

Natural Climate Solutions for Forestry and Agriculture in Maine

Potential Solutions

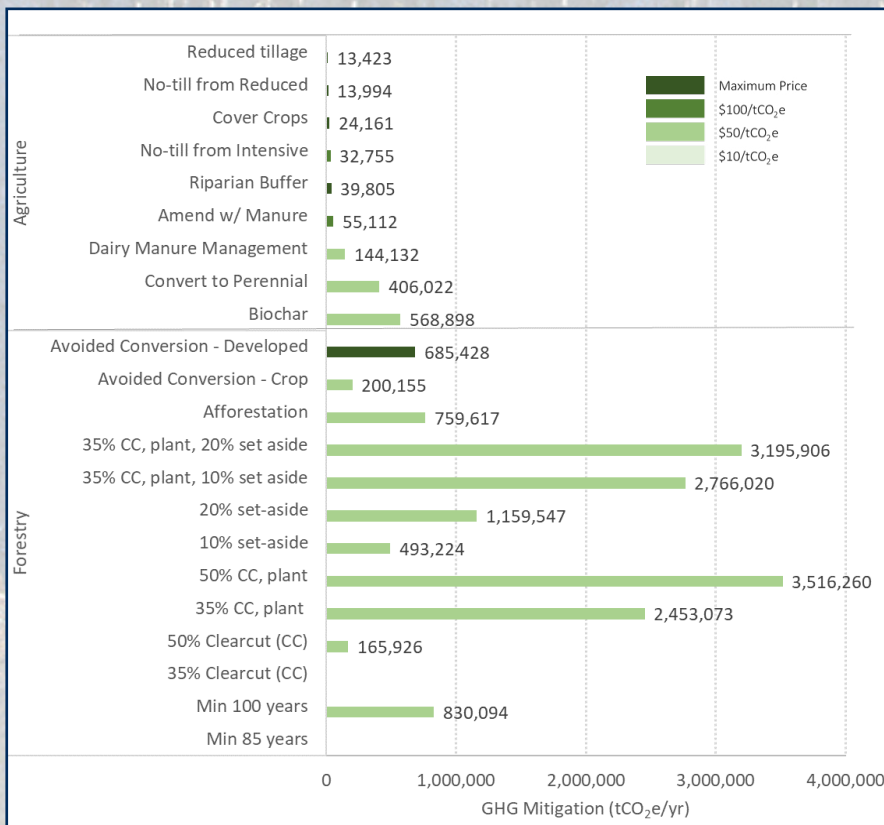
Natural climate solutions (NCS) such as planting trees, reducing tillage, managing manure, and conserving land that sequester carbon or reduce greenhouse gas (GHG) emissions can affect near-term climate change mitigation goals in cost-effective ways while also enhancing ecosystem services.

Our comprehensive assessment evaluated the benefits and costs of implementing several NCS practices to mitigate GHG 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 management NCS practices can be implemented at a cost of \$10-20 per ton carbon dioxide equivalent (tCO₂e), while agricultural NCS are in the range of \$25-\$100/tCO₂e (Figure 1).
- Increasing the intensity of active forest management in northern Maine along with avoided conversion and afforestation across the state could yield about 4.5 million tCO₂e/yr in additional carbon sequestration at a cost of \$64 million/yr or \$14/tCO₂e.



- Applying a balanced but mixed management approach can increase forest carbon and maintain a sustainable timber supply.

- Maine farmers could amend soil with biochar, reduce tillage intensity, plant riparian buffers, and construct and utilize anaerobic digesters to manage dairy manure waste, mitigating up to 786,000 tCO₂e/yr in GHG emissions or about double the sector's current annual emissions, at an average cost of \$34/tCO₂e.

- Implementing a mix of these NCS across the state has the potential to make Maine carbon neutral or net zero by 2045.

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

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 gross emissions (17.5 MtCO₂e) 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.

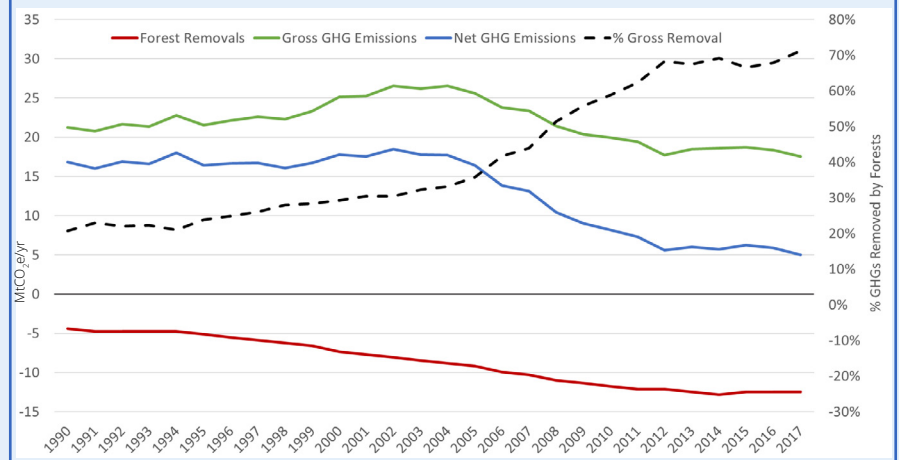


Figure 2. Maine GHG emissions and forest carbon removals, 1990-2017
(Source: Domke et al., 2020; Maine DEP, 2020).

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

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.

For more information on the Maine Natural Climate Solutions Initiative, contact

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