



Environment and Natural Resources Trust Fund

2023 Request for Proposal

General Information

Proposal ID: 2023-087

Proposal Title: Integrating Environmental Education into Classroom Curriculum

Project Manager Information

Name: Seth Thompson

Organization: U of MN - College of Biological Sciences

Office Telephone: (605) 431-7747

Email: thom2587@umn.edu

Project Basic Information

Project Summary: Our project integrates a research-based environmental science curriculum into classrooms at Heritage Environmental STEM Magnet School in West Saint Paul to delivery world-class learning for ~750 students annually.

Funds Requested: \$64,000

Proposed Project Completion: June 30, 2025

LCCMR Funding Category: Small Projects (H)

Secondary Category: Environmental Education (C)

Project Location

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

Region(s): Metro

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

Region(s): Metro

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.

Protecting and sustaining our natural resources is a central part of the culture of Minnesota. By providing high-quality, inquiry-based environmental education in middle school classrooms, we help cultivate a new generation of Minnesotans who care about the natural world and have the tools, knowledge, and networks to protect it. Imagine the impact of learning about the importance of water quality, native and invasive species, and water management by getting the opportunity to sample for macroinvertebrates, conduct water quality testing, and meet scientists who study environmental issues for a living! Ensuring the protection of Minnesota's natural resources into the future will be a team effort, requiring collaborations and partnerships between scientists, resource managers, and the public. By providing access to hands-on environmental education, we will enhance the scientific literacy and environmental ethos of our community, resulting in strong partnerships that better preserve Minnesota's natural resources.

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.

In this program, we integrate authentic environmental science education into middle school classrooms in West Saint Paul Minnesota. Using an existing research-based curriculum from the College of Biological Sciences, our program will increase student knowledge of important environmental issues, including understanding the impacts of contaminants of emerging concern on aquatic ecosystem health, studying the impact of invasive species on local ecosystems, and maintaining biodiversity in natural environments. Through inquiry-based learning experiences, students develop key science process skills that allow them to make evidence-based decisions, leading to more sustainable behaviors and building a long-lasting commitment to conservation. Specifically, our program integrates three specific activities:

- 1) Inquiry-based environmental education in every middle school classroom at Heritage Environmental STEM Magnet school, supporting ~750 students each year
- 2) Field-trips to Cedar Creek Ecosystem Science Reserve to provide outdoor learning experiences for 7th and 8th grade students, deepening their connections to nature
- 3) Intensive summer programming for 8th grade students that provides exposure to current environmental research and prepares students for advanced course work in environmental science.

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?

This project will result in hands-on, outdoor education for over a thousand Minnesota students. These experiences and access to world-class scientific resources (both material and human) will promote enhanced knowledge and skills for protecting Minnesota's natural resources. Additionally, our teacher partnerships will create a cohort of strong scientific mentors that will enhance our impact for years to come.

Activities and Milestones

Activity 1: Delivering an inquiry-based classroom environmental science curriculum

Activity Budget: \$30,000

Activity Description:

Partnering with teachers at Heritage Environmental STEM Magnet school, we will integrate existing inquiry-based environmental science curriculum into the classroom for 5th-8th graders. This is achieved by bringing scientist mentors from the University of Minnesota into the classroom to support students as they perform guided experiments that allow them to explore relevant environmental phenomenon connect to cutting-edge research happening at the University of Minnesota. For example, the 5th grade unit builds of the emerging research showing the impact of road salt on the salination of freshwater systems. In this unit, students perform a guided experiment where they expose zebrafish embryos to various concentrations of salt and measure the impact on growth and development. During the experiment, students get to work closely with a scientist mentor that helps guide them through the scientific process and connect their findings to the real-world environmental implications of their work. Across grades 5-8 we have additional units covering topics such as invasive species, biodiversity conservation, eutrophication, and contaminants of emerging concern.

Activity Milestones:

Description	Completion Date
Implement 5th Grade Road Salt and Contaminants of Emerging Concern Units	October 31, 2023
Implement 7th Grade Eutrophication Unity	February 28, 2024
Implement 6th Grade Biodiversity and Conservation Unit	April 30, 2024
Implement 8th Grade Global Change Unity	May 31, 2024

Activity 2: Providing outdoor educational experience through field trips at Cedar Creek Ecosystem Science Reserve

Activity Budget: \$14,000

Activity Description:

Cedar Creek currently hosts ~5000 students annually on field trips, with established expertise in serving middle school students. To maximize the impact of our classroom program described above, we will pair students' classroom program with an integrated field trip that expands upon the learning covered in the guided-inquiry units. Additionally, students will have the opportunity to learn about the world-class research taking place at Cedar Creek and see first-hand how environmental science research is done in the field. We will focus on field trip experience for 7th and 8th grade students, an age that has been shown to be critical in the formation of environmental identity.

Activity Milestones:

Description	Completion Date
7th Grade Spring Field Trips	March 31, 2024
8th Grade Fall Field Trips	October 31, 2024

Activity 3: Preparing students for advanced environmental science course work through summer programming

Activity Budget: \$20,000

Activity Description:

To further support students as they transition from middle school into high school and broaden access to advanced environmental science coursework (such as AP environmental science), we will implement a summer bridge program that offers 6-weeks of intensive environmental research experiences to students the summer between their 8th and 9th grade years. These experiences will expose students to research methodologies in environmental science, enhance critical thinking skills, and further develop environmental identity. Importantly, this bridge program will also serve as an opportunity for student traditionally underrepresented in advanced coursework (i.e. low-income and/or racially minoritized students) to have additional opportunities to further develop the skills and knowledge needed to be successful in advanced course work. By using the summer cohort model, we will be able to apply an asset-based model of student development where participating students bring their own interest and experiences to the table to inform the development of the research experiences. This should further development student’s agency, environmental identities, and environmental career interest, ultimately resulting in a more diverse environmental workforce in the future.

Activity Milestones:

Description	Completion Date
Deliver 1st summer program	June 30, 2024
Deliver 2nd summer program	June 30, 2025

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Dr. Caitlin Barale Potter	Cedar Creek Ecosystem Science Reserve	Dr. Potter is the Associate Director at Cedar Creek and will oversee the field trip activities detailed in project activity 2	Yes
Miles Lawson	ISD 197	Secondary Curriculum Coordinator: Mr. Lawson oversees the secondary curriculum within the district and will serve as the primary district representative on the project	No
Kristin Dirksen	Heritage Environmental STEM Magnet	5th Grade Teacher	No
Leigh Danner	Heritage Environmental STEM Magnet	5th grade teacher	No
Terence Doud	Heritage Environmental STEM Magnet	8th Grade Teacher	No

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?

The proposed project will promote Minnesotans' science literacy, excitement for environmental research, and appreciation for the role of environmental research in protecting Minnesota's natural resources. Direct interaction between researchers and students will make lasting impressions on individuals and contribute to informed communities. Sustaining these efforts long-term will require additional financial investments, but the College's outreach programs have a track record of varied and well-leveraged financial relationships. Our work has been supported through federal grants, local foundation grants, collegiate cost sharing, and broader impacts relationships with University of Minnesota Faculty on their own research grants.

Project Manager and Organization Qualifications

Project Manager Name: Seth Thompson

Job Title: Director of Outreach

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

Seth K. Thompson is the Director of Outreach for the College of Biological Sciences at the University of Minnesota and Co-Director of the College's Impact Exchange. He brings over a decade of experience in implementing public engagement and outreach programs to our team. Currently, he oversees the College's outreach programs, including the InSciEd Out Program Twin Cities hub, Market Science, and the SciSpark Scholars mentorship program. He has worked with the InSciEd Out program for over 5 years, developing programming from the ground up that now serve over 3,000 students annually in the Twin Cities with a focus on communities underrepresented in science. He has extensive experience working with K-12 teachers, having provided professional development programming for over 75 teacher partners and maintains strong connections with K-12 teachers and administrators across the Twin Cities. Under his leadership, the Market Science program hosted over 60 community events last year resulting in over 9,000 interactions with Minnesotans. Additionally, he has expertise in STEM education research and multiple publications relating to inquiry-based science education and STEM equity. He has mentored over 20 undergraduate researchers and several graduate students. His role in the proposed project is to oversee all programming by working with potential district

partners, recruiting new teacher partners, supervising student staff (both graduate and undergraduate) and managing the budget and administrative tasks of the proposed project. Details on his current projects and a list of publications can be found on his website (<http://thom2587.wixsite.com/sciencewithimpact>).

Organization: U of MN - College of Biological Sciences

Organization Description:

The College of Biological Sciences encompasses the full breadth and depth of biology with departments and graduate programs spanning the discipline. In 2019, CBS enrolled 2,235 undergraduates and 279 graduate students and had 152 faculty. CBS research and programming were supported by over 2,000 active grants totaling over \$28 million in external funding, including awards from the National Institutes of Health, the National Science Foundation, and the U.S. Department of Agriculture, among others.

The community engagement team provides centralized support and vision for the College's outreach programs and fosters a more holistic approach to community engagement. The team will serve as a multidisciplinary hub for innovation and training, leveraging the talents found across the University of Minnesota system to bring together experts in communication, design, and science to offer innovative training in science communication for members of the University of Minnesota community that will further support the community engagement and outreach mission. This newly formed "engagement ecosystem" provides the College with a centralized effort to connect with the broader community through public events and community-embedded programs.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Undergraduate student (academic)		Undergraduate students (academic): Assuming a pay rate of \$15 per hour for undergraduate students, we request support for 20 hours per week in all project years. These hours would be distributed among 2 or 3 undergraduate students that would be recruited to participate as mentors from middle school students during activity implementation.			0%	0.76		\$24,000
Undergraduate student (summer)		Undergraduate students (summer): 40 hours per week of undergraduate student time to be split among 1-2 undergraduates serving as research mentors during bridge programming. The summer students will also support teachers in adapting classroom activities and coordination of the Summer Expo.			0%	0.48		\$16,000
							Sub Total	\$40,000
Contracts and Services								
							Sub Total	-
Equipment, Tools, and Supplies								
	Tools and Supplies	\$5,000 per year to support consumable supplies for the classroom activities. These will include lab reagents, water quality sampling supplies, filters, etc.	Program support					\$10,000
							Sub Total	\$10,000
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								

							Sub Total	-
Travel In Minnesota								
	Other	Bussing expenses for field trips for 7th & 8th grade classes. Based on current rates, we estimate \$1,000 for bussing costs per trip and budget for two trips per year (one for 7th one for 8th), for a total of \$2,000 per year. This represents round trip travel of ~ 80 miles for ~150-175 students per trip.	Bussing for Field Trips					\$4,000
							Sub Total	\$4,000
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
							Sub Total	-
Other Expenses								
		Waivers for field trip fees to provide free field trips to all 7th and 8th grade students at Heritage each project year. Cost per class are \$333 so total annual costs for 15 classes is \$5,000.	Field Trip Fee Waivers					\$10,000
							Sub Total	\$10,000
							Grand Total	\$64,000

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				
In-Kind	Indirect costs associated with this proposal at 35% MTDC.	Indirect costs cover both facilities costs and administrative costs that are incurred by the University of Minnesota when conducting sponsored research, instruction, and public service projects.	Potential	\$22,400
			State Sub Total	\$22,400
Non-State				
			Non State Sub Total	-
			Funds Total	\$22,400

Attachments

Required Attachments

Visual Component

File: [5aeb4506-e6c.pdf](#)

Alternate Text for Visual Component

Concept diagram showing the philosophy of our classroom programing. We build strong teacher partnerships to deliver world-class environmental education in the classroom and to offer impactful outdoor learning experiences....

Optional Attachments

Support Letter or Other

Title	File
UMN Letter of Support	54412faf-10f.docx

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?

Yes, Sponsored Projects Administration



**Cultivating
mentors for
the next
generation**

**Supporting
discovery
and fostering
curiosity**



**World-class learning in
and out of the classroom**

