

Natural Climate Solutions for Forestry and Agriculture in Maine

Overview

Maine has set climate change goals of reducing greenhouse gas (GHG) emissions by 80% by 2050 and having net-zero emissions by 2045.

Natural climate solutions (NCS), such as planting trees, reducing tillage, managing manure, and conserving land that sequester carbon or reduce GHG emissions can provide cost-effective near-term GHG mitigation and enhance ecosystem services.

Our comprehensive assessment evaluated the benefits and costs of implementing several NCS practices to mitigate greenhouse gas emissions from Maine's forestry and agriculture sectors.

A key component of the Maine NCS Initiative project is to determine cost-effective land-based practices that can be implemented on a broad scale.

Key Findings

- Most forest NCS can cost \$10-20 per ton carbon dioxide equivalent (tCO₂e), while agricultural NCS range from \$25-100/tCO₂e (Figure 1).
- Increasing forest management in northern Maine along with avoided conversion and afforestation across the state could yield about 5.3 million tCO₂e/yr in additional carbon sequestration at a cost of \$15/tCO₂e.
- Applying balanced but mixed management can increase forest carbon and maintain a sustainable timber supply.
- Maine farmers could amend soil with biochar, reduce tillage intensity, plant riparian buffers, and adopt anaerobic digesters to mitigate nearly 1.5 times the sector's current emissions at a cost of \$33/tCO₂e.
- Implementing a mix of these NCS has the potential to make Maine carbon neutral by 2045 or earlier.

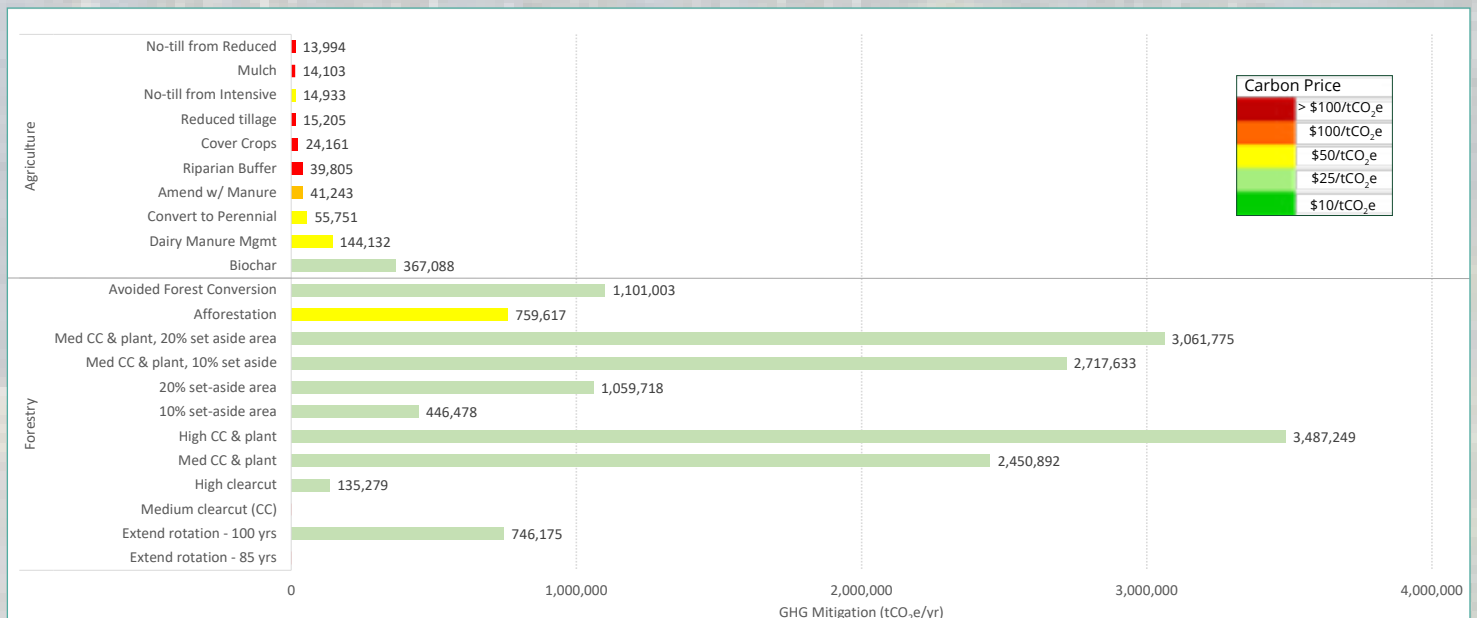


Figure 1. Total Maine forest and agriculture NCS mitigation potential (tCO₂e/yr).

Natural Climate Solutions Initiative

Maine's Forest and Agriculture GHG Emissions and Carbon Sequestration

✎ The forestry sector in Maine sequestered 12.5 million tons of carbon dioxide equivalent (MtCO₂e) in 2017, removing about 70% of the state's 17.5 MtCO₂e of gross emissions across all reported sectors (Figure 2).

✎ Maine's agricultural sector emitted 0.38 MtCO₂e in 2017, or 2% of total state emissions. About 65% of the sector's emissions are from livestock, with dairy contributing 48% of the total.

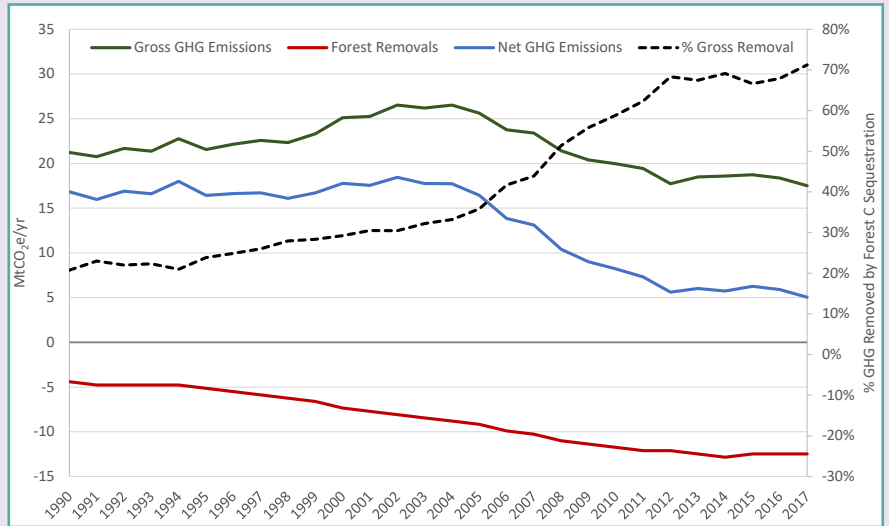


Figure 2. Maine GHG emissions and forest carbon removals, 1990-2017 (Source: Domke et al., 2020; Maine DEP, 2020).

Climate Change and the Land Use Sector

- The Northeast is warming faster with more intense rain events compared to the rest of the U.S.
- Maine's temperature has increased by 3.2 °F and precipitation has increased by 15% since 1895, and the growing season in Maine is two weeks longer than it was in 1950.
- Changing climatic conditions are likely to place increasing stress on Maine's forests, particularly those species that are either at their northern or southern limit or vulnerable to emergent pests and pathogens.
- While Maine's growing season is longer, increased weather variability is adversely impacting farming.

Funding support for this project was provided by the Doris Duke Charitable Foundation, Maine Farmland Trust, and the Senator George J. Mitchell Center for Sustainability Solutions.

For more details, please see the [full report on the Maine NCS initiative website](https://crsf.umaine.edu/forest-climate-change-initiative/ncs).

[CRSF.UMAINE.EDU/FORREST-CLIMATE-CHANGE-INITIATIVE/NCS](https://crsf.umaine.edu/forest-climate-change-initiative/ncs)

The Maine Natural Climate Solutions (NCS) Initiative project seeks to:

- Assess current practices to determine the degree to which foresters and farmers are using NCS;
- Determine the most cost-effective NCS for Maine;
- Understand key barriers of adopting NCS; and
- Generate information about which practices can be implemented on a broader scale.

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The mission of the **Center for Research on Sustainable Forests (CRSF)** is to conduct and promote leading interdisciplinary research on issues affecting the management and sustainability of northern forest ecosystems and Maine's forest-based economy. The **Forest Climate Change Initiative (FCCI)** seeks to better coordinate regional research and scientists working on the potential effects of climate change on forests, while also effectively collaborating to address key statewide research needs and opportunities.

