

## 2025 Delaware Envirothon 5<sup>th</sup> Topic

### Forest Resiliency: A Natural Climate Solution

#### Objectives:

Highlight best management practices that contribute to resilient forests while also maintaining and increasing carbon storage and sequestration.

Overview of strategies and policies that contribute to maintaining and increasing carbon storage and sequestration on forest lands.

Discuss how climate conditions affect forest health

Discuss climate benefits provided by Forest Lands

#### Key Concepts:

Natural climate solutions are conservation or management practices that capture and store carbon, reduce greenhouse gas emissions, or improve ecosystem resiliency.

Rather than being fearful of the future, we must adopt a problem-solving approach to climate change. It is important to manage for resilient forests – those that can resist and recover from disturbance – that are better able to adapt to change.

Forest management including monitoring for disease and pest outbreaks and controlling invasive species helps maintain and enhance forest resiliency.

Many forest conservation and management practices aimed at increasing forest resilience have other co-benefits such as improving water quality, providing habitat for pollinator species and wildlife as well as enhancing carbon sequestration.

Carbon storage and sequestration can reach optimal levels on Forest lands through conservation and enhancement strategies. Conservation strategies focus on protecting carbon that is already stored in forest lands while enhancement strategies include management and restoration actions that increase carbon sequestration and storage.

Enhancing carbon sequestration and storage on forest land is an important strategy for achieving Delaware's climate goals.

\*\* These concepts were adapted from the “*Delaware’s Natural and Working Lands: A Policy Report for Supporting Carbon Benefits*” (2021).

**Laura Upham**

Forest Stewardship Coordinator  
Delaware Forest Service

- Forestry management activities that reduce wildfire risks, improve forest health, timber productivity, and habitat value.
  - Erosion and Sedimentation Law & DE Seed Tree Law
  - Consideration of future climate conditions in forest management decisions
- Delaware Forest Resiliency Fund
  - NIACS Adaptation Strategies and Approaches

**Bill Seybold**

Forest Health Specialist  
Delaware Forest Service

- Biology and impacts of typical forest pests & diseases
  - Periodic aerial/ground surveys
- How climate conditions affect forest health

**Michael A. Valenti, Ph.D.**

Outreach & Site Director  
Abbott's Mill Nature Center  
Delaware Nature Society

- Overview of Delaware's Statewide Forest Strategy & Delaware's Forest Lands
- Implementation goals policy strategies from Forest Strategy to improve carbon sequestration (avoided conversion, reforestation/afforestation, increase of stewardship plans, maintain updated forest inventories, development/enhancement of forest product markets, increase urban tree canopy, utilize prescribed fire
- Forestland Preservation Program, Forest Legacy, Open Space Program

**Coeli Hoover, Ph. D.**

Research Ecologist  
USDA Forest Service  
Northern Research Station

- Climate benefits provided by Forest Lands
- Carbon Storage and sequestration in Eastern Forests
  - Where does carbon exist in the forest ecosystem
- The importance of quantifying carbon benefits

## Resources

*Delaware's Natural and Working Lands: A Policy Report for Supporting Carbon Benefits* (2021)

<https://documents.dnrec.delaware.gov/energy/Documents/Climate/Natural-and-Working-Lands-Report-March-2021.pdf>

Forest Stewardship Program Standards and Guidelines

<https://www.fs.usda.gov/sites/default/files/forest-stewardship-program-standards-guidelines.pdf>

Forest Best Management Practices to Protect Delaware's Water Quality

[https://agriculture.delaware.gov/wp-content/uploads/sites/108/2017/12/DE\\_BMPManual.pdf](https://agriculture.delaware.gov/wp-content/uploads/sites/108/2017/12/DE_BMPManual.pdf)

Delaware Forest Service Conservation Programs (webpage)

<https://agriculture.delaware.gov/forest-service/forest-conservation-programs/>

NIACS Adaptation Strategies and Approaches

[https://adaptationworkbook.org/niacs-strategies/forest\\_carbon\\_management](https://adaptationworkbook.org/niacs-strategies/forest_carbon_management)

Mid-Atlantic Forest Ecosystem Vulnerability Assessment and Synthesis

[https://forestadaptation.org/sites/default/files/MAR\\_Highlights\\_April2019.pdf](https://forestadaptation.org/sites/default/files/MAR_Highlights_April2019.pdf)

Ramsfield, et al. (2016). *Forest health in a changing world: effects of globalization and climate change on forest insect and pathogen impacts.*

[https://www.fs.usda.gov/rm/pubs\\_journals/2016/rmrs\\_2016\\_ramsfield\\_t001.pdf](https://www.fs.usda.gov/rm/pubs_journals/2016/rmrs_2016_ramsfield_t001.pdf)

How does fire impact forests and wildlife? Infographic USFW

<https://www.fws.gov/media/how-does-fire-impact-forests-and-wildlife-infographic#&gid=1&pid=1>

2020 Delaware Forest Resource Assessment

[https://delawaretrees.com/del\\_forest\\_resource\\_assessment\\_2020r.pdf](https://delawaretrees.com/del_forest_resource_assessment_2020r.pdf)

Delaware Statewide Forest Strategy

[https://delawaretrees.com/del\\_statewide\\_forest\\_strategy\\_2020r.pdf](https://delawaretrees.com/del_statewide_forest_strategy_2020r.pdf)

Carbon Sinks in a Changing Climate

<https://www.nrs.fs.usda.gov/rooted/docs/rooted-vol15.pdf>

Effects of Stand Age on Aboveground Live Tree Carbon Stock and Change in Forests\*

[https://www.fs.usda.gov/nrs/pubs/Rooted-in-Research/nrs\\_rooted-res\\_20-nov2023.pdf](https://www.fs.usda.gov/nrs/pubs/Rooted-in-Research/nrs_rooted-res_20-nov2023.pdf)

Assessing Assisted Migration Under Climate Change Scenarios

[https://www.fs.usda.gov/nrs/pubs/Rooted-in-Research/nrs\\_rooted-res\\_38\\_august2024.pdf](https://www.fs.usda.gov/nrs/pubs/Rooted-in-Research/nrs_rooted-res_38_august2024.pdf)

The Climate Change Tree Atlas: Managing Tree Species in the Face of Climate Change\*\*  
<https://www.nrs.fs.usda.gov/rooted/docs/rooted-vol06.pdf>

\*see Project Learning Tree Activity 8. Counting Carbon

\*\*see Project Learning Tree Activity 3: Atlas of Change

Forestry Management Fact Sheet

[https://delawareenvirothon.org/wp-content/uploads/2021/03/Forestry\\_Management\\_Fact\\_Sheet.pdf](https://delawareenvirothon.org/wp-content/uploads/2021/03/Forestry_Management_Fact_Sheet.pdf)

## RESOURCES FOR CLASSROOM INSTRUCTION ON CLIMATE CHANGE

### **Project Learning Tree: Southeastern Forests and Climate Change**

#### Section 1: Climate Change and Forests

Activity 1. Stepping through Climate Science <https://sfcc.plt.org/section1/activity1/>

The Forest Service and Climate Change 13:10 mins:  
<https://www.youtube.com/watch?v=u4wAJirB7ZQ>

Student Question page for video available on the Activity 1 webpage

Activity 3. Atlas of Change: <https://sfcc.plt.org/section1/activity3/>

#### Section 2: Forest Management and Adaptation

Activity 5. Managing Forests for Change: <https://sfcc.plt.org/section2/activity5/>

#### Section 3: Carbon Sequestration

Section Overview: [https://sfcc.plt.org/wp-content/uploads/sites/3/Section\\_3.pdf](https://sfcc.plt.org/wp-content/uploads/sites/3/Section_3.pdf)

Activity 7. Carbon on the Move: <https://sfcc.plt.org/section3/activity7/>

Activity 8. Counting Carbon <https://sfcc.plt.org/section3/activity8/>