ADAPTATION & FOREST MANAGEMENT

Stephen Handler, NIACS

SAF/ CIF Spring Meeting
Sault Ste. Marie, MI
May 1, 2013

NIACS
Northern Institute of Applied Climate Science

NORTHWOODS
CLIMATE CHANGE RESPONSE FRAMEWORK

Acknowledgements

Chris Swanston, Maria Janowiak, Patricia Butler, Leslie Brandt, Danielle Shannon

(Northern Institute of Applied Climate Science)

Linda Nagel (Michigan Technological University)

NIACS
Northern Institute of Applied Climate Science

NORTHWOODS
CLIMATE CHANGE RESPONSE FRAMEWORK

Michigan Tech

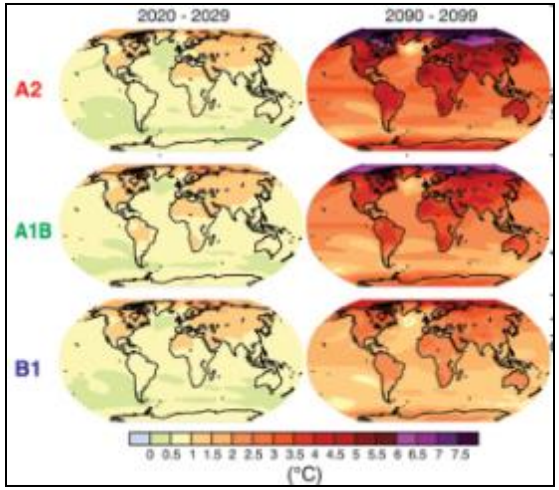
Northern
RESEARCH STATION
USDA Forest Service

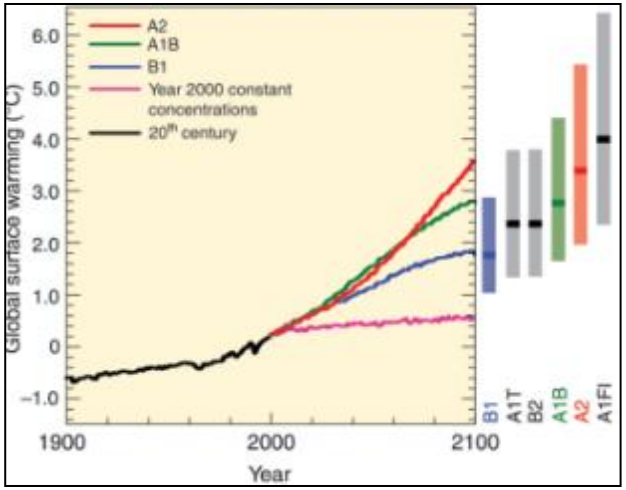
Road Map

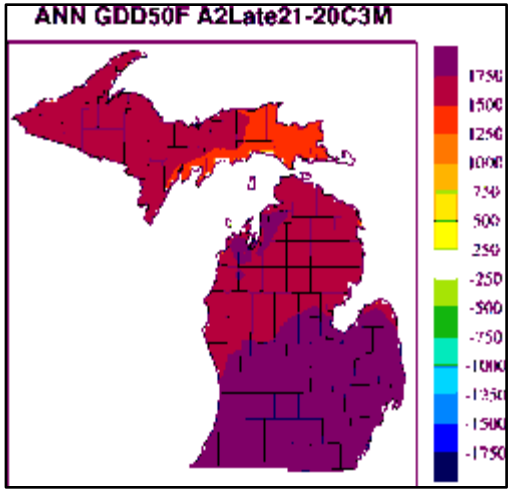
- Adaptation 101
- Northwoods Climate Change Response Framework
- Three Key Ideas for Foresters

Existing Complexity

Added Complexity







How do we deal with all this?

Adapt.

Adaptation is the adjustment of systems in response to climate change.




Ecosystem-based adaptation activities build on the sustainable management, conservation, and restoration of forests

Parry et al. 2007, SCBD 2009, Groves et al. 2010

Forest Adaptation & Mitigation

***ADAPTATION*.**

- Actions to reduce the vulnerability of forests to climate change
- Positioning forests to become more healthy, resistant, & resilient

***MITIGATION*.**

- Using forests to sequester carbon, provide renewable energy, & avoid carbon losses from fire, mortality, conversion, etc.

THESE ARE DIFFERENT, BUT CAN WORK TOGETHER.

Spittlehouse and Stewart 2003, Malmsheimer et al. 2008

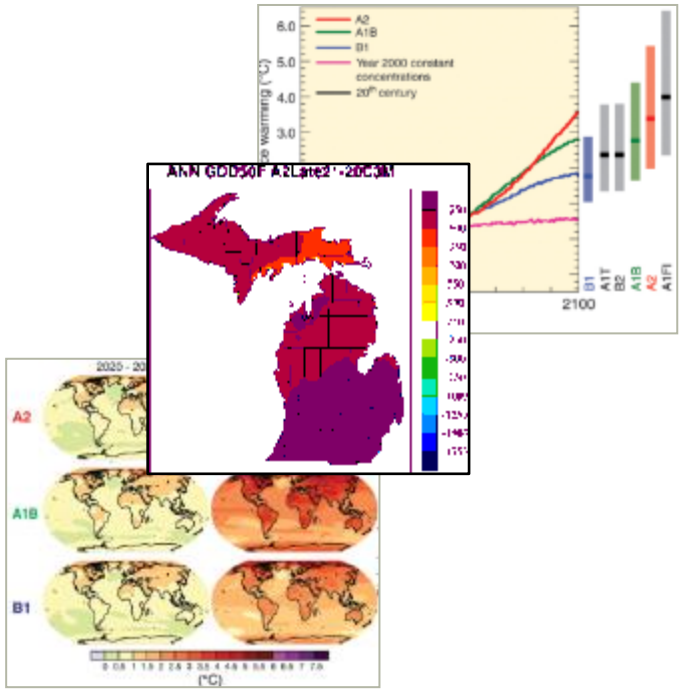
Forest Adaptation & Mitigation

ADAPTATION.

MITIGATION.

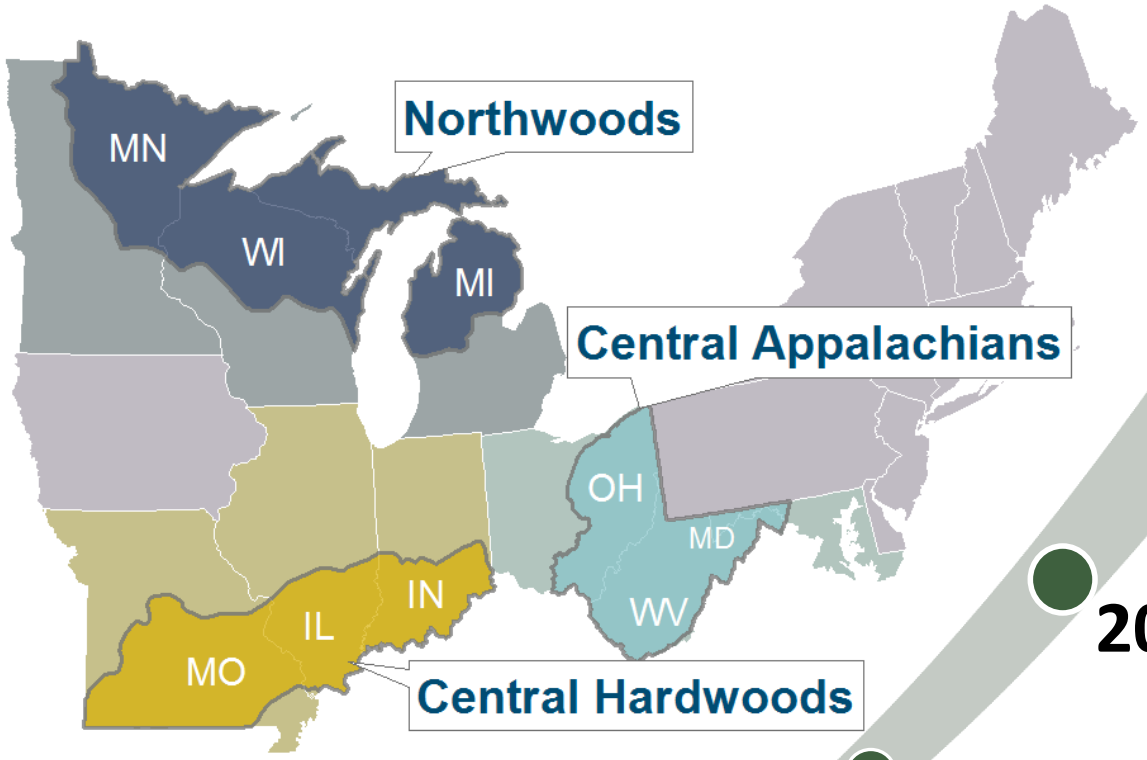
Climate Change Response Framework

A collaborative approach among scientists, managers, and landowners to incorporate climate change considerations into forest management.



www.forestadaptation.org

Climate Change Response Framework



2012: Central Appalachians

2011: Central Hardwoods

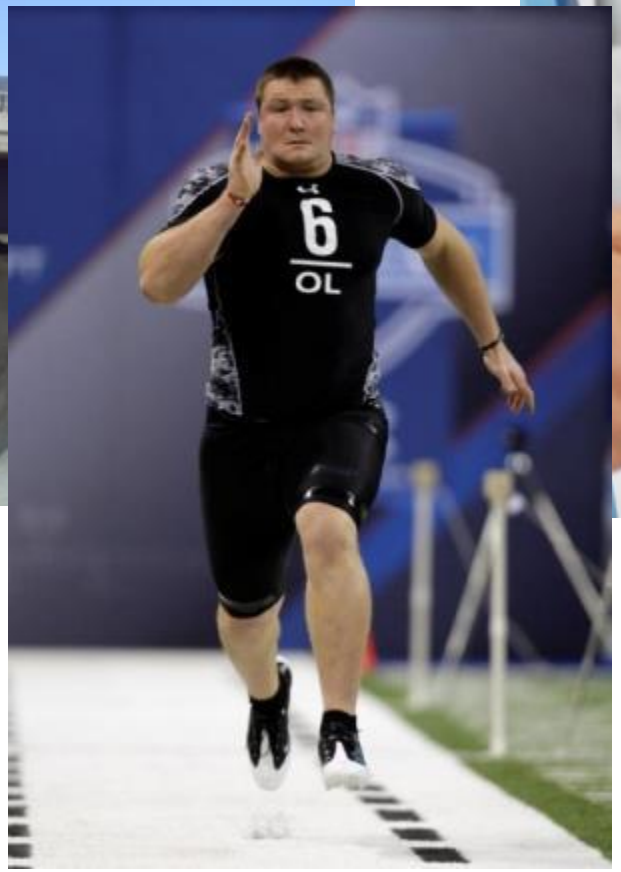
2010: Northwoods expansion

2009: Wisconsin's Chequamegon-Nicolet NF pilot

Three key adaptation ideas for foresters

1. Base your decisions on the best available information

Information before Adaptation



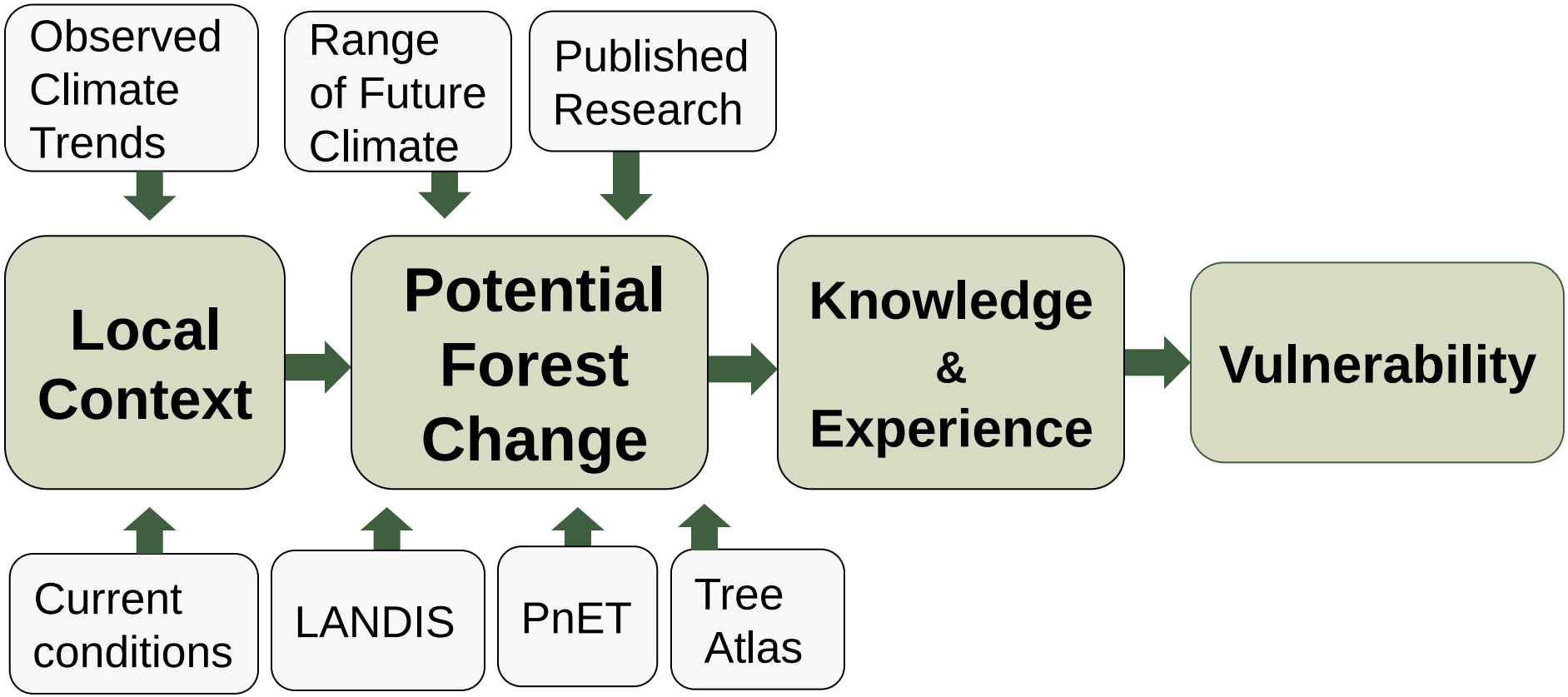
Forest Ecosystem Vulnerability Assessment

- Evaluate key vulnerabilities to climate change
- Examines a range of future climates
- Not considering changes in management, land use, or policy
- Does not make recommendations
- Pilot assessment: www.nrs.fs.fed.us/pubs/38255

Forest Systems Addressed

- Northern hardwoods
- Aspen-birch
- White pine/ red pine
- Jack pine
- Upland spruce-fir
- Lowland conifers
- Lowland/ riparian hardwoods
- Oak associations
- Barrens

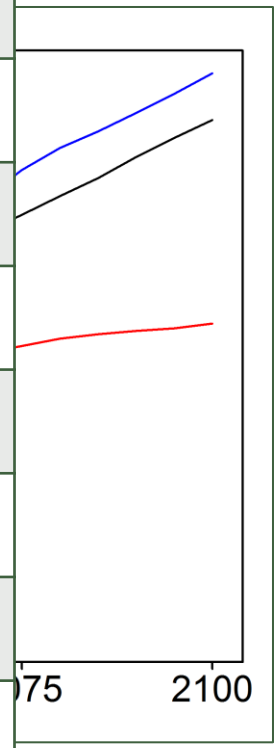
Vulnerability Assessment Schematic



Expert Panel Workshop

Ecosystem Vulnerability Assessment

Forest System	Vulnerability
Northern hardwoods	Moderate
Aspen-birch	Moderate
Upland spruce-fir	High
Lowland conifers	High-Moderate
Jack pine	High-Moderate
Red pine-white pine	High-Moderate
Oak associations	Low-Moderate
Lowland-riparian hardwoods	Moderate
Barrens	Low-Moderate



2. Know your full range of options

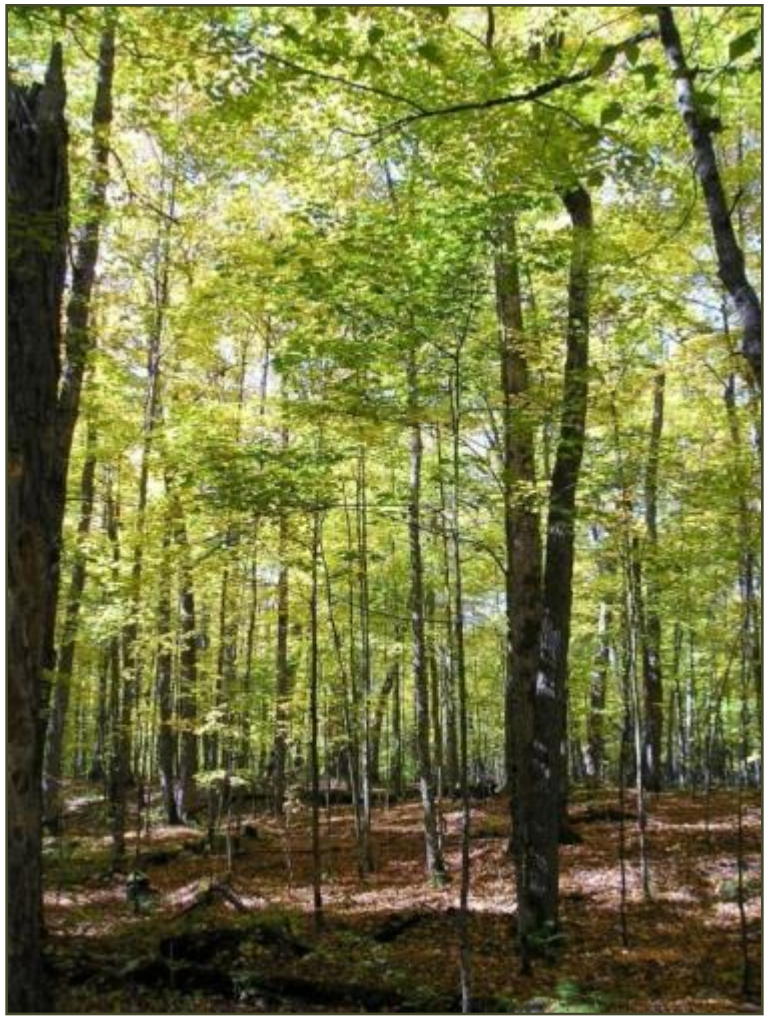
Adaptation Option #1: Resistance

Adaptation Option #1: Resistance

Improve the defenses of the forest against effects of change.

- Short-term
- High-value

Photo: USFS



Millar et al. 2007

Adaptation Option #2: Resilience

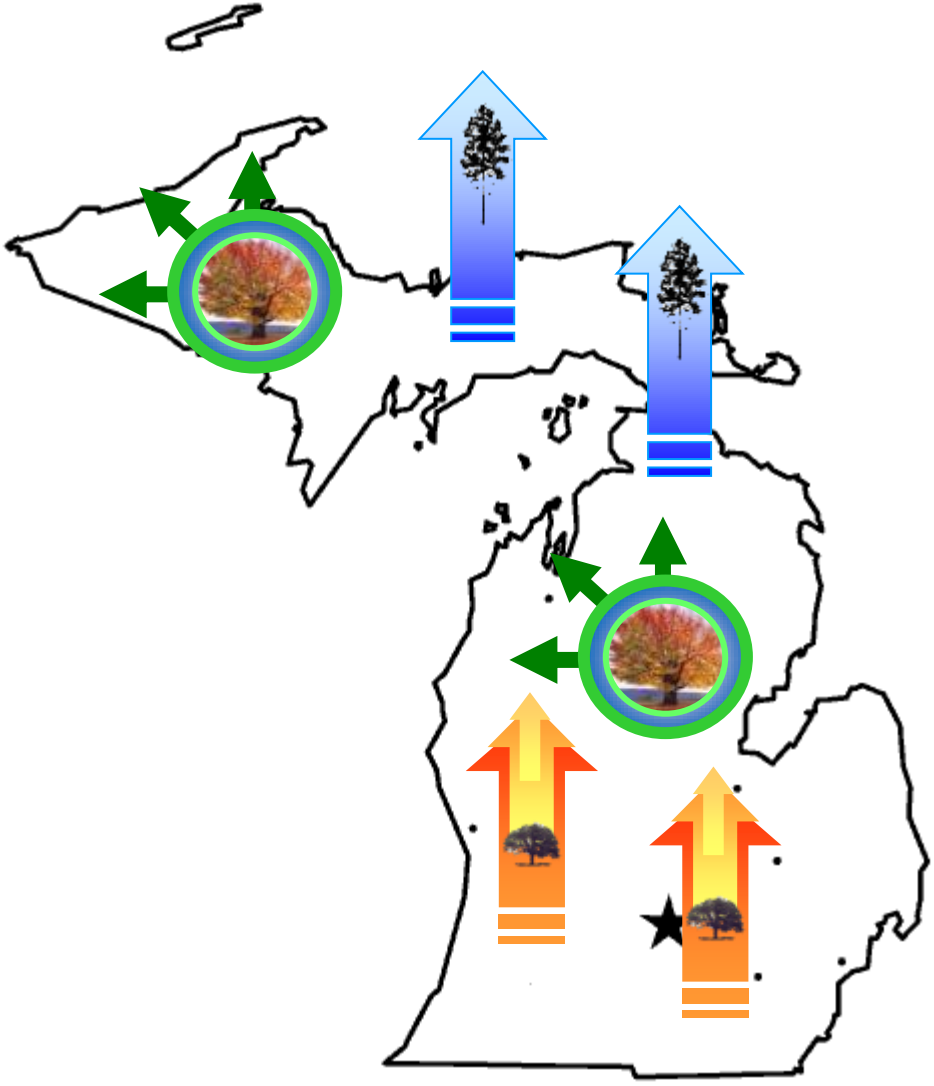
Accommodate gradual change, usually returning to a prior condition after disturbance

Photo: USFS

Millar et al. 2007

Adaptation Option #3: Response

Intentionally accommodate change, enabling ecosystems to adaptively respond



Millar et al. 2007

Adaptation Option #4: Realignment

Move heavily disturbed systems into alignment with current and future conditions rather than restoring to a historical baseline

Millar et al. 2007, 2008

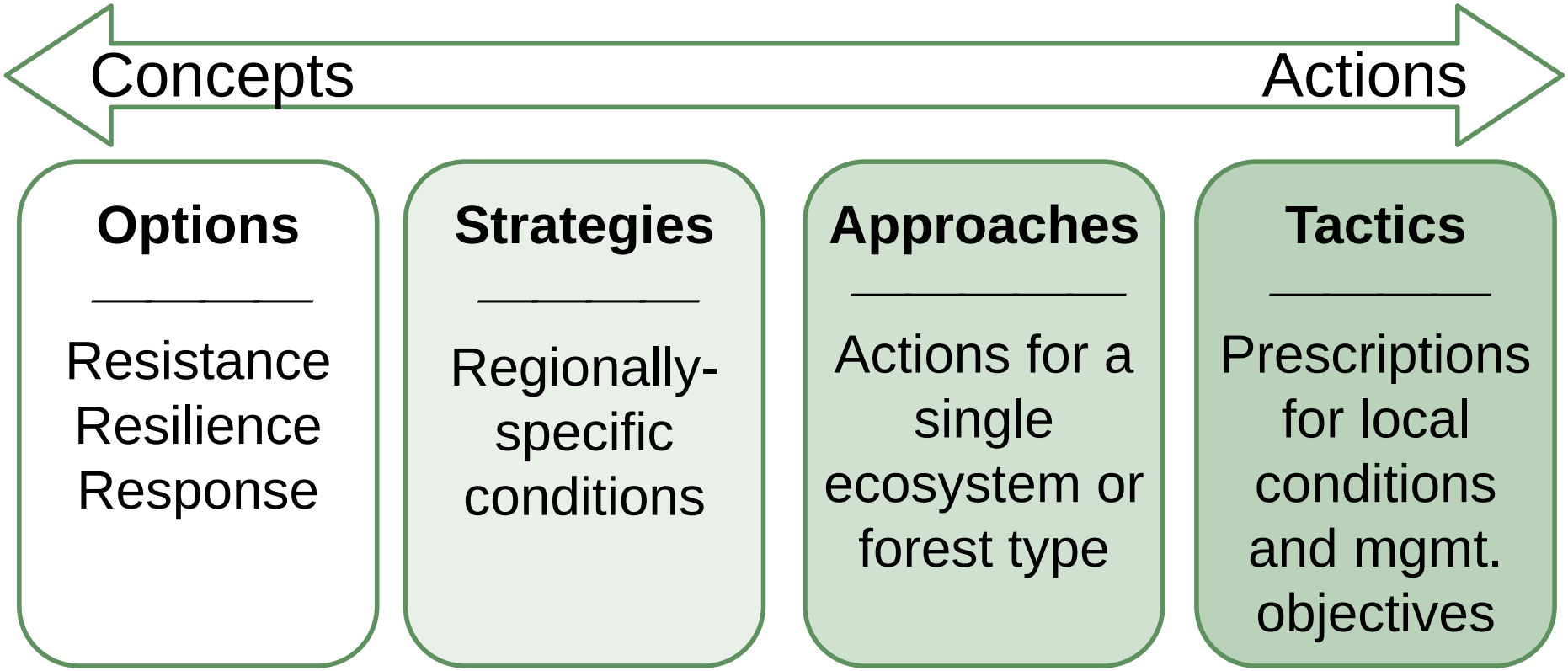
Adaptation Option #5: Reduce

Mitigate greenhouse gases through carbon sequestration and renewable energy use

Millar et al. 2007, 2008

Forest Adaptation Resources (FAR)

Translating concepts to actions

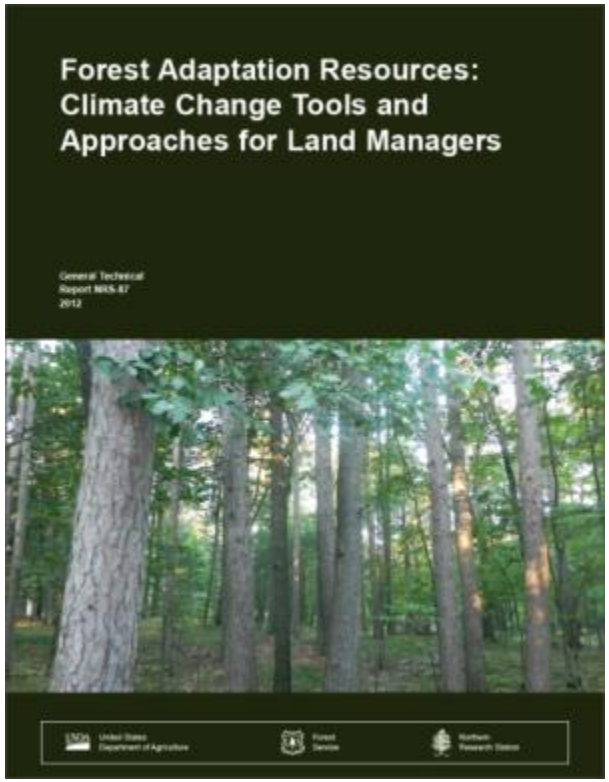


Swanston and Janowiak 2012; www.nrs.fs.fed.us/pubs/40543

Forest Adaptation Resources (FAR)

- Menu of **approaches and strategies** for climate change adaptation
- Designed for a variety of land managers
- Workbook process for practical application
- Does not make recommendations
- Published version for northern WI

  www.nrs.fs.fed.us/pubs/40543

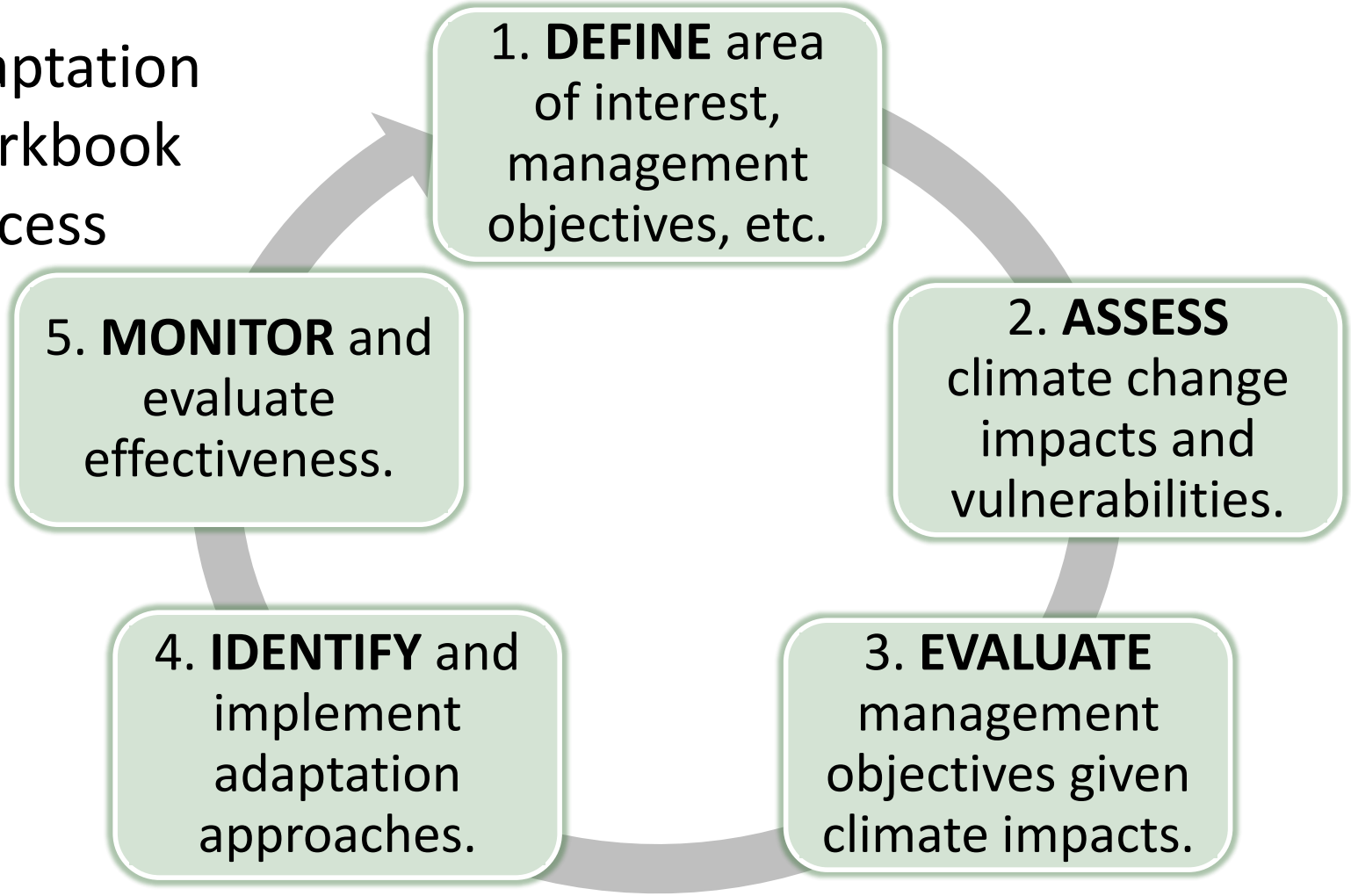


Swanston and Janowiak 2012

3. Goals and site conditions drive the process

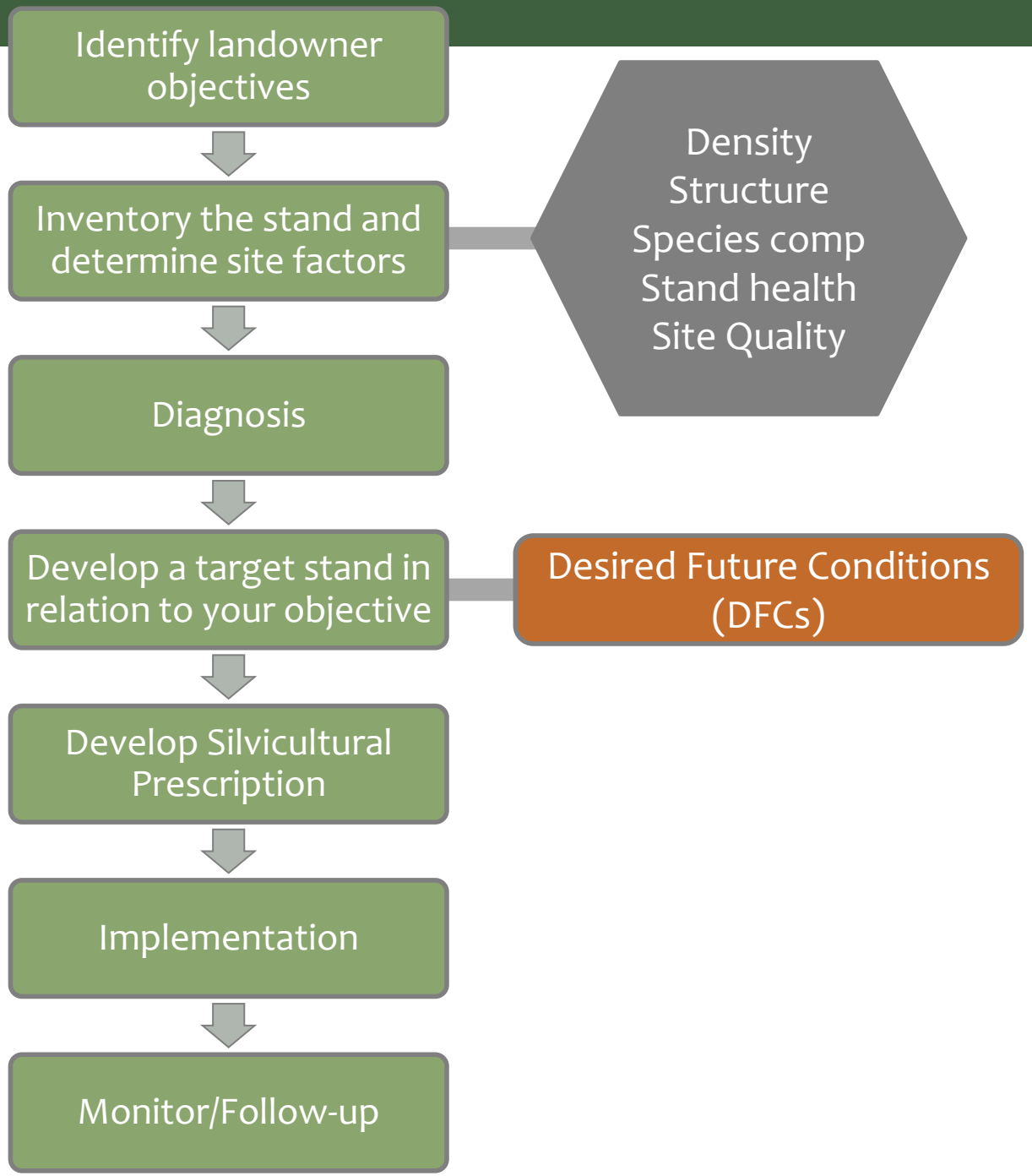
Forest Adaptation Resources (FAR)

Adaptation Workbook Process



Swanston and Janowiak 2012; www.nrs.fs.fed.us/pubs/40543

The Silviculture Prescription Process



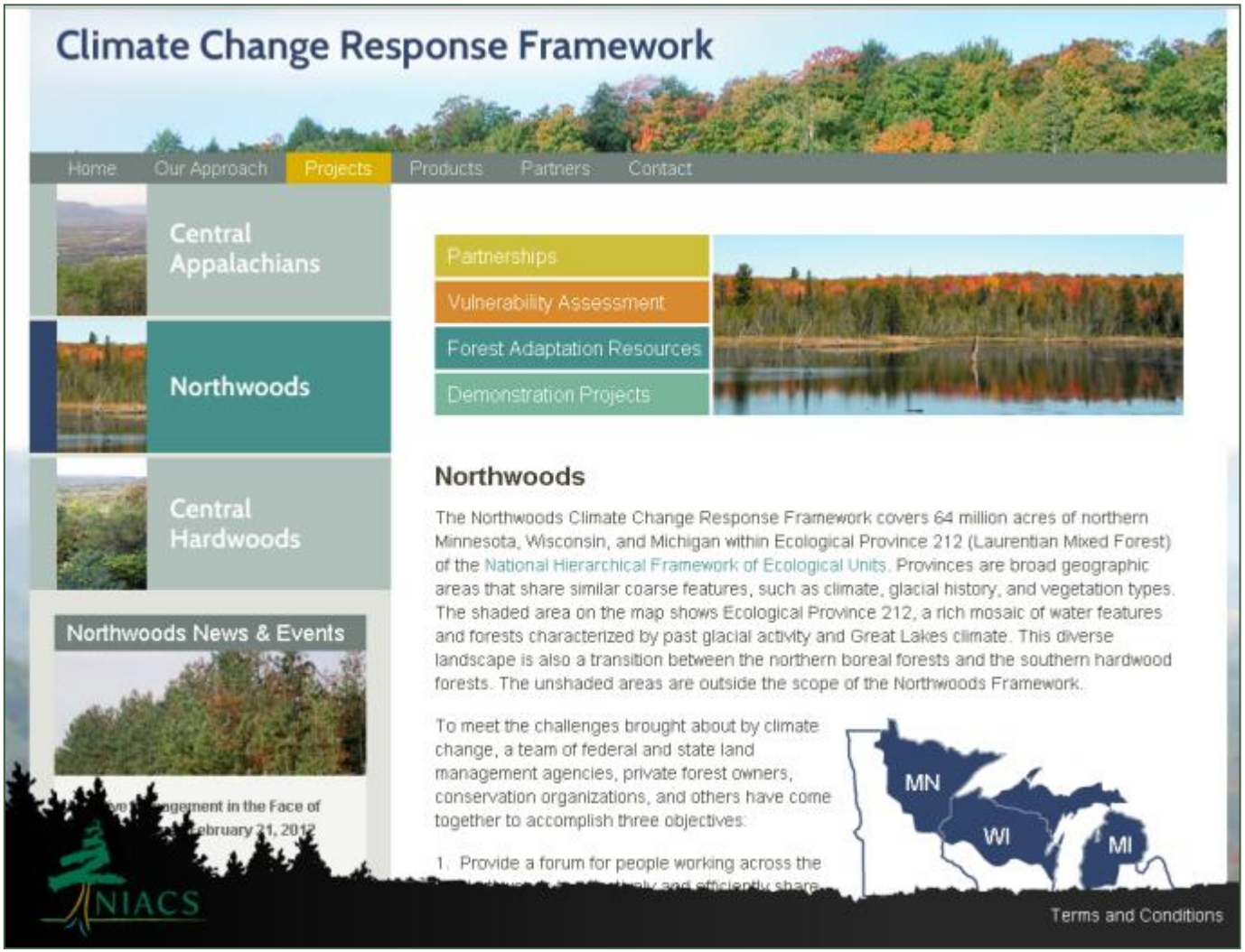
Individual Goals and Site Conditions

Recap

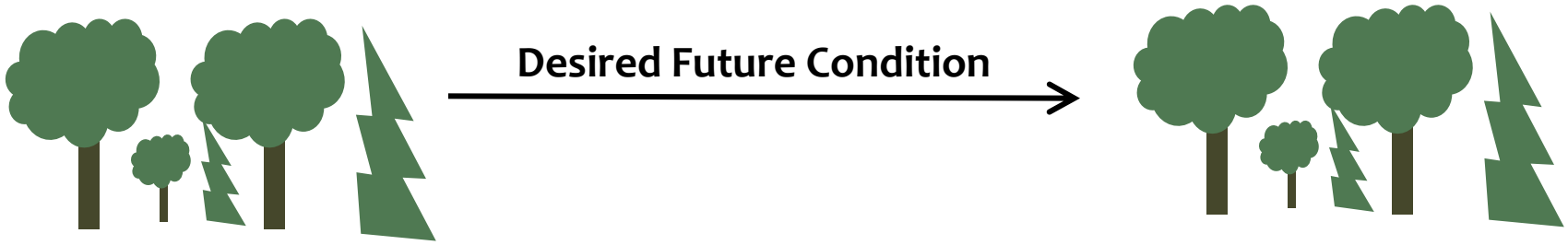
- Adaptation 101
- Northwoods Climate Change Response Framework
- Three Key Ideas for Foresters
  1. *Base your decisions on the best available information*
  2. *Know your full range of options*
  3. *Goals and site conditions drive the process*

Thank you!

www.forestadaptation.org

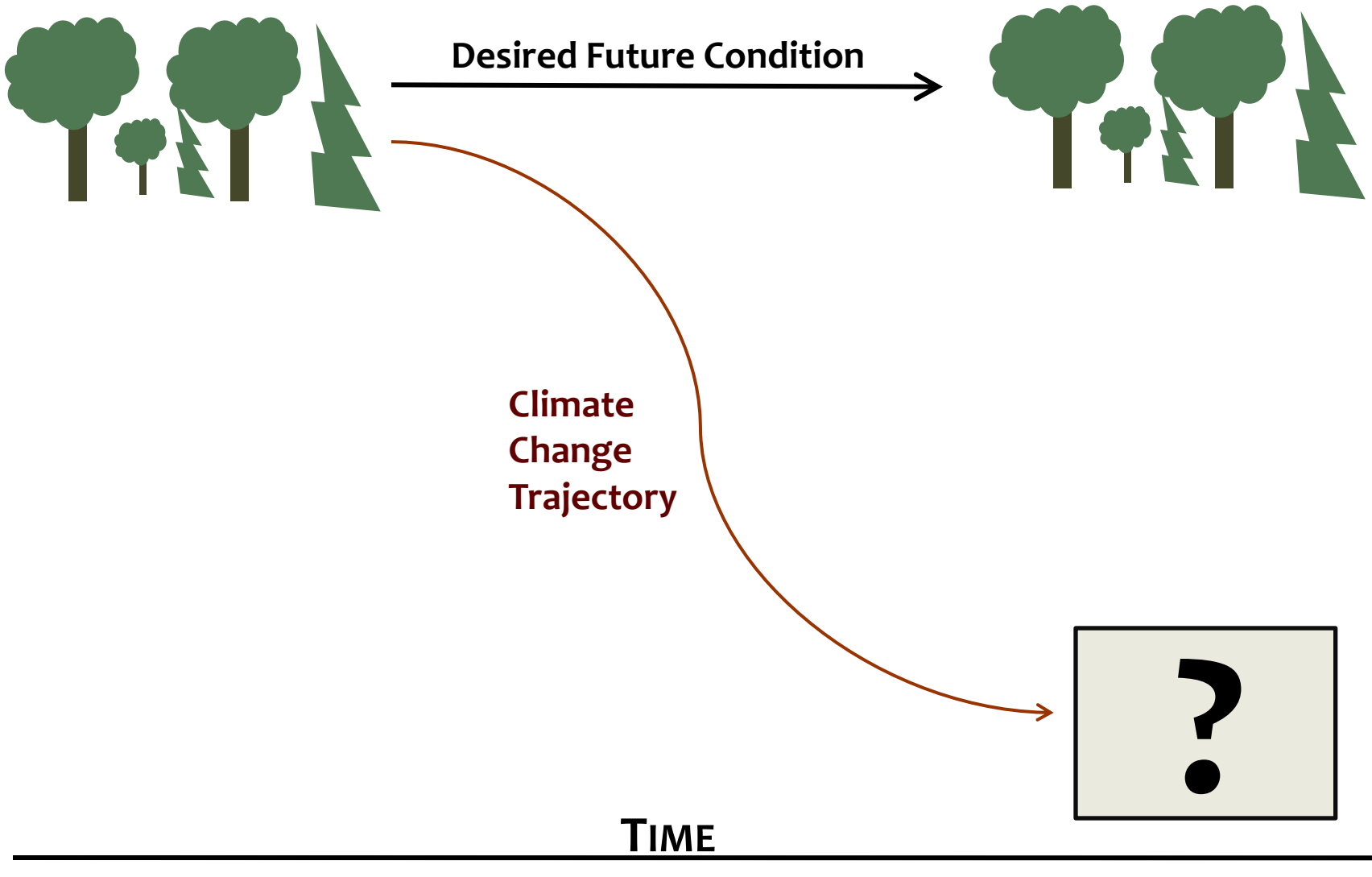


Adaptation

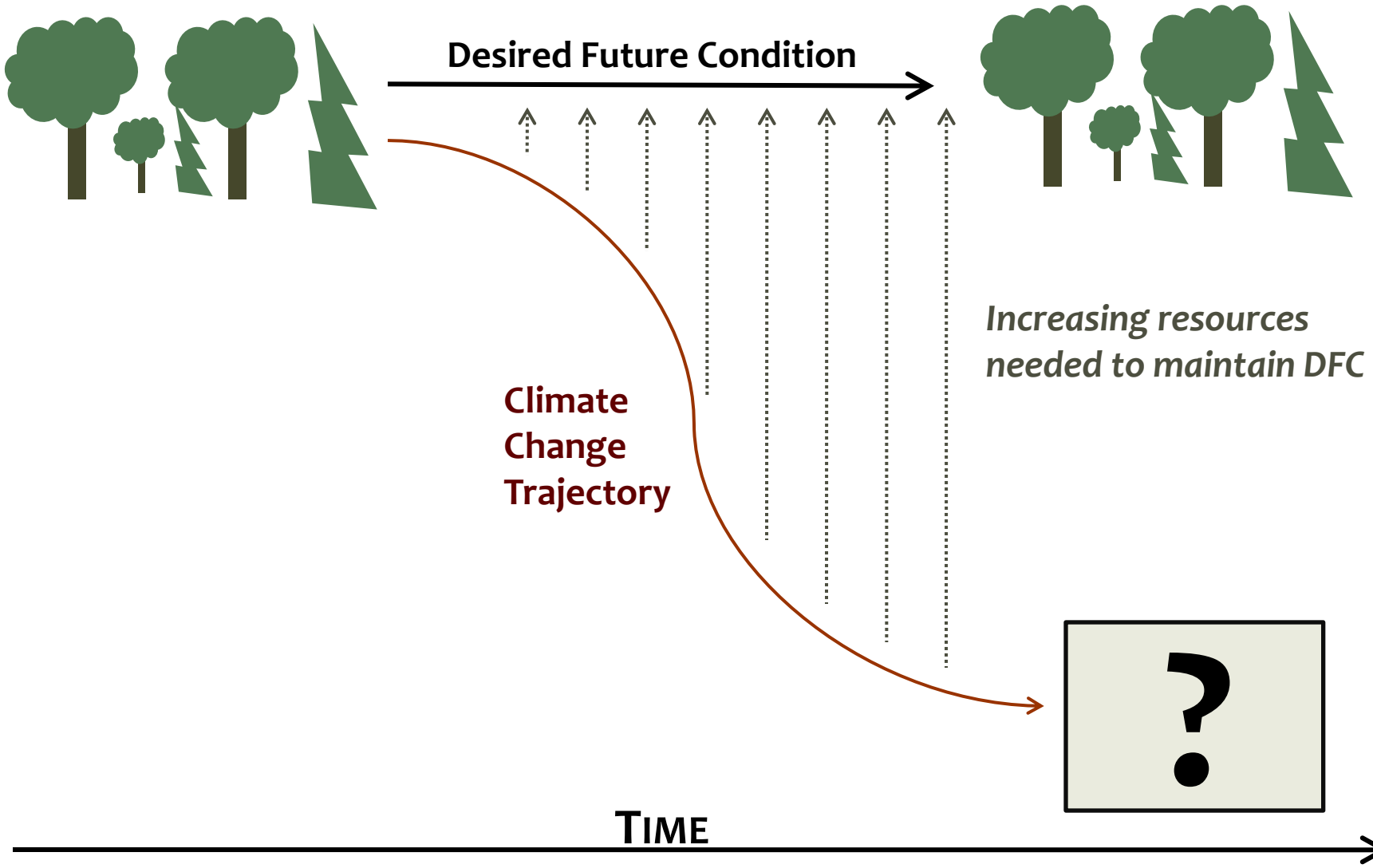


TIME

Adaptation



Adaptation


Desired Future Condition
Increasing resources needed to maintain DFC
Climate Change Trajectory
?
TIME

Adaptation