Climate Change, Forests, & Forest Habitats

Part 2: Climate Change Adaptation

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Climate Change Response Framework
www.forestadaptation.org

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




Adaptation actions are designed to specifically address climate change impacts & vulnerabilities in order to meet goals and objectives

How to respond to climate change?

What actions can help systems adapt to climate change and other threats while also meeting landowner needs?



If you want a single “answer” for how to respond to climate change, it’s

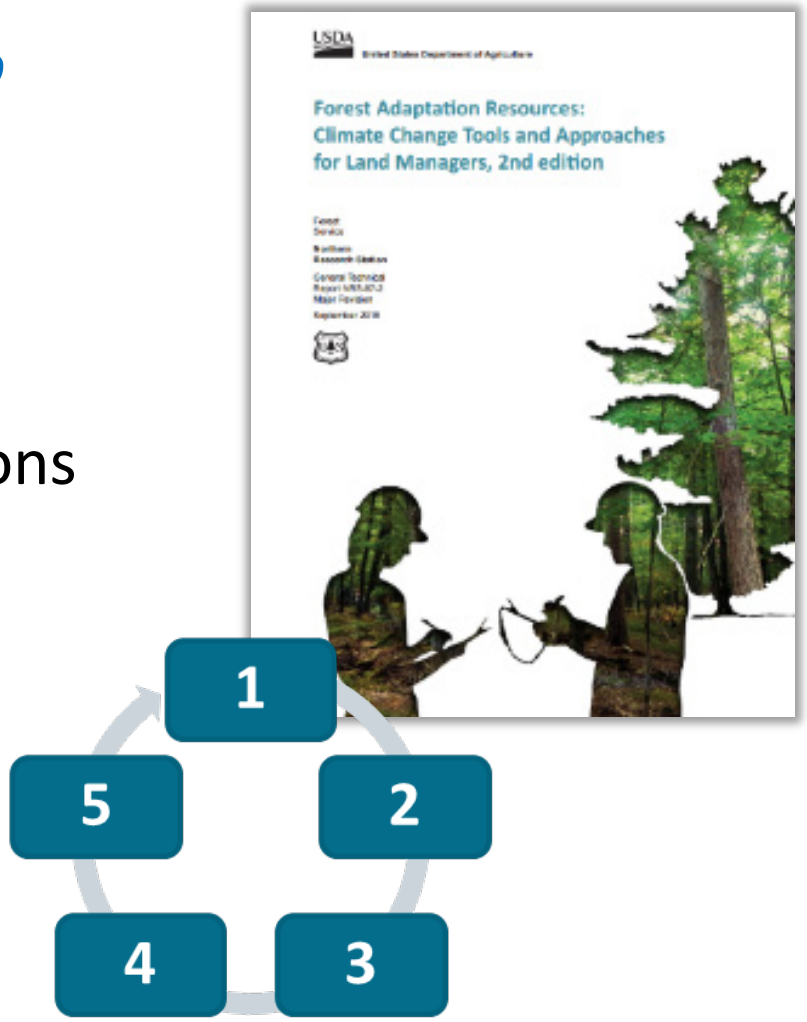
“It depends”

It depends on **where** you are working and **what** you’re trying to achieve.

Forest Adaptation Resources

A flexible workbook and menu to address diverse needs

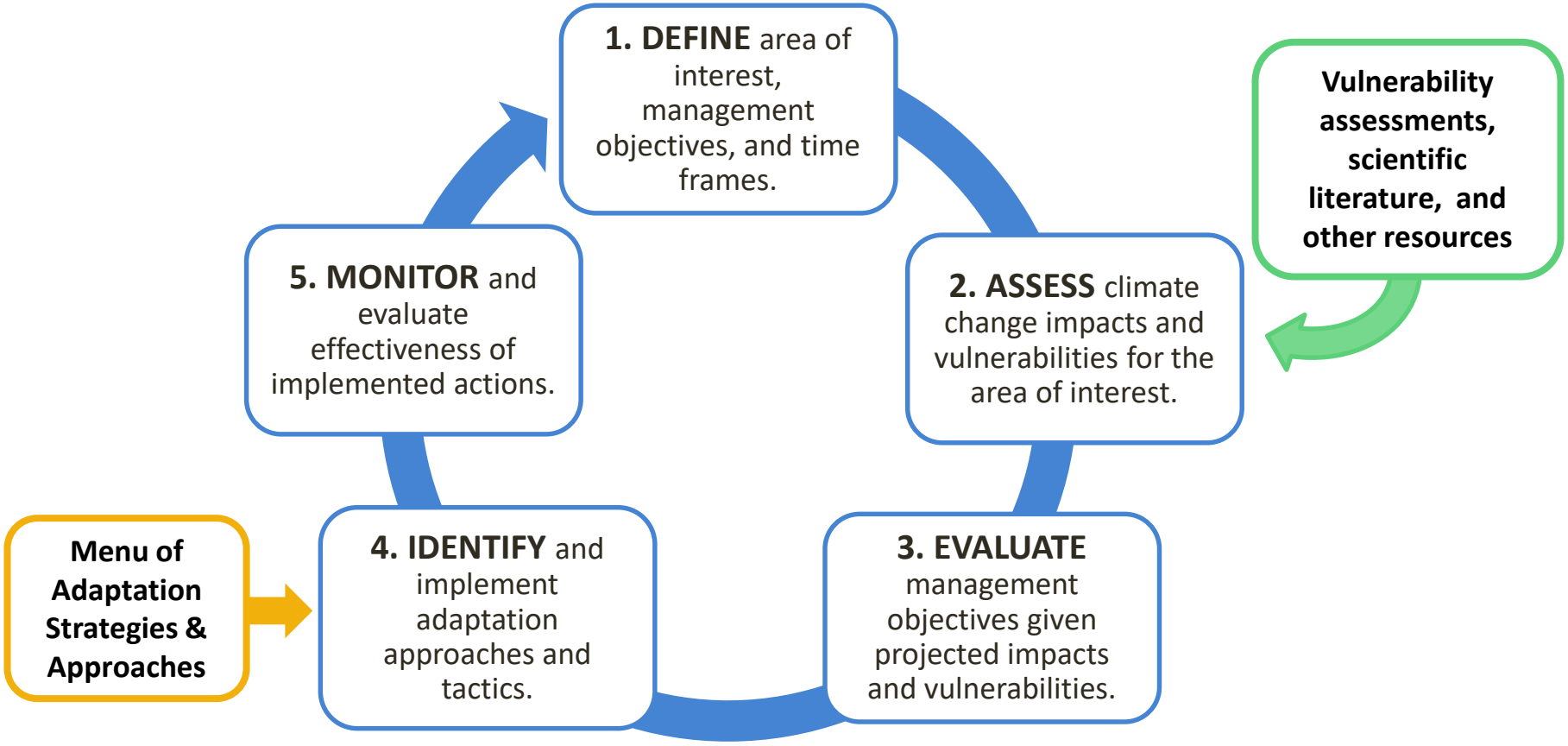
- Designed for a variety of land owners with diverse goals
- Does not make recommendations
- Menu of adaptation strategies and approaches for forest management



Swanston et al. 2016; www.adaptationworkbook.org

Adaptation Workbook

A workbook process provides "structured flexibility"



Swanston et al. 2016; www.adaptationworkbook.org

A Spectrum of Adaptation Options

RESISTANCE

- Improve defenses of forest against change and disturbance
- Maintain relatively unchanged conditions

RESILIENCE

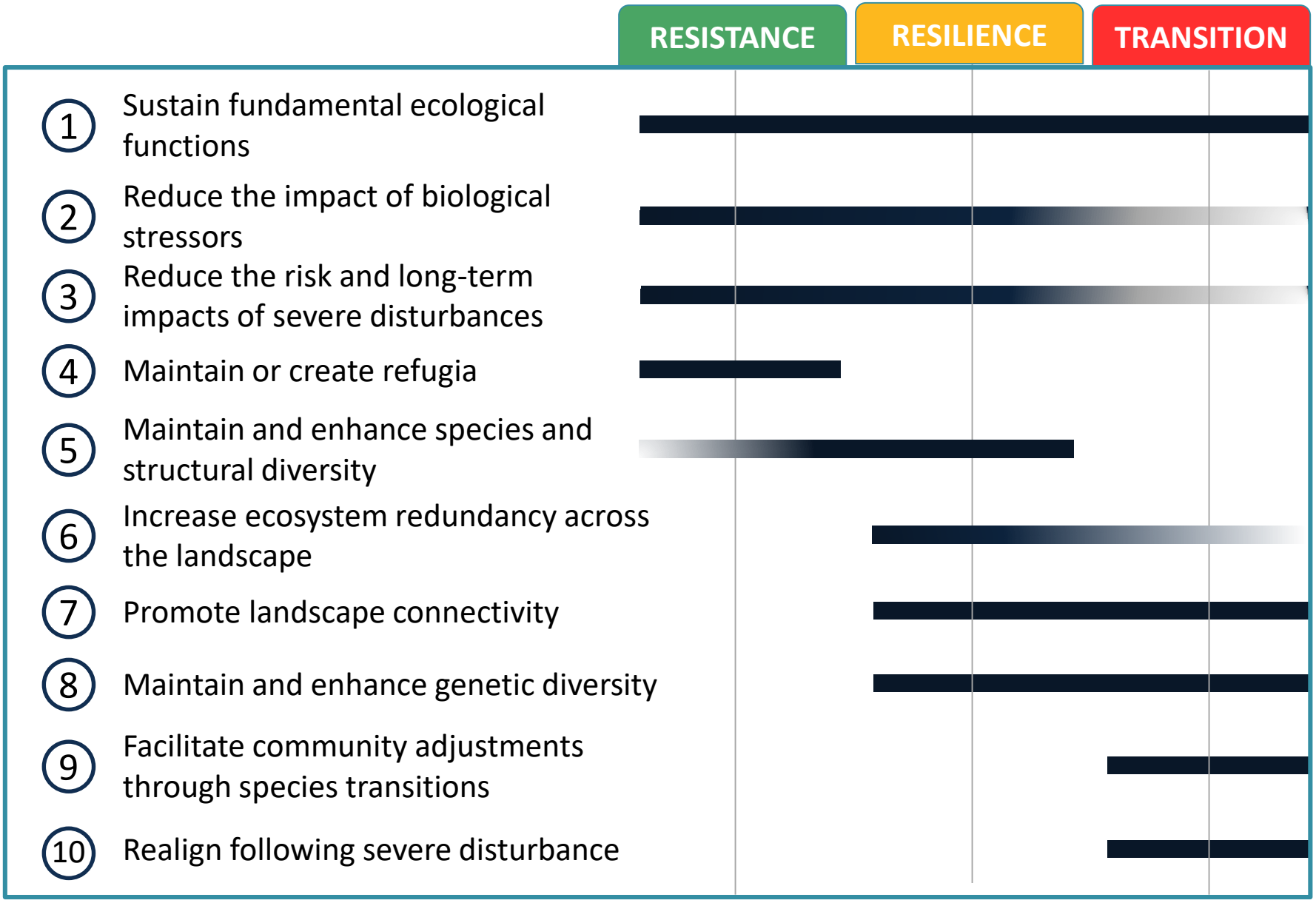
- Accommodate some degree of change
- Return to prior reference condition following disturbance

TRANSITION

- Intentionally facilitate change
- Enable ecosystem to respond to changing and new conditions

Millar et al. 2007, Swanston et al. 2016, Nagel et al. 2017

Climate Change Adaptation: Strategies



Swanston et al. 2016

Real-World Adaptation Projects

More than 50 projects in New England

- Federal
- State
- Local
- Multi-ownership
- Tribal
- University
- NGO
- Private

www.forestadaptation.org/demos

Adaptation Options in Projects

RESISTANCE

RESILIENCE

TRANSITION

Northern New England:

32%	43%	25%

Southern New England:

21%	46%	33%

Preliminary data via T. Ontl

Resist Change

Resist Change

Prevent the introduction and establishment of invasive plant species and remove existing invasives

Maintain or improve the ability of forests to resist pests and pathogens

Prudence Island Natural Heritage Unit: www.forestadaptation.org/node/6186

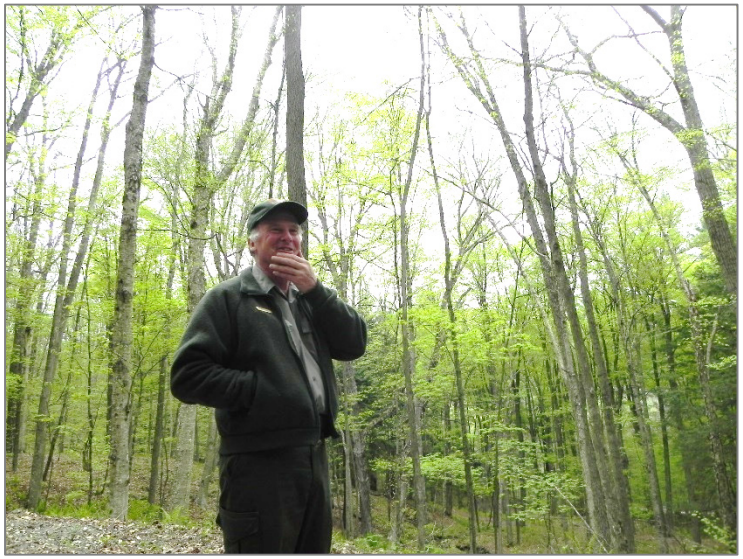
Enhance Resilience

Enhance Resilience

Maintain and restore diversity of native tree species

Promote diverse age classes

Retain biological legacies



Marsh-Billings-Rockefeller Nat'l Historical Park: www.forestadaptation.org/node/6098

Enhance Resilience

Restore fire to fire-adapted ecosystems

MA Dept. of Conservation and Rec, Bristol Lot: www.forestadaptation.org/bristol

Enhance Resilience

Maintain or restore soil quality and nutrient cycling

Atlas Timberlands: www.forestadaptation.org/atlas

Enhance Resilience

Maintain or restore hydrology

Trout Unlimited and Partners: www.forestadaptation.org/tu-ne

Transition Systems

Transition Systems

Favor or restore native species that are expected to be better adapted to future conditions

Norcross Wildlife Sanctuary: www.forestadaptation.org/norcross

Transition Systems

Introduce species that are expected to be adapted to future conditions.

Providence Water: www.forestadaptation.org/providence

Principles for Adaptation

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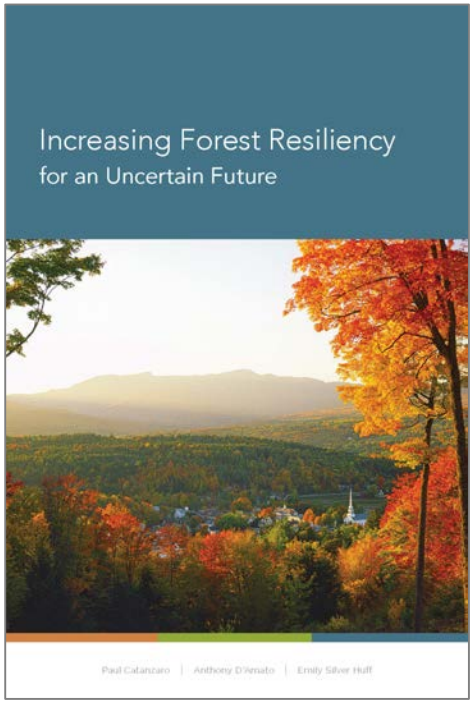
- **Prioritization and triage** – direct actions based on vulnerability and anticipated effectiveness
- **Flexible and adaptive management** – stay flexible, and improve over time
- **"No regrets" decisions** – emphasize win-win actions, especially in the short-term
- **Precautionary actions** – take action to reduce risk in the most vulnerable systems
- **Variability and uncertainty** – design actions to accommodate a greater variety of future conditions
- **Integrating mitigation** – use complimentary actions to ensure forest can sequester carbon

Swanston et al. 2012

Increasing Forest Resiliency Guide

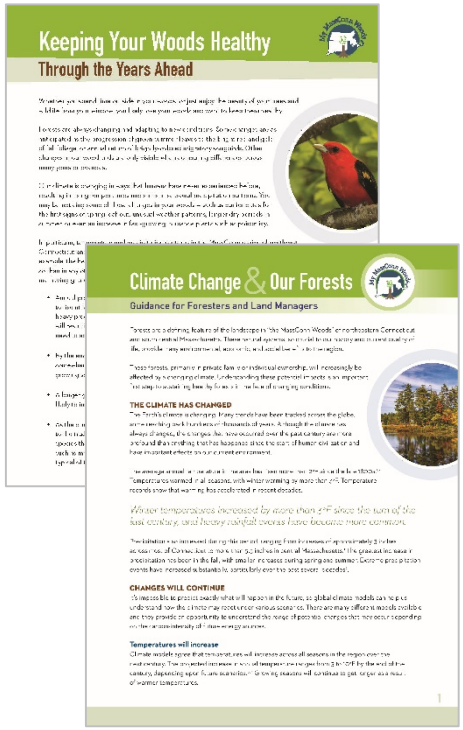


15 actions under 4 categories:

1. Keep forest forested and connected
2. Reduce stressors
3. Reduce vulnerability
4. Provide refuge

Catanzaro et al. 2016; www.masswoods.net

Forester and landowner handouts:



- Protect water and soils on your land.
- Improve ability of your trees to resist bugs and disease.
- Prevent and control non-native plants and weeds that already threaten native plants and animals.
- Manage damage to young trees from excessive deer browsing.
- Prepare for big weather events by promoting strong, healthy trees in your woodlot.
- Respond quickly after big disturbance events to help your woods bounce back.
- Promote a diversity of tree species and tree sizes.
- Protect rare or sensitive plant and animal communities.
- Consider how your current trees and new trees that you may want to plant will react to future conditions.
- Monitor your woods and the effect of different management tactics.

www.mymasswoods.org