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

Project Title: **ENRTF ID:**   069-B

Assessing the Value of Green Infrastructure within Minnesota's Water Infrastructure Funding Shortfal

Category: B. Water Resources

Sub-Category:

Total Project Budget: $ 384,923

Proposed Project Time Period for the Funding Requested: June 30, 2023 (3 yrs)

Summary:

Report on financing water infrastructure through green and grey solutions. Data on where and how natural resource management can address critical infrastructure funding shortfalls while improving habitat and ecosystem services.

Name: Terin   Mayer

Sponsoring Organization: U of MN

Job Title:

Department: Humphrey School of Public Affairs

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Location:

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Proposal is to assess water infrastructure funding shortfall and value green infrastructure potential to estimate public savings from preserving, protecting, and conserving natural land-cover.

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

PROJECT TITLE: Assessing the Value of Green Infrastructure within Minnesota's Water Infrastructure Funding Shortfall

I. PROJECT STATEMENT

We propose a state-wide study of the potential role of green infrastructure — the economic value of services provided by natural systems — in addressing Minnesota's estimated $7.5 billion water infrastructure gap.

Minnesota faces a water infrastructure financing challenge. The EPA estimates that maintaining the state's wastewater and drinking water infrastructure will cost $7.5 billion over the next 20 years. Loan requests to the state's Drinking Water Revolving Fund and Clean Water State Revolving Fund have recently exceeded their capacity by 7 and 3 times, respectively. Since local water utilities rely substantially on revenues from ratepayers, changing state demographics also raise serious affordability concerns, especially in rural parts of the state that are losing population.

What these cost estimates omit, however, are the economic value of services provided by natural systems: the "green" complement to traditional "gray" infrastructure. In both rural and urban settings, green infrastructure can mitigate the intensity and frequency of excess storm water flows, enhance groundwater recharge for drinking water supply, and reduce water treatment burden by filtering contaminants through the soil column. Preserving, protecting, and enhancing Minnesota's natural systems could thus play a substantial role in meeting water infrastructure financing shortfalls, as well as buffering local communities against weather extremes. However, fundamental data on these ecosystem services are missing. Answers to basic questions like what, where, and how much green infrastructure can contribute are needed. Such answers are most useful at a scale that front-line decision-makers can use at the city, township, county and special district levels.

We propose a state-wide study of the potential role of green infrastructure in addressing Minnesota's water infrastructure gap. We aim to assess the infrastructure need and local funding capacity of each of the state's 6,787 community water systems. In addition to providing cost comparisons for traditional and nature-based wastewater and drinking water infrastructure as well as co-benefits of these systems, we will identify different financing solutions for these investments and assessments of the local implications of different funding strategies.

II. PROJECT ACTIVITIES AND OUTCOMES

Activity 1 Title: Water infrastructure assessment

Description: Statewide assessments of waste water and drinking water infrastructure investment need and local revenue raising capacity. Under the leadership of Dr. Jerry Zhao and the Institute for Urban & Regional Infrastructure Finance, we will assess and map water infrastructure needs for each community water system statewide. To assess needs for green and grey water infrastructure investment, we will add to the dataset information on tax base and other local revenue sources, and compare projected costs with available resources.

ENRTF BUDGET: $ 141,450

Outcome	Completion Date
1. Map and dataset of estimated water gray infrastructure costs out to 2070 for state's 6,787 community water systems.	*July 2021*
2. Corresponding map and data of revenue raising capacity from own sources (ratepayers, property tax, storm water fees, etc.)	*December 2022*

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3. Report on sources of additional water infrastructure demand outside of maintenance costs assumed in above, and implications for costs	July 2021

Activity 2 Title: Green infrastructure potential to address water quality and quantity and deliver co-benefits
Description: There is a growing awareness of the benefits of "green infrastructure" in the form of perennial cover, riparian buffers, and restored wetlands to improve water quality, enhance groundwater recharge, reduce flooding, and deliver other valuable ecosystem services, including habitat for wildlife. Building off ten years of work at the Natural Capital Project and research on the economic and biodiversity benefits of nature, we will assess the potential for green infrastructure to address water quality and quantity management requirements and deliver valuable co-benefits.
ENRTF BUDGET: $ 169,504

Outcome	Completion Date
1. Maps and geographic information system data showing viable locations for nature-based infrastructure strategies and associated water treatment and quantity management savings to community water systems.	July 2022
2. Extension of and integration with existing decision-support tools for parcel acquisition to show estimated potential water infrastructure savings.	July 2022
3. Informational and educational materials highlighting green infrastructure cost savings tailored to local governments involved in "One Watershed, One Plan" collaborations.	June 2023

Activity 3 Title: Financing local solutions
Description: We anticipate persistent funding gaps between local resources to protect water quality and needs of communities. In this activity, we will identify alternative revenue streams or innovative financing mechanisms to address identified revenue gaps for critical water infrastructure (green and grey).
ENRTF BUDGET: $ 73,969

Outcome	Completion Date
1. Report summarizing alternative financial instruments for green and gray infrastructure development – e.g. federal funding sources, public-private partnerships, & green bonds	June 2023
2. Forecasts to 2070 of local fiscal impacts of example financing strategies and customized reports to One Watershed One Plan groups on available financing mechanisms to promote water quality and other ecosystem services.	June 2023

III. PROJECT PARTNERS AND COLLABORATORS:
The project will be co-led by Dr. Bonnie Keeler and Dr. Jerry Zhao (faculty at the Humphrey School of Public Affairs at the University of Minnesota) and managed by current Ph.D. student Terin Mayer. Work will be conducted in collaboration with One Watershed One Plan partners and the Department of Health.

IV.   LONG-TERM IMPLEMENTATION AND FUNDING:
This project is a stand-alone effort and not part of a longer-term funding request. It builds on previous work on the value of water-related ecosystem services and estimated costs of drinking water treatment and source water protection. All data generated as part of the project will be shared with agency partners and made publicly available through reports hosted online.

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Attachment A: Project Budget Spreadsheet
Environment and Natural Resources Trust Fund
M.L. 2020 Budget Spreadsheet
Legal Citation:
Project Manager: Terin Mayer
Project Title: Assessing the Value of Green Infrastructure within Minnesota's Water Infrastructure Funding Shortfall
Organization: Humphrey School of Public Affairs, University of Minnesota
**Project Budget:** $ 384,923
Project Length and Completion Date: June 30, 2023 (3 yrs)
Today's Date: 4-15-2019

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Budget	Amount Spent	Balance
BUDGET ITEM			
Personnel (Wages and Benefits)	$ 382,423	$ -	$ 382,423
Dr. Bonnie Keeler / Co-PI, $25,338 (4% salary 1.3% benefits), 4% FTE each year for 3 years			
Dr. Zhirong (Jerry) Zhao / Co-PI, $26,275 (4% salary 1.3% benefits), 4% FTE each year for 3 years			
Keeler Lab / Grand-funded Senior Scientist, $146,400 (50% salary 13.6% benefits), 50% FTE each year			
Zhao Lab / Grant Funded Research Staff, $49,787 (25% salary 6.8% benefits), 25% FTE each year for 3			
Terin Mayer / Graduate Research Assistant, $134,624 (50% salary 100% benefits), 50% FTE each year			
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			
Travel to city, county and regional water infrastructure facilities, for capital spending document review, approximately 5 trips, average of 75 miles each. Per UMN travel policy.	$ 1,000	$ -	
Other			
Publications fees	$ 1,000	$ -	
Presentation costs at MN Water Resource Conference	$ 500	$ -	
COLUMN TOTAL	$ 384,923	$ -	$ 382,423

SOURCE AND USE OF OTHER FUNDS CONTRIBUTED TO THE PROJECT	Status (secured or pending)	Budget	Spent	Balance
Non-State:		$ -	$ -	$ -
State:		$ -	$ -	$ -
In kind:		$ -	$ -	$ -

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

Assessing the Value of Green Infrastructure within Minnesota's Water Infrastructure Funding Shortfall

We propose a state-wide study of the potential role of green infrastructure — the economic value of services provided by natural systems — in addressing Minnesota's estimated $7.5 billion water infrastructure gap. We aim to assess the infrastructure need and local funding capacity of each of the state's 6,787 community water systems. By providing cost comparisons for traditional and nature-based wastewater and drinking water infrastructure as well as co-benefits of these systems, we aim to identify the public savings from preserving, protecting, and enhancing Minnesota's natural systems.

Water Systems
- Surface Water
- Groundwater
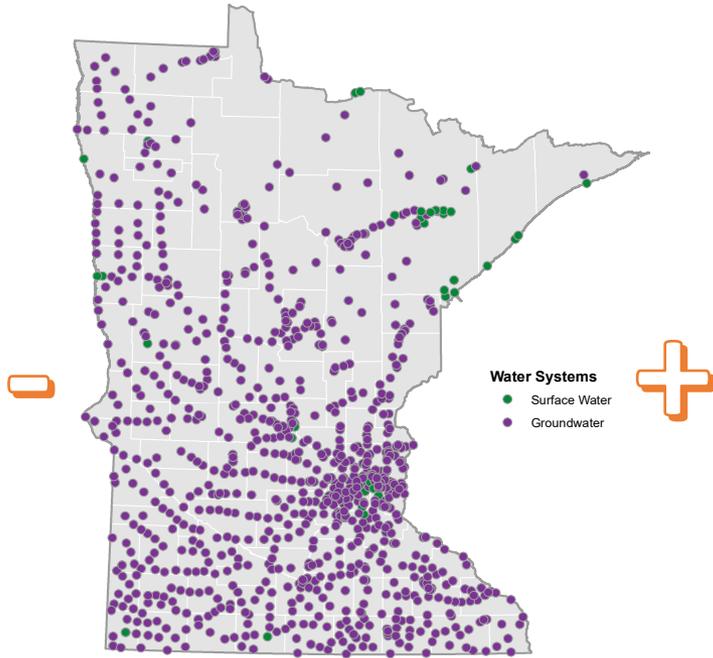
Between drinking water (above) and waste water systems, there are 6,787 community water systems in the state. Source: MDH.

Document, assess, estimate water infrastructure funding need & local government funding capacity
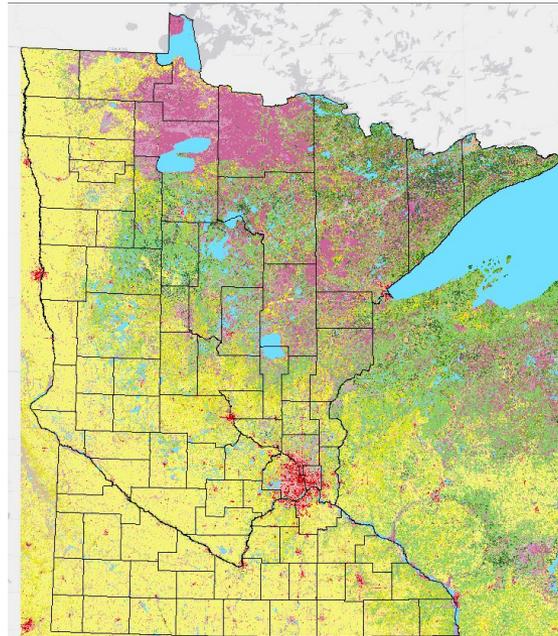
USGS data shows a diversity of land-cover in Minnesota. Some, like perennials, riparian buffers, and restored wetlands can mitigate treatment costs.

Identify & value green infrastructure potential (flood mitigation, water filtration, groundwater recharge, etc.)

New data on green infrastructure potential at an actionable scale for cities, counties, and special districts.

Estimate & communicate public savings from preserving, protecting, conserving, enhancing natural systems

05/12/2019

Proposal Title: Assessing the Value of Green Infrastructure within Minnesota's Water Infrastructure Funding Shortfall

Project Manager: Terin Mayer, Humphrey School of Public Affairs, Center for Science, Technology, and Environmental Policy, University of Minnesota

Terin Mayer comes to academia with over 10 years of nonprofit and academic project management experience. In his nonprofit work he has successfully built high-functioning teams, managing a group of 20 volunteers that coordinated another 150 people in civic engagement activities. He was also a project manager for the Climate Impact Lab, a multi-university research collaborative, where he helped coordinate four professors and a team of 20 full and part time research staff.

Research Co-Investigators

Dr. Jerry "Zhirong" Zhao is an associate professor of public administration. His research focuses on public budgeting and finance, in particular how local governments generate sufficient revenue under ever-increasing constraints; how state and local fiscal structures affect the pattern and effectiveness of public service delivery; and how public and nonprofit organizations interact with each other in budgetary and service decision making. Jerry holds a PhD in Public Administration from the University of Georgia and earned bachelor's and master's degrees in Urban Planning from Tongji University (China). Dr. Zhao is the Director the Institute for Urban & Regional Infrastructure Finance.

Dr. Bonnie Keeler is an Assistant Professor at the Humphrey School of Public Affairs at the University of Minnesota and a researcher in the Center for Science, Technology, and Environmental Policy. Keeler is a nationally recognized leader in the assessment and valuation of ecosystem services, and a faculty collaborator of [Natural Capital Project](#) – a between Stanford University, the Nature Conservancy, and the World Wildlife Fund. Keeler's particular expertise is in better understanding and capturing the multiple values of clean water using biophysical and economic approaches. She also oversees projects on the recreation and mental health benefits of urban parks, the costs and benefits of conservation and restoration, and the sustainable management of agricultural landscapes. Keeler earned her Ph.D. in Natural Resources Science and Management from the University of Minnesota with an emphasis in Economics, Policy, Management, and Society.

Institutional information: The Humphrey School of Public Affairs, University of Minnesota

As one of the country's top 10 professional public policy and planning schools, the Humphrey School of Public Affairs prepares students and supports research that promotes the common good in a diverse and changing world. The School is home to eight policy research centers that lead cutting-edge research on issues ranging from politics and governance to urban and regional planning to technology and environmental sustainability. The Humphrey School will provide office, computing, technological, and administrative support for the proposed research.