

USDA United States Department of Agriculture
Natural Resources Conservation Service
nrcs.usda.gov/

NRCS provides America's farmers and ranchers with financial and technical assistance to voluntarily put conservation on the ground, not only helping the environment but agricultural operations, too.

NIACS Northern Institute of Applied Climate Science
niacs.org/

The Northern Institute of Applied Climate Science (NIACS) is a collaborative effort among the Forest Service, universities, conservation organizations, and forest industry that provides information on managing forests for climate change adaptation and enhanced carbon sequestration.

USDA United States Department of Agriculture
Climate Hubs
climatehubs.usda.gov/

The USDA Climate Hubs develop and deliver science-based, region-specific information and technologies, with USDA agencies and partners, to agricultural and natural resource managers.

Natural Resources Conservation Service

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Climate Change,
YOUR FOREST AND YOU

Forests are always changing and adapting to new conditions, including recent changes in our climate[1,2]. The USDA Northern Forests Climate Hub and Northern Institute of Applied Climate Science have identified tools and approaches[3] to help landowners adapt to climate change. The conservation programs offered by the Natural Resources Conservation Service (NRCS) can help private landowners achieve these goals through technical and financial assistance. Below are some examples of how you can employ adaptation strategies and NRCS programs to help you steward your forest resources and prepare for climate change impacts.

How is climate change impacting my forest?

Temperature Increases
Temperatures in the Northeast have risen by 2.4° F over the past century and are projected to increase by another 3.5-8.5° F in southern New England by the end of the century, with winters expected to warm more than other seasons. This affects snowpack depth, length of growing season, and drought stress, all of which can impact survival of trees and seedlings, and rates of tree respiration and evapotranspiration.

Precipitation Changes
Heavy precipitation events have increased in number and severity in the Northeast since the mid-20th century, more so than anywhere else in the United States. This trend toward more frequent, heavier rainfall events is expected to continue, with longer periods of drought in between. By 2100, the entire Northeast is expected to receive 21 percent more rainfall events greater than 1 inch. Coastal areas of southern New England are expected to see the largest increases in heavy rainfall. Extreme precipitation has significant impacts on soil moisture, frozen ground duration, flooding, surface runoff, and infrastructure.

Soil Moisture and Drought Stress
Drought stress may increase due to warmer conditions, longer growing seasons, and longer periods between rainstorms. During more frequent intense rain events, water can be lost to runoff rather than being stored in the soil, which may also increase drought stress. Drought stress can make trees more vulnerable to insect outbreaks and diseases. These factors may lead to drier conditions for southern New England forests, even though total annual precipitation has been and is likely to continue to increase.

For a full description of climate change impacts on your land, visit the Climate Explorer Tool at:
adaptationworkbook.org/explore-impacts

What can I do?

Whether you are concerned about climate change impacts or are just interested in keeping your forest healthy and productive, NRCS has programs that can provide the technical and financial assistance to help you achieve your goals and objectives.

Conservation Stewardship Program (CSP)

The Conservation Stewardship Program helps landowners implement conservation practices which protect, restore, and enhance wetlands, grasslands, and working farms and ranches through conservation enhancements.

Environmental Quality Incentives Program (EQIP)

Through EQIP, landowners can receive technical and financial assistance to implement conservation practices that protect soil and water quality.

Where do I start?

Contact your local USDA Service Center to get started. Discussing your resource concerns with an NRCS conservation planner will help you:

- Identify your GOALS and OBJECTIVES,
- consider how climate change will affect your land, and
- select adaptation strategies and conservation practices.

Examples

OBJECTIVE: Improve Degraded Plant Communities

ADAPTATION APPROACHES: Reduce competition for moisture, nutrients, and light; Maintain and restore diversity of native species; Prevent the introduction and establishment of invasive plant species and remove existing invasive species.

CONSERVATION PRACTICES: Forest Stand Improvement, Brush Management, Woody Residue Treatment, Herbaceous Weed Treatment

Forests in southern New England are experiencing significant oak mortality due to drought and defoliation by pests, such as gypsy moth. Reducing tree density creates open forest conditions, which promotes the health and vigor of the residual trees by reducing competition for moisture, nutrients, and light. Brush management can be used to improve or restore native habitats and reduce invasive species. Understory vegetation management, along with the proper spacing between trees, allows for plant regeneration, improves habitat for many wildlife species, and lowers the risk of wildfire. This could facilitate a follow-up treatment with prescribed burning or plantings of desired species.

OBJECTIVE: Increase Native Plants

ADAPTATION APPROACHES: Establish or encourage new mixes of native species; Favor existing genotypes that are better adapted to future conditions; Introduce species that are expected to be adapted to future conditions.

CONSERVATION PRACTICES: Tree/Shrub Establishment, Forest Stand Improvement

Encouraging tree species that are expected to be adapted to future conditions can be accomplished by managing existing forests to promote native species better adapted to future conditions, planting new mixes of species, or protecting future adapted seedlings. For example, disease-resistant varieties of elm and chestnut can be established to restore ecological functions, or new species can be planted to replace ash trees lost to emerald ash borer (EAB). Increasing stand-level diversity and function addresses a wide array of resource concerns, increases stand resiliency to climate change, and strengthens ongoing management activities. Additional benefits may include increasing carbon storage and providing more diverse wildlife habitat and food sources.

OBJECTIVE: Reduce Risk of Severe Disturbances

ADAPTATION APPROACHES: Maintain or improve the ability of forests to resist pests and pathogens; Alter forest structure to reduce severity or extent of wind and ice damage; Prevent the introduction and establishment of invasive plant species and remove existing invasives.

CONSERVATION PRACTICES: Forest Stand Improvement, Brush Management, Prescribed Burning, Firebreak, Woody Residue Treatment, Herbaceous Weed Treatment

Creating a more open forest structure through thinning, brush management, and/or prescribed burning practices can help control undesirable vegetation and plant disease, while improving wildlife habitat and restoring ecological sites. These types of adaptive management actions can also reduce the risk of damage from extreme storms and pest outbreaks. Clearing of down woody debris and converting “slash”, which is left over after a timber harvest or forest stand improvement, into wood chips can cut down the amount of fuel available in case of fire, while also reducing the population of potentially harmful insects. The branches and tree tops can be redistributed on the forest floor to allow for quick decomposition and to increase the rate of nutrient cycling in the forest.

OBJECTIVE: Increase Carbon Storage and Sequestration in Forests

ADAPTATION APPROACHES: Alter forest composition or structure to maximize carbon; Increase structural complexity through retention of biological legacies in living and dead wood; Reforest lands that have been deforested and afforest suitable lands

CONSERVATION PRACTICES: Forest Stand Improvement, Tree/Shrub Establishment, Biochar Production from Woody Residue

The establishment of new trees and shrubs can sequester carbon as well as reduce soil carbon losses from erosion. Climate change increases the potential for severe disturbances that may reduce forest carbon stocks. Within managed forests, there are a variety of techniques that can be used to increase carbon storage and sequestration, such as retaining dead wood and increasing soil organic matter. Older forests tend to store more carbon than young or secondary growth forests, due to their greater structural complexity; aim to maintain older and larger legacy trees, as well as dead wood including snags, down wood, and coarse woody debris. Woody debris that remains on site after management activities or wildfires can be used to create biochar. Biochar may be spread in the forest to enrich soils; it stores carbon and is a useful soil amendment that increases organic matter and water-holding capacity.

Other Resources Available

Forestry practices are available through the NRCS, including alley cropping, firebreaks, stream crossings, access roads, prescribed fire, and more; visit your local USDA Service Center or www.nrcs.usda.gov for more information.

The NRCS can help you consider climate change impacts in conservation planning. More adaptation strategies and approaches are available, including promoting landscape connectivity, and providing refugia for desired and protected species that may be vulnerable to changing stressors. Visit the Climate Change Response Framework website at: forestadaptation.org/adapt

Citations

1. Janowiak, Maria K et al, 2018. New England and northern New York forest ecosystem vulnerability assessment and synthesis: a report from the New England Climate Change Response Framework project. Gen. Tech. Rep. NRS-173. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 234 p. https://doi.org/10.2737/NRS-GTR-173

2. Kunkel, K.E., et al., Regional climate trends and scenarios for the U.S. National Climate Assessment. Part 1. Climate of the Northeast U.S., 2013, US Department of Commerce, National Oceanic and Atmospheric Administration: Washington, DC. p. 87.

3. Swanston et al, 2016. Forest Adaptation Resources: climate change tools and approaches for land managers, 2nd edition. http://www. treesearch.fs.fed.us/pubs/52760, www.forestadaptation.org/adapt/adaptation-strategies.

4. Ontl, T. et al. 2020. Forest Management for Carbon Sequestration and Climate Adaptation, Journal of Forestry 118(1): 86-100doi:10.1093/jfore/fvz062