

**Environment and Natural Resources Trust Fund
2014 Request for Proposals (RFP)**

Project Title:

ENRTF ID: 164-F

Innovative Technology to Seed Plants on Streambanks

Category: F. Methods to Protect, Restore, and Enhance Land, Water, and Habitat

Total Project Budget: \$ 189,000

Proposed Project Time Period for the Funding Requested: 3 Years, July 2014 - June 2017

Summary:

Develop and evaluate an innovative, safe method of establishing perennial vegetation on steep bare streambanks to reduce sediment and erosion to waterways while providing sustainable, economic and environmental benefits.

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Sponsoring Organization: U of MN

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Location

Region: Statewide

County Name: Statewide

City / Township:

<input type="checkbox"/> Funding Priorities	<input type="checkbox"/> Multiple Benefits	<input type="checkbox"/> Outcomes	<input type="checkbox"/> Knowledge Base
<input type="checkbox"/> Extent of Impact	<input type="checkbox"/> Innovation	<input type="checkbox"/> Scientific/Tech Basis	<input type="checkbox"/> Urgency
<input type="checkbox"/> Capacity Readiness	<input type="checkbox"/> Leverage	<input type="checkbox"/> Employment	<input type="checkbox"/> TOTAL <input type="checkbox"/> %



PROJECT TITLE: Innovative Technology to Seed Plants on Streambanks

I. PROJECT STATEMENT

The overall goal of this project is to establish vegetative cover on steep bare streambanks using innovative air and water planting equipment to achieve multiple environmental benefits to the waterway including reduced soil erosion, improved water quality, enhanced aquatic and wildlife habitat and increased pollinators. Sediment is a major pollutant in Minnesota waterways affecting water quality, aquatic habitat and streambank stability and flow. Best Management Practices (BMPs) continue to be revised for land use and agricultural practices in watersheds to reduce erosion and sediment contributions to waterways. Between 56 and 86 percent of the sediment entering various rivers in southern Minnesota came from streambank and bluff erosion.

Many of these bluffs and streambanks are steep, unstable and very inaccessible making hand seeding and live staking a safety hazard. A typical slope stabilization project can cost tens to hundreds of thousands of dollars. Perennial vegetation or woody vegetation offer stabilization to these bank sites. Innovative ways and methods should be developed to seed vegetative and woody plants remotely that would offer inexpensive stabilization and minimize safety hazards to staff. Our study will evaluate a process and method of using a portable hydro seeder and compressed air equipment to seed and plant perennial native grasses/forbs and woody vegetation on streambanks. This method would encourage proactive stabilization efforts using less state budget funds than are currently used often in response to emergency problems, such as road or bridge being undermined by streams.

Two innovative planting methods will be studied using the portable hydro seeder and compressed air equipment. This new seed and willow delivery planting method will involve using a portable hydro seeder and compressed air equipment. The hydro seeder will deliver a mixture of native seed and anti-erosion compound to the streambank. Native seeds will be inserted into seed capsules. Both seed capsules and willow sticks will be propelled into the streambank by the use of the compressed air equipment from either on top of the bank, in a boat or across the waterway from the streambank. Plots will be designed vertically on the bank from the water's edge to the top of the bluff. Data will also be collected on soil and hydrologic properties of the study banks. Naturally, each site has its own soil and geomorphic characteristics which play a role in determining which bank stabilization planting or practice should be considered. This study will help determine which types of sites are most amenable to vegetative stabilization.

The study will be implemented in streambanks in Blue Earth and Martin Counties in south central Minnesota. Using the portable hydro seeder and compressed air equipment (seed capsules), deep rooted native species such as big blue stem, switchgrass, sedges and prairie cord grass will be used. Forbs will also be seeded adding pollinator benefits. Willow cuttings and several other native shrub varieties will also be used in the study, delivered by the compressed air equipment. Results of the demonstration study will be used to accelerate Minnesota's streambank stabilization and protection efforts using an efficient and cost-effective method. Pre and post site watering and monitoring will be key to the successful establishment of these plants.

II. DESCRIPTION OF PROJECT ACTIVITIES

Activity 1: Plan, establish and monitor demonstration sites

Budget: \$ 174,533

Identify project sites and design project layout. Identify perennial seeds and woody (willow and shrub) plants to be planted. Establish four streambank demonstration sites of various heights (could have multiple bluffs at each site). Test perennial seeding equipment and willow planter. Prepare the sites for planting; plant the sites; water and manage sites after planting; collect soil and hydrology data, management, rainfall and growth data throughout the summer and record site data monthly during winter. Monitor second year growing season, watering when needed. Various combinations of these plantings will be demonstrated: 1) ¼ bottom willows and ¾ vegetation, 2) all willows top to bottom 3) all vegetation top to bottom and 4) a combination throughout the plot area.



Outcome	Completion Date
1. Project details on: selected sites, plot design, seeds and willows/shrubs to be planted, methods of preparation/seeding/planting/post planting practices developed.	Summer 2014
2. Conduct field tests with seeding and planting equipment	Summer 2014
3. Plant research and demonstration sites (plant fall 2014 and spring 2015)	Spring 2015
4. Manage and monitor sites (growing seasons and winter 2014 through 2016)	Spring 2017
5. Final report of project results	June 2017

Activity 2: Conduct outreach activities

Budget: \$ 14,467

Outreach activities will include workshops and field days at the research site targeting watershed and natural resource professionals and agencies, state and local government officials and landowners. Develop web based extension publications and articles to share study findings.

Outcome	Completion Date
1. Three workshops/field days held in the spring and fall (fall 2014 to fall 2016)	Sept. 2016
2. Web based outreach materials developed (virtual field days, webinars, fact sheets, papers)	Dec. 2016
3. Final Report	June 2017

III. PROJECT STRATEGY

A. Project Team/Partners

The University of Minnesota will receive all of the funding and contribute time and effort to the project. Staff involved include: Gary Wyatt (Extension Professor & Project Leader), Diomy Zamora (Associate Extension Professor & Co-Project Leader), Chris Lenhart (Research Professor & Co-Project Leader) and a PhD student that he will be advising. The project team will be responsible for implementing all activities of this demonstration project including plot establishment, monitoring and outreach. The Martin County Soil and Water Conservation District will assist in the project with post-plot water testing (\$6,000).

We intend to invite key personnel interested in streambank protection from the following agencies to partner with this project: The Nature Conservancy, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Soil and Water Conservation Districts and the Minnesota Department of Agriculture. These partners will cooperate with no cost to the project.

B. Timeline Requirements

A three-year project length is needed to collect information, establish research plantings, collect and analyze the data, develop Minnesota-based recommendations, conduct outreach activities, and prepare project summary reports. (July 1, 2014 to June 30, 2017)

C. Long-Term Strategy and Future Funding Needs

Streambank erosion problems can't be solved with vegetative treatments alone. Watershed management to reduce stream flow is needed in combination with structural in-stream practices. In identifying sites for this project our team will consider the role of vegetative treatments in projects with established structural practices such as rock at the toe of the streambank, use of root wads and rock or wood vanes, since most soil bioengineering projects have some structural element to reduce toe-erosion at high flows. Our team will also consider sites that have already collapsed from mass-wasting and just need to be re-vegetated to expedite evolution to a more stable condition, thus reducing sediment loading.

Information collected from this study will be used to address channel erosion issues in other parts of Minnesota. We will continue to seek funding from other environmental and clean water funding sources and watershed agencies to promote or further study these methods and improve this effort beyond the life of the project.

2014 Detailed Project Budget

Project Title: Innovative Technology to Seed Plants on Streambanks

IV. TOTAL ENRTF REQUEST BUDGET: 3 years (July 1, 2014 to June 30, 2017)

<u>BUDGET ITEM</u>	<u>AMOUNT</u>
Personnel: 1 Graduate Student for 400 hours/year for 3 years, \$29,577. They will help manage the plot data, document plant growth and help with outreach. Co-PI Chris Lenhart @ 5% salary and fringes, \$15,325	\$ 44,902
Contracts:	
Contractor to water sites	15,500
SWCD to take water quality testing from streamwater	6,000
Contract hydroseeder company	37,000
Contract manufacturing company to modify compressed air equipment	6,000
Equipment/Tools/Supplies:	
Water Quality Monitoring Devices	3,000
Willow Cuttings @ \$0.25/cutting x 5,000 cuttings + \$150 S&H	2,800
Seeds for deep rooted native grasses and forbs	10,000
Processing seed into seed balls	20,000
Air equipment, Compressed air tanks, Safety equipment	3,500
Misc. field supplies	1,243
Travel:	
Planning, selecting sites, site visits, travel and other expenses	2,500
Student (2 trip/mon x 7 mon/yr. x 350 miles/trip x \$0.565/mile)	9,493
PI (Wyatt) (2 trip/mon x 7 mon/yr. x 150 miles/trip x \$0.565/mile)	4,069
Co-PI (Zamora) (1 trip/mon x 7 mon/yr. x 350 miles/trip x \$0.565/mile)	4,746
Lodging & per diem (10 days/year x \$80/day x \$46/day per diem x 10)	3,780
Additional Budget Items:	
Outreach Activities:	
Workshops/Field Tours (3 @ \$2,500/workshop (field tour) promotion, fact sheets, printing, bus rental, supplies, facility rental)	7,500
Virtual Field Days (2 @ \$1,500/field day/year, taping, editing)	3,000
Webinars (3 during the 3 years, cost in producing, managing, editing, equipment rental)	1,000
Travel associated with outreach activities (5 trips/yr. @ 350 miles/trip x \$0.565/mile)	2,967
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND \$ REQUEST =	\$ 189,000

V. OTHER FUNDS

<u>SOURCE OF FUNDS</u>	<u>AMOUNT</u>	<u>Status</u>
Other Non-State \$ Being Applied to Project During Project Period:	None	
Other State \$ Being Applied to Project During Project Period:	None	
In-kind Services During Project Period: Gary Wyatt (PI) salary (\$5,797) and fringe (\$2,520) @ 3% = \$8,317. Diomy Zamora (Co-PI) salary (\$3,560) and fringe (\$1,196) @ 2% = \$4,756	\$ 13,073	<i>Secured</i>
Remaining \$ from Current ENRTF Appropriation (if applicable):	None	
Funding History:	None	

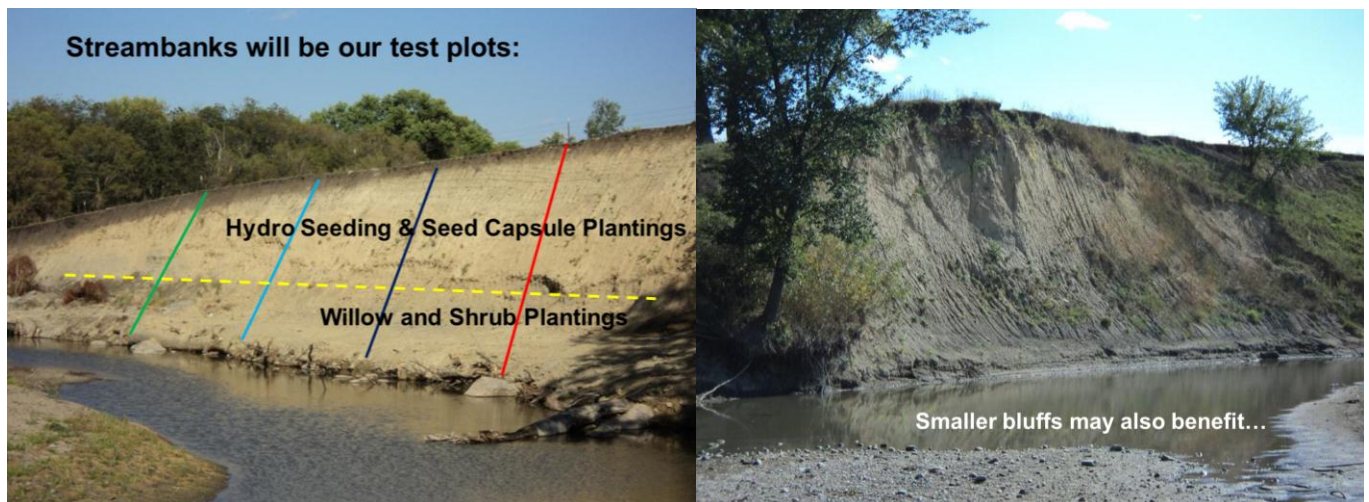
Innovative Technology to Seed Plants to Streambanks

2014 LCCMR Grant Proposal

Gary Wyatt, UM Extension, wyatt@umn.edu



Streambank erosion is a problem in many watersheds in Minnesota increasing soil sediment to waterways negatively affecting aquatic habitat for native plants and animals.



Our project will evaluate innovative methods of seeding plants to streambanks which are hard to safely plant by hand. Native grasses/forbs will be delivered to the upper part of the banks with a hydroseeder and seed capsule delivery system while willow and shrub sticks will be delivered to the base of the streambank up from the water's edge.



Seed capsule w/ paint ball, and pen showing size comparison



Hydroseeding will be applied to the upper part of the bank



Willow and shrub sticks will be projected into banks

Project Manager Qualifications

Gary Wyatt is an Extension Professor/Extension Educator at the University of Minnesota Extension focusing on Agroforestry, invasive species and biomass energy (bioenergy). Mr. Wyatt co-leads the Extension team in implementing Extension's Agroforestry, invasive species and bioenergy programs to educate woodland owners, agricultural producers/landowners and natural resource professionals. After teaching Vocational Agriculture in high school for four years in Iowa he completed his master's degree in Vocational Education from Iowa State University in 1983. He was hired as Watonwan County Extension Educator in St. James, MN in 1983.

Mr. Wyatt has conducted agricultural and farmer research projects on Soybean cyst nematodes, manure management and land applications, white mold, Best Management Practices on rural landscapes, living snow fences and windbreaks. He actively promotes conservation incentive programs and practices and the establishment of different forms of agroforestry practices in Minnesota landscapes for environmental and economic benefits. These agroforestry practices include alley cropping (planting agricultural crops in alleys created by rows of trees), silvopasture (managing trees + forage + trees together), riparian forest buffers, windbreaks, and forest farming (farming non-timber forest products in the forests). He works with the Extension Forestry team to integrate bioenergy crops within agroforestry practices to produce feedstock for energy. Mr. Wyatt has created, authored and published many fact sheets and news articles plus several peer-reviewed extension publications to reach targeted audiences about agroforestry, invasive species and bioenergy. Fact sheets and project information can be found at the Extension Agroforestry web site, www.extension.umn.edu/agroforestry

Mr. Wyatt has 29 years of Extension experience in working with landowners and many state agencies and organizations to create sustainable landscapes in Minnesota. He also serves as a Principal Investigator and Co-PI of a number of projects including: 1) Living Snow Fence Payment Calculator, 2) Assessment of Biomass Yield and Energy Value in Established Native Polyculture and Woody Plantings in Minnesota Landscapes, 3) A Decision Support Tool to Restore Impaired Waters, 4) Field Windbreak/Living Snow Fence Crop Yield Assessment, and 5) Production and Economics of perennial-based woody herbaceous biomass crops under alley cropping systems.

We are also extremely excited to have Christian F. Lenhart, University of Minnesota Research Assistant Professor in Bio-Systems Engineering joining the team. Chris has extensive research experience in working on the Minnesota River watershed as well as sub-watersheds. His knowledge of soils, hydrology and plant species will be very valuable in the project. www.bbe.umn.edu/People/Lenhart/