Helping People Help the Land

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.

www.il.nrcs.usda.gov

NIACS
Northern Institute of Applied Climate Science

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

www.niacs.org

USDA Climate Hubs
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CLIMATE CHANGE IMPACTS AND CARBON ON YOUR LAND

ILLINOIS

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

HOW IS CLIMATE CHANGE IMPACTING MY FOREST?

For a full description of climate change impacts on Illinois forests, view the Climate Explorer Tool at: https://adaptationworkbook.org/explore-impacts.

TEMPERATURE INCREASES

Temperatures in Illinois have risen ~1° F since the beginning of the century, and are projected to increase by 4.5-9.5° F by late century. This affects deer browse pressure, 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

Average annual precipitation in Illinois has been above average since 1990; winters and springs are projected to be much wetter by mid-century. By late century, summer precipitation is projected to decline by 5-10% across central and southern parts of the state. Extreme rainfall events are becoming more common across the Midwest, and are expected to continue to intensify throughout the century. Heavy rainfall has significant impacts on soil moisture, flooding, surface runoff and potential for erosion, 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 will be lost to runoff rather than being stored in the soil, particularly on sites with fine-textured soils, which will also increase drought stress. Drought stress can make trees more vulnerable to insect outbreaks and diseases. Even though total mean annual precipitation has been and is likely to continue to increase, these factors may lead to net drier conditions for Illinois' forests. There is some evidence that elevated carbon dioxide in the atmosphere may help some tree species withstand short-term drought stress.

WHAT CAN I DO?

Whether you are concerned about climate change impacts or are just interested in what you can do to keep 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)

Helps landowners, land trusts, tribes, and other entities protect, restore, and enhance forestlands, wetlands, grasslands, and working farms through conservation easements.

ENVIRONMENTAL QUALITY INCENTIVES PROGRAM (EQIP)

Provides technical and financial help to landowners for conservation practices that address natural resource concerns.

WHERE DO I START?

After applying for a specific program, you'll meet with a **CONSERVATION PLANNER**, who will help you:

- Identify your **GOALS** and **OBJECTIVES**,
- Consider how climate change will affect your land, and
- Select adaptation strategies and conservation practices.

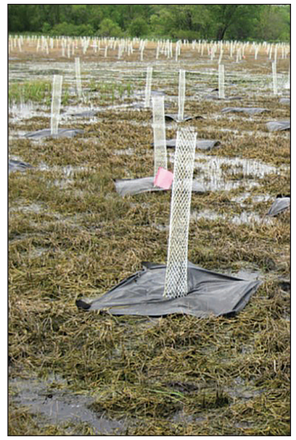
EXAMPLES:

OBJECTIVE: REDUCE THE IMPACT OF SEVERE DISTURBANCES ON CARBON SEQUESTRATION AND STORAGE

ADAPTATION APPROACHES: Alter forest structure and competition to maintain forest health; Restore or maintain fire in fire-adapted ecosystems; Reduce impacts to soils and nutrient cycling; Prevent the introduction and establishment of invasive plant species and remove existing invasives.

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

Prescribed burning involves applying controlled fire to a predetermined area to support one or more of the following purposes: controlling undesirable vegetation or plant disease; preparing or enhancing sites for harvesting, planting, or seeding; reducing wildfire hazards, slash, or debris; improving wildlife habitat, plant production, quantity, or quality; and restoring or maintaining a particular state of an ecological site. Brush management and Forest Stand Improvement achieve similar goals through reduction of undesirable and overstocked trees and shrubs that minimize forest health risks, improve growth and composition of desirable trees and the removal of invasive, or noxious woody vegetation, thereby allowing for restoration and regeneration of desired vegetative cover.



OBJECTIVE: PLANT FOR HIGH CARBON SEQUESTRATION

ADAPTATION APPROACHES: Reforest lands that have been deforested and afforest suitable lands; restore sites with a diversity of species that are adapted to future conditions; increase stocking on well-stocked or understocked forest lands; promote species and structural diversity to enhance carbon capture and storage efficiency.

CONSERVATION PRACTICES: Tree/Shrub Establishment, Brush Management, Woody Residue Treatment, Riparian Forest Buffer

New trees and shrubs are established under this conservation practice to control erosion, improve water quality, maintain soil moisture, and provide for carbon sequestration on the land. Plantings can take place in areas to reinforce an existing stand of trees in understocked woodlands, to alter future forest composition with species that are more adapted to future climatic conditions, to implement afforestation on appropriate open lands, or to increase wildlife habitat, food sources, shelter, and corridors for movement. Trees and shrubs can be planted on selected areas under any land use, with adequate sunlight. Species can be selected for their rate of growth as well as their adaptability to site conditions to achieve multiple landowner goals.

OBJECTIVE: INCREASE ON-SITE CARBON STORAGE

ADAPTATION APPROACHES: Alter forest composition or structure to maximize carbon; increase structural complexity through retention of biological legacies in living and dead wood.

CONSERVATION PRACTICES: Biochar Production from Woody Residue, Restoration of Rare and Declining Habitats, Forage and Biomass Planting

Under these approaches, use forest management techniques to maintain and increase on-site carbon storage. These include, but are not limited to, applying uneven-aged management, using longer rotations, retaining cavity/den trees, snags, and down woody debris, and protecting or increasing soil organic material. Plan to retain all snags and downed woody debris of 6" diameter or larger at the base. Identify leave-trees or clumps of trees that will be retained on site throughout their life span. These would ideally be trees that also provide wildlife habitat (e.g., future cavity/den trees, species that develop loose bark at older ages, mast producers, etc.). Close unneeded roads and limit off-road vehicular traffic to avoid displacing the forest litter layer. You can also use woody debris remaining after fuel reduction harvests or wildfires to create biochar. Biochar stores carbon and is a useful soil amendment that improves soil organic matter and water-holding capacity.

OTHER RESOURCES AVAILABLE

Other forestry and carbon sequestration practices are available through the NRCS, including alley cropping, firebreaks, stream crossings, access roads, and more; visit your local USDA Service Center or www.il.nrcs.usda.gov for more information. For more adaptation strategies and approaches that are available, including wetlands, wildlife, and other topics vulnerable to changing stressors, visit the Climate Change Response Framework website at: https://forestadaptation.org/adapt/adaptation-strategies.

CITATIONS

1. Brandt, L. et al. 2014. Central Hardwoods ecosystem vulnerability assessment and synthesis: a report from the Central Hardwoods Climate Change Response Framework project. Gen. Tech. Rep. NRS-124. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 254 p. https://doi.org/10.2737/NRS-GTR-124

2. 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.

3. Kunkel, R., et al. 2013. Regional Climate Trends and Scenarios for the U.S. National Climate Assessment: Climate of the Midwest U.S. NOAA Technical Report NESDIS 142-3.

4. Frankson, R., K. Kunkel, S. Champion, B. Stewart, D. Easterling, B. Hall, and J. R. Angel, 2017: Illinois State Climate Summary. NOAA Technical Report NESDIS 149-IL, 4 pp. https://statesummaries.ncics.org/chapter/il/

5. Ontl, T. et. al. 2020 Forest Management for Carbon Sequestration and Climate Adaptation, Journal of Forestry 118(1): 86-101, doi 10.1093/jfore/fvz:062