# Environment and Natural Resources Trust Fund

2027 Request for Proposal

## General Information

**Proposal ID:** 2027-475

**Proposal Title:** Minnesota Resilience Accelerator: Nature-Based Watershed Planning

## Project Manager Information

**Name:** Nfamara K Dampha

**Organization:** U of MN - College of Food, Agricultural and Natural Resource Sciences

**Office Telephone:** (612) 814-3930

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## Project Basic Information

**Project Summary:** Develop decision tools (Nature-Based Investment Navigator) that help watershed managers identify flood risks, evaluate nature-based solutions, and guide resilient land and water management investments that protect communities, and working lands

**ENRTF Funds Requested:** $299,000

**Proposed Project Completion:** June 30, 2030

**LCCMR Funding Category:** Small Projects (G)

**Secondary Category:** Resiliency (A)

## Project Location

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

Statewide

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

Statewide

**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.**

Minnesota's rivers, wetlands, and agricultural landscapes face increasing flood risks due to more frequent heavy precipitation and changing land use. These trends place growing pressure on water resources, working lands, infrastructure, and downstream communities. Climate assessments show increasing extreme precipitation across watersheds connected to the Mississippi River system (NOAA, 2022). The scale of potential impacts was demonstrated by the 2019 flooding across the Mississippi, Missouri, and Arkansas river systems, which affected 19 states and caused approximately $20 billion in damages (WRI, 2025).

Despite improved precipitation datasets such as NOAA Atlas 14, many watershed planning decisions still rely on historical assumptions rather than forward-looking climate scenarios (NOAA, 2013; NOAA, 2025). As a result, watershed districts and natural resource agencies often lack practical tools to translate climate and hydrologic data into actionable land and water management decisions.

Nature-based solutions such as wetlands, floodplains, and riparian systems can reduce flood risks while improving water quality, soil health, and habitat (Opperman et al., 2009; Ruangpan et al., 2024). However, decision-makers often lack clear information about where these strategies will deliver the greatest benefits. This project addresses this gap by developing a decision-support tool that helps watershed managers identify flood vulnerabilities and prioritize NbS investments.

**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.**

This project will develop practical decision-support tools that help Minnesota watershed managers identify flood risks and prioritize nature-based solutions that strengthen climate resilience and protect natural resources. The project will focus on pilot watersheds in the Lower Minnesota River and Cannon River systems, where agricultural land use, hydrologic change, and ecosystem-service potential intersect.

First, the project will integrate existing climate, flood hazard, land-use, and watershed datasets, to produce spatial maps identifying flood-risk hotspots and natural resource vulnerabilities (NOAA, 2022). These maps will help watershed districts and agencies identify areas where flooding threatens wetlands, agricultural lands, water resources, and communities.

Second, the project will evaluate nature-based and hybrid flood mitigation strategies, including wetland restoration, floodplain reconnection, riparian buffers, and soil conservation practices—using ecosystem service modeling tools such as the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) model (Sharp et., al., 2026) and Pollutant Load Estimation Tool (PLET), 2025. These analyses will estimate flood regulation benefits, avoided damages, and environmental co-benefits of alternative land management scenarios (Ruangpan et al., 2024).

Finally, the project will translate results into practical decision tool—a Nature-Based Investment Navigator, scenario maps, and resilience playbooks, to support watershed planning and resilience building and strengthened supply chain.

**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 produce decision-support tools that help Minnesota watershed managers identify flood-risk areas and prioritize nature-based solutions that protect and enhance natural resources. Expected outcomes include spatial maps identifying flood vulnerabilities affecting wetlands, rivers, and agricultural lands; analysis of nature-based strategies such as wetland restoration, floodplain reconnection, and riparian buffers; and practical planning tools that guide watershed investments. This will help agencies target conservation actions where they provide the greatest benefits. In doing so,

the project will support improved water quality, soil health, habitat protection, and long-term resilience of Minnesota's watersheds and natural landscapes.

## Activities and Milestones

### Activity 1: Map Flood Risk and Natural Resource Vulnerabilities in Minnesota Pilot Watersheds

**Activity Budget:** $90,000

**Activity Description:**
This activity will identify locations where flooding and land-use change pose the greatest risks to Minnesota's natural resources and communities. The project team will compile and integrate statewide datasets on precipitation, flood hazards, land use, soils, topography, and watershed conditions. Key datasets will include NOAA Atlas 14 precipitation data, Minnesota flood hazard maps, land cover datasets, watershed monitoring data, and agricultural land-use information.

Using geospatial analysis and watershed modeling tools, we will produce spatial maps identifying flood-risk hotspots and areas where wetlands, rivers, agricultural lands, and infrastructure are vulnerable to heavy precipitation and runoff. Particular attention will be given to pilot watersheds in the Lower Minnesota River and Cannon River systems, where agricultural land use and hydrologic change intersect with opportunities for nature-based solutions.

The resulting vulnerability maps and datasets will provide a science-based foundation for identifying priority areas where flood mitigation, wetland restoration, riparian buffers, or other watershed management strategies can reduce risks to Minnesota's natural resources. These results will guide the evaluation of nature-based mitigation strategies in Activity 2 and support practical planning decisions by watershed districts and state agencies.

**Activity Milestones:**

| Description | Approximate Completion Date |
|---|---|
| Compiled flood, climate, land-use, and watershed datasets for pilot watersheds | March 31, 2028 |
| Developed flood risk and natural resource vulnerability maps | September 30, 2028 |
| Produced watershed vulnerability assessment identifying priority intervention areas | December 31, 2028 |

### Activity 2: Evaluate Nature-Based and Hybrid Flood Mitigation Strategies

**Activity Budget:** $109,000

**Activity Description:**
This activity will evaluate nature-based and hybrid strategies that reduce flood risks while enhancing Minnesota's natural resources. Building on the vulnerability analysis from Activity 1, the project team will assess where nature-based solutions can most effectively reduce flood impacts while providing additional environmental benefits. The analysis will focus on pilot watersheds in the Lower Minnesota River and Cannon River systems, where agricultural land use and watershed dynamics create opportunities for flood mitigation and landscape restoration.

Using ecosystem service modeling tools such as the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) model, we will quantify the flood regulation benefits provided by wetlands, floodplains, riparian buffers, and soil conservation practices. The modeling will estimate how these natural systems influence runoff, water retention, sediment transport, and downstream flood risks under different land management scenarios.

The project will also evaluate hybrid strategies that combine natural infrastructure with traditional flood mitigation approaches. For example, the analysis will examine how wetland restoration, floodplain reconnection, riparian habitat restoration, and soil conservation practices can complement existing watershed infrastructure and land management strategies.

Results will be synthesized into a Nature-Based Investment Navigator, a decision-support framework that compares natural and engineered flood mitigation options.

**Activity Milestones:**

| Description | Approximate Completion Date |
|---|---|
| Developed ecosystem-service models for flood regulation and sediment retention | June 30, 2028 |
| Evaluated nature-based flood mitigation scenarios in pilot watersheds | December 31, 2028 |
| Developed Nature-Based Investment Navigator comparing avoided damages and costs | June 30, 2030 |

## Activity 3: Deliver Decision Tools and Resilience Planning Resources for Minnesota Watersheds

**Activity Budget:** $100,000

**Activity Description:**
This activity will translate project findings into practical decision-support tools that watershed districts, state agencies, and land managers can use to reduce flood risks and strengthen climate resilience. Building on the vulnerability mapping and mitigation analysis from Activities 1 and 2, the project team will work with watershed districts, particularly, Lower Minnesota, NGOs (i.e., Rainbow Research), and community partners (Clean River Partners) to co-develop tools that support real-world planning and investment decisions.

Key outputs will include scenario maps that identify priority locations where wetlands, floodplains, riparian buffers, and other natural infrastructure can reduce flood risks and improve water quality. The project will also develop resilience playbooks that provide step-by-step guidance for integrating nature-based solutions into watershed planning, conservation programs, and infrastructure decision-making.

An interactive online dashboard/storymap will present project results in a user-friendly format, allowing decision-makers to explore flood risk maps, evaluate mitigation scenarios, and compare natural and hybrid solutions. Through a stakeholder workshop and partner engagement, the project will ensure that these tools meet the needs of Minnesota watershed managers and support long-term planning for flood resilience, natural resource protection, and sustainable watershed management across the state.

**Activity Milestones:**

| Description | Approximate Completion Date |
|---|---|
| Conducted a stakeholder workshop with watershed districts and partners | December 31, 2028 |
| Developed resilience playbooks and interactive decision-support dashboard/storymap | June 30, 2029 |
| Delivered final guidance report and statewide decision-support tool (MRA pilot) | May 31, 2030 |

## Dissemination

**Describe your plans for dissemination, presentation, documentation, or sharing of data, results, samples, physical collections, and other products and how they will follow ENRTF Acknowledgement Requirements and Guidelines.**
Project findings, data products, and decision-support tools will be shared with watershed managers, state agencies, conservation organizations, and Minnesota communities to support improved management of natural resources and climate resilience planning.

Throughout the project, the team will engage watershed districts, partner organizations, and state agencies through stakeholder workshop and technical meetings in the Lower Minnesota River and Cannon River pilot watersheds. These workshops will ensure that project results are accessible and directly relevant to watershed planning and conservation decisions.

Project outputs, including flood risk maps, mitigation scenario analyses, resilience playbooks, and the Nature-Based Investment Navigator, will be shared through a publicly accessible online platform hosted by the University of Minnesota's Natural Capital Project (NatCap TEEMs). All spatial datasets and modeling documentation will be made available for use by Minnesota watershed districts and agencies to support ongoing planning and implementation.

Results will also be disseminated through presentations at regional water and natural resource conferences (e.g., Minnesota Water Resources Conference, BWSR Academy, MN Watersheds Expo) and through technical and peer-reviewed publications. Partner organizations will help share findings with landowners, watershed groups, and conservation practitioners.

All project communications, publications, and digital products will acknowledge support from the Environment and Natural Resources Trust Fund (ENRTF) and include the required attribution language and logo.

## 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?**
Project results will be implemented through Minnesota watershed planning and conservation programs. Pilot watershed findings from the Lower Minnesota River and Cannon River watersheds will inform One Watershed One Plan (1W1P) implementation coordinated by the Minnesota Board of Water and Soil Resources (BWSR). The project will identify priority locations for wetland restoration, floodplain reconnection, and riparian buffers that can be implemented through existing funding programs including BWSR Clean Water Fund implementation grants, the Reinvest in Minnesota (RIM) Reserve program, Minnesota DNR flood hazard mitigation programs, MPCA WRAPS implementation funding, and federal programs such as USDA NRCS Regional Conservation Partnership Program.

## Project Manager and Organization Qualifications

**Project Manager Name:** Nfamara K Dampha

**Job Title:** Lead Natural Resources Scientist and Research Center Director

**Provide description of the project manager's qualifications to manage the proposed project.**
Dr. Nfamara K. Dampha is Lead Natural Resources Scientist and Director of the Natural Capital Project's Earth–Economy Modelers (NatCap TEEMs) Center in the Department of Applied Economics at the University of Minnesota. His research

focuses on natural capital accounting, ecosystem service modeling, climate adaptation, and sustainability science, with an emphasis on integrating ecological and economic analysis to support natural resource management and environmental decision-making.

Dr. Dampha has more than 15 years of experience leading interdisciplinary research and policy initiatives with universities, governments, nonprofit organizations, and international institutions. He serves as a Senior Climate Change Consultant with the World Bank, contributing to climate resilience, watershed management, and environmental policy initiatives in multiple regions. His work integrates geospatial analysis, ecosystem service modeling, and stakeholder engagement to support practical decision-making for climate adaptation, water resource management, and sustainable land use.

At the University of Minnesota, Dr. Dampha leads interdisciplinary collaborations that quantify the environmental and economic value of natural systems and translate scientific knowledge into decision-support tools for policymakers and natural resource managers. He is currently a PI or Co-PI on grant awards totaling $679,930 and has technically supported US$125,000,000 climate and nature-based investment projects funded by the World Bank in Burundi and Gambia. His experience coordinating interdisciplinary research teams and working with watershed organizations, government agencies, and community partners positions him well to lead the proposed project and ensure its successful implementation.

**Organization:** U of MN - College of Food, Agricultural and Natural Resource Sciences

**Organization Description:**
The University of Minnesota is a leading public research university with internationally recognized expertise in environmental science, agriculture, natural resource management, and sustainability research. Within the University, the College of Food, Agricultural and Natural Resource Sciences (CFANS) and the Department of Applied Economics provide interdisciplinary research capacity to address major environmental and agricultural challenges facing Minnesota and the world.

The Natural Capital Project's Earth–Economy Modelers (NatCap TEEMs) center at the University of Minnesota advances research on ecosystem services, natural capital accounting, and sustainability science. The center develops analytical tools and interdisciplinary research to quantify the value of nature in economic and policy decision-making. Through partnerships with scientists, policymakers, and community organizations, NatCap TEEMs supports research that informs sustainable land management, climate resilience, and environmental governance at local, regional, and global scales.

## Budget Summary

| Category / Name | Subcategory or Type | Description | Purpose | Gen. Ineligible | % Benefits | # FTE | Classified Staff? | $ Amount |
|---|---|---|---|---|---|---|---|---|
| **Personnel** | | | | | | | | |
| Lead Natural Resources Scientist | | Principal Investigator: Project leadership; leads Activities 2 and 3; modeling, analysis, reporting | | | 36.6% | 0.63 | | $106,000 |
| Postdoctoral Associate | | Leads modeling and spatial analysis; leads Activity 1 and contributes to activity 2, data processing, geospatial analysis, dashboard support | | | 26.1% | 0.57 | | $52,000 |
| Project Manager | | Supporting PI with coordination, stakeholder engagement, workshop organizing, reporting, | | | 24.2% | 0.5 | | $56,000 |
| | | | | | | | **Sub Total** | **$214,000** |
| **Contracts and Services** | | | | | | | | |
| Lower Minnesota River Watershed District (LMRWD) | Service Contract | Watershed technical coordination ($8,000); Scenario co-design workshops ($5,000); Watershed planning integration into planning processes such as 1W1P and local watershed strategies ($7,000); Data sharing and technical review including provision of watershed datasets and review of modeling outputs ($5,000). | | | | 0.3 | | $25,000 |
| Clean River Partners | Service Contract | Stakeholder engagement coordination with farmers, watershed stakeholders, and conservation partners ($8,000); Community outreach and communication including development of outreach materials and stakeholder briefings ($6,000); Watershed coordination support including meetings with watershed districts and project partners ($6,000); Implementation insights on conservation practices and watershed restoration strategies ($5,000). | | | | 0.3 | | $25,000 |
| Rainbow Research | Service Contract | Stakeholder workshop facilitation for watershed resilience planning workshops ($10,000); Workshop planning and preparation of materials and facilitation support ($5,000); Outreach and dissemination of project findings through presentations, briefings, and stakeholder communications ($5,000); Project communications support including preparation of | | | | 0.3 | | $25,000 |

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|---|---|---|---|---|---|---|---|---|
| | | resilience playbooks and public-facing materials ($5,000). | | | | | | |
| | | | | | | | **Sub Total** | **$75,000** |
| **Equipment, Tools, and Supplies** | | | | | | | | |
| | | | | | | | **Sub Total** | **-** |
| **Capital Equipment** | | | | | | | | |
| | | | | | | | **Sub Total** | **-** |
| **Acquisitions and Stewardship** | | | | | | | | |
| | | | | | | | **Sub Total** | **-** |
| **Travel In Minnesota** | | | | | | | | |
| | Miles/ Meals/ Lodging | 4 trips to pilot watersheds (Lower Minnesota River and Cannon River). Approximately 250 miles roundtrip per trip × 5 project participants, mileage reimbursement at ~$0.67/mile, plus parking and local travel costs. Estimated travel cost per trip for 5 participants ≈ $2,000. | Conduct field visits, meet with watershed district partners, review watershed conditions, validate modeling inputs, and coordinate development of flood mitigation and nature-based investment scenarios. | | | | | $6,000 |
| | | | | | | | **Sub Total** | **$6,000** |
| **Travel Outside Minnesota** | | | | | | | | |
| | | | | | | | **Sub Total** | **-** |
| **Printing and Publication** | | | | | | | | |
| | Publication | Preparation and publication of two scientific or technical publications summarizing project results; includes publication fees, figure preparation, and dissemination materials for watershed partners and agencies. | To disseminate project findings, modeling results, and decision-support tools to watershed managers, agencies, and the broader scientific and practitioner community, supporting long-term use of the | | | | | $4,000 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | project's flood resilience planning tools. | | | | | |
| | | | | | | | **Sub Total** | **$4,000** |
| **Other Expenses** | | | | | | | | |
| | | | | | | | **Sub Total** | **-** |
| | | | | | | | **Grand Total** | **$299,000** |

## 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 | Lower Minnesota River Watershed District operational resources | Additional staff time to support technical coordination, watershed data sharing, participation in scenario development workshops, and review of modeling outputs. | Secured | $10,000 |
| | | | **State Sub Total** | **$10,000** |
| **Non-State** | | | | |
| In-Kind | Clean River Partners organizational resources | Additional staff time to support stakeholder engagement support, watershed partner coordination, and input on conservation implementation strategies. | Secured | $10,000 |
| In-Kind | Rainbow Research program support | Additional staff time to support workshop facilitation support, stakeholder outreach, and dissemination of resilience planning resources. | Secured | $10,000 |
| | | | **Non State Sub Total** | **$20,000** |
| | | | **Funds Total** | **$30,000** |

**Total Project Cost: $329,000**

**This amount accurately reflects total project cost?**

Yes

## Attachments

### Required Attachments

*Visual Component*

File: b92908e6-51f.pdf

*Alternate Text for Visual Component*

The visual is an infographic summarizing the Minnesota Resilience Accelerator project. It highlights project goals to map flood risks, evaluate nature-based solutions, and develop decision tools. It shows pilot watersheds (Cannon and Lower Minnesota), environmental benefits such as flood mitigation and water quality, partner organizations, with $300,000 budget....

### Supplemental Attachments

*Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other*

| Title | File |
|---|---|
| Board Resolution Letter | 1a981431-b64.pdf |
| letter of support - Rainbow Research | cbb08fc8-d97.pdf |
| Letter of support - Lower Minnesota River Watershed District (LMRWD) | 23868502-9ab.pdf |
| Letter of support - Clean River Partners | 4a02d5f4-779.pdf |
| Media | d9a551ad-f0f.pdf |

## Administrative Use

**Does your project include restoration or acquisition of land rights?**

No

**Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?**

Yes, I understand the UMN Policy on travel applies.

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

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

**Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing $10,000 or more or large-scale stream or wetland restoration?**

No

**Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care, treatment, education, training, instruction, or recreation to children")?**

No

**Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:**

Melissa Sullivan

**Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements**

Yes, I understand