Cornell University

Forest Management & Greenhouse Gas Mitigation Opportunities

Information Sheet #7 – OVERVIEW

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Fast Facts

- **Impacts**: Forest management can store (sequester) carbon in growing trees and in long-lived wood products, and can provide biomass for bioenergy to replace fossil fuels, all of which reduces carbon dioxide in the atmosphere.
- **An imperative to act:** Improved forest management can increase profit and reduce carbon dioxide emissions to the atmosphere, reducing impacts from climate change.
- **Opportunity for proactive change #1:** Improved forest management can increase bioenergy products to displace fossil fuels, and thus reduce greenhouse gas emissions.
- **Opportunity for proactive change #2**: Improve forest management can provide increased income from sales of timber for long-lasting wood products to replace high-carbon-emitting steel and concrete building materials.

Introduction

In New York State (NY), 63% of land is forested (19 million acres), three quarters of forestland is owned privately by 788,000 landowners, and a third of landowners state that their forestland is part of their farm (Widmann et al. 2015). Taken together, forests are the largest 'carbon sink' – the growing trees are the largest pool of active carbon accumulation in the state. Landowners have many forest management goals, but at least two thirds rank protecting biological diversity, water resources, and wildlife habitat as very important or important (Widmann et al. 2015). Greenhouse gas (GHG) emissions are now receiving much attention as an important environmental issue. At the same time, growing interest in bioenergy will likely increase the use of wood as bioenergy feedstocks to displace fossil fuels. Forests store carbon in trees and in soil and also in long-lived wood products such as plywood and lumber after harvest while also displacing energy-intensive steel and high CO_2 emitting concrete (Bergman et al. 2014). Forests can provide renewable biomass for bioenergy and building materials that reduces fossil fuel use and GHG emissions. Forests are great systems for capturing carbon and landowners can actively manage their forest to improve the climate change mitigation potential in addition to their existing suite of forest management goals and opportunities. This Information Sheet will demonstrate some of the management strategies to maximize carbon sequestration and minimize GHG emissions.

Environmental Concerns

Forests play an important part role in the global carbon cycle. Protecting forests and improving their management will ensure that the New York's largest CO_2 sink does not become a source of emissions (Raciti et al. 2012). Improved forest management, afforestation, and sustainable biomass harvest for bioenergy and wood products could provide large and cost-effective GHG mitigation opportunities (Raciti et al. 2012, Wightman & Woodbury 2015a, Bergman et al. 2014).

Summary of Regulation of GHGs

Emissions of GHGs from forests are not regulated. However, there are opportunities for forest management activities to qualify for GHG mitigation credits (also called carbon credits or carbon offsets) from various carbon markets. New York State is a member of the Regional Greenhouse Gas Initiative (RGGI, a multi-state agreement to regulate emissions of GHGs from the electricity sector) that allows certain forest practices to earn carbon credits. The Federal Clean Power Plan is also expected to provide opportunities for mitigating GHG emissions by means of bioenergy production from woody biomass. While such programs may provide opportunities for payments for forest carbon sequestration, the requirements may be very stringent and the costs of compliance high (Fahey et al. 2010, Tonitto et al. 2016).

Goal

This information sheet is intended to help individual landowners and those who work with them better understand the role forests and their products play in the carbon cycle so they may navigate methods for reducing GHG emissions by improved forest management along with other goals for their land.

Summary of Potential GHG Mitigation Practices on Land*

Description of Strategy	Opportunities	Considerations
Increase forest growth rate to increase carbon sequestration per area.	Improve forest management to increase wood growth and harvest for both high-value wood products and low-value residues for bioenergy.	Developing and implementing a forest management plan costs time and money and may not provide financial return for many decades.
Plant trees on available non-forest land (afforestation) to increase carbon sequestration per area.	Unproductive land can be planted with short-rotation woody crops, forest plantations, or native forest species to provide many benefits in addition to wood products and bioenergy feedstocks.	Land may not be available, and if land already has a productive use such as pasture, this pasture may deforest another location (i.e. leakage – no net gain). Planting trees can be costly and will not provide a financial return for decades.
Prevent deforestation to prevent loss of carbon stored in forests.	Maintaining land in forest provides many benefits including wildlife habitat but also carbon sequestration, wood products, and bioenergy feedstocks that can all reduce GHG emissions.	Maintaining forest land may limit opportunities for economic development that could provide a higher financial return than from forests.

*These practices above are further enhanced if forest products 1) displace high-GHG-emitting building materials such as concrete and steel, 2) displace fossil fuels with woody biomass; 3) are recycled at the end-of-life for extended carbon-sequestration or for bioenergy.

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