Environment and Natural Resources Trust Fund
2020 Request for Proposals (RFP)

Project Title: **ENRTF ID: 203-EH**

Monetizing Carbon Capture by Minnesota Forests

Category: H. Proposals seeking $200,000 or less in funding

Sub-Category: E. Air Quality, Climate Change, and Renewable Energy

Total Project Budget: $ 161,838

Proposed Project Time Period for the Funding Requested: June 30, 2022 (2 yrs)

Summary:

Minnesota forests have tremendous potential to absorb excess CO2 from the atmosphere, mitigating climate change. This project is intended to jump-start a market for forest carbon offsets in Northern Minnesota.

Name: Christopher Wright

Sponsoring Organization: U of MN - Duluth NRRI

Job Title: Dr.

Department: Natural Resources Research Institute

Address: 5013 Miller Trunk Highway

Duluth MN 55811

Telephone Number: (585) 642-0525

Email ckwright@d.umn.edu

Web Address:

Location:

Region: Northeast

County Name: Beltrami, Carlton, Cass, Clearwater, Cook, Hubbard, Itasca, Koochiching, Lake, Lake of the Woods, Pine, Roseau, St. Louis

City / Township: Duluth

Alternate Text for Visual:

Minnesota forests offset CO2 emissions by industrial sources by capturing atmospheric CO2 and converting it to biomass. The potential carbon offset market in Northern MN is on the order of $100-million per year.

_____ Funding Priorities	_____ Multiple Benefits	_____ Outcomes	_____ Knowledge Base
_____ Extent of Impact	_____ Innovation	_____ Scientific/Tech Basis	_____ Urgency
_____ Capacity Readiness	_____ Leverage	_____ TOTAL	_____%

PROJECT TITLE: Monetizing Carbon Capture by Minnesota Forests

I. PROJECT STATEMENT

Minnesota has made great strides in reducing its CO_2 emissions from electricity generation. Less tapped has been the potential of Minnesota forests to capture and store excess CO_2. Such capture, or carbon sequestration, combined with carbon-neutral power generation, would position the state as a global leader in climate change mitigation.

By some accounts, improved management of U.S. forests could reduce the nation's net greenhouse gas emissions by 30%, with Minnesota's forests poised to play a leading role. The economic challenge is to develop a means to compensate forest landowners for this ecosystem service. Recently, the so-called "cap-and-trade" carbon market run by the California Air Resources Board (CARB) has emerged as the leading mechanism for doing so. There, industrial emitters of greenhouse gases can reduce their net CO_2 emissions by purchasing what are known as "forest carbon offsets". In a nutshell, industrial sources in California pay land owners to capture and store atmospheric CO_2 —using nature's well-tested technologies of photosynthesis and forest growth.

In terms of participation on the CARB market, Minnesota has fallen well behind neighboring states. Jump-starting such participation is the goal of this project, starting with forest owners in northern Minnesota. The Natural Resources Research Institute (NRRI) has a unique combination of expertise in ecosystem modeling, spatial analysis, web-based delivery of environmental data, silviculture, and business development. Given these skills, and a modest investment, we believe that we can significantly encourage the development of a much-needed source of revenue for northern Minnesota's forest sector, all the while advancing the state's leadership role in advancing integrated climate change solutions.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1 Title: *Lowering barriers-to-entry in the carbon offset market: Development of a web-based decision-support tool for estimating carbon offset potential of northern Minnesota forests.*
ENRTF BUDGET: $80,919

Description: The primary barrier-to-entry in the CARB market is the high cost of designing and certifying carbon offset projects. These costs discourage small- to medium-sized forest owners in northern Minnesota from even considering the CARB market as an additional revenue source. Therefore, it is critical to develop an easily accessible (i.e., web-based) decision-support tool, utilizing best available science, that would allow forest managers to "look", i.e., estimate potential carbon capture on their lands, before they "leap" into the carbon offset market. We will utilize NRRI's expertise in online delivery of environmental data for resource planning (e.g., the MN Natural Resource Atlas) to build a web-based system that will query data sets and simulation models located on a geospatial data server located at NRRI, returning maps of carbon capture potential at relatively high spatial resolution (30 meters) for specific forest land holdings. In building this tool, we will consult with the U.S. Forest Service, Forest Inventory and Analysis office in St. Paul for advice on data sources, simulation modeling, and associated best practices. Concurrent with software development, we will reach out to forest owners potentially interested in pursuing carbon offset projects, with the intent of incorporating user feedback into the decision-support system.

Outcome	Completion Date
1. Develop beta version of web tool; reach out to forest land owners potentially interested in pursuing opportunities on the CARB offset market	*Jan 1, 2021*
2. Develop final version of web tool; incorporating feedback from interested parties identified above	*Jul 1, 2021*

Activity 2 Title: *Jump-starting a carbon offset market in northern Minnesota*
ENRTF BUDGET: $80,919

Description: In this activity we will reach out more broadly to forest land owners in northern Minnesota using the web tool to demonstrate offset potential. Under the CARB framework, land owners selling carbon offsets must implement forest management practices that increase carbon capture relative to business-as-usual practices. It is important to emphasize that carbon offset projects need not preclude continued resource use. For example, a timber producer may be eligible for a carbon credit simply by increasing the length of their forest rotation (number of years between timber harvests) relative to existing practice. Here we will utilize NRRI expertise in silviculture and business development to provide technical advice to interested parties in the early stages of engaging with the CARB offset market.

Outcome	Completion Date
1. Reach out more broadly to forest owners using web tool to demonstrate offset potential	*Jan 1, 2022*
2. *Assist interested parties in early stages of participation in the CARB offset market*	*Jun 30, 2022*

III. PROJECT PARTNERS AND COLLABORATORS:

Name	Title	Affiliation	Role
Dr. Chris Wright	Landscape Ecology Program Mgr.	NRRI	PI
Tim White	Business Development & Intellectual Property Mgr.	NRRI	Collaborator
John DuPlissis	Silviculture Research Program Mgr.	NRRI	Collaborator
Will Bartsch	Senior Research Scientist	NRRI	Collaborator
Kristina Nixon	GIS Analyst	NRRI	Collaborator

IV. LONG-TERM IMPLEMENTATION AND FUNDING:

In the short term, this project will build institutional capacity allowing NRRI to take a leading role in creating a robust market for forest carbon offsets in northern Minnesota. Acting as a business incubator, our expectation is that these activities will eventually be taken up by the private sector, consistent with NRRI's mission to create employment opportunities in northern Minnesota. We also expect opportunities to monetize forest carbon capture to expand more broadly outside the region to other parts of the state.

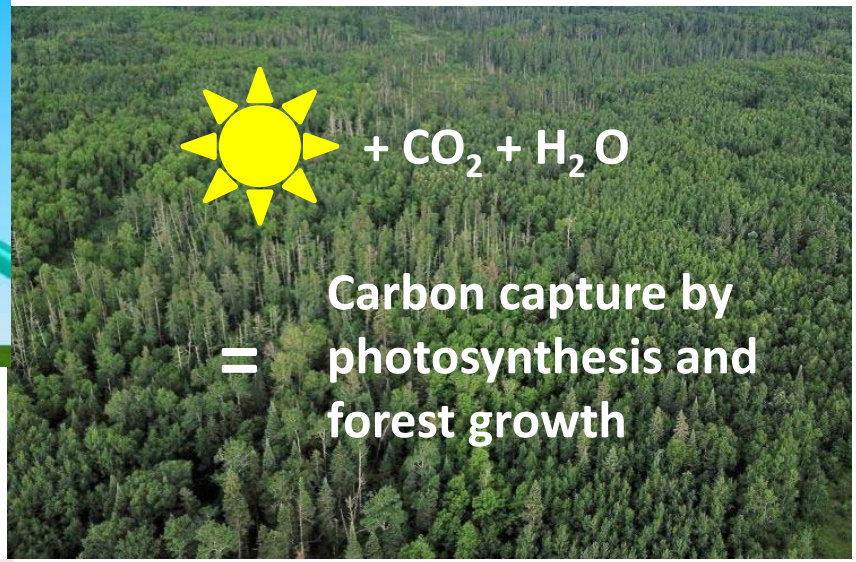
Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet
Legal Citation:
Project Manager: Chris Wright
Project Title: Monetizing Carbon Capture by Minnesota Forests
Organization: Natural Resources Research Institute
Project Budget: $161,838
Project Length and Completion Date: 2 years, 6/30/2022
Today's Date: 3/15/2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)	$ 159,518	$ -	$ 159,518
*Chris Wright/Landscape Ecology Program Mgr. $ 110,838 (74% salary, 26% benefits), 65% FTE for 2 years. *Note: NRRI research staff salaries are largely sponsored by external funders.*			
Tim White/Business Development & Intellectual Property Mgr. $19,407 (74% salary, 26% benefits), 5% FTE for 2 years			
John DuPlissis/Silviculture Research Program Mgr. $13,471 (74% salary, 26% benefits), 5% FTE for 2 years			
Will Bartsch/Senior Research Scientist $8,529 (74% salary, 26% benefits), 5% FTE for 2 years			
Kristina Nixon/GIS Analyst $7,273 (77% salary, 23% benefits), 5% FTE for 2 years			
Professional/Technical/Service Contracts			
	$ -	$ -	$ -
Equipment/Tools/Supplies			
	$ -	$ -	$ -
Capital Expenditures Over $5,000			
	$ -	$ -	$ -
Fee Title Acquisition			
	$ -	$ -	$ -
Easement Acquisition			
	$ -	$ -	$ -
Professional Services for Acquisition			
	$ -	$ -	$ -
Printing			
	$ -	$ -	$ -
Travel expenses in Minnesota			
Within state travel to meet with cooperators and visit potential sites for carbon capture. Total mileage estimate 2000 miles per year. 2000 miles x $0.58 / mile = $1160 per year	$ 2,320	$ -	$ 2,320
Other			
	$ -	$ -	$ -
COLUMN TOTAL	$ 161,838	$ -	$ 161,838

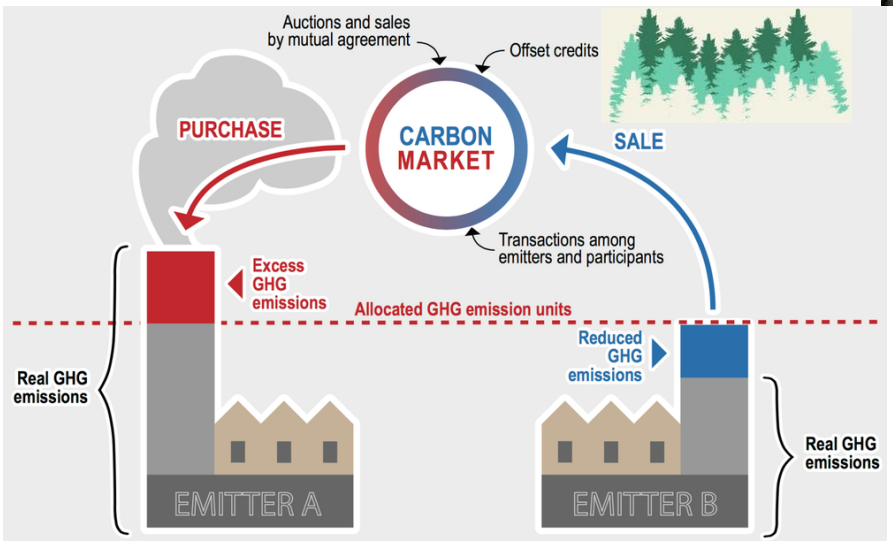
SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
Non-State:		$ -	$ -	$ -
State:		$ -	$ -	$ -
In kind: Unrecovered F&A @ 54% MTDC		$ 87,392	$ -	$ 87,392

Other ENRTF APPROPRIATIONS AWARDED IN THE LAST SIX YEARS	Amount legally obligated but not yet spent	Budget	Spent	Balance
		$ -	$ -	$ -

Minnesota forests capture CO_2 from air; using it in photosynthesis and forest growth, **reducing climate change risk**, and offsetting industrial CO_2 emissions



Capture of CO_2 by MN forests can then be sold on the California carbon market, offsetting industrial CO_2 emissions as required by CA law.



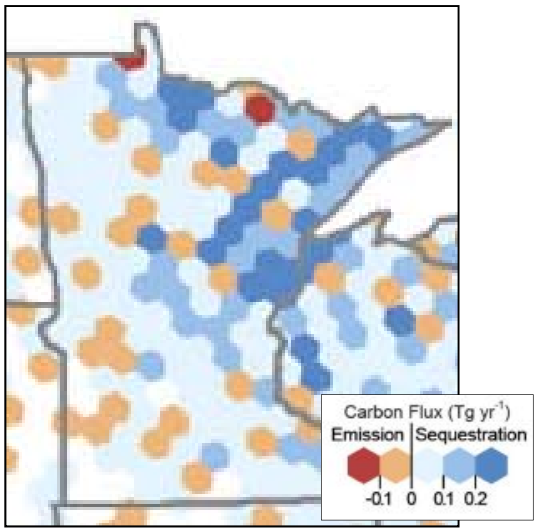
MN forest CO_2 uptake

At price of $14 per million metric tons of CO_2 the **return** on CO_2 capture **(in blue)** of 0.2 terragrams (Tg) per year is approximately:

$50 per acre per year

over length of offset contract, typically 10 years

Source: Woodall et al (2015)



Offset market potential in Northern MN on order of $100-million per year

PROJECT TITLE: Monetizing Carbon Capture by Minnesota Forests

F. Project Manager Qualifications and Organization Description

Dr. Chris Wright, Natural Resources Research Institute (NRRI), University of Minnesota Duluth
Dr. Wright will serve as project manager and be responsible for overall project coordination. Dr. Wright is a quantitative ecologist and Program Manager in Landscape Ecology. His current research includes carbon accounting, analysis of land cover/land use change, climate change impacts on critical bird habitat, and Big Data applications for environmental monitoring. His areas of expertise include geospatial computing, remote sensing, and the analysis of complex ecological systems. Dr. Wright's work has informed natural resource management by the U.S. Fish and Wildlife Service and natural resource policy at the U.S. Environmental Protection Agency. His work on land cover/land use change in the Prairie Pothole Region was featured in the 2018 National Climate Assessment. Lastly, he has experience leading large, multi-disciplinary projects ($2.4M in funding from National Science Foundation).

Education
PhD Ecology, Montana State University, Bozeman. 2004
MS Agronomy, Montana State University, Bozeman. 1994
BA Biology, Williams College, Williamstown, MA. 1990

Project Team:
Team members at NRRI bring a broad set of skills including research and work experience in Geographic Information Systems (GIS), ecological simulation modeling, applied forestry, business development, and public dissemination of environmental information on the web. **Will Bartsch** is a Senior Research Scientist and manager of the MN Natural Resource Atlas. **John Duplissis** is the Silviculture Research Program Manager, with experience in Forest Extension and carbon offsets. Tim White is the Business Development & Intellectual Property Manager, with previous experience marketing carbon offsets at the Kohler Company. **Kristina Nixon** is a GIS analyst.

ORGANIZATION DESCRIPTION
The Natural Resources Research Institute is a University of Minnesota Duluth applied research organization. NRRI's mission is to deliver research solutions to balance Minnesota's economy, resources and environment for resilient communities.