

Applied Research in Forestry and Bioeconomy *\$2.0M Appropriation Request*

Critical Research for Minnesota

Minnesota's forests and forest industries are facing multiple challenges ranging from climate change and forest health to global market competition.

Two Applied Research Projects

NRRI is requesting continuing Legislative support for two strategic applied research and demonstration projects intended to deliver new opportunities for Minnesota.

PROJECT 1

Statewide Application of Forest Management Assessment Tool (\$500K)

FOCUS: Continue development of a forest management assessment and decision tool that integrates forest productivity, ecosystem services, and economic information to identify the benefits and tradeoffs of land management decisions.

- prior work modeled 4M acre demonstration area in Northern Minnesota; leveraged LiDAR, satellite & physical data sets,
- convened advisory group to afford broad engagement of forestry stakeholders,
- developed a graphic/user interface for easy access in the field.

BENEFITS:

Extend tool from 4M acres (300K parcels) to more than 17.4M acres (1.6M parcels)

- ✓ statewide current forest inventory summary statistics at parcel level
- ✓ forest harvest scenarios outside of demonstration area
- ✓ methods to evaluate cumulative impact of landscape level changes
- ✓ economic assessments in forest health & productivity, habitat and water quality

FUNDING DISTRIBUTION:

1. Voice of customer collection and client engagement (\$30K)
2. Tool development and database manipulation (\$370K)
3. User interface development and outreach (\$100K)

Over >

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PROJECT 2

Development and Demonstration of Biochar Opportunities (\$1.5M)

FOCUS: Biochar is a carbon-negative technology, a material that can be produced from biomass waste residues, customized for beneficial uses and can create new forestry and manufacturing jobs.

- not all biochars are the same; we must learn how to adjust properties per application (soil remediation, moisture retention, pollutant removal)
- biochar is not a standalone solution; we must learn how to co-produce with energy and other bioproducts and how to incorporate into engineered systems

BENEFITS: *this research will*

- ✓ understand Minnesota's potential for biochar industry development
- ✓ identify markets for secondary forest species and beetle-killed trees
- ✓ improve forest management through new markets
- ✓ reduce forest fire hazard
- ✓ provide affordable, market test quantities of biochar to partners for field demonstrations across Minnesota

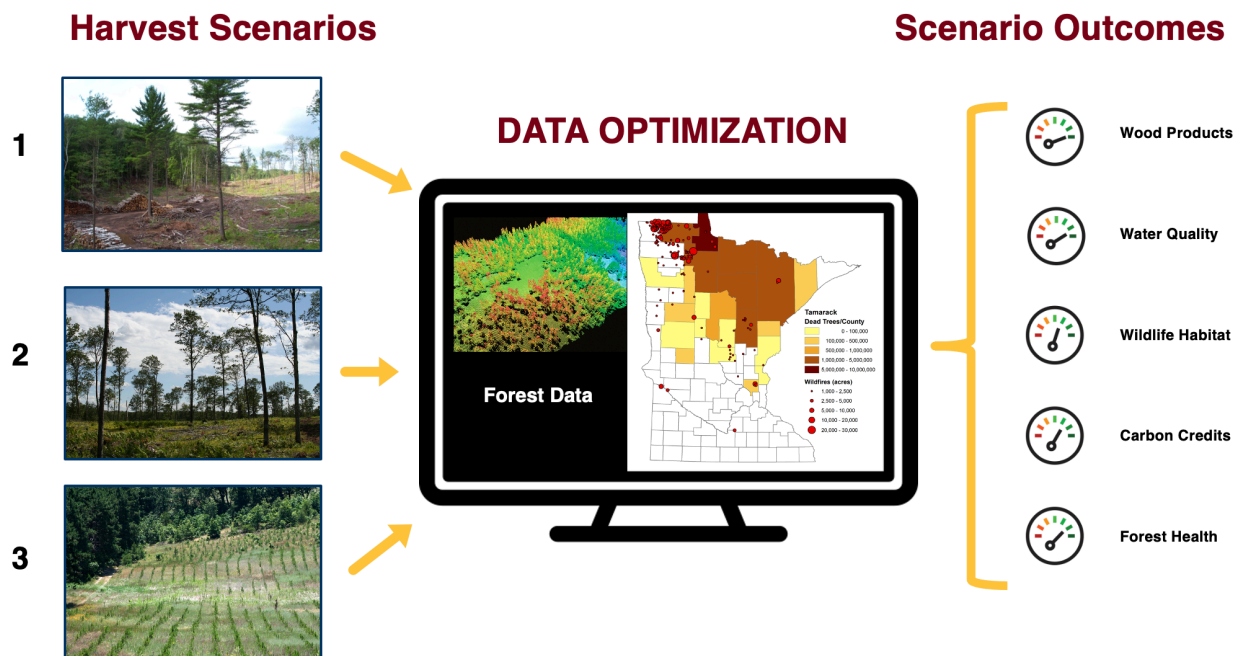
FUNDING DISTRIBUTION:

1. Lab to pilot demonstration of custom biochar materials (\$650K)
 - Water remediation (PFAS, *E. coli*, phosphate) in partnership with UMN, MPCA, municipal water treatment facilities, county landfill operators & soil and water districts
 - Soil enrichment in partnership with UMN, MNDNR, USDA, USFS, sustainable forestry foundations, utilities, mining companies, municipalities
2. Operation cost assistance to furnish market test quantities (\$250K)
 - Entrepreneurs, businesses, agencies and development partners
3. Infrastructure/facility upgrades for safety, quality & productivity (\$600K)

Minnesota Forestry

Forest Management Opportunities Assessment Tool

Goal: Develop a decision tool to evaluate forest harvest scenarios and to identify the benefits and tradeoffs of land management decisions for Minnesota.



Forest Assessment Tool Objectives

- ✓ Obtain input from end-users and advisory committee to develop
- ✓ Understand current forest conditions under alternative harvest scenarios
- ✓ Understand impact of future management and climate on forests
- ✓ Understand impact of harvest and future climate on forests
- ✓ Determine how to optimize value of ecosystem services
- ✓ Deploy interactive Forest Assessment Tool

Minnesota Forestry

Forest Management Opportunities Assessment Tool

NRRI Position Statement:

Traditional forest management practices are being impacted by declining markets. NRRI works to understand those impacts and finds opportunities for new markets to meet the needs of Minnesota's changing forest landscapes.

Define the challenge we are addressing:

Declining demand for forest products, a changing climate and new opportunities like carbon markets will force forest managers to think differently about how they manage forest lands. New tools will be required to help forest managers select management practices and identify optimal outcomes.

Why is this relevant to Minnesota?

Minnesota's forest products industries, sawtimber, paper, pulp and engineered wood products, contributed **\$9.8 billion** in forest product shipments and **\$3.4 billion** in direct value to Minnesota's economy in 2019 (Bergstrand 2019). Maintaining the health and productivity of this resource is of paramount concern to all Minnesotans.

What is the solution?

NRRI is developing a spatially-explicit decision tool that integrates forest productivity, ecosystem service, and economic information to help land managers evaluate management options and select management practices that will meet their needs. This online **Forest Management Opportunities Assessment Tool** will offer a new method of evaluating forest management and harvest planning scenarios that accounts for the monetary and non-monetary value of the services that forest ecosystems provide in addition to the value of the forest products.

Natural Resources
Research Institute

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Biochar

A TRIPLE WIN FOR MINNESOTA

Biochar can directly impact our forest, water and agriculture. NRRI is the regional research hub for strategic biochar research. *We are uniquely focused on:*

- **Partnerships**
- **Integrated research solutions**
- **Impacts for Minnesota**



Statewide Partnerships

- City of Minneapolis
- Cloquet Forestry Center
- MN Forest Resources Council
- University of MN/Extension
- MN Forestry Industry
- MN Mining Industry
- MN Power

Research Solutions

- Ranging from resources to material properties
- Custom biochar product development
- Applications in soil health, water remediation, materials development, & energy

Impacts for Minnesota - a component of high-value products

- Carbon sequestration
- Agricultural and forest soil health
- **Water treatment: nutrients and pollutants**
- Forest fuel reduction
- **New markets for forest biomass (materials, energy)**
- **New jobs for the MN forest industry and beyond**

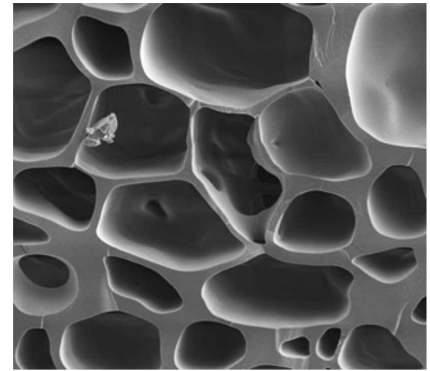
Biochar

WHAT IS BIOCHAR?

Biochar is a charcoal-like material most commonly made by heating plant matter, or biomass, in the absence of oxygen.

Biochar Primary Sources

- Forest/Mill Residuals
- Low value species
- White-wood pellets
- Pest-killed Trees



NRRI Thermal Processing



Biochar Secondary Sources

- Agricultural residues
- Water treatment biosolids
- Manure management

Beneficial Attributes

- Stable carbon
- Absorption
- Water retention
- Microbial habitat
- Soil structure

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