Environment and Natural Resources Trust Fund
2017 Request for Proposals (RFP)

Project Title: **ENRTF ID: 002-A**

What are the Public Benefits of Protecting Sourcewater?

Category: A. Foundational Natural Resource Data and Information

Total Project Budget: $ 320,000

Proposed Project Time Period for the Funding Requested: 2 years, July 2017 – June 2019

Summary:

Updated maps and data quantifying sourcewater risks, ecosystem service valuation of clean water, and analyses of equity and community capacity will improve decisions about the protection and management of sourcewater.

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Sponsoring Organization: U of MN

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Location

Region: Statewide

County Name: Statewide

City / Township:

Alternate Text for Visual:

Map of Minnesota showing the location of all drinking water supply management areas.

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

PROJECT TITLE: What are the public benefits of protecting sourcewater?

I. PROJECT STATEMENT

Access to clean safe water is essential for promoting health, recreation, and economic development. However, we systematically *undervalue* our water resources leading to the overuse of water or degradation of water quality. Approximately 75% of Minnesota households rely on groundwater for household use and the majority of the land area supplying these families with drinking water is under private ownership. Land use and management in sourcewater areas, particularly actions that increase nutrients and other contaminants, impacts the health and welfare of millions of Minnesotans. Agency leaders and Gov. Dayton have identified an urgent need to better understand and articulate the ***true value of clean water*** and develop practical approaches to apply this information to decisions about the protection and management of our water resources. The proposed project will focus on the 1.22 million acres in Minnesota designated as sourcewater protection areas with investments in three activities:

1) Mapping land use change and risks to clean water for all 584 drinking water management areas.
2) Valuation of the multiple public benefits of land protection for clean water.
3) Assessment of the equity implications of sourcewater protection and community capacity to protect land and improve water quality.

These activities will highlight potential risks and opportunities to protect water quality and provide multiple public benefits, identify financial practices or incentive programs that protect the value of clean water, and build capacity among citizens and decision-makers to take action in sourcewater protection areas to improve water quality.

II. PROJECT ACTIVITIES AND OUTCOMES

Budget: $99,000

Activity 1: Mapping land use change and risks to clean water

In partnership with the Minnesota Department of Health (MDH), we will conduct a comprehensive risk assessment for all 584 drinking water supply management areas in Minnesota. We will improve and expand upon MDH's current approach to risk assessment by including new data on land use change and other potential threats to water quality or quantity. We will also assess how changing assumptions about vulnerability class and travel time of pollutants currently used by MDH affect the acreage of lands needing protection and potential costs. These activities will expand upon and enhance tools used by MDH to map sourcewater areas and identify risks to water quality.

Outcome	Completion Date
1. New risk maps and data on future land use trends and threats in each of the 584 sourcewater areas.	January 2018
2. Evaluation of current MDH approaches to assessing sourcewater vulnerability and recommendations for improved management and delineation of management areas. For example, we will evaluate how MDH estimates the travel time for pollutants and produce updated maps of sourcewater protection areas based on different assumptions of travel time and geologic vulnerability.	June 2018

Activity 2: Valuation of the multiple public benefits of clean water **Budget: $101,000**

By not fully accounting for the value of clean water and land protection, we risk undervaluing and mismanaging our natural capital. We will build on ten years of experience at the Natural Capital Project to advance our understanding of the multiple public benefits or "ecosystem services" associated with land protection or restoration with a focus on the value of clean water. We will assemble a comprehensive dataset on avoided treatment costs for nitrate and other contaminants and estimate the economic value of agricultural production in each sourcewater area. We will also quantify other valuable public benefits related to recreation and tourism,

cultural identity, wildlife and aquatic habitat, and reduced soil loss and erosion. These activities will help to illuminate the true value of clean water and identify how this information can inform decisions ranging from payment programs or incentive schemes to evaluating the return on investment in land protection.

Outcome	Completion Date
1. Collection, visualization, and dissemination of ecosystem services valuation data for each sourcewater area (agricultural production, agricultural management practices, treatment costs, health, property values, recreation and tourism, cultural identity, habitat).	January 2018
2. Data and summary reports on the costs and public benefits associated with clean water and land protection and recommendations for mainstreaming these values in policy and agency decision making.	December 2018

Activity 3: Assessment of equity and community capacity **Budget: $120,000**

The costs of water pollution disproportionately affect rural, low income, and culturally isolated populations. We will combine census data on demographics, income, and immigrant populations with the data collected in Activities 1 & 2 to quantify the equity implications of alternative protection strategies for clean water. We will also conduct a series of focus groups and surveys across a geographically and demographically diverse sample of households to examine how different subpopulations use and value water, perceive water risk, and engage in water and land protection. We will identify opportunities for and constraints to water protection.

Outcome	Completion Date
1. Report of the equity implications of alternative water management strategies, including how different communities use and value clean water. The report will include maps and planning tools that can be used to inform future investments in sourcewater protection.	January 2019
2. Surveys and focus groups in communities identified as "at-risk" based on Activity #1 that reveal how different subgroups use and value water, perceive risk, and engage in protection. Results will be synthesized in a report identifying constraints to and opportunities for sourcewater protection based on community assessments.	June 2019

III. PROJECT STRATEGY

A. Project Team/Partners

The project will be led by Dr. Keeler, Director and Lead Scientist of the Natural Capital Project at the University of Minnesota's Institute on the Environment and Dr. Davenport, Associate Professor in Forest Resources at the University of Minnesota. The project will support several new positions, including a project coordinator, research analyst, four summer interns recruited from local colleges or universities, and one graduate research assistant. The project was developed in partnership with the Minnesota Department of Health and will be conducted in close collaboration with agency partners.

B. Project Impact and Long-Term Strategy

This project is a stand-alone effort and not part of a longer-term funding request, although it builds and expands on a current LCCMR project led by Keeler, Brauman, and Twine entitled "Assessing Water Scarcity and Threats". The project also leverages a 2015 statewide assessment of Soil and Water Conservation District capacity to protect groundwater conducted by Pradhananga, Davenport, and Perry and funded by the Minnesota Department of Natural Resources. The project outcomes include detailed assessments of risks to clean water and the value of sourcewater protection in Minnesota. In addition, the project will highlight the importance of considering equity and understanding local capacity in key sourcewater areas for community-based land protection for clean water. All data generated as part of the project will be shared with agency partners and made publicly available through publication in a peer-reviewed open access journal.

C. Timeline Requirements

The proposed work will begin July 2017 and continue for 24 months.

2017 Detailed Project Budget

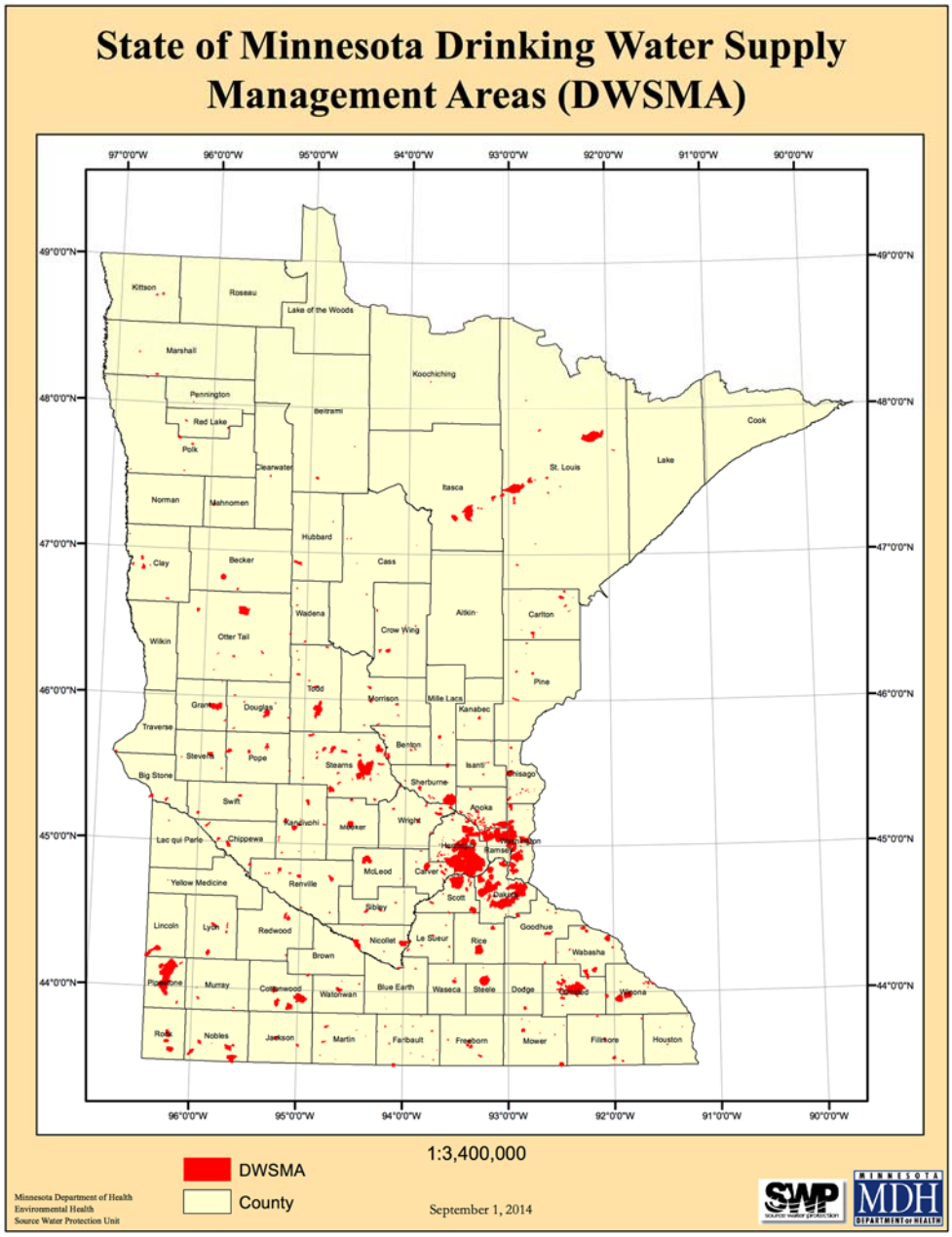
Project Title: ***What are the public benefits of protecting sourcewater?***

IV. TOTAL ENRTF REQUEST BUDGET: 2 years

BUDGET ITEM	AMOUNT
Personnel	
Lead Scientist: Salary and fringe (33.7%) for Keeler for two years (PI; 0.25 FTE)	$ 61,000
Faculty: One month of faculty salary and fringe (33.7%) for Davenport in year two (Co-PI; 0.1 FTE)	$ 16,000
Research Support: Salary and fringe (27.4%) for one Project Coordinator (0.25 FTE) and one Research Analyst (1.0 FTE) in each of two years to support project management, reporting, data collection, spatial mapping, and biophysical and economic analysis.	$ 149,000
Graduate Assistant: Salary and fringe for one University of Minnesota graduate student at 50% FTE for one year. Graduate fringe is budgeted at 83% of salary and includes tuition for the academic year, health care for the fiscal year and social security and Medicare for 6.5 pay periods (summer).	$ 43,000
Summer Internships: Summer support for undergraduate interns for 2 students in each project year at $12/hr for 300 hours total per intern per summer	$ 15,000
Equipment/Tools/Supplies: Survey printing and mailing (4500 surveys with cover letters and postage-paid return envelopes; 3 waves of mailing), focus group room rental and hospitality, focus group supplies. Publication fees for disseminating project results in peer-reviwed open access journal ($3,000) and presentation at annual Minnesota Water Resources Conference	$ 28,000
Travel: Travel within Minnesota. These funds will be used to pay mileage (75%) and per diem costs (25%) for researchers and graduate students. Assumes $400 per trip with three trips per project year for three people	$ 8,000
TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =	$ 320,000

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State $ To Be Applied To Project During Project Period: The Institute on the Environment, University of Minnesota, has supported and will continue to support research and outreach activities conducted by the Natural Capital Project. The IonE funding is not dedicated or commited specifically to this proposal, but can support research, software, data hosting and complimentary activities. Total funding for this project to date is $1.0 million, with an additional $125,000 projected for FY17 and FY18.	N/A	Secured
Other State $ To Be Applied To Project During Project Period:	N/A	N/A
In-kind Services To Be Applied To Project During Project Period: The University of Minnesota's Facilities and Administrative rate is 53% of modified total direct costs (total direct less graduate student fringe, capital equipment, subawards over $25,000 and on-site facilities rental). The amount, if F&A expenses would have been allowed on the project, would be $169,600. The University will provide office space, IT services, and administrative / financial services in support of the project.	$169,600	Secured
Funding History: N/A	N/A	N/A
Remaining $ From Current ENRTF Appropriation: $234,936 - ENRTF for 2015-04a" Informed water management: Mapping scarcity, threats, and values" The proposed work leverages an existing LCCMR appropriation awarded July 2015 to PI's Keeler, Brauman, and Twine. The project has $190,000 remaining in the budget as of January 2016 and the project has an end date of June 30th 2018. The existing appropriation will generate statewide maps and data on future precipitation, temperature, and water scarcity that will inform the sourcewater risk assessments proposed in this study.	$190,000	Unspent



Project Visual: Map of active Drinking Water Supply Management Areas (DWSMA) in Minnesota, referred to in the proposal as "sourcewater areas". Boundaries for each DWSMA are defined based on an assumption of a ten-year travel time for contaminants to reach water supplies. Some experts have suggested that a fifty-year travel time assumption is more appropriate. We will apply varying assumptions about sourcewater travel time and vulnerability to delineate new boundaries for each DWSMA and combine with information on water risks due to land conversion. These maps and data are essential to communities in developing their sourcewater protection plans. However, lack of resources and capacity often limits the implementation of local measures to protect water and communities are not always aware of threats to their water supply or the true value of sourcewater protection. The proposed work will address data gaps on water risks and economic analyses of the multiple benefits of sourcewater protection and assess community capacity to implement changes on the ground.

Proposal Title: What are the public benefits of protecting sourcewater?

Project Manager: Dr. Bonnie Keeler, Institute on the Environment, University of Minnesota

Dr. Keeler is a nationally recognized leader in the assessment and valuation of ecosystem services. At the University of Minnesota's Institute on the Environment, Dr. Keeler oversees the Natural Capital Project – a collaborative partnership between the University of Minnesota, Stanford University, the Nature Conservancy, and the World Wildlife Fund. As Program Director and Lead Scientist, Keeler directs a team of experts in ecology, economics, and software development seeking to better communicate and quantify the value of nature. In collaboration with local and international partners, the Natural Capital Project has elevated the value of ecosystem services in decisions at local to regional scales, developed models and tools to support better management of agricultural and forested landscapes, and advanced the research and implementation of nature-based solutions around the world.

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: Institute on the Environment, University of Minnesota

The mission of the Institute on the Environment is to discover solutions to Earth's most pressing environmental problems by conducting transformative research, developing the next generation of global leaders and building world-changing partnerships. The Institute supports programs addressing global food and agricultural systems, ecosystem services, water resources, sustainable enterprise, and environmental leadership.