

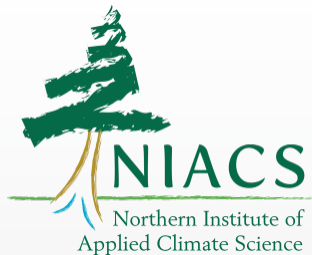


United States Department of Agriculture
Northern Forests Climate Hub

Climate Adaptation in Action: Tools & Examples from Wetland Managers



Todd Ontl, Chris Swanston, P. Danielle Shannon, Stephen Handler



Michigan Wetlands Association Annual Conference
Sept 2017

Northern Institute of Applied Climate Science



Provides **practical** information, resources, and **technical assistance** related to natural resources and climate change

Regional multi-institutional partnership among:



Michigan
Technological
University



The
UNIVERSITY
of VERMONT



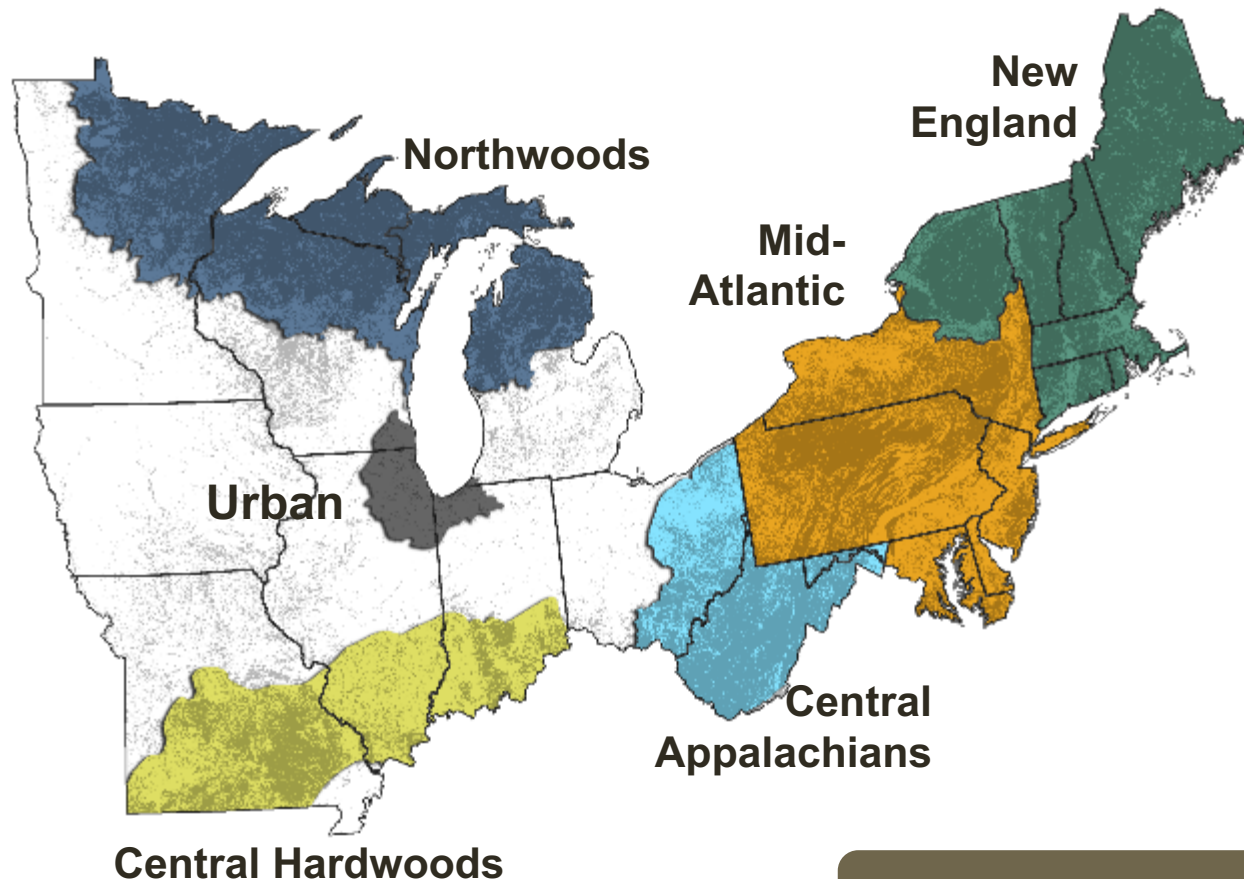
College of Food, Agricultural
and Natural Resource Sciences
UNIVERSITY OF MINNESOTA

ncasi

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

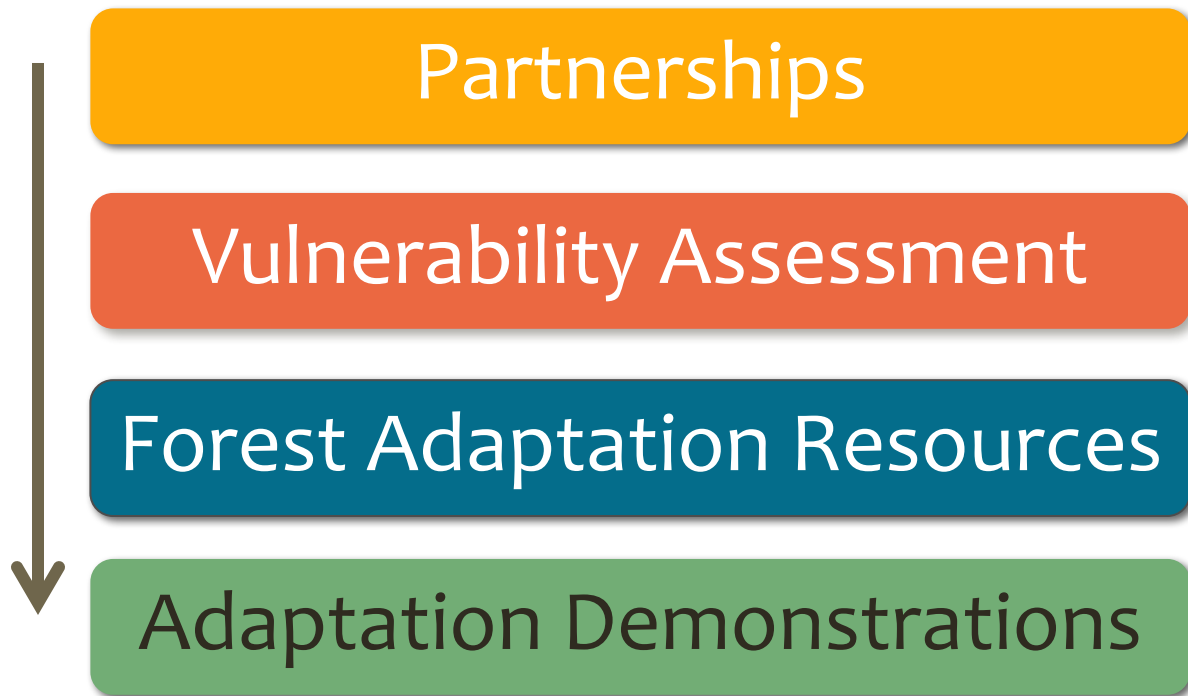
Climate Change Response Framework

Assisting natural resource managers to **integrate climate change** considerations into management planning and activities



Climate Change Response Framework

Process oriented, works on multiple scales



Climate Change Vulnerability Assessments

WISCONSIN
INITIATIVE ON
CLIMATE
CHANGE
IMPACTS



PLANTS & NATURAL COMMUNITIES WG

Climate Change Vulnerability Assessment for Open Bog in Wisconsin

In 2014, the Wisconsin DNR's Natural Heritage Conservation program conducted ten vulnerability assessment workshops across Wisconsin to evaluate the potential impacts of climate change on over 50 natural communities. At one workshop, a team of conservation professionals utilized experience and published literature to assess the vulnerability of [Open Bog](#) based on the potential impact and adaptive capacity of the ecological processes, dominant and important plant species, and stressors to the community.*



Distribution of Open Bog in Wisconsin based on 1990 data

Executive Summary

In large peatland basins with no inlets or outlets, the balance of precipitation to evaporation is crucial. Warmer temperatures may increase water losses, and unless precipitation also increases, eventual drying could occur, touching off peat decomposition and increases in available nitrogen, increasing the risk of invasive species or encroachment by sedge meadow species. Risk of catastrophic wildfire may increase, and fires that consume subsurface peat would be detrimental, though less severe fires could be a benefit. Impact



Vulnerability Determination Process on the WICCI

Vulnerability to Climate Change

Floodplain Forest	Moderately Low to Moderate
Southern Hardwood Swamp	Moderately High to High
Southern Tamarack Swamp	High
White Pine-Red Maple Swamp	Moderate to Moderately High

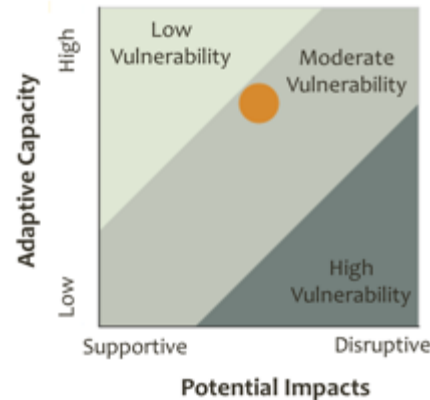
www.wicci.wisc.edu



9 ecoregional
assessments
published or in press



Michigan Forest Ecosystem Vulnerability Assessment and Synthesis: A Report from the Northwoods Climate Change Response Framework Project



Northern
Research Station

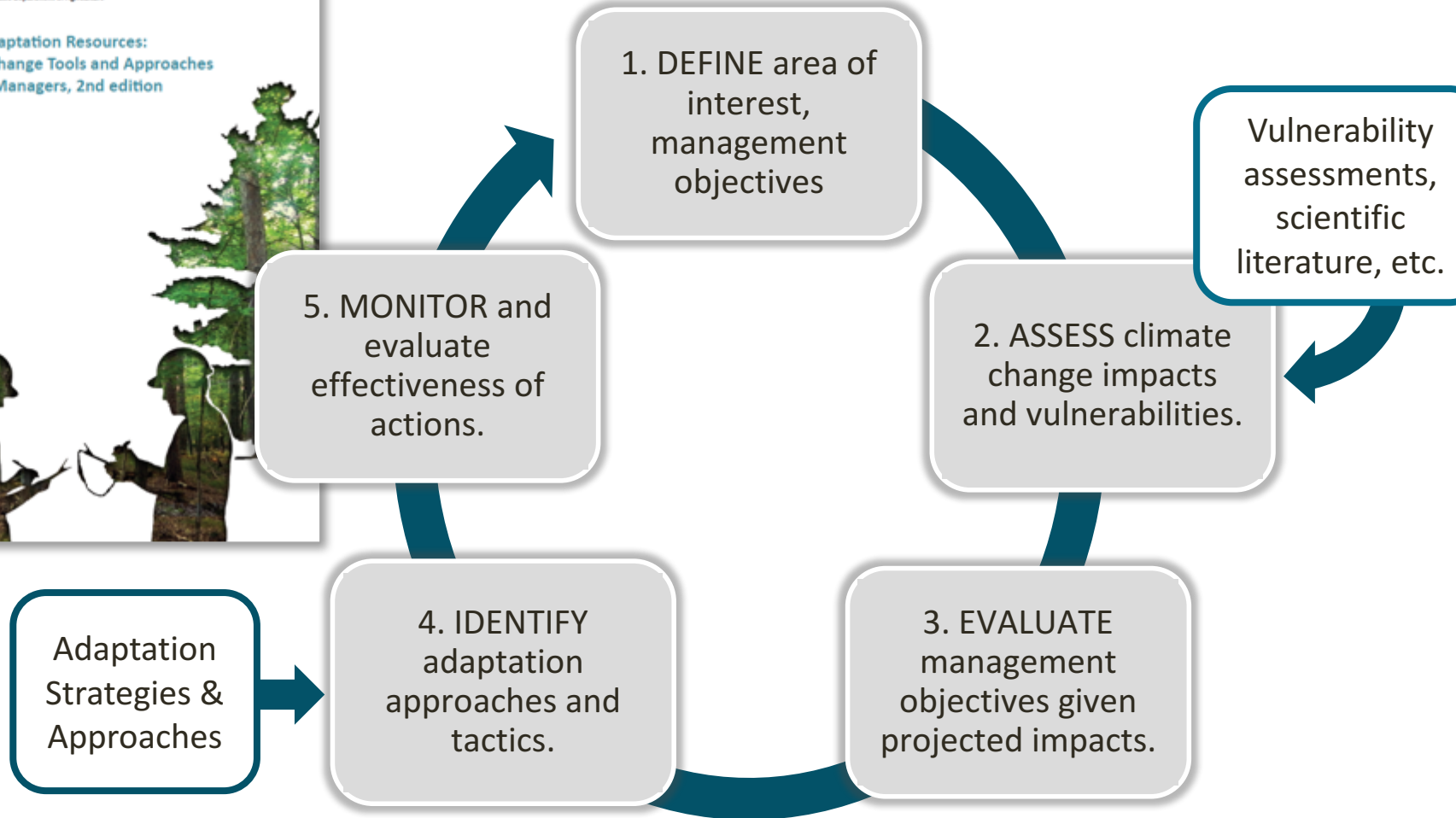
General Technical
Report NRS-129

March 2014

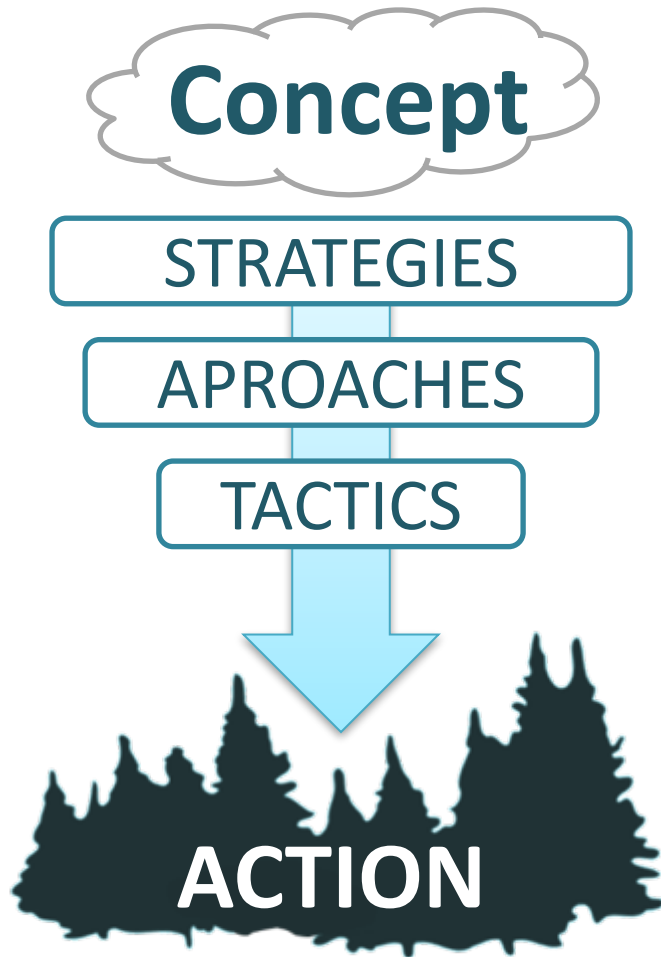
forestadaptation.org/vulnerability-assessment

Forest Adaptation Resources

Adaptation Workbook provides “structured flexibility”



Forest Adaptation Resources



The **Menu** helps you create **clear rationale** for your actions by connecting them to **broader adaptation ideas**.

- Intentionality
- Success

Adaptation Strategies and Approaches

Adaptation Strategies and Approaches

Strategy 1: Sustain fundamental ecological functions

- 1.1 — Maintain or restore soil quality and nutrient cycling
- 1.2 — Maintain or restore hydrology
- 1.3 — Maintain or restore riparian areas

Strategy 2: Reduce the impact of existing 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 invasives
- 2.3 — Manage herbivory to protect or promote regeneration

Strategy 3: Protect forests from severe fire and wind disturbance

- 3.1 — Alter forest structure or composition to reduce risk or severity of fire
- 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

Strategy 4: Maintain or create refugia

- 4.1 — Prioritize and protect existing populations on unique sites
- 4.2 — Prioritize and protect sensitive or at-risk species or communities
- 4.3 — Establish artificial reserves for at-risk and displaced species

Strategy 5: Maintain and enhance species and structural diversity

- 5.1 — Promote diverse age classes
- 5.2 — Maintain and restore diversity of native tree species
- 5.3 — Retain biological legacies
- 5.4 — Restore fire to fire-adapted ecosystems
- 5.5 — Establish reserves to protect ecosystem diversity

Strategy 6: Increase ecosystem redundancy across the landscape

- 6.1 — Manage habitats over a range of sites and conditions
- 6.2 — Expand the boundaries of reserves to increase diversity

Strategy 7: Promote landscape connectivity

- 7.1 — Use landscape-scale planning and partnerships to reduce fragmentation and enhance connectivity
- 7.2 — Establish and expand reserves and reserve networks to link habitats and protect key communities
- 7.3 — Maintain and create habitat corridors through reforestation or restoration

Strategy 8: Enhance genetic diversity

- 8.1 — Use seeds, germplasm, and other genetic material from across a wider geographic range
- 8.2 — Favor existing genotypes that are well adapted to future conditions
- 8.3 — Increase diversity of nursery stock, favoring those species or genotypes most likely to succeed

Strategy 9: Facilitate community adjustment to change

- 9.1 — Anticipate and respond to species declines
- 9.2 — Favor or restore native species that are expected to persist
- 9.3 — Manage for species and genotypes with wide tolerances
- 9.4 — Emphasize drought- and heat-tolerant species
- 9.5 — Guide species composition
- 9.6 — Protect future-adapted regions
- 9.7 — Establish or encourage new management practices
- 9.8 — Identify and move species to sites where they are more likely to succeed

Strategy 10: Plan for and respond to disturbance

- 10.1 — Prepare for more frequent and more severe disturbances
- 10.2 — Prepare to realign management of disturbed areas
- 10.3 — Promptly revegetate sites after disturbance
- 10.4 — Allow for areas of natural resource recovery
- 10.5 — Maintain seed or nursery stock of desired species
- 10.6 — Remove or prevent establishment of invasives and non-natives

Source: Butler, P.R., C.W. Swanston, M.J. Janowiak, L.R. Parker, and J. Swanson. 2007. Adaptation Strategies and Approaches. In: C.W. Swanston and M.J. Janowiak, editors. *Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers*, 2nd edition. Gen. Tech. Rep. NC-472. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station, p 15-34. <http://www.fs.fed.us/pnw/pubs/gtr/gtr472.pdf>

Adaptation Strategies and Approaches for Forested Watersheds - Draft - v 1.0

Authors: Danielle Shannon, Maria Janowiak, Stephen Handler, Chris Swanston

One of the major challenges of adapting ecosystems to climate change is translating broad concepts into specific, tangible actions. Adaptation strategies and approaches provide a menu of adaptation actions to support integrating climate change considerations into forested watershed management and conservation activities. The strategies and approaches are derived from a wide range of reports and reviewed published literature on climate change adaptation, as well as intermediate "building blocks" for integrating climate change into targeted and specific tactics for land management adaptation. This document is intended to be used with an Adaptation Resource, which provides more detailed information on integrating climate change considerations into forested watershed management.

This resource is designed to help land managers and other stakeholders to develop and implement adaptation strategies and approaches for forested watersheds. It helps to translate broad concepts into specific, tangible actions. It helps to identify and implement the most suitable adaptation actions for a particular management goal. It helps to identify and implement the most suitable adaptation actions for a particular management goal. It helps to identify and implement the most suitable adaptation actions for a particular management goal.

Importantly, the adaptation strategies and approaches are designed to be used in conjunction with current management actions that work to sustain forest health and productivity. A goal of the adaptation strategies and approaches is to help land managers to adopt new practices that are currently being used.

This document includes a preliminary set of adaptation strategies and approaches for forested watersheds that can be used by natural resource managers working on projects related to forest and habitat management, supporting hydrologic function, infrastructure improvements, and recreation. It is intended to complement and supplement the adaptation strategies and approaches for forest management that were developed as part of the *Forest Adaptation Resources: Climate change tools and approaches for land managers*, 2nd edition (www.fs.fed.us/pnw/pubs/gtr472.pdf).

Using the Adaptation Strategies and Approaches

The adaptation strategies and approaches can provide:

- A full spectrum of possible adaptation actions that can help sustain healthy, forested watersheds and achieve management goals in the face of climate change
- A menu of adaptation actions from which managers select actions best suited to their specific management goals and objectives
- A platform for discussing climate change-related topics and adaptation methods
- Example tactics that could potentially be used to implement an approach, recognizing that specific tactics will be designed by the land manager.

The adaptation strategies and approaches do not:

- Make recommendations or set guidelines for management decisions. It is up to the land manager to decide how this information is used.
- Express preference for any strategies or approaches within an ecosystem type, location, or situation. Rather, a combination of location-specific factors and manager expertise is needed to inform the selection of any strategy or approach.

DISA/T – do not distribute. Refer to Forest Adaptation Resources, 2nd edition for expanded info, and strategies and approaches for forestry

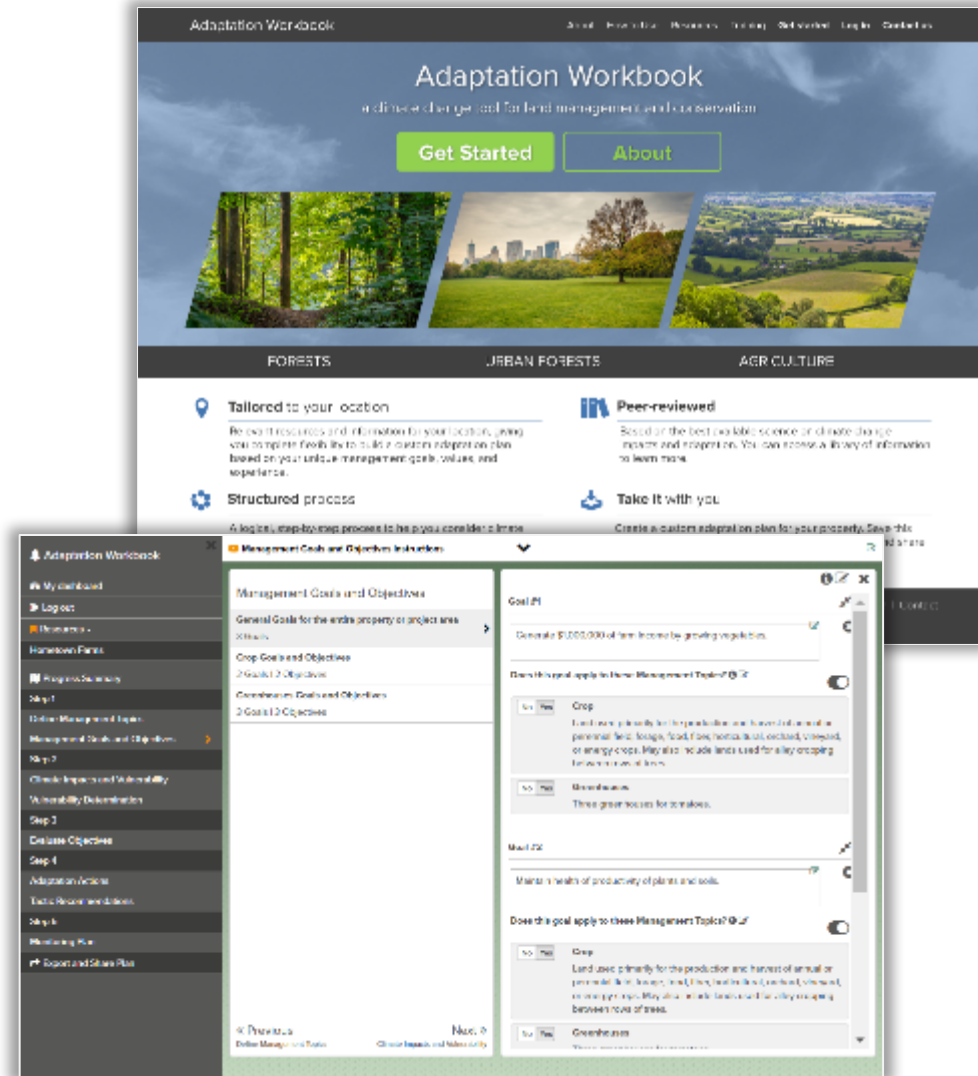


TRY the
Water
Menu!

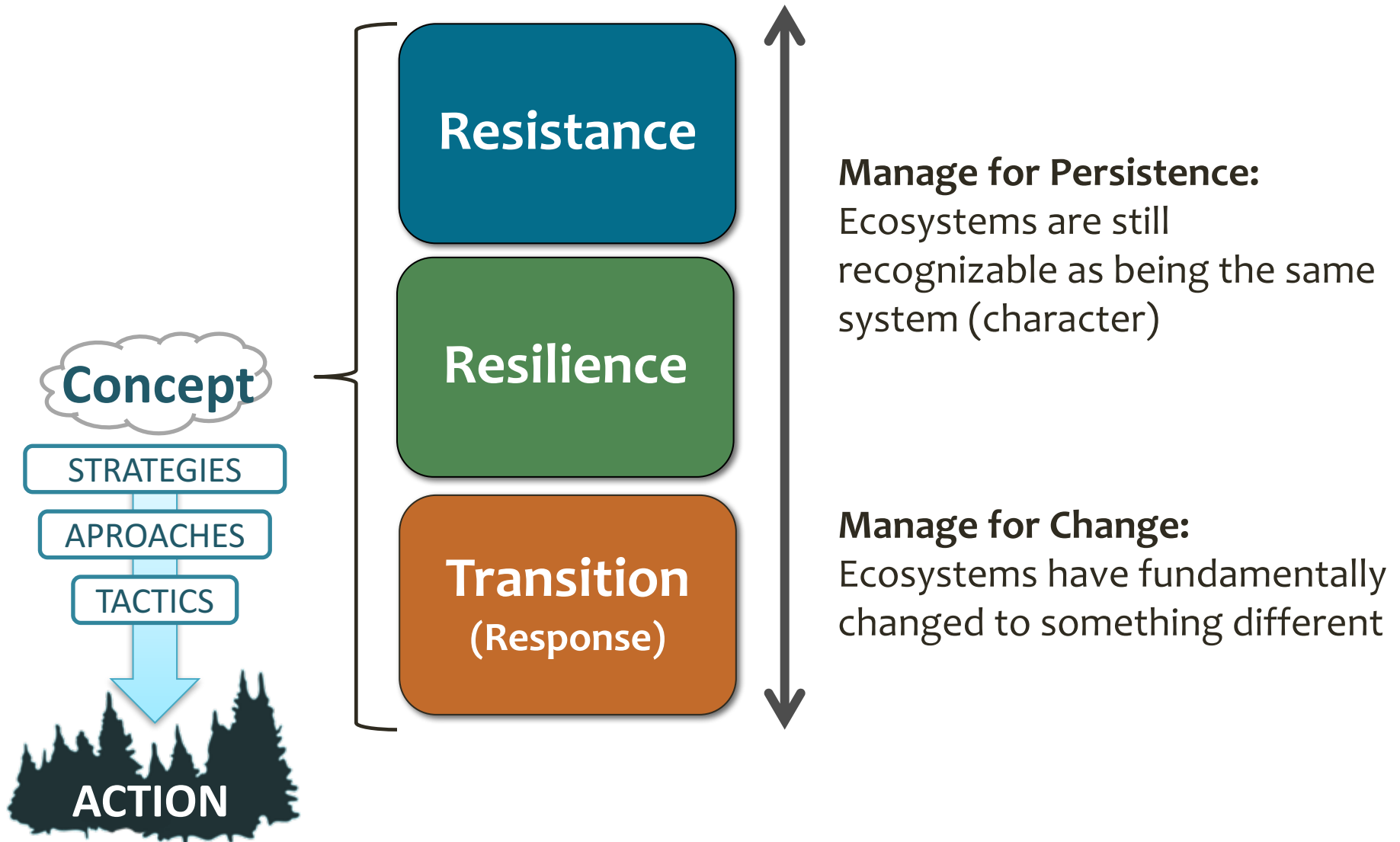
TRY the
Forests
Menu!

AdaptationWorkbook.org

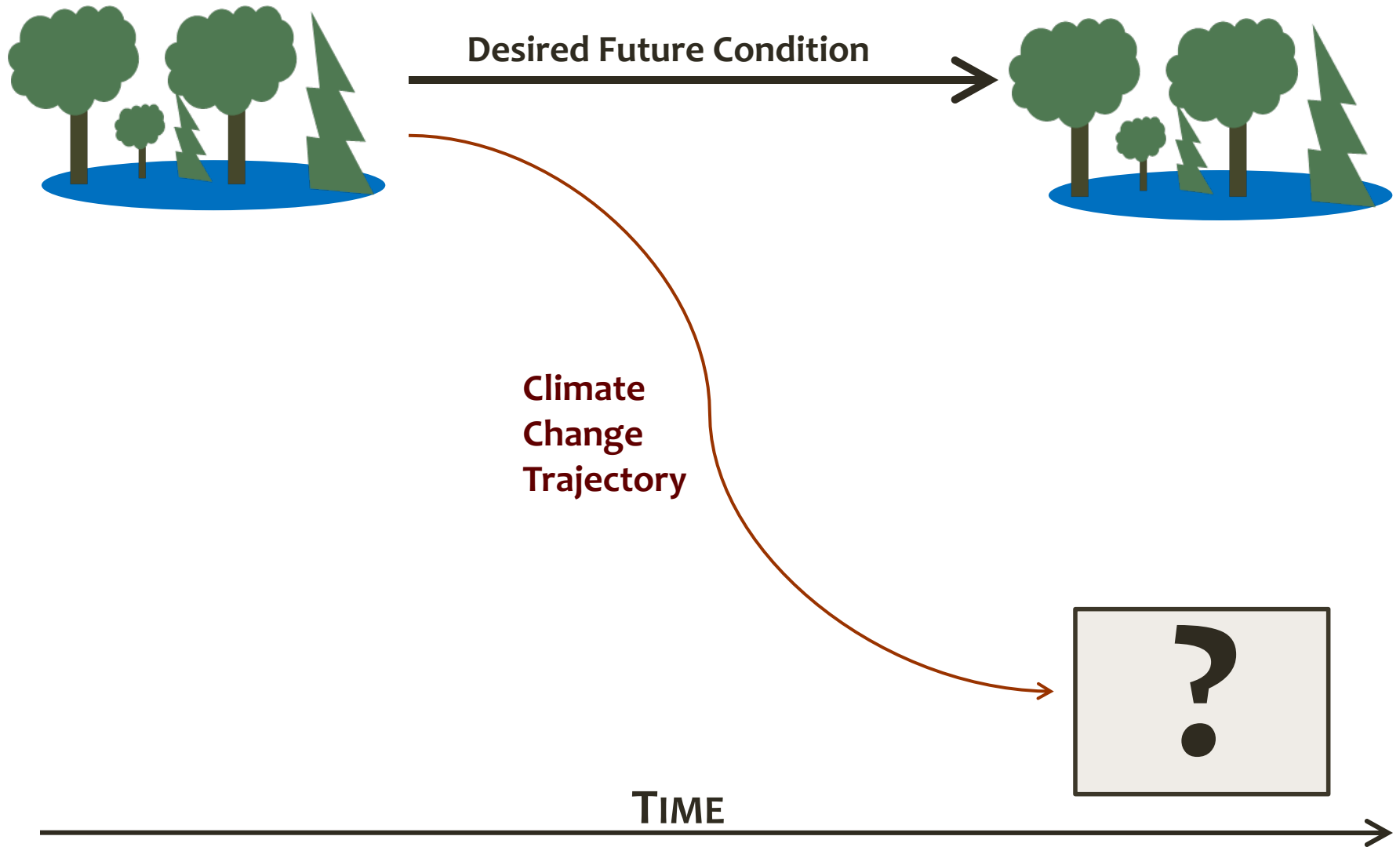
- Self-guided, flexible
- Forestry & natural resources, urban forestry, agriculture
- National - tailored by location
- Creates custom adaptation plan
- Distance learning courses



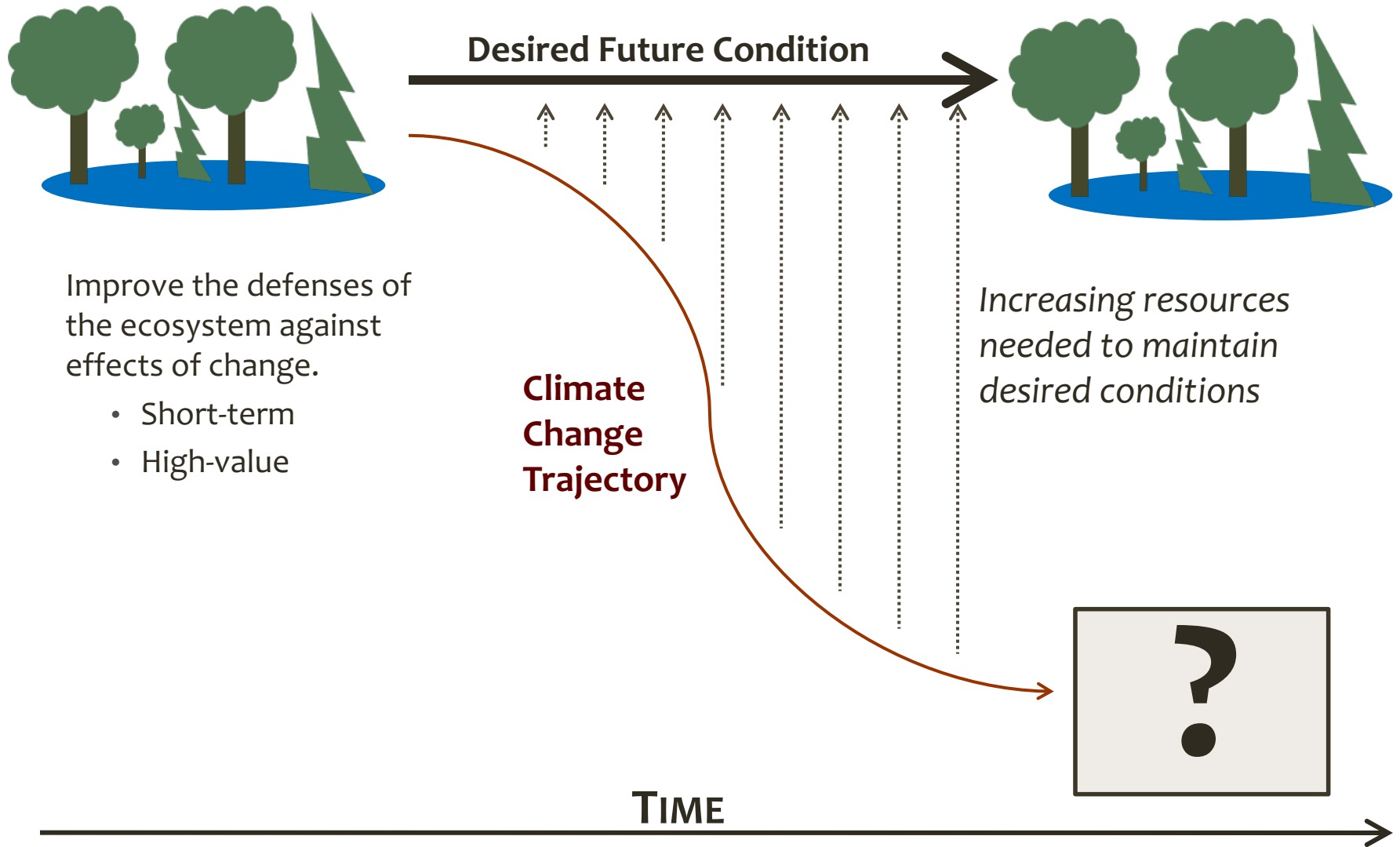
Adaptation Options



Resistance (persistence)



Resistance (persistence)

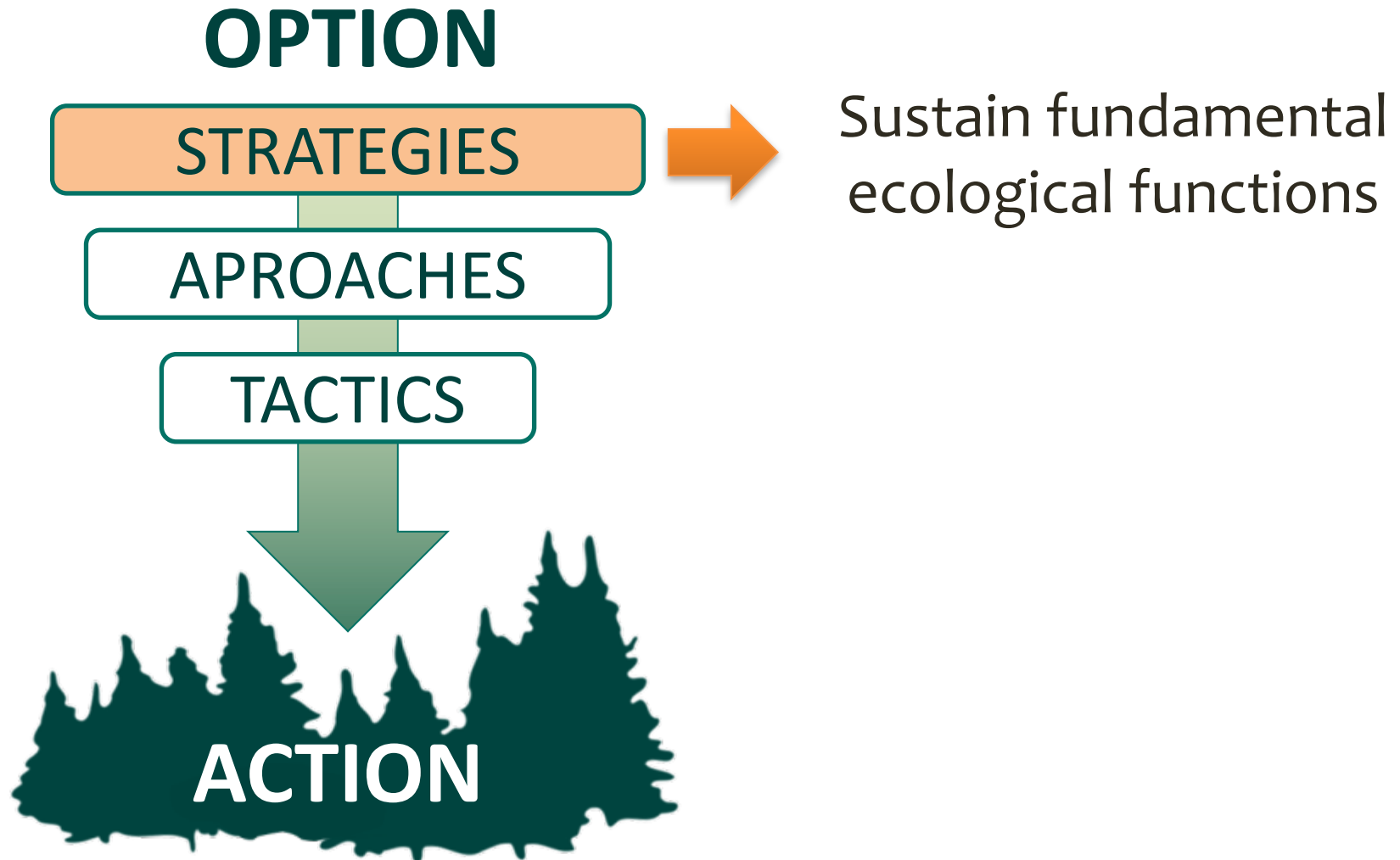


Adaptation Strategies and Approaches

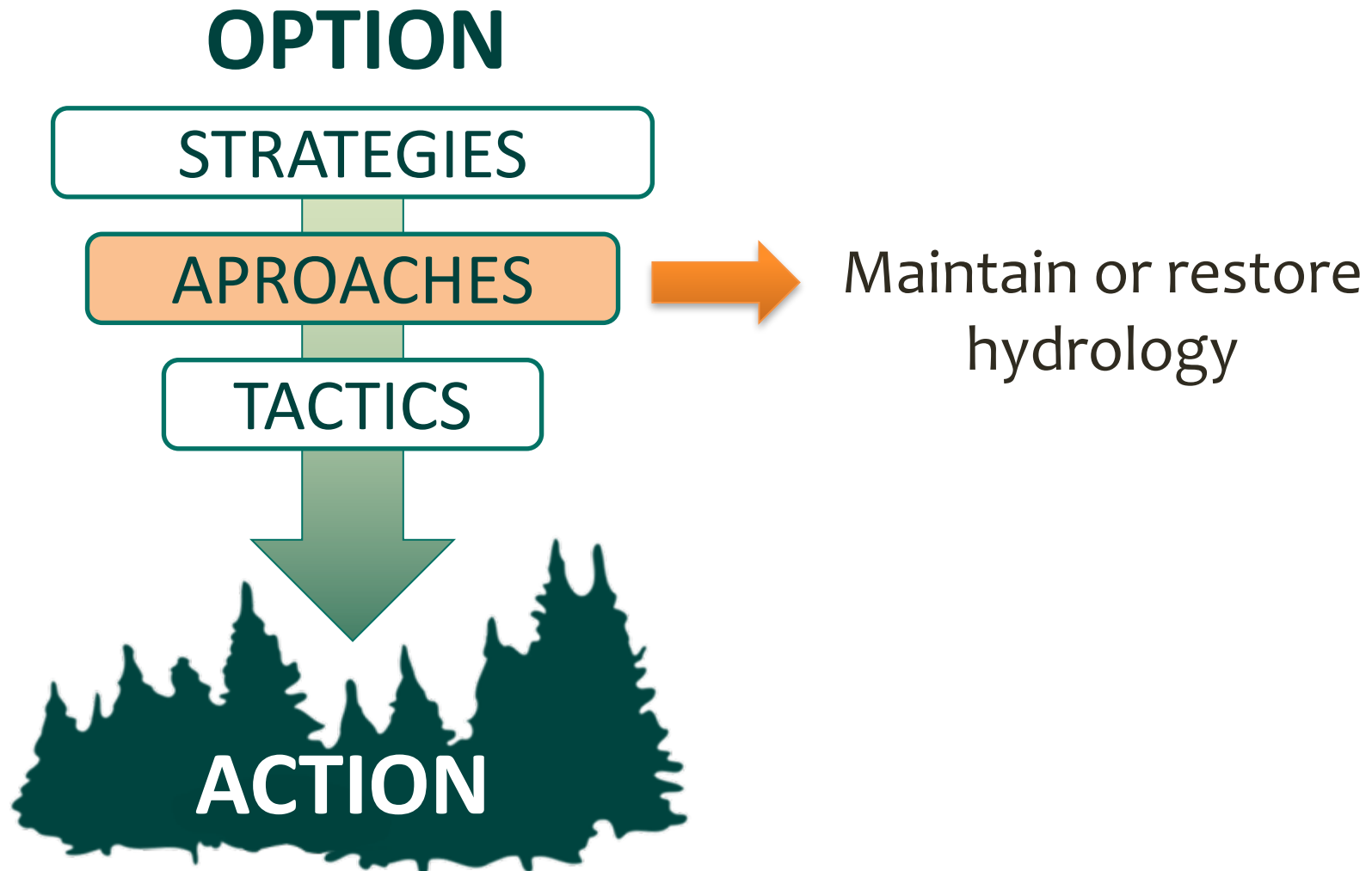


Option: Resistance
(forestall change)

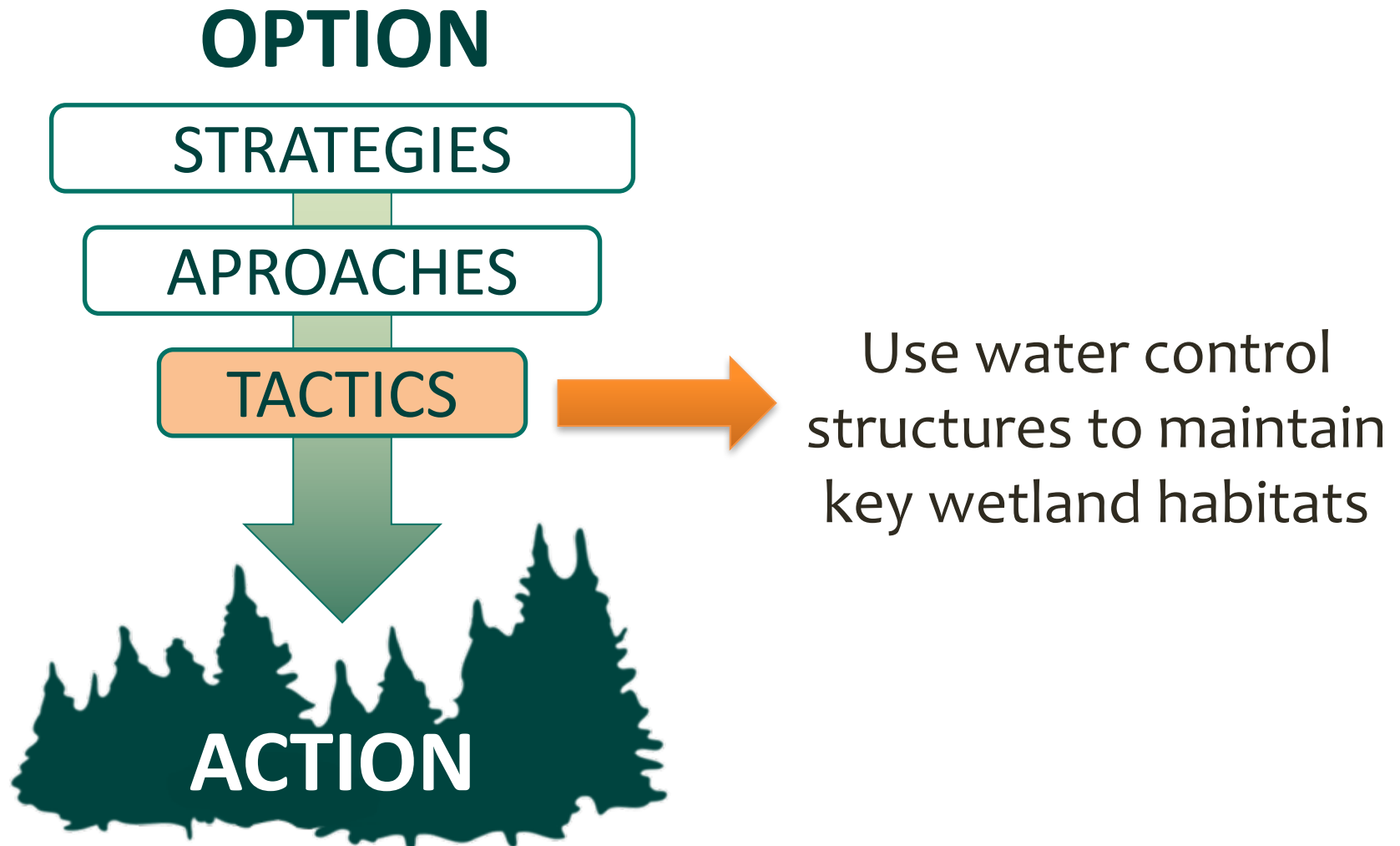
Adaptation Strategies and Approaches



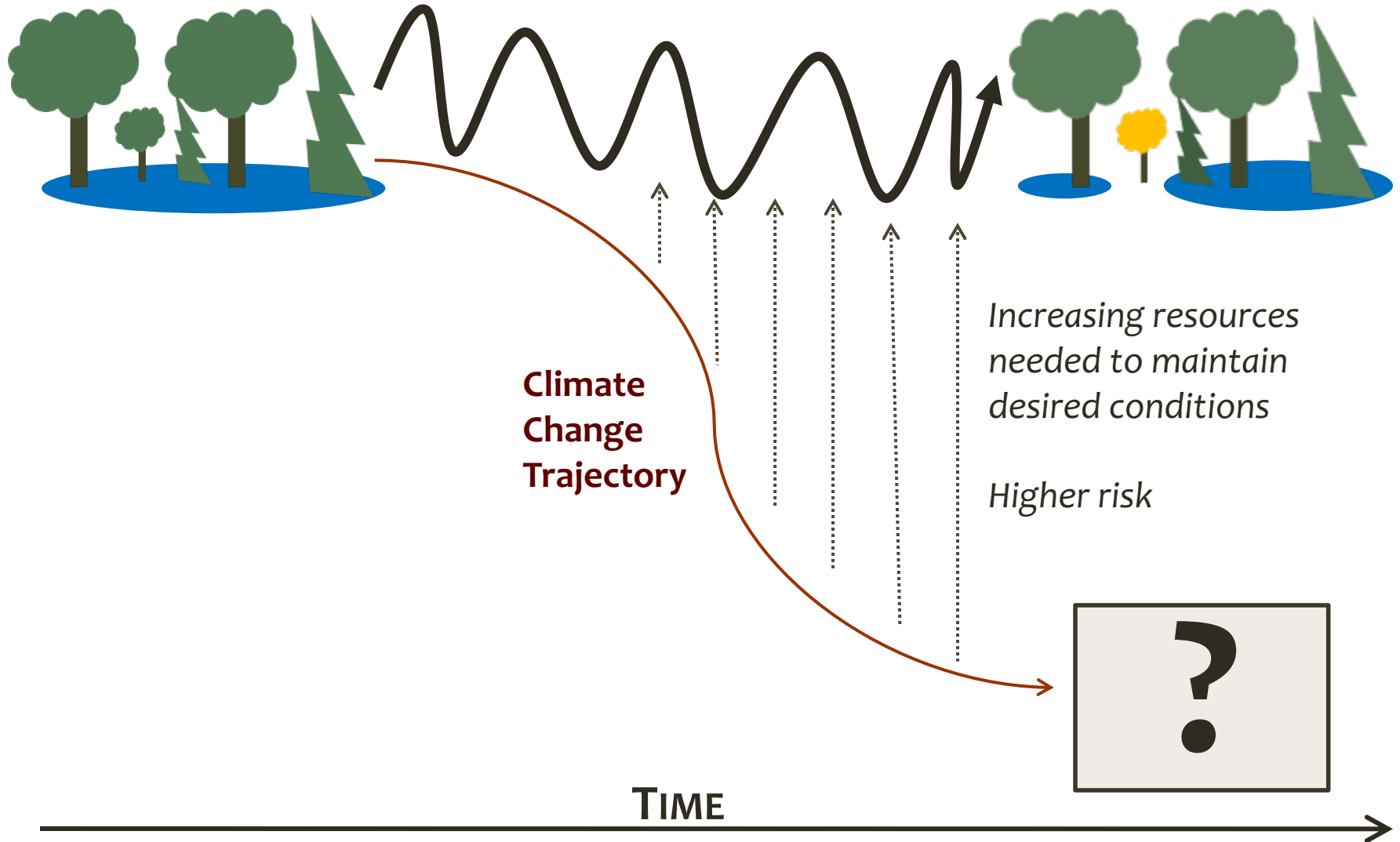
Adaptation Strategies and Approaches



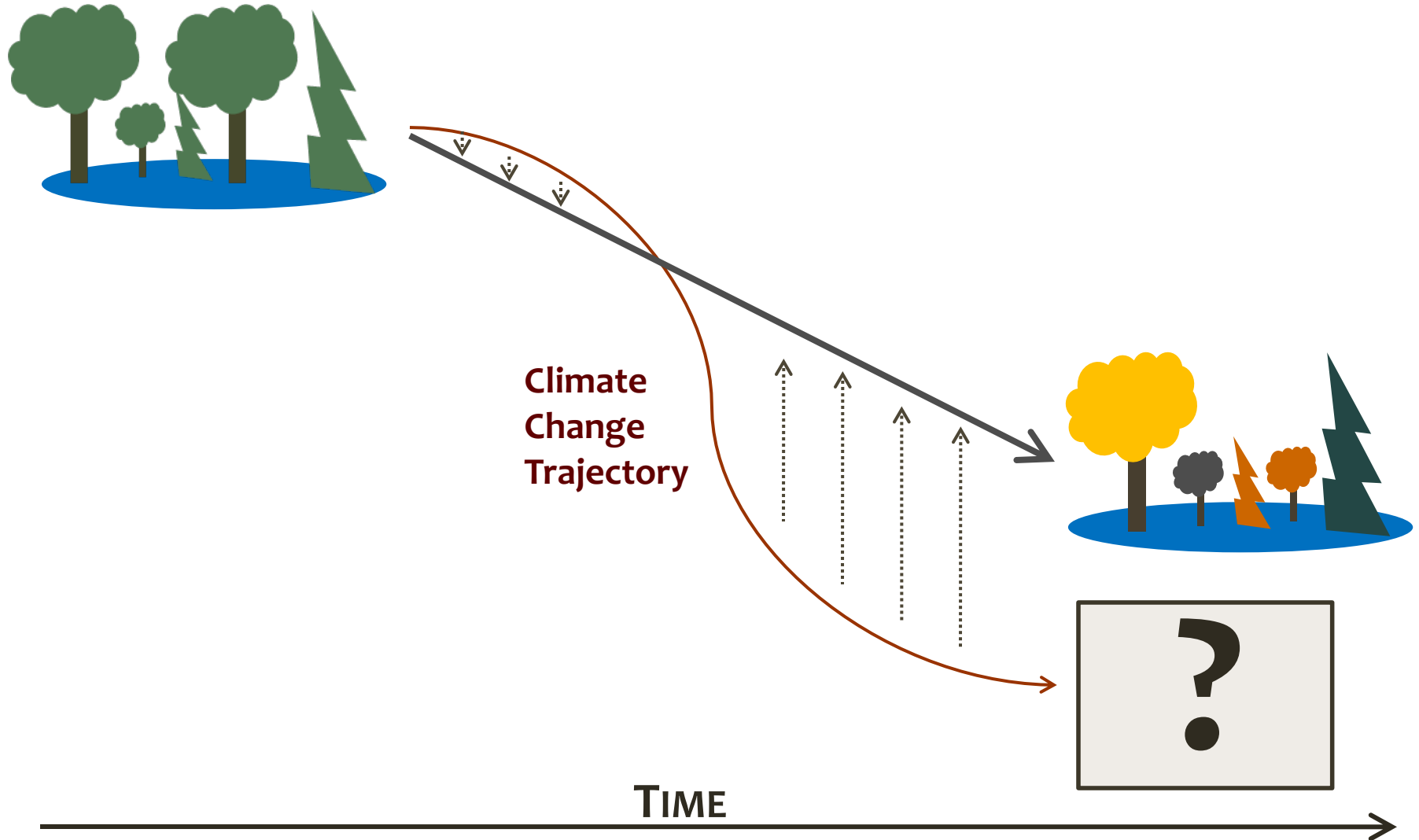
Adaptation Strategies and Approaches



Resilience (persistence)

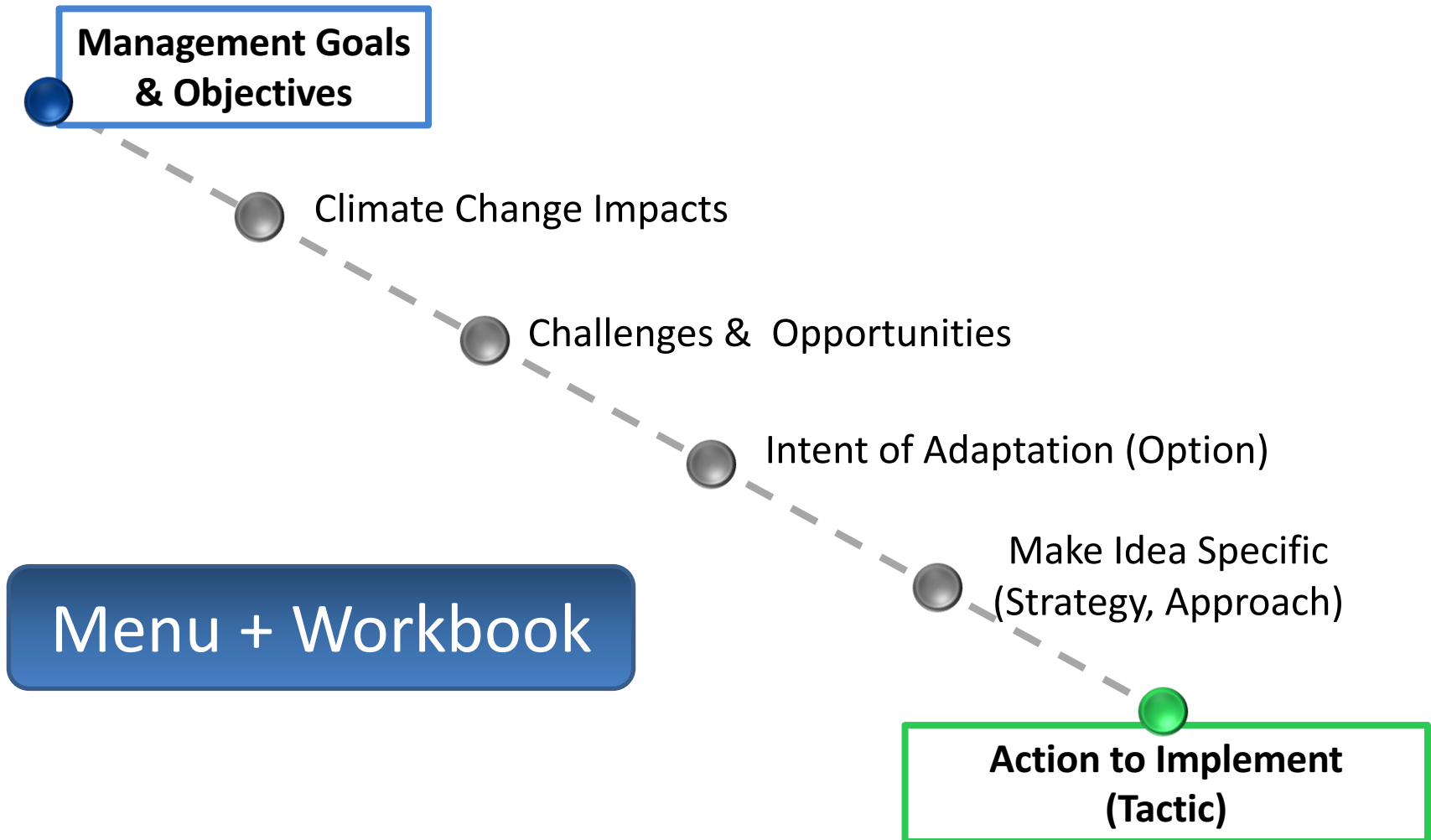


Transition (change)



Connect the dots

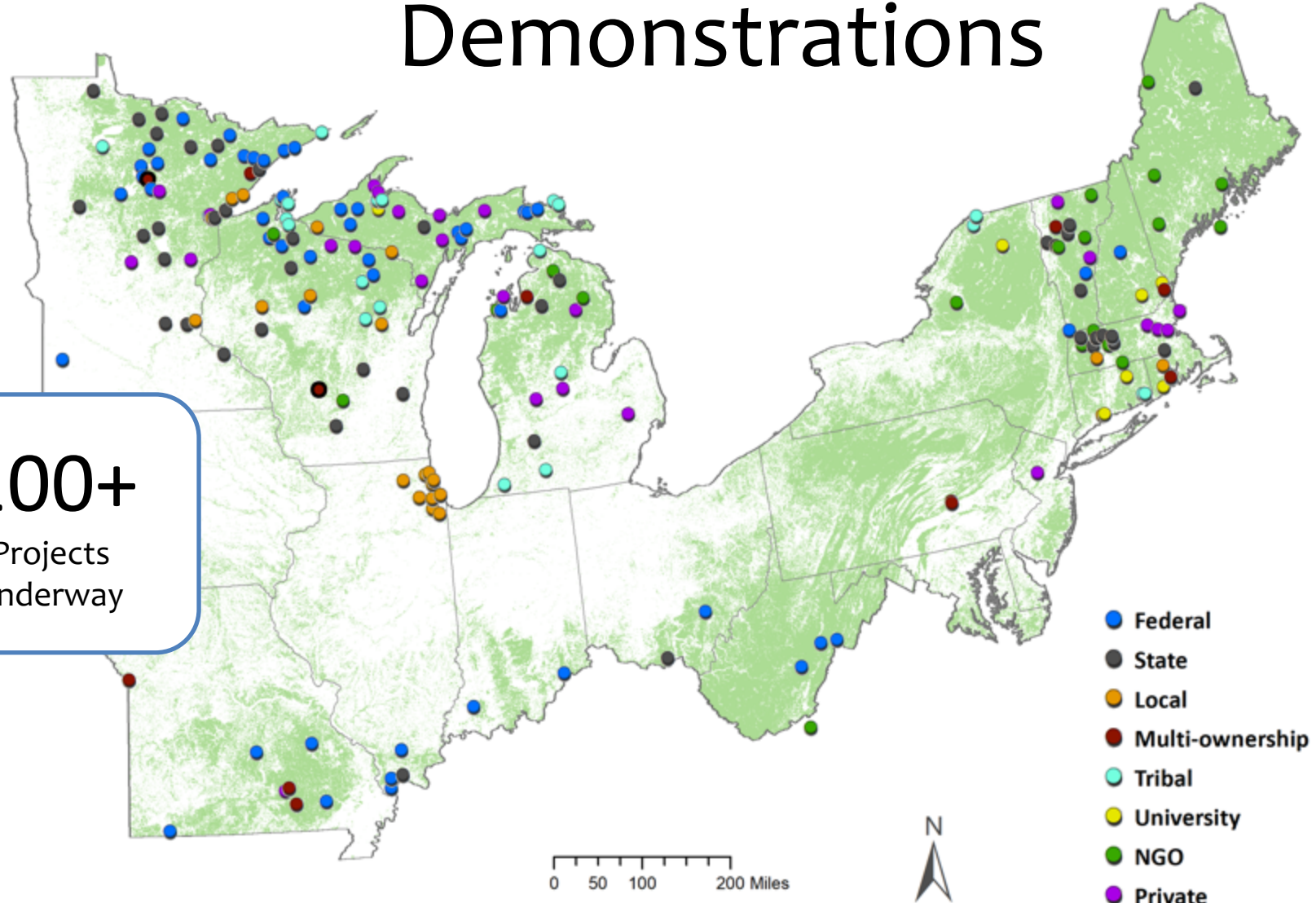
Specify your *intention*



Adaptation Demonstrations

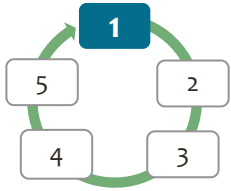
200+

Projects
underway

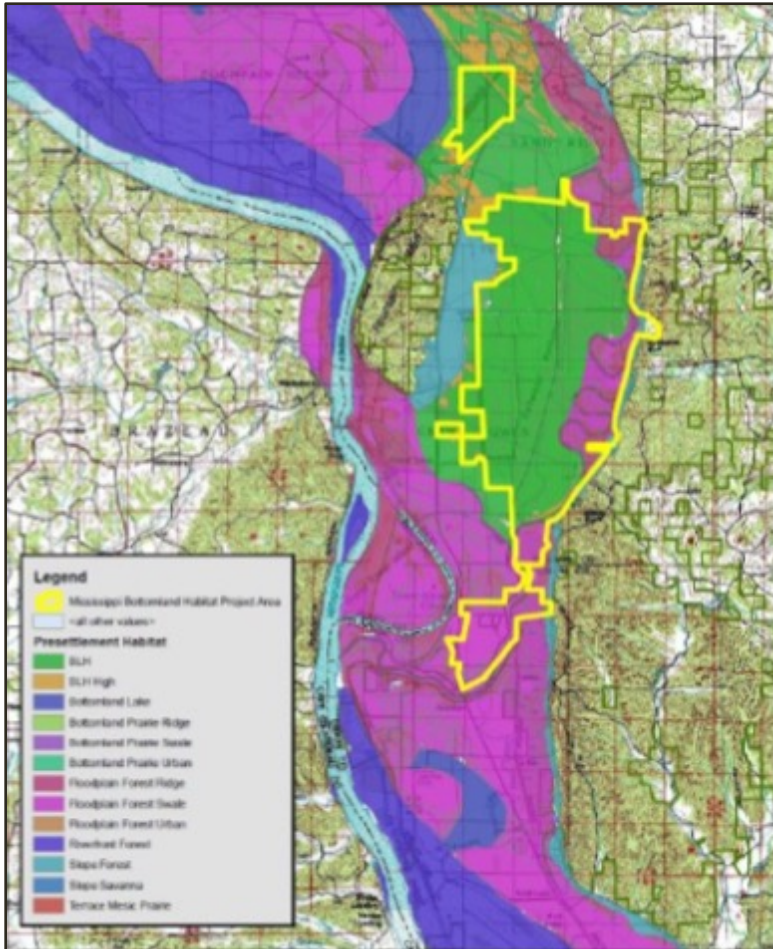


Shawnee National Forest, Cypress Creek NWR, & Ducks Unlimited



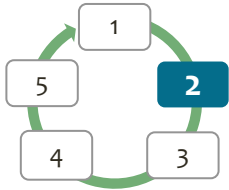


Step 1: DEFINE area of interest, management goals and objectives, and time frames.



Management Goals

1. Restore hydrologic conditions in floodplain wetlands
2. Enhance regeneration of flood-tolerant tree species
3. Restore former agriculture to new floodplain forest



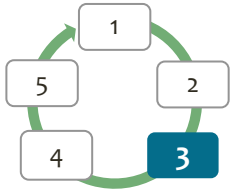
Step 2: ASSESS climate change impacts and vulnerabilities for the area of interest.

Broad-scale Impacts & Vulnerabilities

How might broad impacts be different in the area of interest?

- More extreme precipitation
- Increased magnitude & frequency of flooding events
- Increased soil erosion
- Changes in habitat suitability for bottomland forest tree species





Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Mgmt. Obj.

Enhance regeneration of flood-tolerant tree species

Challenges

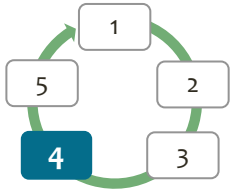
- Longer growing seasons favor invasives
- Severe flooding could impact some species

Opportunities

- Improved for prescribed fire in fall
- Favorable conditions for pin oak

Feasibility of Meeting Obj. (Current Mgmt)

High



Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Adaptation Strategy	Tactic	Consider:
Maintain & enhance species and structural diversity	Changes in hydrology allow for controlled burns, management of wetland diversity	<ul style="list-style-type: none">• Benefits• Drawbacks• Barriers
Use genetic material from across a greater geographic range	Diversify species composition used for restoration by using pin & willow oak from further south	
Establish new mixes of native species	Introduce cypress and tupelo	

Regional Workshops

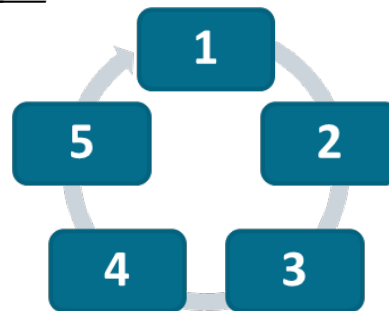
Two-day workshop focused on wetland adaptation

Real-world projects

(Federal, State, Tribal, NGO, Private)

Using Adaptation Workbook

Structured process to
integrate climate
change considerations
into management.



Thank you!!

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