Environment and Natural Resources Trust Fund

2023 Request for Proposal

General Information

Proposal ID: 2023-043

Proposal Title: Biochar Implementation in Habitat Restoration: Pilot

Project Manager Information

Name: Todd Rexine

Organization: Great River Greening

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Project Basic Information

Project Summary: Great River Greening will pilot the Implementation of portable biochar kilns in natural resource management and restoration as a reduced carbon-emitting, biologically beneficial alternative to open pile burning when managing invasive tree and shrub species.

Funds Requested: $185,000

Proposed Project Completion: June 30, 2026

LCCMR Funding Category: Small Projects (H)

Secondary Category: Air Quality, Climate Change, and Renewable Energy (E)

Project Location

What is the best scale for describing where your work will take place?

Region(s): Central, Metro, SE,

What is the best scale to describe the area impacted by your work?

Region(s): Central, Metro, SE,

When will the work impact occur?

During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Woody encroachment and woody invasive species control on habitat projects can produce large quantities of waste wood. On-site pile burning is the cheapest method of disposal, while the chip and log markets are saturated due to EAB etc., making these preferred disposal methods even more costly. Pile burning leaves room for improvement in terms of carbon balance and soil fire scars.

Biochar is the process of burning biomass at high temperatures under low-oxygen conditions that converts it into a product that can be used as a soil additive for carbon sequestration, drought resistance, and microbial support in natural systems, farm fields, and gardens. Biochar production releases less smoke and greenhouse gas than pile burning. While it requires specific equipment and knowledge, it is an accessible technology and process. By reducing barriers to its use for land managers, local government units, and service providers, its use can multiply quickly with this modest investment for a pilot demonstration program.

In addition to the carbon sequestration benefits of biochar, indirectly it will help contain the costs of 1) the removal of invasive woody species, and 2) thinning of wooded habitats in a significant percentage of habitat restoration projects.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

Great River Greening is proposing a pilot project to address the scalability of biochar kilns as an effective technique for processing waste wood material from natural resource management activities. As part of the process, several “Oregon” and “Ring of Fire” biochar type kilns will be purchased. On-site demonstrations, results monitored and disseminated completed as part of habitat restoration and enhancement projects, all in partnership with other organizations, local government units, for profit natural resource providers, and landowners.

Funding will support on-site demonstrations, results monitored and disseminated, and outreach on the applications of biochar production for natural resource management on public lands and connecting with individuals on how to implement on private lands. The message of sustainable land management practices will benefit practitioners in the short term as well as communities in the long term, increasing awareness of climate-related issues and positive steps that people in many situations can take. The demonstration of the direct applications of biochar kilns to landowners, local government units, and natural resource practitioners will allow a broader set of organizations to include these practices in future land management activities, increasing the utilization of this material processing technique.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state’s natural resources?

We propose to:

- Convert the burning of invasive wood species or log piles from the conventional manner to the biochar pyrolysis method.
- Demonstrate biochar production at 9 restoration and enhancement sites throughout 3 regions of Minnesota.
- Engage 75 land managers, local government units, and natural resource practitioners in the process.
- Engage 50 volunteers to promote use on residential-scale
- Allow access to kilns for land managers, local government units, and natural resource practitioners to test out.
- Calculate and assess the cubic yards of biochar that can be processed from invasive wood waste at different scales of density.

Activities and Milestones

Activity 1: 1. Purchase and construct biochar kilns.

Activity Budget: $42,500

Activity Description:
After a thorough review with peers and partners, we will purchase the construction of up to 10 “Oregon” and “Ring of Fire” kilns to be used across each of the three MN regions named above. One “Oregon” or “Ring of Fire” kiln can process 6-10 cubic yards of brush per day producing 1.5 cubic yards of biochar or .44 tons of sequestered carbon per kiln. A properly trained technician has the ability to supervise 2-3 kilns per day.

Activity Milestones:

Description	Completion Date
Contact metal farbicators and collect quotes on producing kilns	September 30, 2023
Purchase and contract the fabrication of 10 kilns	February 28, 2024

Activity 2: Biochar Demonstration and Outreach.

Activity Budget: $100,500

Activity Description:
DEMONSTRATION: Great River Greening will use and demonstrate kilns on 9 sites throughout the 3 proposed regions of Minnesota. We will monitor and document the process including:
Testing the quality of biochar produced through sample testing,
Monitoring the timing and process to produce a full kiln of biochar,
Conducting precutting density counts to discern the quantity of biochar produced per acre.
Reporting on the carbon sequestration gained.
OUTREACH: Offer trainings on how to use biochar kilns properly and safely for wood waste disposal. Trainings would be offered to land managers, service providers, and other organizations that would share the benefits of using on-site kilns to manage tree and shrub removal in addition to how to use a kiln. This process will also involve other entities having access to testing the kilns on projects, specifically landowners, practitioners, and other organizations that could benefit from using biochar kilns in habitat restoration activities.

Activity Milestones:

Description	Completion Date
Define projects with land owning partners – 9 total sites throughout 3 regions of Minnesota.	December 31, 2023
Demonstrations of biochar produced from invasive tree and shrub species, specifically buckthorn and	June 30, 2025
Demonstrate the efficacy and scale of biochar techniques in each region by facilitating kiln use.	December 31, 2025
Engage 75 practitioners in the use of the biochar kilns to demonstrate the biochar process.	March 31, 2026
Engage 50 volunteers in the use of biochar kilns	March 31, 2026

Activity 3: Dissemination

Activity Budget: $42,000

Activity Description:
Produce educational materials on biochar applications in natural resource projects, contextualized for land managers and natural resource practitioners.

Notify service providers and land managers that Great River Greening will be integrating the required use of biochar

kilns for any future land management over onsite pile burning or brush stacking. By making biochar a requirement for wood waste removal for all vendors on our sites, GRG will greatly expand the positive impacts of biochar and increase the speed of adoption.

Dissemination will occur to

- Land Managers,
- Local governmental units,
- Educational institutions,
- Other NGOs
- For-profit service providers
- Individual Landowners

Activity Milestones:

Description	Completion Date
Develop materials summarizing the efficacy of the use of the kilns in different land management.	February 28, 2026
Disseminate the information to 100 local governmental units, non-governmental organizations, municipalities, service providers and/or landowners.	April 30, 2026

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

This is a pilot project that will accelerate biochar kiln implementation to become a new standard operating procedure for natural resource management projects in the future. Long-term funding is to be determined as part of the initial partner development. There is some commercial value to biochar which may be a catalyst for larger implementation in Minnesota. Biochar produced from this funding will be utilized by the landowners and Great River Greening as a beneficial soil amendment in related habitat restoration projects and/or given away to volunteers, landowners, and partners, etc; but will not be sold for financial gain.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Upland, Wetland, and Shoreline Restoration in Greater Metropolitan Area	M.L. 2016, Chp. 186, Sec. 2, Subd. 08g	$509,000
Community Stewardship to Restore Urban Natural Resources - Phase Ten	M.L. 2017, Chp. 96, Sec. 2, Subd. 08i	$524,000
Pollinator Central: Habitat Improvement with Citizen Monitoring	M.L. 2021, First Special Session, Chp. 6, Art. 5, Sec. 2, Subd. 08a	$750,000
Pollinator Central II: Habitat Improvement With Community Monitoring	M.L. 2021, First Special Session, Chp. 6, Art. 6, Sec. 2, Subd. 08c	$631,000

Project Manager and Organization Qualifications

Project Manager Name: Todd Rexine

Job Title: Director of Operations & Programs

Provide description of the project manager's qualifications to manage the proposed project.

Todd Rexine (M.L.A. Landscape Architecture, U of M) has a diverse set of experience in planning, executing, and funding the restoration of native habitats. Todd oversees and coordinates Great River Greening's programs and conversation staff, ensuring that the conservation and volunteer programs meet the agency's mission and goals. He works with the programs to analyze the organization's goals from a system-level approach analyzing how natural and human systems interact. Todd is also a project manager on studies focused on sustainable landscape management, alternative stormwater design, shoreline restoration, and river and stream bank restoration.

Organization: Great River Greening

Organization Description:

Great River Greening's mission is to secure the legacy of Minnesota land and water through community-based restoration, stewardship and partnership, striving to improve Minnesota's natural resources, protect clean air and water, and increase community access to sustainable open space. Since 1995, Great River Greening has engaged 49.300 volunteers (12,800 of them youth) in hands-on education and stewardship activities, helping restore over 17,000 acres of habitat in 400 communities across Minnesota. Great River Greening focuses our work in locations and on activities that provide conservation impact, ecosystem services, and community benefits, with projects including: developing planting designs and/or restoration management plans for natural areas; planting native trees, shrubs, wildflowers, and grasses; stabilizing shorelands and ravines; conducting ecological inventories; implementing conservation practices on farmland; and completing restoration and management activities including exotic species removal, prairie seed

collection, and prescribed burns. In addition, Great River Greening engages community members from schools, faith groups, civic groups, businesses, and veterans groups in public volunteer events and engages over 100 youth per year through targeted service-learning programs. Through community education and engagement, Greening is restoring natural resources, while building environmental leaders and stewards of tomorrow.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	$ Amount
Personnel								
Ecologist and Project Manager		Coordination with the land managers and natural resource practitioners for project implementation.			21%	0.54		$50,000
Grant Manager		Grant management and project implementation.			21%	0.39		$30,000
Outreach and Communications		Coordination of outreach and demonstration events and dissemination of informational materials.			21%	0.09		$5,000
Field Crew		Implementation of biochar production and on-site field work.			9%	0.18		$10,000
Grant Administration		Finance administration and grant fund coordination, status reporting, and amendment communication.			24%	0.09		$5,000
							Sub Total	**$100,000**
Contracts and Services								
TBD	Professional or Technical Service Contract	Contracting land management service providers to incorporate the use of biochar kilns in the disposal of woody material on projects coordinated with Great River Greening and the land-owning partners.				-		$40,000
							Sub Total	**$40,000**
Equipment, Tools, and Supplies								
	Tools and Supplies	Supplies and equipment required for kiln use	Purchase of supplies and equipment to facilate the safe handling of kilns and biochar.					$5,000
	Equipment	Fabrication and purchase of 10 biochar kilns	Biochar kilns will be stationed in 3 listed regions of the State for demonstrations and for entities to test after particitpating in demonstrations.					$20,000
							Sub Total	**$25,000**

Capital Expenditures								
							Sub Total	**-**
Acquisitions and Stewardship								
							Sub Total	**-**
Travel In Minnesota								
	Miles/ Meals/ Lodging	Travel to and from project sites, partner meetings, and outreach events.	Support on-site visits and project implementation.					$3,000
							Sub Total	**$3,000**
Travel Outside Minnesota								
							Sub Total	**-**
Printing and Publication								
	Printing	Printing of informational material to give to land managers and natural resource practitioners.	Material will be distributed to educate land managers and natural resource practitioners on the applications of biochar kilns in habitat restoration woody material disposal.					$2,000
							Sub Total	**$2,000**
Other Expenses								
		Kiln mobilization and storage expenses	Facilitate the movement and storage of the biochar kilns.					$5,000
		Event related expenses	Tents, tables, chairs, food, latrine, etc, as required to support project demonstration and educational events in promotion of the LCCMR strategy and objectives.					$10,000
							Sub Total	**$15,000**
							Grand Total	**$185,000**

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request

Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
Cash	Outdoor Heritage Funded projects.	These projects will support the material cutting portion of the biochar production.	Pending	$50,000
			State Sub Total	**$50,000**
Non-State				
In-Kind	Municipal and other land owning partners.	Landowner labor and time facilitating the use of biochar kilns.	Potential	$20,000
Cash	Municipal and other land owning partners.	A variety of expenses directly related to the individual landowner or partner sites such as contracting, material purchase, or indirect expenses related to the management projects.	Potential	$20,000
In-Kind	GRG administrative match	GRG staff indirect administrative expense to do the work for this grant.	Secured	$5,000
Cash	GRG cash match.	GRG direct expenses required to do the work for this grant.	Secured	$30,000
Cash	USDA - Partnership for Climate-Smart Commodities	Assess the commodity side of biochar from natural resource management and feasibility for use in agriculture applications in MN.	Potential	$50,000
			Non State Sub Total	**$125,000**
			Funds Total	**$175,000**

Attachments

Required Attachments

Visual Component

File: 1eb79185-849.pdf

Alternate Text for Visual Component

Summary of the Great River Greening biochar grant proposal with illustrations of the biochar production process and outlines of the proposed activities....

Financial Capacity

File: 685652a4-b6b.pdf

Board Resolution or Letter

Title	File
GRG Board Resolution LCCMR ML2023FY2024 Biochar	09f3cf80-886.pdf

Optional Attachments

Support Letter or Other

Title	File
Letter of Support - Dakota County	c24a3494-9f0.pdf
ML 2023 Great River Greening Biochar flyer	65da8fb7-a6a.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Does your project have potential for royalties, copyrights, patents, or sale of products and assets?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

No

Does the organization have a fiscal agent for this project?

No

Biochar Implementation in Natural Resource Management

Air Quality, Climate Change, and Renewable Energy

GREAT RIVER GREENING
RESTORING LAND, WATER AND WONDER

Implementation of biochar kilns as a low carbon emitting, biologically beneficial alternative to woody material disposal in habitat restoration.

What is biochar?

The end-product of burning biomass under low-oxygen, temperature specific conditions. The benefits of biochar are widely applicable in MN -

- Carbon sequestration
- Incorporation in water filtration basins
- Soil Enhancement - Natural Areas, Agriculutre, Gardens
  - Soil microbial support and fertility
  - Improved water retention and drainage in soil
  - Retention of nitrogen and sulfurs in soil
- Facilitate reestablishment of vegetation on sterile soil

image source: www.netzero.green 5/05/2022

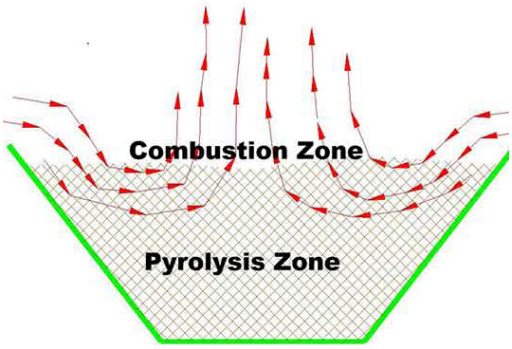

image source: www.biocharkiln.com 5/5/2022

How can biochar production (pyrolysis) be used in land management?

- Excess wood material from habitat restoration such as invasive shrubs (buckthorn) or disease impacted trees (red oak or ash) can be burned on site in kilns to produce biochar.
- Pyrolysis emits reduced greenhouse gasses compared to open burning (the typical method of material disposal).

(International Biochar Initiative, 2021, Wilson Biochar, 2021, Great Plains Institute, 2021, Bioeconomy Coalition of Minnesota, 2021)

Great River Greening inspires, engages, and leads communities throughout Minnesota in conserving and caring for the land and water that enrich our lives.

Biochar Implementation in Habitat Restoration

Air Quality, Climate Change, and Renewable Energy

GREAT RIVER GREENING
RESTORING LAND, WATER AND WONDER

Wood waste from habitat enhancement.

Biochar kiln pyrolysis
image source: www.organicfarmermag.com 3/30/2021

Biochar ready for soil amendment
image source: www.betterenergy.org3/30/2021

1. Construct Biochar Kilns
Contract the fabrication of kilns that may be transported to sites for in-situ biochar production and demonstration.

2. Biochar Demonstration and Outreach.
Demonstrate kiln use at sites in SE, Central and Metro MN regions.
Connect with natural reource practioners, land mangers, educational institutions, and land owners.

3. Dissemenation
Connect Produce educational materials on biochar application and kiln use.

1 flame cap kiln can process 6-10 cubic yards of material/day which is 1.5 cubic yards of biochar. This equals .44 tons of carbon sequestered per kiln.

	Metal Kilns	Pile Burning
Smoke Impacts	Flame cap technique contains the combustion, which burns wood more efficiently, creating less smoke.	Pile burning simply burns entire wood piles in unregulated way, this creates significantly more smoke.
Soil Impacts	Containing the fire in a metal kiln creates a barrier between the heat and soil, buffering and protecting the soils from extreme heat pulses.	Piling and burning occurs directly on the soil surface. The consequences to the soilcan be extremely detrimental to soil structure and microorganisms
Value Added Product	Using kilns creates biochar, a valuable product for soil carbon sequestration, and amending soils	Piling and burning does not result in any value-added product.