

CLIMATE CHANGE ADAPTATION IN FORESTRY: Concepts, tools and lessons learned



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MFRC Northeast Landscape Planning Committee

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TWO QUESTIONS:

1. Why does climate change matter?
2. What can forest managers do?



WHY DOES CLIMATE CHANGE MATTER?

Climate change increases the number and severity of many threats to forests



Stress



Disturbance



More stress



More disturbance

WHY DOES CLIMATE CHANGE MATTER?

Climate change increases the risks associated with forest management



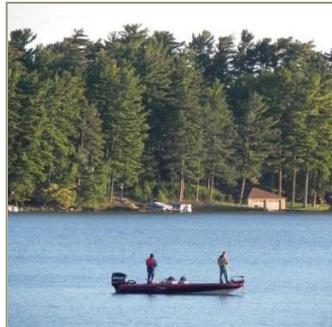
Long-term productivity



Forest cover



Products



Values



Ecosystem Services

WHAT CAN MANAGERS DO? ADAPT.

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



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

FOREST ADAPTATION & MITIGATION

ADAPTATION.

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

MITIGATION.

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

THESE ARE DIFFERENT, BUT CAN WORK TOGETHER.

ADAPTATION OPTION #1: RESISTANCE

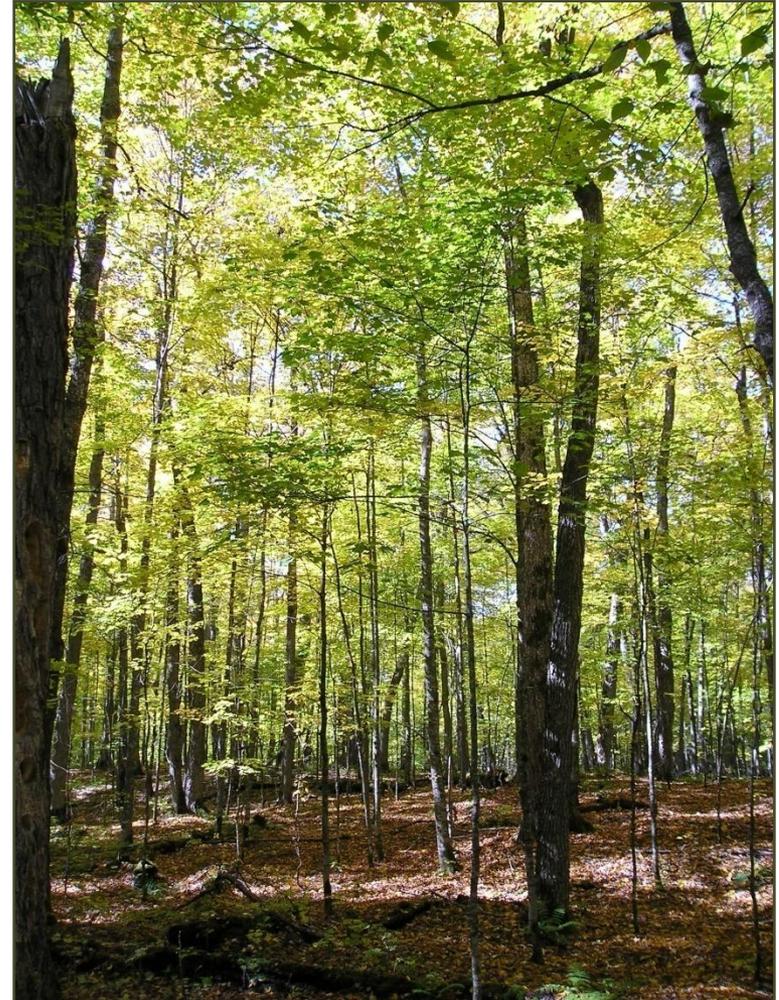
ADAPTATION OPTION #1: RESISTANCE

Improve the defenses of the forest against effects of change.

- ◆ Short-term
- ◆ High-value



Photo: USFS



ADAPTATION OPTION #2: RESILIENCE

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

Examples:

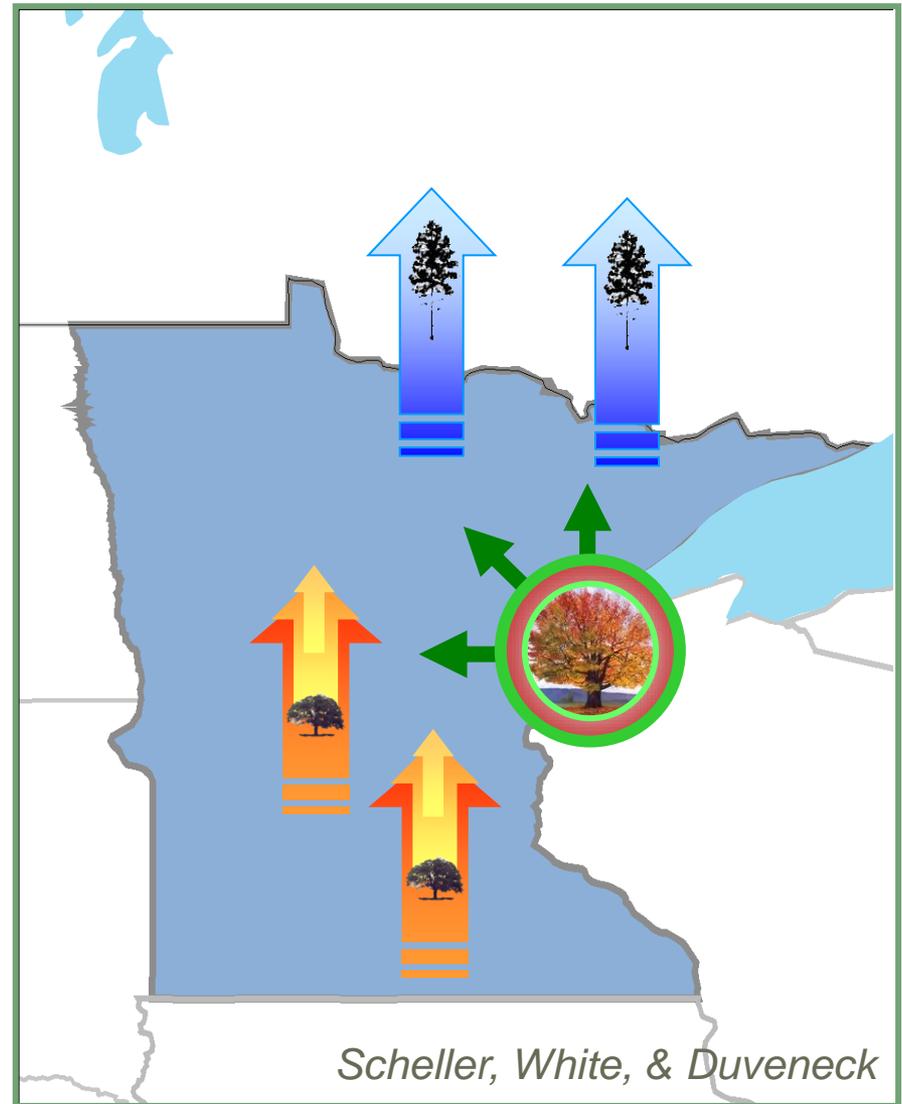
- Thinning stands to improve overall health & vigor
- Management of vegetation following disturbance



Photo: USFS

ADAPTATION OPTION #3: RESPONSE

Intentionally accommodate change, enabling ecosystems to adaptively respond



ADAPTATION PRINCIPLES: #1

Strategies and approaches fill the gap between concepts and action:

Applicable across large areas

Location & situation specific

Options

Broad concepts:

Resistance
Resilience
Response

Strategies

Regionally-
specific
ecological and
managerial
conditions

Approaches

Actions that
can be applied
to a single
ecosystem or
forest type

Tactics

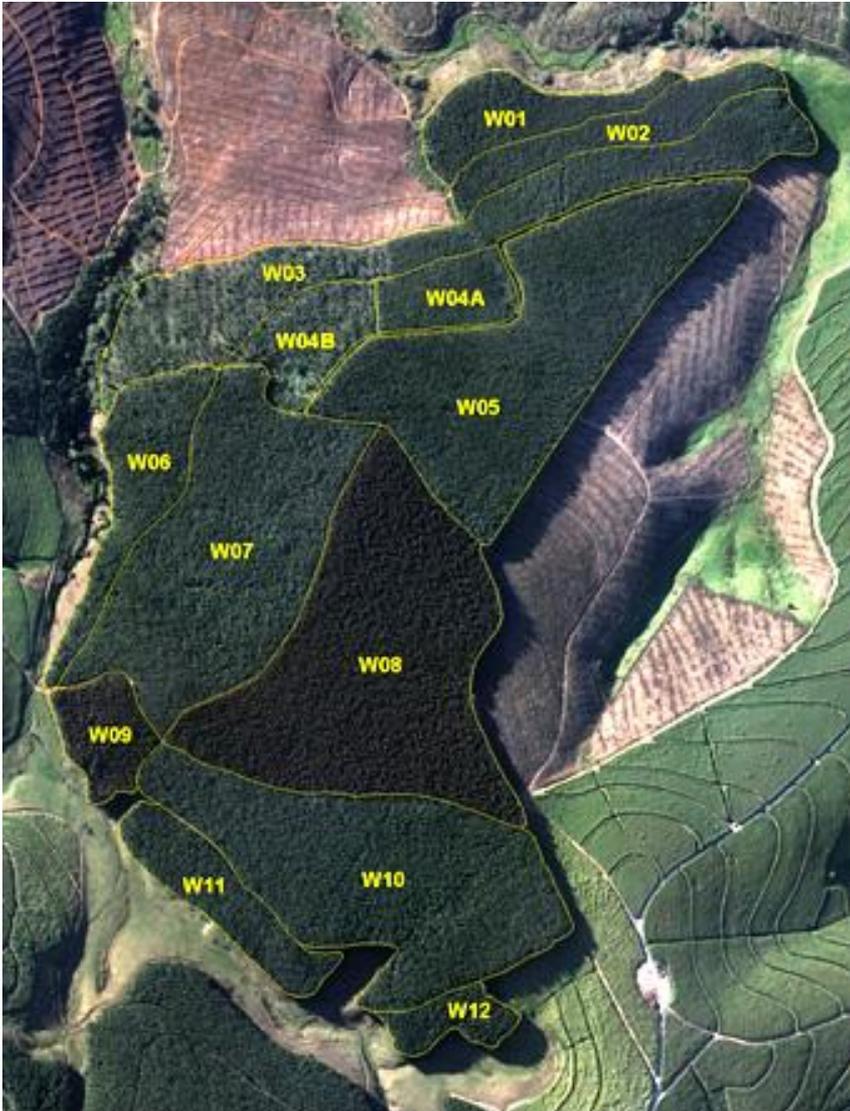
Prescriptions
for individual
sites and
management
objectives

ADAPTATION PRINCIPLES: #2

Strategies can serve multiple purposes:

Strategy	Resistance	Resilience	Response
Strategy 1. Sustain fundamental ecological functions.	X	X	X
Strategy 2. Reduce the impact of existing biological stressors	X	X	X
Strategy 3. Protect forests from severe fire and wind disturbance	X	X	
Strategy 4. Maintain or create refugia.	X		
Strategy 5. Maintain and enhance species and structural diversity.	X	X	
Strategy 6. Increase ecosystem redundancy across the landscape.		X	X
Strategy 7. Promote landscape connectivity.		X	X
Strategy 8. Enhance genetic diversity.		X	X
Strategy 9. Facilitate community adjustments through species transitions.			X
Strategy 10. Plan for and respond to disturbance.			X

ADAPTATION PRINCIPLES: #3

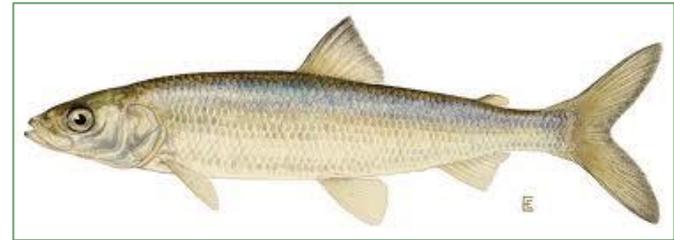


Three R's can occur in tandem across the landscape

Specific tactics are unique to each individual owner and manager

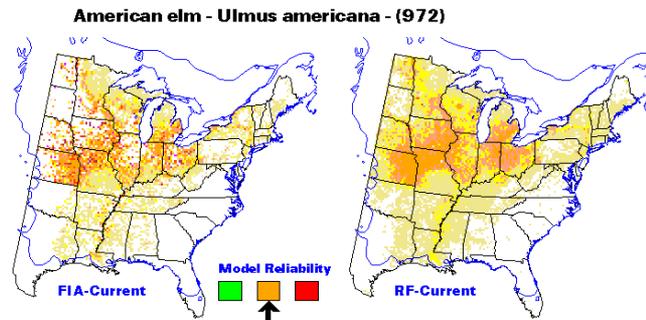
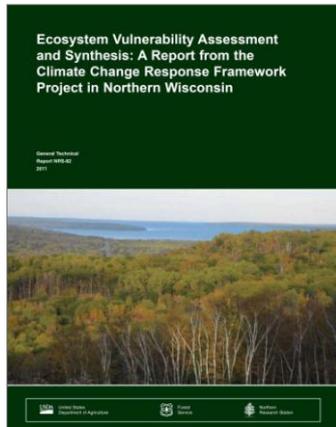
ADAPTATION PRINCIPLES: #4

- Management goals and PLACE should drive the process



ADAPTATION PRINCIPLES: #5

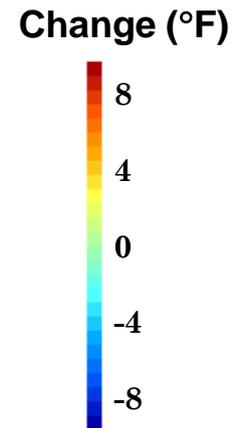
Use a variety of information sources to locally interpret climate projections



Summer Temp Change (°F)



Winter Temp



ADAPTATION PRINCIPLES: #6

Learn by doing



ADAPTATION PRINCIPLES: #7

Take action slowly & deliberately



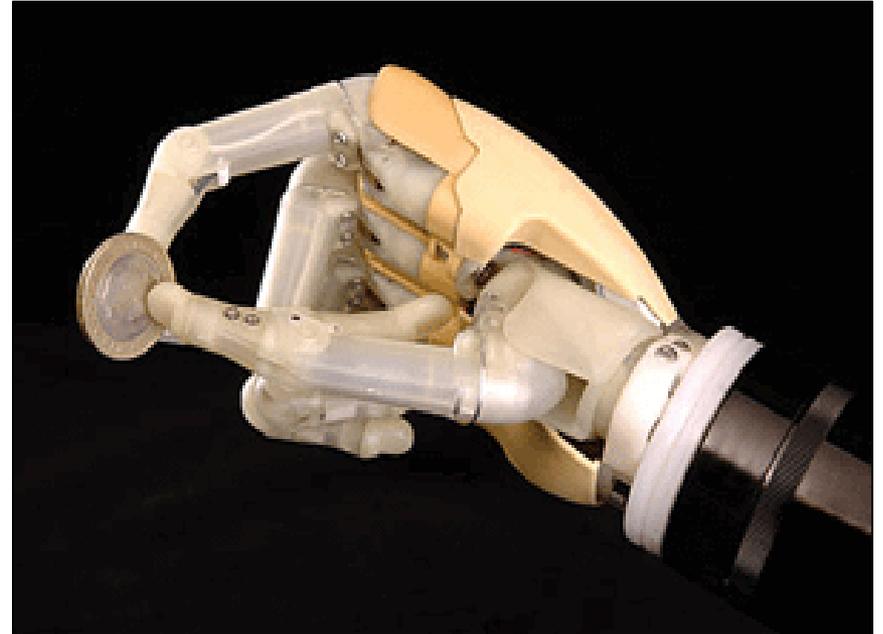
ADAPTATION PRINCIPLES: #8

Think about the bigger picture



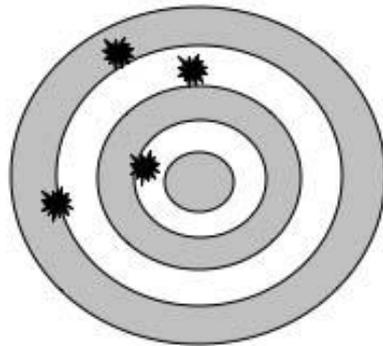
ADAPTATION PRINCIPLES: #9

Desired Future Condition vs. Desired Future Function

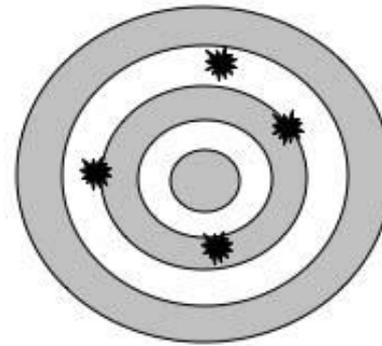


ADAPTATION PRINCIPLES: #10

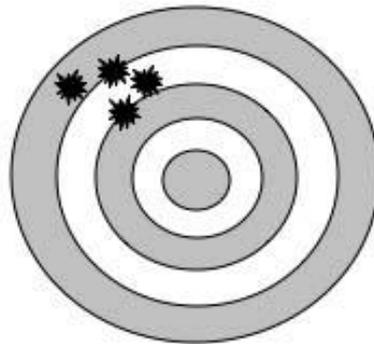
Plan for a range of future climate conditions



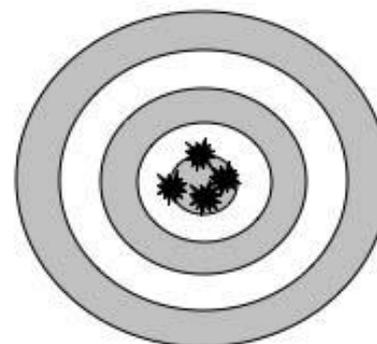
**Not Accurate
Not Precise**



**Accurate
Not Precise**



**Not Accurate
Precise**



**Accurate
Precise**

FOREST ADAPTATION RESOURCES

- Menu of **approaches and strategies** for climate change adaptation
- Designed for a variety of land managers
- Tailored to local forest types
- Workbook process
- Does not make recommendations or decisions for managers
- Published version for northern WI

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

Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers

General Technical
Report NRS-87
2012



THANK YOU

www.climateframework.org

Climate Change Response Framework

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Demonstration Projects

Northwoods

The Northwoods Climate Change Response Framework covers 64 million acres of northern Minnesota, Wisconsin, and Michigan within Ecological Province 212 (Laurentian Mixed Forest) of the *National Hierarchical Framework of Ecological Units*. Provinces are broad geographic areas that share similar coarse features, such as climate, glacial history, and vegetation types. The shaded area on the map shows Ecological Province 212, a rich mosaic of water features and forests characterized by past glacial activity and Great Lakes climate. This diverse landscape is also a transition between the northern boreal forests and the southern hardwood forests. The unshaded areas are outside the scope of the Northwoods Framework.

To meet the challenges brought about by climate change, a team of federal and state land management agencies, private forest owners, conservation organizations, and others have come together to accomplish three objectives:

1. Provide a forum for people working across the

February 21, 2012

NIACS

Terms and Conditions

DISCUSSION QUESTION:

How could Landscape Planning incorporate the ideas of climate change adaptation?

WHAT CAN MANAGERS DO? ADAPT.



Desired Future Condition



TIME



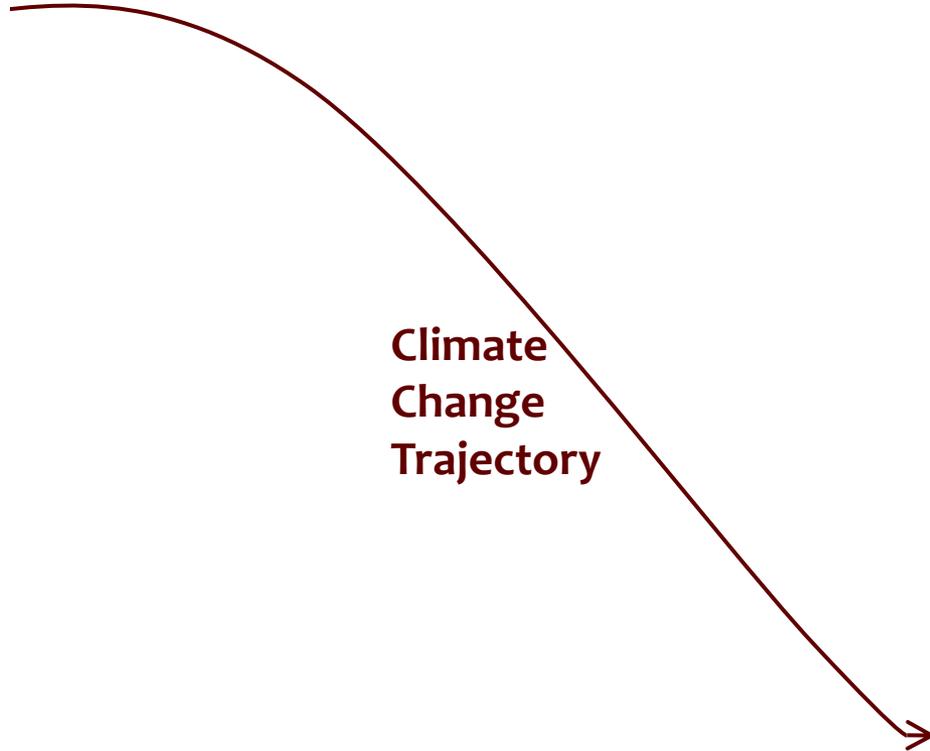
WHAT CAN MANAGERS DO? ADAPT.



Desired Future Condition



Climate
Change
Trajectory



TIME



WHAT CAN MANAGERS DO? ADAPT.



Desired Future Condition



Climate
Change
Trajectory

*Increasing resources
needed to maintain DFC*



TIME



WHAT CAN MANAGERS DO? ADAPT.

