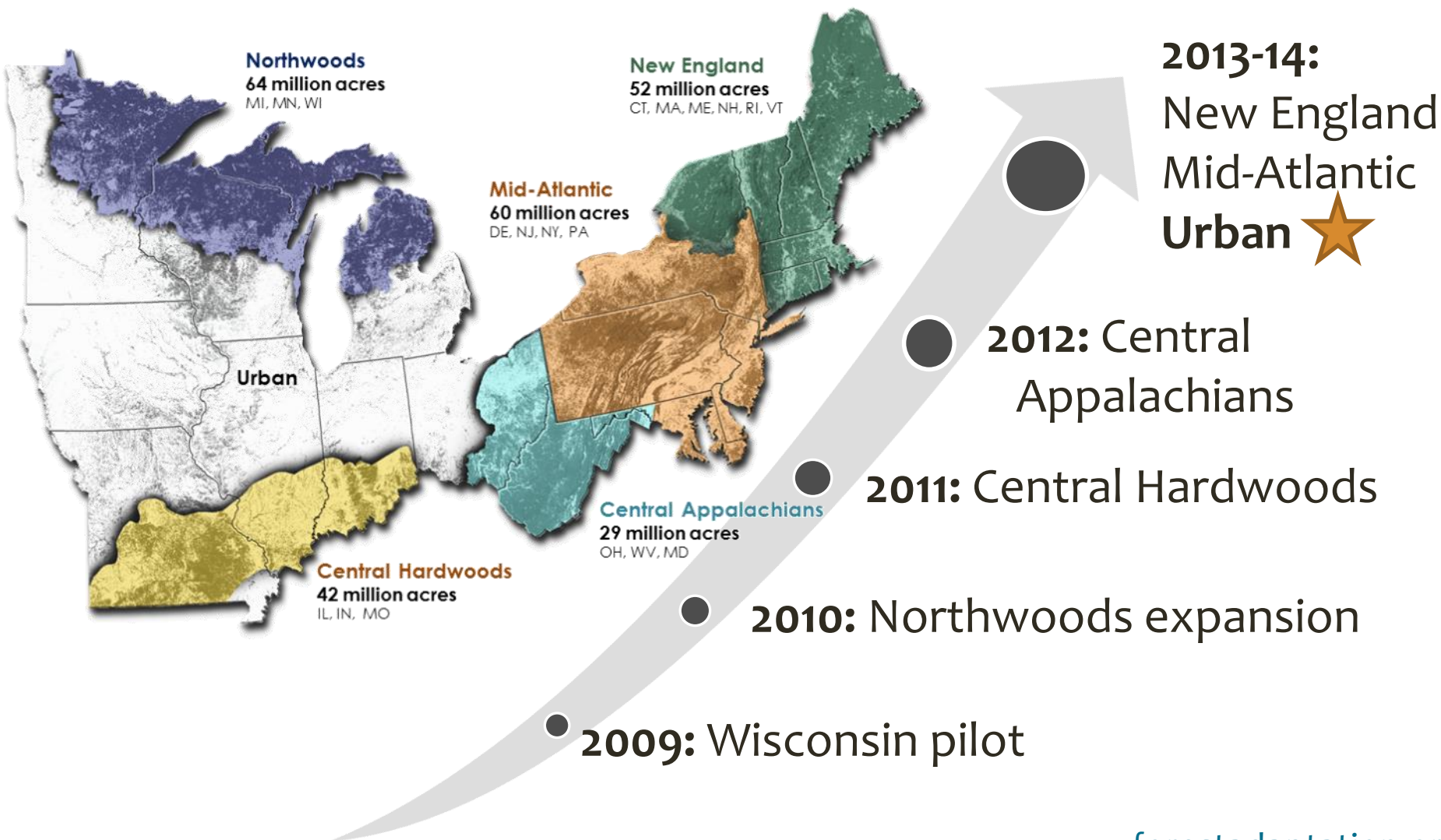


Michigan Tech
ncasi

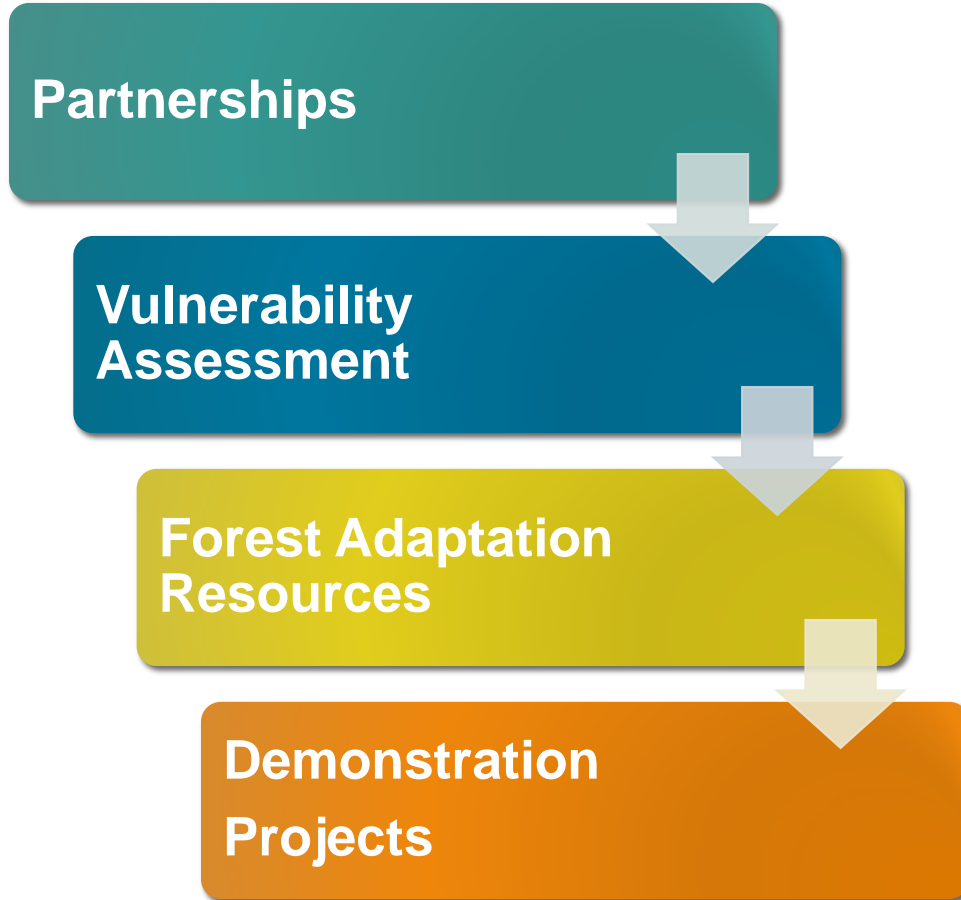


PAST WORK

CLIMATE CHANGE RESPONSE FRAMEWORK



CLIMATE CHANGE RESPONSE FRAMEWORK



CLIMATE CHANGE RESPONSE FRAMEWORK

Partnerships

work with scientists, land managers
public, NGO, university,
private organizations

Vulnerability Assessment

understand how climate change
may affect forests in an ecoregion

Forest Adaptation Resources

structured approach to identify
strategies, approaches, and
tactics to adapt to climate change

Demonstration Projects

incorporate information
into decision-making and on-the
ground projects

PARTNERSHIPS



ECOSYSTEM VULNERABILITY ASSESSMENT AND SYNTHESIS DOCUMENTS

- Focus on tree species and forest ecosystems
- Use two downscaled climate models/scenarios
- Use two-three forest impact models
- Summarize peer-reviewed and secondary literature on the impacts of climate change
- Assess the vulnerability of natural communities or forest types to climate change



EXPERT PANEL



- Mix of scientists, managers
- Representation of government, non-governmental organizations, academic institutions, private industry

VULNERABILITY PROCESS

Local
Info

Potential
Forest
Change



Vulnerability
(*& Confidence*)

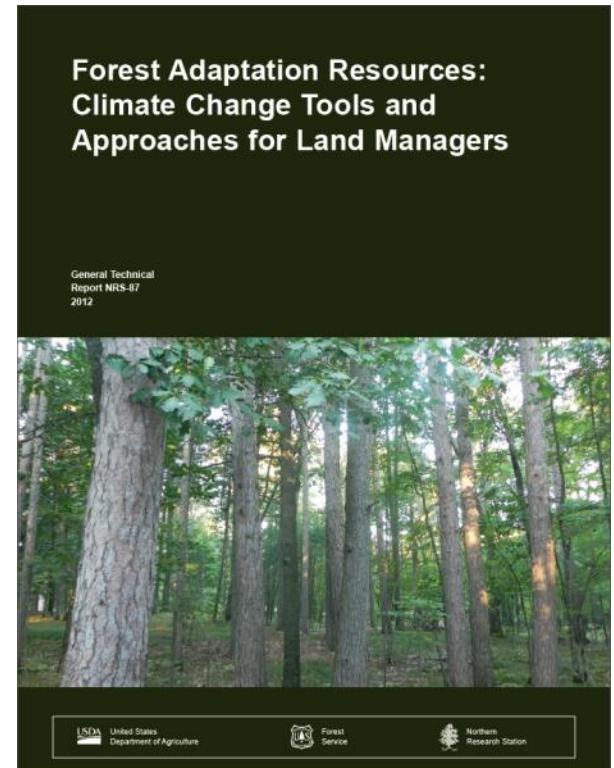
Place-based, model-informed, expert-driven, transparent

COMMUNITIES ASSESSED

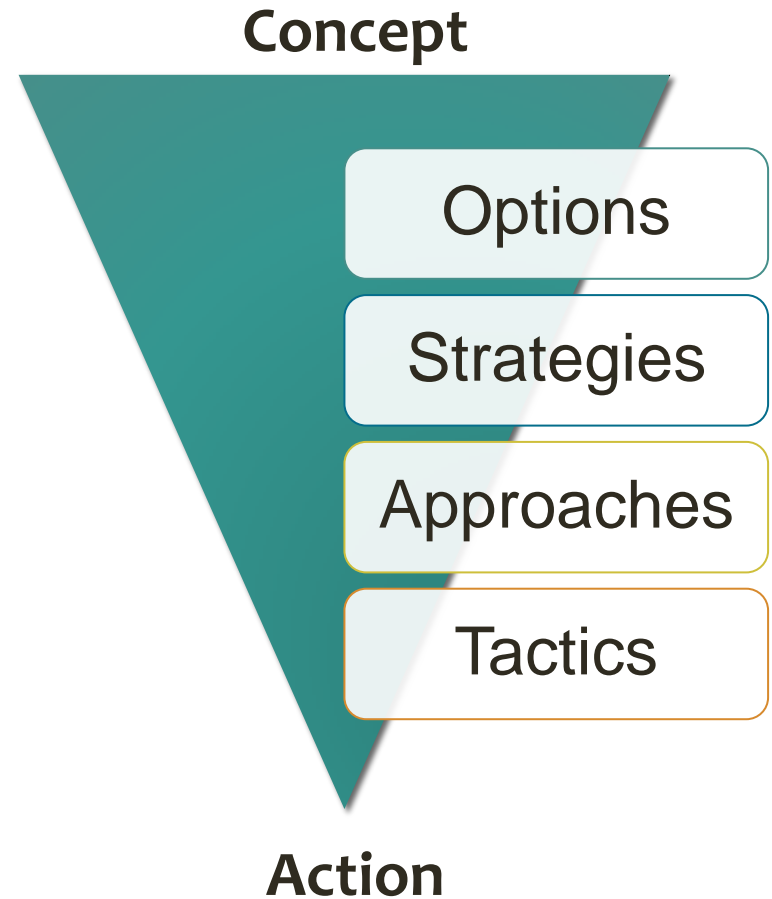
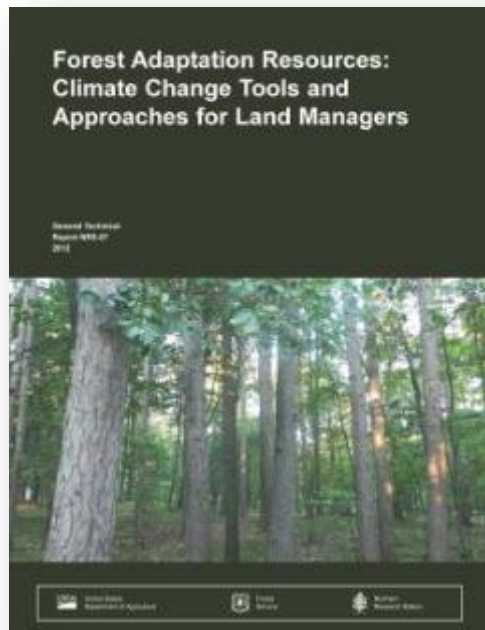
Community Type	Potential Impacts	Adaptive Capacity	Vulnerability	Evidence	Agreement
Dry-Mesic Upland Forest	Moderate	High	Low-Moderate	Medium	Medium-High
Mesic Upland Forest	Negative	Low	High	Medium	Medium-High
Mesic Bottomland Forest	Moderate	Moderate	Moderate	Limited - Medium	Medium
Wet Bottomland Forest	Moderate-Negative	Moderate	Moderate-High	Limited-Medium	Medium
Flatwoods	Moderate-Positive	Moderate	Low-Moderate	Limited-Medium	Medium
Closed Woodland	Positive	High	Low	Limited	Medium
Open Woodland	Positive	High	Low	Limited-Medium	Medium
Barrens and Savannas	Positive	Moderate	Low	Medium	Medium-High
Glade	Moderate-Positive	Moderate	Low-Moderate	Medium	Medium-High

FOREST ADAPTATION RESOURCES

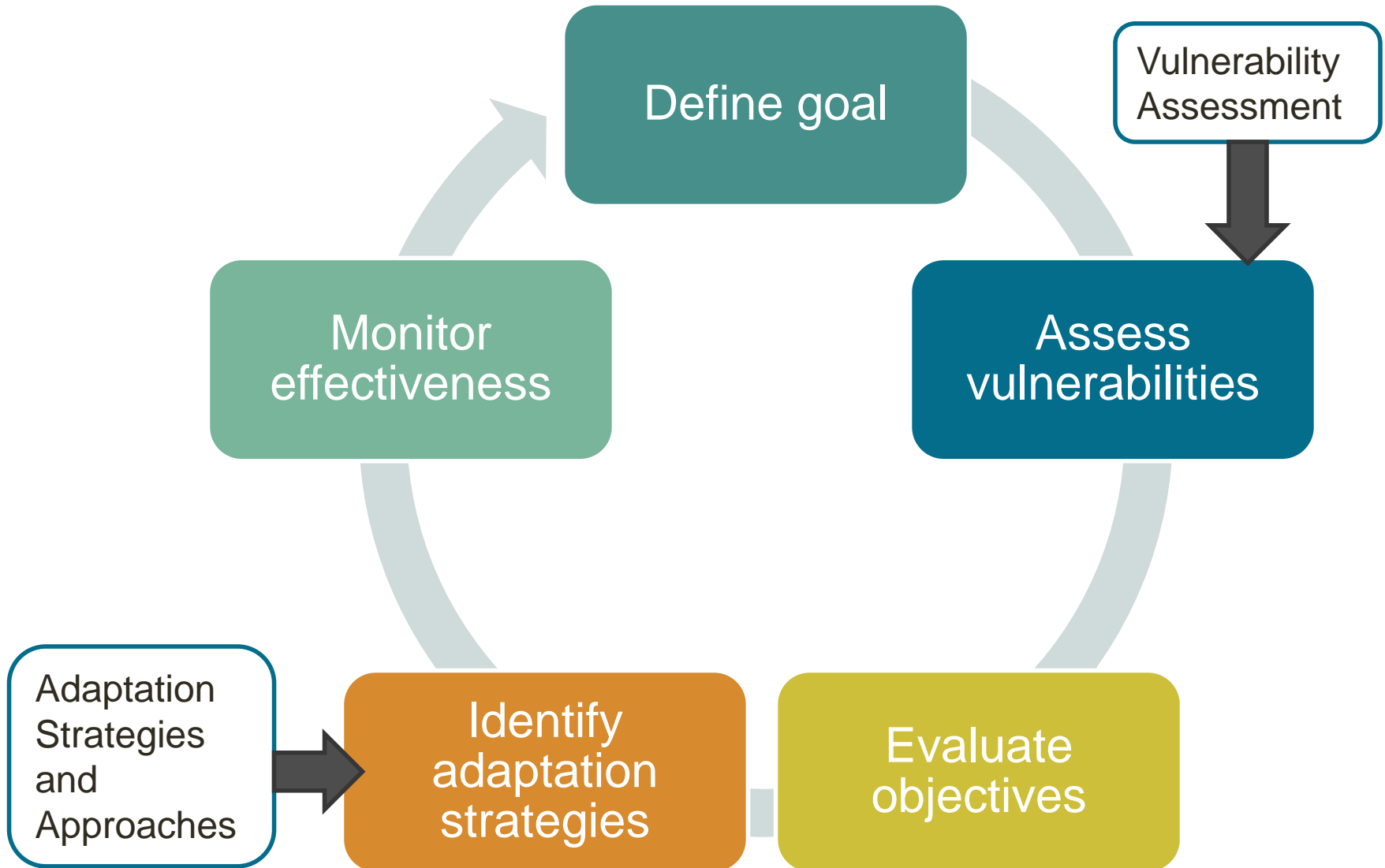
- Designed for a variety of land managers with **various goals and objectives**
- Tailored to **eastern forest types**; the first version is now in revision
- **Does not make recommendations**
- Menu of adaptation **strategies & approaches** for forest ecosystems
- www.nrs.fs.fed.us/pubs/40543



Forest Adaptation Resources: Adaptation Strategies and Approaches



FOREST ADAPTATION RESOURCES: ADAPTATION WORKBOOK



DEMONSTRATION PROJECTS

Real-world examples of how managers have integrated climate considerations into forest management planning and activities



URBAN FORESTRY CLIMATE CHANGE RESPONSE FRAMEWORK

URBAN FORESTRY CCRF OBJECTIVES

- **Engage** with communities across the Northeast, Mid-Atlantic, and Midwest that are interested in adapting their urban forest management to climate change.
- Work with these communities to **assess the vulnerability** of their urban forests to climate change.
- Identify and/or develop tools to **aid adaptation** of urban forests to climate change.
- Develop **real-world examples** of climate-informed management of urban forests.



CHICAGO WILDERNESS AREA PILOT OBJECTIVES

- Establish a template for climate adaptation in urban forestry that can serve as an example both regionally and nationally by:
 - Engaging with urban forestry professionals, scientists, and municipalities across the Chicago Wilderness area.
 - Developing and applying an approach to assess the vulnerability of urban forests in the Chicago Wilderness area to climate change.
 - Applying tools to aid adaptation of Chicago Wilderness area urban forests to climate change.
 - Developing real-world examples of climate-informed management of urban forests in at least four municipalities.



CLIMATE CHANGE RESPONSE FRAMEWORK

Partnerships



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graph TD; A[Partnerships] --> B[Vulnerability Assessment]; B --> C[Forest Adaptation Resources]; C --> D[Demonstration Projects];
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The diagram illustrates a four-step process for climate change response. It begins with 'Partnerships' (teal box), followed by 'Vulnerability Assessment' (dark blue box), 'Forest Adaptation Resources' (yellow-green box), and finally 'Demonstration Projects' (orange box). Each step is connected to the next by a downward-pointing arrow.

Vulnerability Assessment

Forest Adaptation Resources

Demonstration Projects

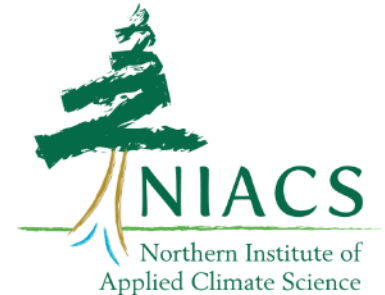
work with scientists, urban foresters, natural area managers, public, nongovernmental, university, private organizations

KEY PARTNERS

- Chicago Wilderness
 - Climate Change Task Force
 - Trees and Green Infrastructure Task Force
- US Forest Service
 - Northern Research Station
 - Eastern Region
 - Northeastern Area
- Northern Institute of Applied Climate Science
- The Morton Arboretum
- The Field Museum
- Chicago Botanic Garden
- Looking for more!

Chicago
Wilderness

A regional alliance dedicated to
protecting nature and enriching life



CLIMATE CHANGE RESPONSE FRAMEWORK



understand how climate change may affect forests in an ecoregion ★

★ Or, in the case of this project, urban area

MODIFICATIONS TO VULNERABILITY ASSESSMENT PROCESS: URBAN AREAS

1. Assess **tree species vulnerability** to climate change



2. Assess **urban forest vulnerability** to climate change

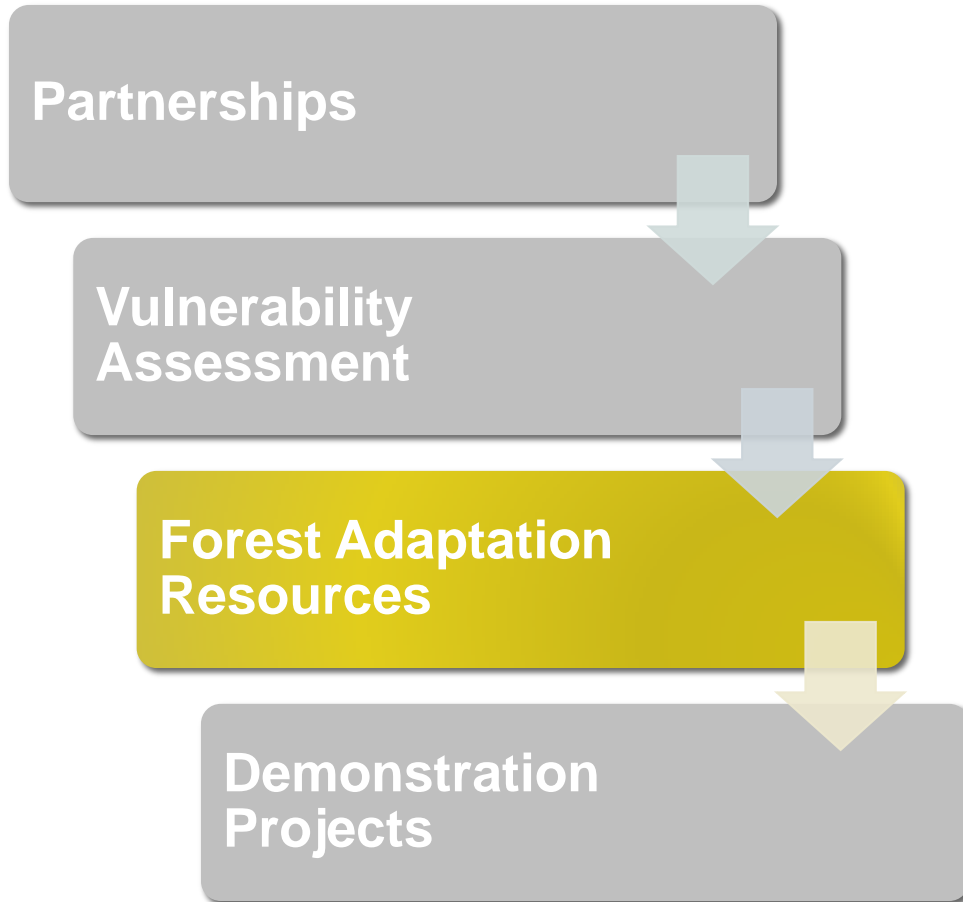
- Done for entire Chicago Wilderness area
- Area-wide scientist/manager expertise incorporated
- Draft done by small team, wider group reviews



- Done at the municipal level
- Local/municipal forester/planner expertise incorporated
- Workshop setting

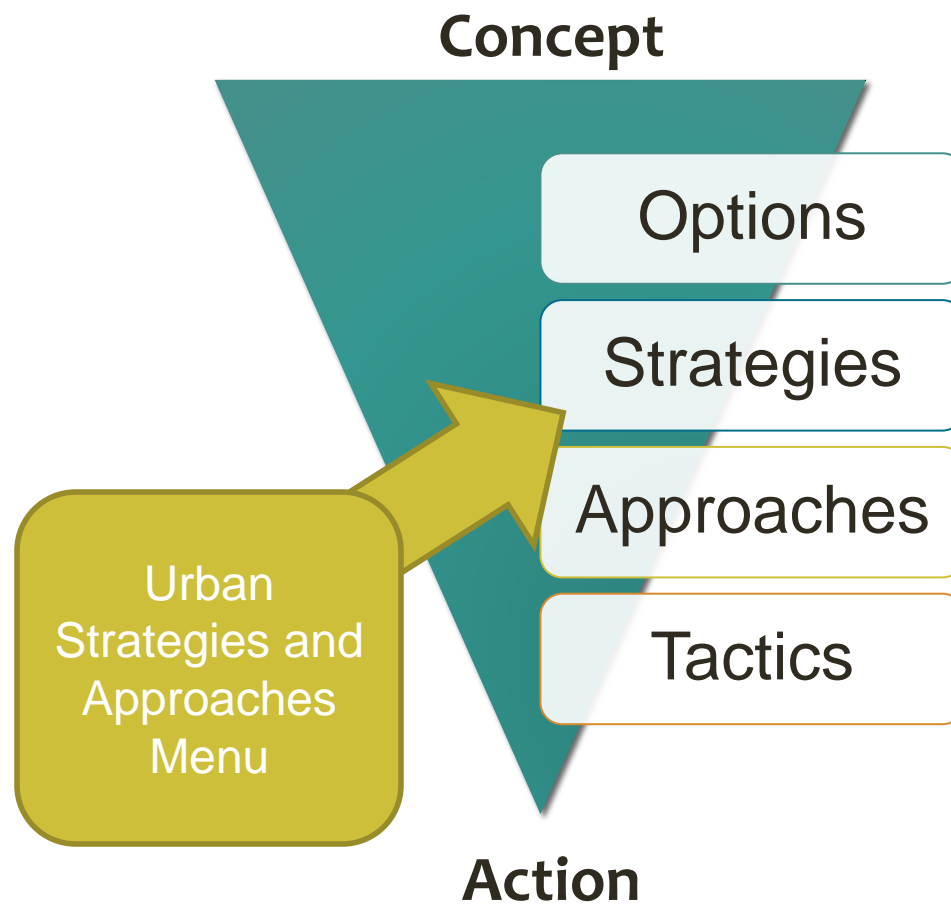
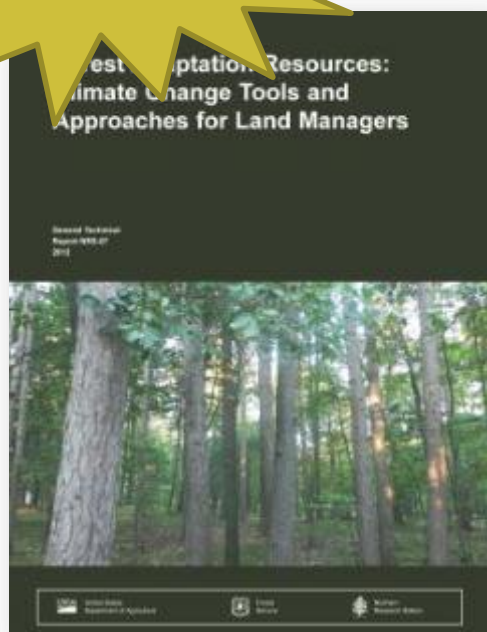


CLIMATE CHANGE RESPONSE FRAMEWORK

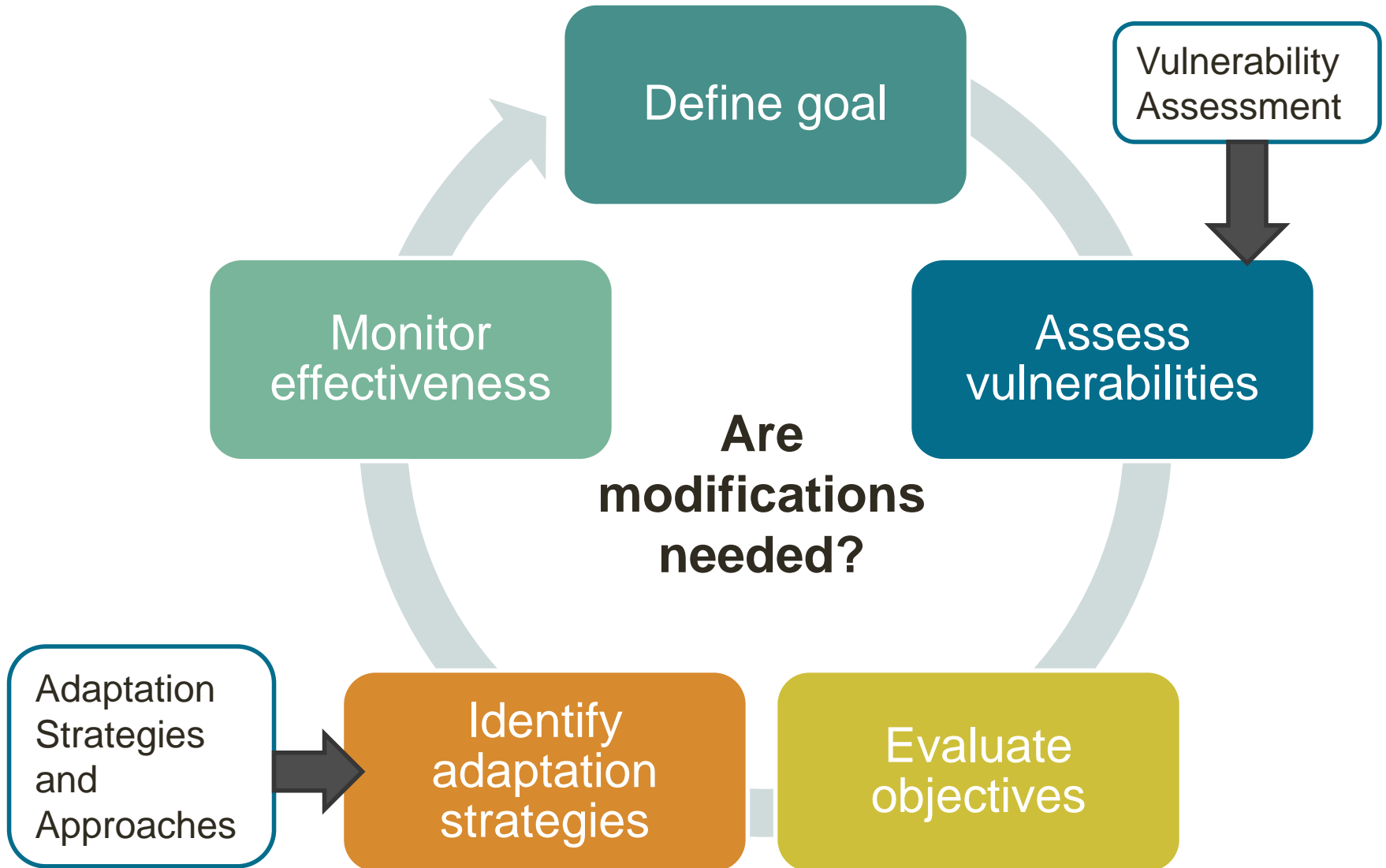


structured process to identify strategies, approaches, and tactics to adapt to climate change

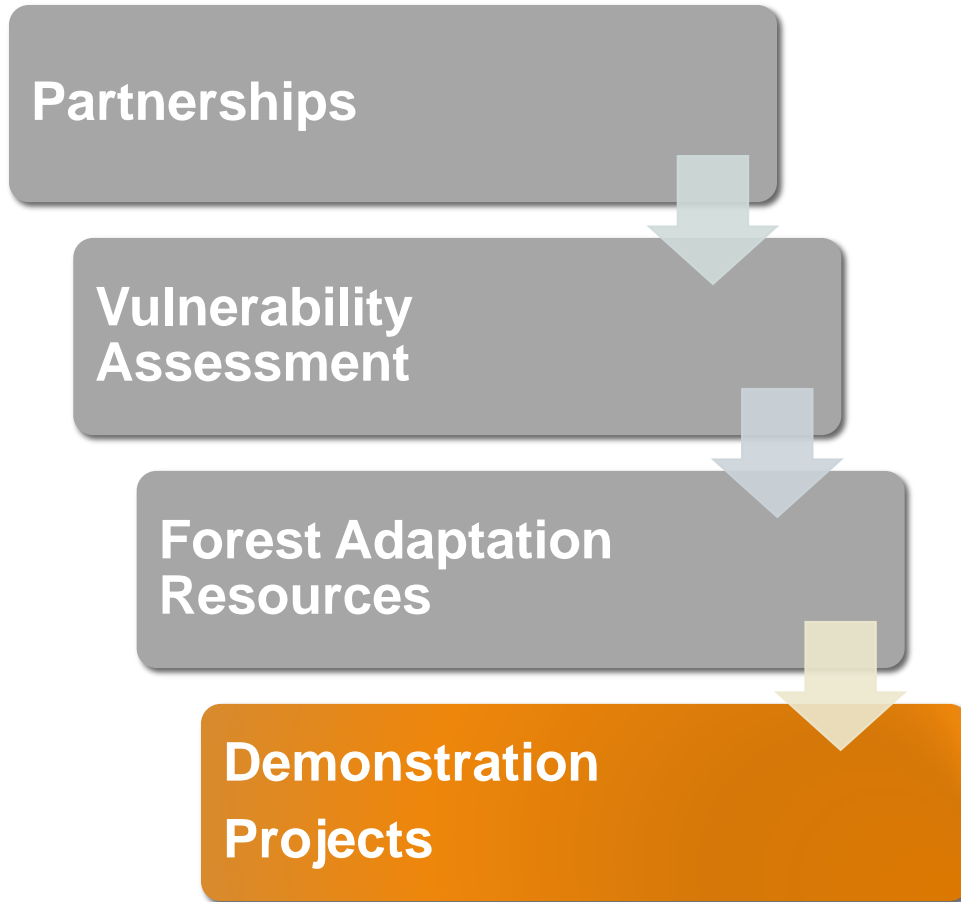
Forest Adaptation Resources



FOREST ADAPTATION RESOURCES: ADAPTATION WORKBOOK



CLIMATE CHANGE RESPONSE FRAMEWORK



incorporate information into decision-making and on-the ground projects

DEMONSTRATION PROJECTS

- Application of vulnerability assessment information and adaptation resources to a **real-world example**, such as:
 - long-term plans (e.g. a master plan or a species planting list)
 - short-term projects (e.g. living streets projects , riparian restoration project)
- Five municipalities in the CW area have expressed interest:
 - Chicago
 - Homewood
 - Glenview
 - Lake Forest
 - Park Ridge
- Demonstrations could also be regional in scope



Photography by: **Linda Kiscellus**

OUTREACH/PRODUCTS

- Print/web-based area-wide species vulnerability assessment
- Municipal vulnerability assessment and adaptation case studies
- Hands-on training for urban forestry professionals
- Web and print resources

Climate Change Adaptation Project
L-A-D FOUNDATION'S PIONEER FOREST

Engaged in sustainable forest management practices for more than 60 years, Pioneer Forest continues efforts to enhance the adaptive capacity of its Clark woodland ecosystems.

As 140,000 acres, the L-A-D Foundation's Pioneer Forest is Missouri's largest private land ownership. Since the early 1950s, the forest has employed a conservative, uneven-aged management method known as single-tree selection harvesting. Pioneer's decades-long research of this successful method strongly indicates a truly sustainable forest management practice. Recognizing the importance of fire in managing shortleaf pine, foresters have developed fire prescriptions to reduce woody species encroachment, restore and maintain the targeted ecosystem, and enhance adaptive capacity to better cope with a range of future climates.

CLIMATE CHANGE AND THE PIONEER FOREST
According to the majority of climate models and a recently completed vulnerability assessment for the Central Hardwoods Region, these climate change impacts are expected in the Missouri-Clark region by the end of the century.

- Mean annual temperature increases from 3 °F to 7 °F.
- Increased precipitation in winter and spring and potential declines in summer.
- Increased frequency and severity of wildfire.

These climatic changes will impact local ecosystems on Pioneer Forest. In woodlands, shortleaf pine, post oak, and blackjack oak are projected to benefit from a warmer climate. They are more fire-tolerant than oaks, but oaks are more fire-sensitive. They are more fire-tolerant than oaks, but oaks are more fire-sensitive. They are more fire-tolerant than oaks, but oaks are more fire-sensitive.

Pioneer Forest Project Area
SIZE: 1,400 acres total
NATURAL COMMUNITY TYPES: Shortleaf pine woodland (300 acres) and grease oak (1,100 acres)

This project is located within the Current River hills subsection of the Missouri-Clark Highlands in south-central Missouri between Hazard Spring and Ironsboro. The rugged terrain of the Current River Hills features extensive forest and woodlands with high ridges dominated by shortleaf pine and oak.

Central Appalachians
Ecosystem Vulnerability Assessment and Synthesis
TECHNICAL SUMMARY

The Central Appalachians region covers 29 million acres from the shores of Lake Erie to the peaks of the Allegheny Mountains. This region contains a mosaic of upland forests and woodlands, riparian and floodplain forests, and other ecosystems that are an essential part of the landscape.

Ecosystems will increasingly be affected by a changing climate. Understanding these potential impacts is an important first step to sustaining healthy forests in the face of changing conditions.

As part of the Central Appalachians Climate Change Response Framework project, more than 30 scientists and forest managers collaborated to assess the vulnerability of forest ecosystems in this region to the likely range of projected climate change. Learn more about project activities at:
<http://forestadaptation.org/central-appalachians>

The climate has changed

Since the turn of the last century (1901 to 2011), daily low temperatures have changed more than daily high or average temperatures. Daily lows have warmed the most during summer and fall months. Both daily highs and lows increased in April and November. Extremely hot days have become more frequent, while extremely cold days have decreased.

The region is receiving 8 percent more precipitation, particularly in the fall since the turn of the last century. Extreme rain events of 3 inches or greater have become more frequent, while light rain events have decreased.

Daily low temperatures increased by 1.9° annually, 1.6° in summer and 1.4° in fall. Daily high temperatures increased by 3.2° in April and decreased by 2° in September and October.

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WEBSITE

The screenshot displays the homepage of the Climate Change Response Framework website. At the top, the title "Climate Change Response Framework" is set against a background image of a forest with autumn foliage. Below the title is a navigation menu with links for Home, Our Approach, Projects, Demos, Products, Partners, Resources, and Contact. The main content area is divided into several sections:

- Partnerships:** Accompanied by a photo of people in a forest.
- Vulnerability Assessments:** Accompanied by a photo of a stream.
- Forest Adaptation Resources:** Accompanied by a photo of a forest.
- Demonstration Projects:** Accompanied by a photo of a person in a forest.

A central text block titled "What is the Climate Change Response Framework?" explains the collaborative approach and lists six regional projects: Northwoods, New England, Mid-Atlantic, Urban, Central Hardwoods, and Central Appalachians. Each region is represented by a colored circle on a map of the United States, with corresponding state abbreviations (MN, WI, MI, NY, VT, NH, MA, CT, RI, PA, MD, NJ, DE, WV, OH, IN, IL, MO).

At the bottom left, there is a "News & Events" section featuring a map of the United States and a news item titled "New USDA Climate Hubs Expand Adaptation Efforts in the Midwest and Northeast". A "See all News & Events" link is provided below.