

VIRTUAL WORKSHOP

Managing West Virginia's Forests in a Changing Climate

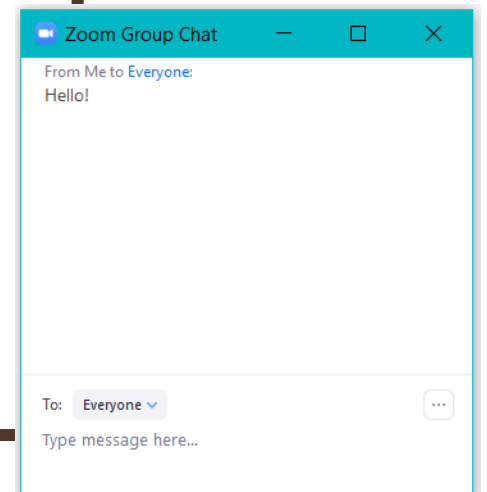
Welcome!

This workshop has been approved for 3.5 CFE credits!

Icebreaker!

Use the chat box to introduce yourself:

*Name, Title, Organization or Location
(and certificate no. for SAF credit!)*



Northern Institute of Applied Climate Science (aka NIACS)



Climate
Carbon

Chartered by USDA Forest Service, universities, non-profit and tribal conservation organizations



Michigan
Technological
University



The
UNIVERSITY
of VERMONT



UNIVERSITY OF MINNESOTA



AMERICAN FORESTS



NCASI

Northern Institute of Applied Climate Science (aka NIACS)

Climate and Carbon Services

- Climate impacts modeling
- Vulnerability assessment
- Climate adaptation
- Carbon science & management
- Science translation & professional training

22 Staff Members (Forest Service/Universities)

- 11 climate adaptation specialists
- 6 research scientists
- 2 web specialists
- 3 GIS/lab specialists

Practical
information

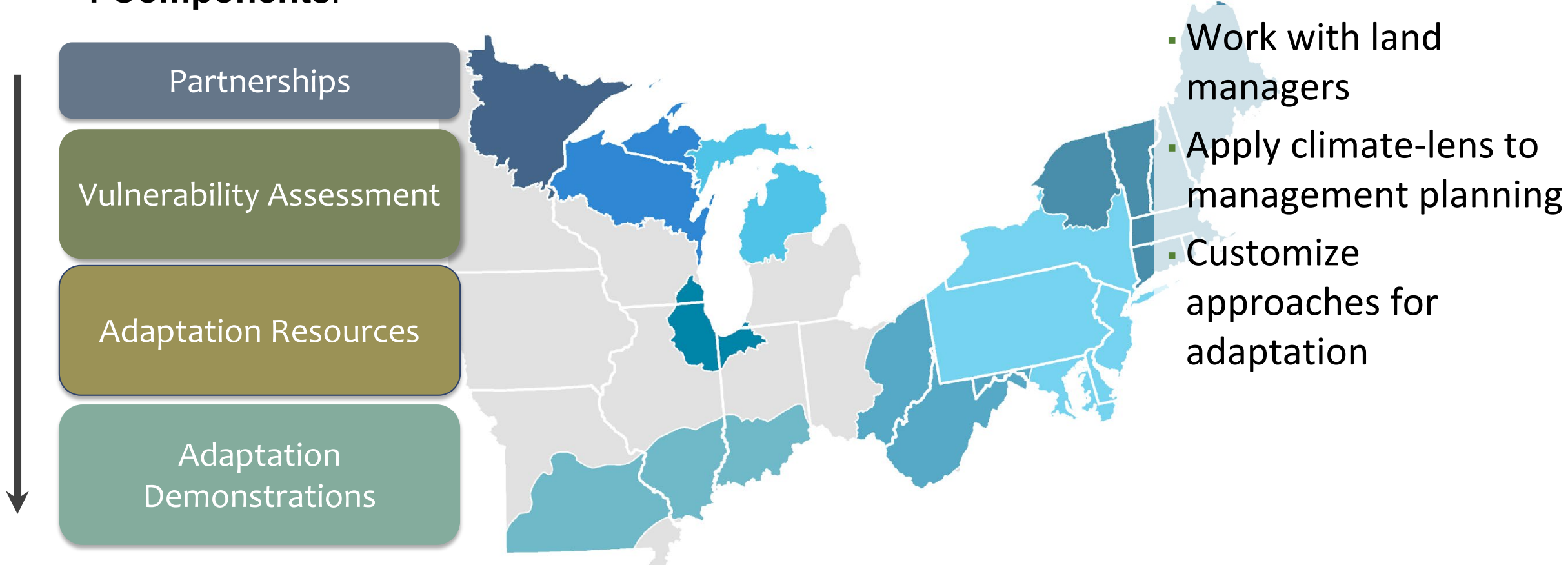
Adaptation
resources

Technical
assistance



Climate Change Response Framework

4 Components:



Vulnerability Assessment & Synthesis

- Series of reports for **natural resource professionals**
- Focus on **tree species and forest ecosystems**
- Examine a **range** of future climates
- Evaluate **key ecosystem vulnerabilities** to climate change
- Does **not make recommendations** or assess vulnerability to changes in mgmt., land use, or policy



Vulnerability Assessments

- Altered soil moisture
- Changes in hydrology
 - Streamflow, water quality, quantity
- Extreme weather events
- Fire risk
- CO₂ fertilization
- Species range shifts
- Increased stressors
- Insect pests
- Forest pathogens
- Invasive plants



Does not make recommendations

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

Sources: Handler et al. 2014, Janowiak et al. 2014

Adaptation Resources

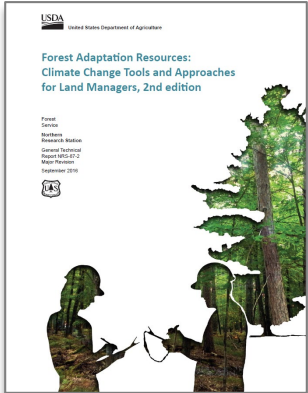
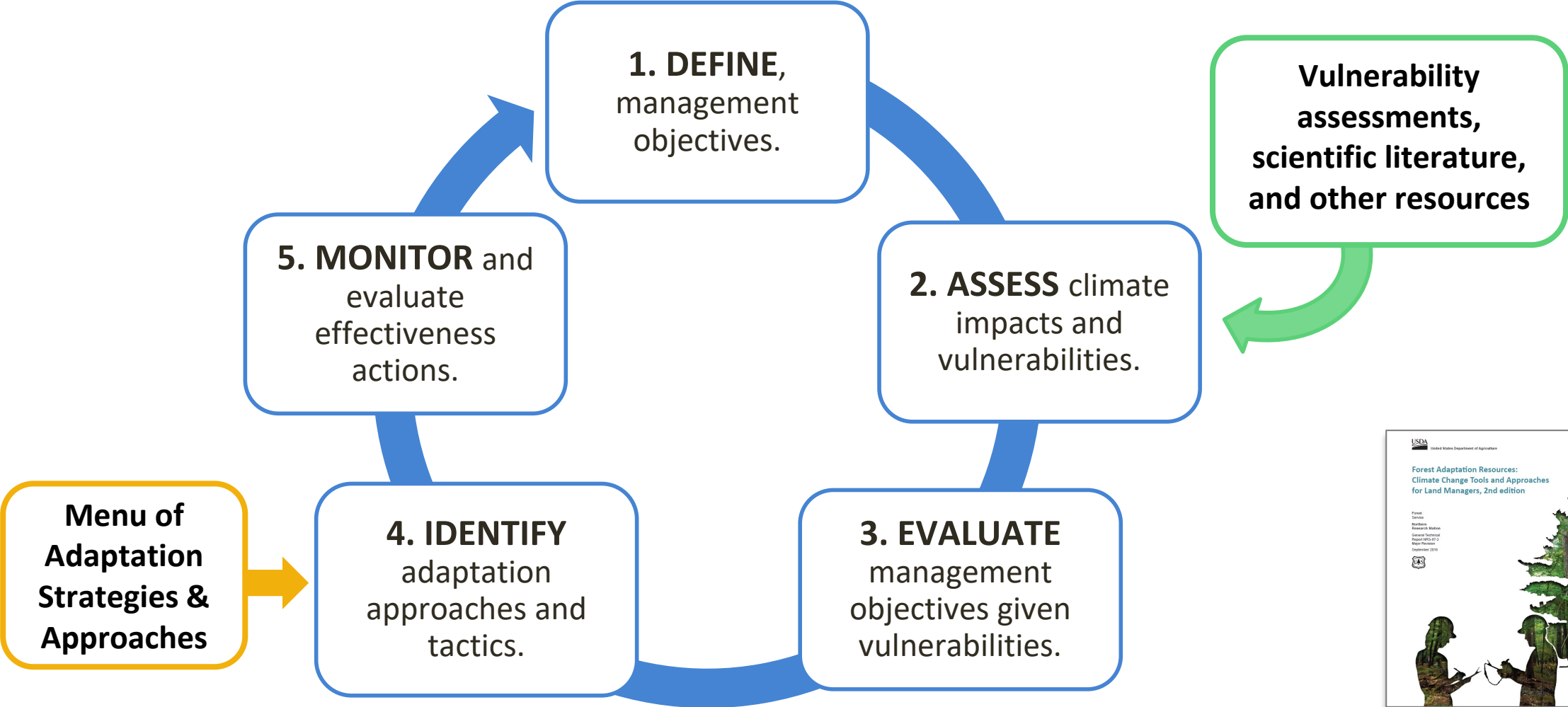
A flexible *workbook* and *menus* to address diverse needs

- Designed for a variety of land owners with diverse goals
- Does not make recommendations
- Includes:
 - Adaptation Workbook
 - Adaptation strategies for different resource areas (menus)
- Interactive online or printable formats



Adaptation Workbook: Decision-support tool

Provides “structured flexibility”



Helping Managers Connect the dots

Management Goals & Objectives

Climate Change Impacts

Challenges & Opportunities

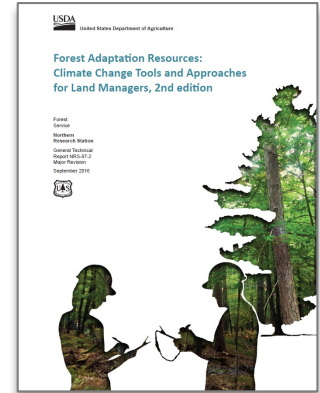
Intent of Adaptation
(Option)

Make Idea Specific
(Strategy, Approach)

Action to Implement
(Tactic)

Monitoring effectiveness

Why it's important:
Helps connect the dots from broad concepts to specific actions for implementation.



Adaptation Workbook

Adaptation Menus of Strategies and Approaches

A collection of plausible adaptation actions that are:

- Specific to a discipline
- Organized into a tiered hierarchy
- Thoroughly researched, co-developed, and tested

Published:

- Forestry
- Urban Forestry
- Forested Watersheds
- Tribal Perspectives
- Agriculture
- Forest Carbon Management
- Recreation
- Non-Forested Wetlands
- Glacial Lake Fisheries

In Preparation:

- Fire-Adapted Ecosystems
- Wildlife Management
- Ocean Coastal Ecosystems
- Fresh-Water Coastal Ecosystems
- Grasslands



Menu of Adaptation Strategies and Approaches

Developed for forests

Strategy 1: Sustain fundamental ecological functions.

- 1.1. Reduce impacts to soils and nutrient cycling.
- 1.2. Maintain or restore hydrology.
- 1.3. Maintain or restore riparian areas.
- 1.4. Reduce competition for moisture, nutrients, and light.
- 1.5. Restore or maintain fire in fire-adapted ecosystems.

Strategy 2: Reduce the impact of biological stressors.

- 2.1. Maintain or improve the ability of forests to resist pests and pathogens.
- 2.2. Prevent the introduction and establishment of invasive plant species and remove existing invasive species.
- 2.3. Manage herbivory to promote regeneration of desired species.

Strategy 3: Reduce the risk and long-term impacts of severe disturbances.

- 3.1. Alter forest structure or composition to reduce risk or severity of wildfire.
- 3.2. Establish fuelbreaks to slow the spread of catastrophic fire.
- 3.3. Alter forest structure to reduce severity or extent of wind and ice damage.
- 3.4. Promptly revegetate sites after disturbance.

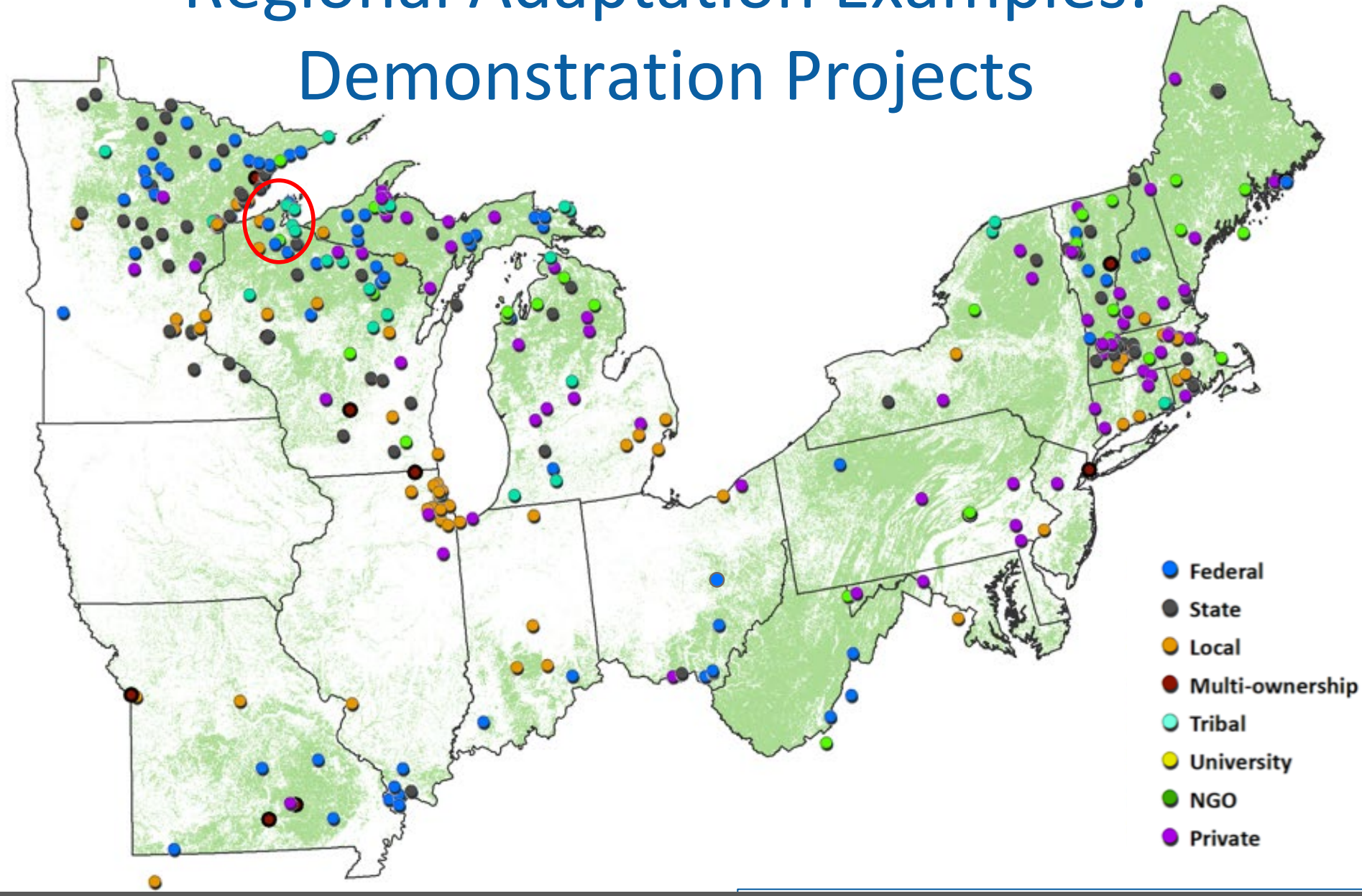
Strategy 4: Maintain or create refugia.

- 4.1. Prioritize and maintain unique sites.
- 4.2. Prioritize and maintain sensitive or at-risk species or communities.
- 4.3. Establish artificial reserves for at-risk and displaced species.

Regional Adaptation Examples: Demonstration Projects

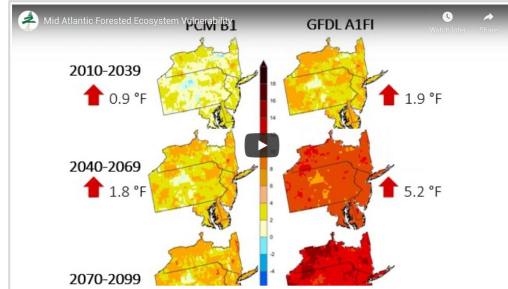
Real-world examples of climate-informed forest management.

More than 400 projects have used the **Adaptation Workbook** to consider climate change and identify adaptation actions.



Practical tools you can use!

Video presentations



Story Map

Climate Change and Adaptation: Mid-Atlantic Forests

Home | Changing Climate | Effects on Forests | Forest Vulnerability | Adaptation Stories | Credits

Forests are a prominent feature of the landscape across the Mid-Atlantic region. Sweeping from the Atlantic coastal plain to the Catskill Mountains, forests cover approximately half of the 40-million-acre assessment area. These forests provide many benefits to residents of this region, including clean air and water, fish and wildlife, and places for families to spend time outdoors. Working forests also give us lumber, maple syrup, ginseng, and other products that support the local economy.

Foresters, biologists, and land managers are working hard to preserve these forests for future generations, as part of the Mid-Atlantic Climate Change Response Framework. Understanding how our forests are changing now and how they will continue to change in the future is the key to making sustainable choices. To help with these decisions, the Mid-Atlantic Forest Ecosystem Vulnerability Assessment and Synthesis, a report from the Mid-Atlantic Climate Change Response Framework, summarizes the best available information about these forests from published research and local knowledge. The first three sections of this story map highlight key themes from the report and describe the general effects of anticipated changes across the region. The final section shows what foresters and land managers are doing to protect these forests and all of the benefits they provide for us.

Click on each tab to learn more.

Adaptation tools & Tree Projections

CLIMATE CHANGE PROJECTIONS FOR INDIVIDUAL TREE SPECIES
MID-ATLANTIC REGION

The region's forests will be affected by a changing climate during this century. A team of forest managers and researchers created an assessment that describes the vulnerability of forests in the Mid-Atlantic region (Blatter-Lepold et al. in review). This report includes information on the current landscape, observed climate trends, and a range of projected future climates. It also describes many potential climate change impacts to forests and summarizes key vulnerabilities for major forest types. This handout is summarized from the full assessment.

TREE SPECIES INFORMATION:
This assessment uses two climate scenarios to "bracket" a range of possible futures. These future climate projections were used with two forest impact models (Tree Atlas and LANDIS) to provide information about how individual tree species may respond to a changing climate. More information on the climate and forest impact models can be found in the assessment. Results for "low" and "high" climate scenarios can be compared on page 2 of this handout.

SPECIES	ADDITIONAL CONSIDERATIONS - 30 MOST COMMON SPECIES
MAY DECREASE	
American basswood	Tolerates shade, susceptible to fire
American beech	Susceptible to beech bark disease, very shade tolerant
Bigtooth aspen	Early-successional colonizer, susceptible to drought
Black cherry	Susceptible to insects and fire, mildly drought tolerant
Eastern hemlock	Hemlock woolly adelgid causes mortality
Eastern white pine	Good disperser, but susceptible to drought and insects
Quaking aspen	Early-successional colonizer, susceptible to heat & drought
Serviceberry	Competitive colonizer, susceptible to drought
Striped maple	Shade tolerant, easily established, susceptible to drought
Sugar maple	Grows across a variety of sites, tolerates shade
Sweet birch	Susceptible to drought, fire, frostkill, and insects
Yellow birch	Good disperser, susceptible to fire, insects, and disease
NO CHANGE	
American hophornbeam	Tolerates shade, susceptible to fire and drought
Eastern hophornbeam	Grows across a variety of sites, tolerates shade
Pitch pine	Early-successional colonizer, susceptible to insect

SPECIES	ADDITIONAL CONSIDERATIONS - 30 MOST COMMON SPECIES
MAY INCREASE	
American elm	Susceptible to Dutch elm disease
Black locust	Early-successional colonizer, susceptible to insect pests
Black oak	Drought tolerant, susceptible to insect pests & diseases
Blackgum	Shade tolerant, fire adapted
Flowering dogwood	Shade tolerant
Northern red oak	Susceptible to insect pests
Pignut hickory	Susceptible to insect pests and drought

Remember that models are just tools, and they're not perfect. Model projections don't account for some factors that could be modified by climate change, like droughts, wildfire activity, and invasive species. If a species is rare or confined to a small area, Tree Atlas results may be less reliable. These factors, and others, could cause a particular species to perform better or worse than a model projects. Human choices will also continue to influence forest distribution, especially for tree species that are projected to increase. Planting programs may assist the movement of future-adapted species, but this will depend on management decisions.

Despite these limits, models provide useful information about future expectations. It's perhaps best to think of these projections as indicators of possibility and potential change. The model results presented here were combined with information from published reports and local management expertise to draw conclusions about potential risk and change in the region's forests.

Real stories of people making climate-informed decisions

CLIMATE CHANGE RESPONSE FRAMEWORK

ILLINOIS INDIANA OHIO MARYLAND NJ
MISSOURI KENTUCKY WEST VIRGINIA VIRGINIA
ARKANSAS TENNESSEE NORTH CAROLINA SOUTH CAROLINA

Start-up | Planning | Action | Evaluation

Climate-informed reforestation in urban riparian forests and floodplain areas.

The purpose of this project is to utilize the reforestation priority area GIS analysis to determine where to best utilize fee-in-lieu funds to reforest areas and enhance floodplain depression projects. This area is a highly active stream valley park with an interconnecting trail system in the suburbs of DC. It is a heavily used and disturbed area with a large amount of infrastructure (sewer, water, gas) and surrounding development. The plan is to be used by the Parks Department, Planning Department, and citizens and the major management goals are to improve water quality, enhance forest quality, and increase biodiversity.

Assessments

Warm Up - Menti Activity

