

Wood Carbon Sequestration: Potential to Reduce Minnesota's Carbon Footprint

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Introduction

Minnesota's Next Generation Act, passed in 2007, requires the state to reduce greenhouse gas emissions 15 percent below 2005 base levels by 2015, 30 percent by 2025 and 80 percent by 2050. This thesis considers whether terrestrial carbon sequestration in forests can effectively reduce Minnesota's carbon footprint. In particular I examined the potential for reforestation and wood product substitution to reduce atmospheric carbon dioxide levels in Minnesota.

Reforestation and forest management should not be overlooked to help decrease atmospheric carbon dioxide levels outlined in Minnesota's Next Generation Energy Act. Besides lowering atmospheric carbon dioxide levels, wood product substitution can further decrease greenhouse gas emissions. The combination of these tactics would reduce atmospheric greenhouse gas levels in Minnesota.

Carbon sequestration is the "transfer and secure storage of atmospheric carbon dioxide (CO2) into other long-lived pools that would otherwise be emitted or remain in the atmosphere" and occurs from photosynthesis.

Methods

For my research, I conducted a literature review about carbon sequestration, wood product substitution, and bioenergy in Minnesota to understand their potential to reduce atmospheric carbon dioxide levels. I interviewed people from the Minnesota Carbon Sequestration Initiative, US Forest Service, MN DNR, and SJU Arboretum about the potential of reforestation and wood product substitution in Minnesota and how that would affect Minnesota's carbon footprint.



"IT IS CLEAR THAT FORESTS, URBAN TREES, AND WOOD PRODUCTS ACCOUNT FOR MOST OF THE US CARBON SINK- WE ESTIMATE THIS PROPORTION TO BE 65-91%." -US FOREST SERVICE

Findings

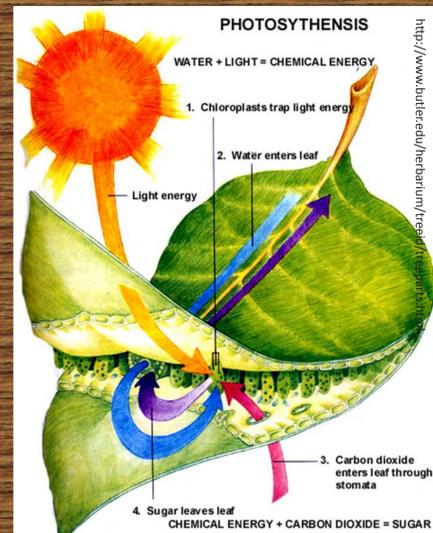
Public Policy:

Minnesota Carbon Sequestration Initiative

- Terrestrial Carbon Sequestration could reduce Greenhouse Gas Levels by 13% for 2025 goals
- Reforestation could reduce 7% of that reduction

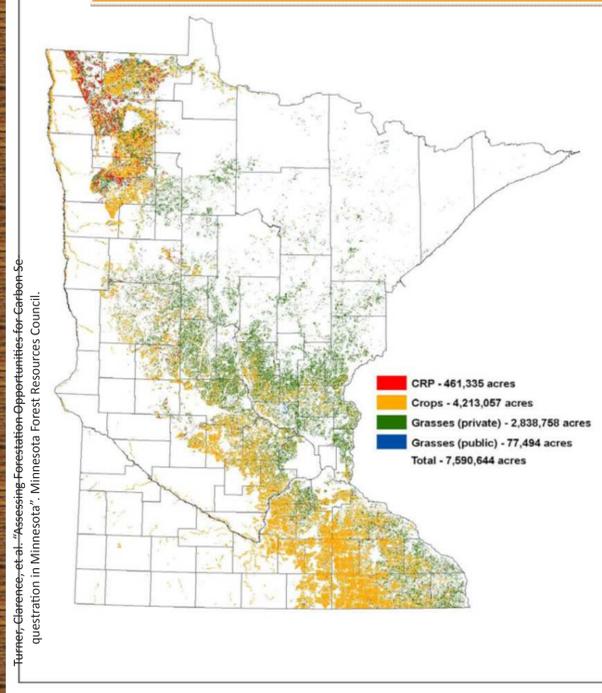
Recommendations:

- Preserve all forests, peatlands, and other vegetation which significantly sequesters carbon, so more carbon dioxide is not emitted into the atmosphere.
- Appropriately change land use and management practices to enhance terrestrial carbon sequestration
- Reforested cropland sequestered carbon at the highest rate over a 50 year period in the Midwest.



Reforestation Locations: The Minnesota Forest

Resource Council identified 5.4 million acres of land that feasibly could be forested.



Public Land:

"In the near term, the [DNR's] first priority will probably be to preserve existing carbon stocks which are under pressure associated with land use conversion away from permanent vegetation".

-Mark Lindquist DNR Biofuels Program Manager and MCSI Associate

Private Land:

A carbon market would stimulate reforestation efforts most effectively in Minnesota because it would increase the landowner's profits not only from the carbon market payment, but also biomass output produced for sale.

Scenario	Acres Reforested	Carbon Sequestered (tons)	Roundwood produced (dry tons)	Residual Biomass produced (dry tons)
No Forestation Incentive	None	None	None	None
Double Pulp-wood Prices	24,472	3.1 million	6,530	1,044
Carbon Market	616,711	44 million	158,096	24,754
Cost-Share	663	61,434	170	33
Public Lands	77,494	6.4	19,866	3,630

Wood Product Substitution:

- Since the energy used to grow wood is derived from the sun and timber production requires little energy mostly powered by a carbon neutral source (biomass), wood products are not only carbon neutral, but carbon negative.
- A case study in Minneapolis showed that fewer greenhouse gasses are emitted from the production of wood than steel. Steel material use resulted in the emission of 4,253 kg more CO2 than the wood material.
- Although both fossil fuels and wood bioenergy fuels emit greenhouse gasses, energy derived from wood is carbon neutral.



Conclusion

Forest conservation is important to keep current carbon dioxide sequestered. Reforestation could reduce emissions 7% by 2025 in Minnesota. Wood products result in fewer carbon dioxide emissions compared to other materials. Appropriate substitution of carbon neutral bioenergy for fossil fuels would further reduce greenhouse gas emissions. The combination of these strategies would decrease atmospheric greenhouse gas levels in Minnesota.

A special thanks to everyone who helped me with my thesis.