Generating revenue to finance natural infrastructure projects in the Mississippi River Basin

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Photo: U.S. Geological Survey

Background

Communities along the Mississippi River face increasing flood risks and water quality challenges.

Spanning 1.2 million square miles, encompassing 41% of the contiguous United States and receiving water from 31 states, the Mississippi River Basin (MRB) is the third largest drainage basin in the world.[1] Owing to its fertile land, the basin has become one of the most productive agricultural regions in the world. The MRB accounts for approximately 65% of the nation's harvested cropland and 92% of the United States' agricultural exports, resulting in an economic impact of more than $405 billion and supporting more than a million jobs.[2] The Mississippi River serves as a major shipping route for a host of international exports.[3] Approximately 70 million people now live within the basin with over 20 million people and 70 cities depending on the Mississippi River for drinking water.[4]

The Mississippi River provides tremendous economic, environmental and cultural value to the people who live within the basin. Yet, it is threatened by two intertwined challenges: water quality impairments and increased flooding events driven by climate change.

Water pollution from upstream agriculture, industry and cities threatens downstream communities' health and well-being. Agricultural runoff is primarily caused by the over-application of fertilizers which is lost through field drainage systems and washed downstream, causing algal blooms and impairing water for drinking, species habitat and recreation. Forty percent of the rivers and streams flowing into the Mississippi River watershed are impaired, increasing drinking water treatment costs for communities.[5]

Communities are further burdened by flood risks increased in part by overengineering of the river, population expansion into flood zones, tile drainage and most recently — climate change.[6]

1 EPA. The Mississippi/Atchafalya River Basin (MARB). Accessed 16 June 2022. https://www.epa.gov/ms-htf/mississippiatchafalaya-river-basin-marb
2 AgriMarketing. 'Mississippi River Economic Impact Exceeds $400 Billion- Twice as Much as Expected'. Published 17 June 2015. https://www.agrimarketing.com/ss.php?id=98737
3 Kolpin, Dana W. 'Importance of the Mississippi River Basin for investigating agricultural-chemical contamination of the hydrologic cycle'. Accessed 16 June 2022. https://pubs.er.usgs.gov/publication/70168344#:~:text=The%20Mississippi%20River%20Basin%20has,27%25%20of%20the%20nation%27s%20population.
4 Mcdonald, Moira. 'River at Risk: the Mississippi'. Published 9 February 2017. https://www.waltonfamilyfoundation.org/stories/k-12-education/river-at-risk-the-mississippi
5 ibid
6 Munoz, S. E., et al. 2018. Climatic control of Mississippi River flood hazard amplified by river engineering. *Nature. 556: 95-98.*

The upper MRB is projected to see increased annual precipitation and an increased frequency of peak flows through the end of the century due to climate change.[7] The 2019 flooding of the Mississippi and two of its tributaries — the Missouri and Arkansas Rivers — caused significant damage to communities, farmers and commodity export markets, totaling around $20 billion in damages. These floods impacted 19 states and some areas of Louisiana were still flooded more than six months later.[8] Barge traffic was blocked for three months, causing almost $1 billion worth of grain to go unshipped between March and June.[9] This flooding event demonstrates the immense cost of increased flood risk on the Mississippi River.

Under-resourced communities along the Mississippi River and its tributaries are particularly burdened by water quality degradation and increasing flood risks.[10, 11] Small communities face declining population bases and associated revenues needed to support municipal water utilities, which in turn are less able to make necessary upgrades to address water quality and quantity challenges. And rural homes that rely on well water are more likely to use drinking water that is contaminated with high levels of nitrates, which has been linked to several health conditions.[12]

Municipal public works managers, State Revolving Funds (SRFs), state regulatory entities and environmental NGOs can help communities achieve their water quality and flood reduction goals by investing in natural infrastructure solutions. These actors can help advance natural infrastructure solutions for water quality and flood reduction goals through their roles in identifying water infrastructure needs (municipal public works managers), financing water quality infrastructure projects (SRFs), setting clean water goals and requirements (state regulatory entities) and engaging state and local stakeholders (environmental NGOs).

Natural infrastructure can protect communities against flood risks and improve water quality.

Natural infrastructure is a critical part of the solution to address the water quality and flooding challenges in the MRB. The strategic restoration of appropriate types of natural infrastructure at a relatively modest scale could reduce flood risk and downstream nitrogen loads by 30% to 40%. This restoration would only require 1% to 5% of the Upper MRB watershed area and provide multiple other benefits to people and wildlife.[13]

The term 'natural infrastructure' refers to naturally-occurring landscape features and/or nature-based solutions that promote, use, restore, or emulate natural ecological processes and:

(A) are created and/or managed through the action or preservation of natural physical, geological, biological, and chemical processes over time; or

(B) are created and/or managed by human design, engineering, and construction to emulate or act in concert with natural processes

to provide multiple benefits for ecological and human needs that include, but are not limited to, managing storm water and runoff, attenuating flooding and storm surges, recharging aquifers, storing water, sustaining and filtering water resources, decreasing wave energy, mitigating dust pollution, and mitigating greenhouse gas emissions.

7 Demaria, E. M. C., Palmer, R. N., Roundy, J. K. 2016. Regional climate change projections of streamflow characteristics in the Northeast and Midwest U.S. *Journal of Hydrology: Regional Studies. 5: 309-323*

8 Gonzalez, Maggie and Samantha Kuzma. 'Nature-Based Flood Mitigation Can Help Mississippi River Farmers'. Published 6 July 2020. https://www.wri.org/insights/nature-based-flood-mitigation-can-help-mississippi-river-farmers

9 United States Coast Guard. 2019. Impacts of the 2019 Upper Mississippi River Flooding on barge movements in the Upper Midwest region. Accessed on 8.17.2022. https://www.dco.uscg.mil/Portals/9/Impacts%20of%202019%20UMR%20Flooding_Barge%20Movements_Fahie_1.pdf

10 Fedinick, K.P., Taylor, S., Roberts, M. 2019. Watered Down Justice. Natural Resources Defense Council, Coming Clean and Environmental Justice Health Alliance. Accessed 8.16.22. NRDC: Watered Down Justice (PDF)

11 Wing, O. E. J et al. 2022. Inequitable patterns of US flood risk in the Anthropocene. *Nature Climate Change. 12: 156-162. Accessed at:* https://www.nature.com/articles/s41558-021-01265-6.pdf

12 US Geologic Service. June 6, 2018. Contamination in U.S. Private Wells. Accessed on 8.16.22. https://www.usgs.gov/special-topics/water-science-school/science/contamination-us-private-wells

13 McLellan, E., Toombs, T., Eagle, A., Suttles, K., Noto, T., Hemler, M. Ranjan, P., Prokopy, L. 2020. *Mitigating Flood Risk and Improving Water Quality in the Upper Mississippi River Basin using Natural Infrastructure: Opportunities and Challenges.* Washington, D.C.: Environmental Defense Fund.

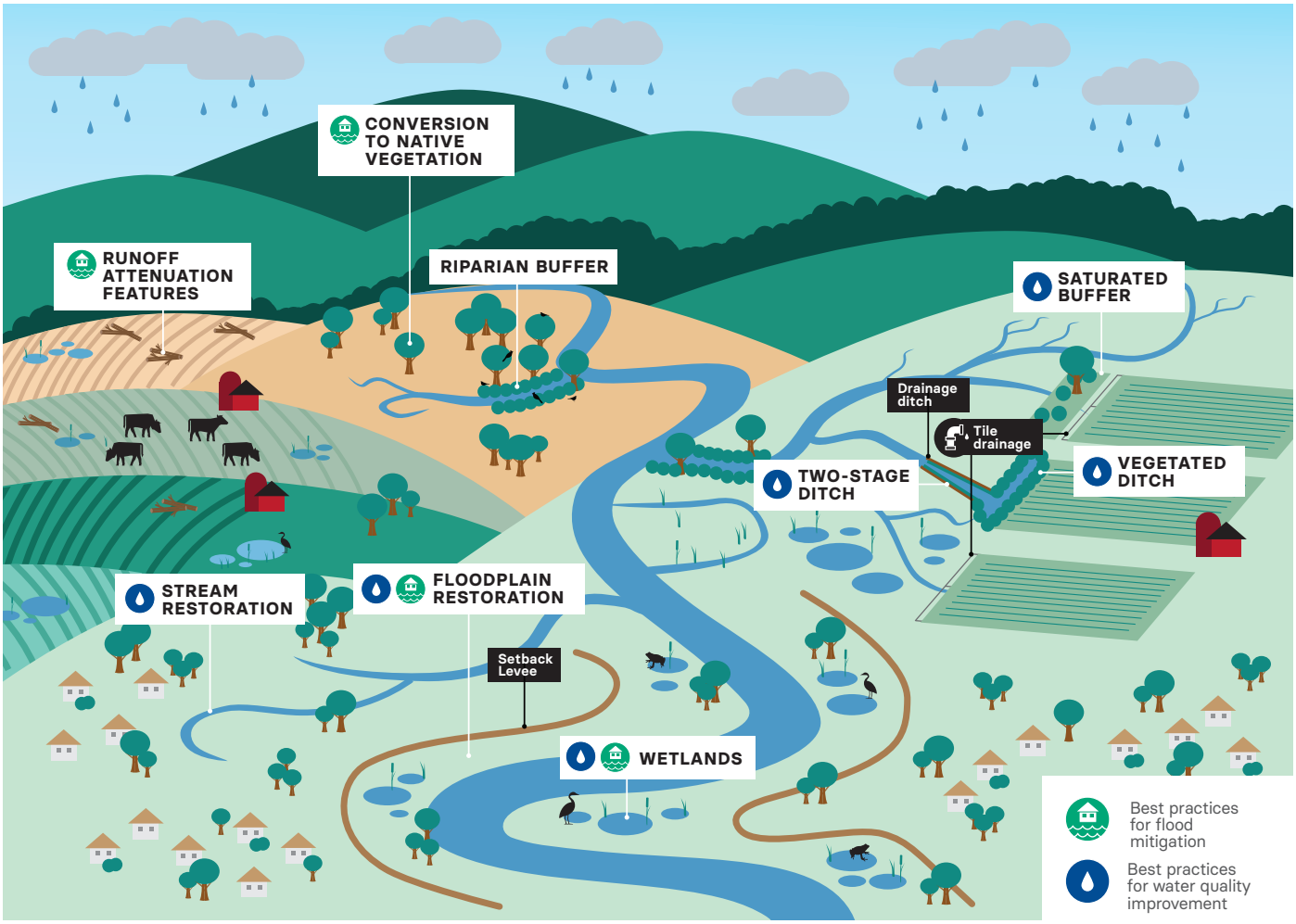


FIGURE 1: Natural infrastructure measures to reduce flooding and improve water quality across the basin

Natural infrastructure projects can independently provide downstream benefits or can support and enhance existing grey water infrastructure by filtering or holding water upstream of communities. Examples of natural infrastructure measures that can be used to improve water quality and reduce flooding include wetlands, floodplain restoration and saturated buffers (as shown in Figure 1). These natural infrastructure features are designed to restore the natural ability of the land to increase water quality and mitigate impacts to surrounding areas from severe events like storms and floods.

BOX 1

GREEN STORMWATER INFRASTRUCTURE

Green stormwater infrastructure is like natural infrastructure but is specifically used to control urban stormwater, sometimes through engineered solutions. Examples of green stormwater infrastructure include permeable pavers, rain gardens, green roofs, urban trees and pocket wetlands. Green stormwater infrastructure can decrease flooding, stormwater overflows and combined sewer overflows (CSOs) as well as reduce pollution in lakes, rivers, and aquifers, thereby making water usable for drinking or recreational purposes.[14] While the primary goal of this report is to explore enhanced investments in natural infrastructure, green stormwater infrastructure can often be a more accessible entry point to municipal investment in nature-based solutions. Green stormwater investments can be a good way for communities to engage with natural water solutions and ways to finance those solutions to eventually become comfortable enough with these solutions to seek out landscape-scale natural infrastructure projects.

14 Environmental Policy Innovation Center (EPIC). 'Financing Green Stormwater and Natural Infrastructure with Clean Water State Revolving Funds'. Accessed 16 June 2022 https://www.policyinnovation.org/publications/cwsrf-financed-gsi-ni

Natural infrastructure can be less expensive to implement than grey infrastructure expansions like wastewater treatment plant upgrades and stormwater retrofits. A review of best-agricultural management practices (BMPs) and grey infrastructure projects implemented in the Chesapeake Bay found that BMP implementation, per pound of nitrogen reduced, was as much as 10 times cheaper than wastewater plant upgrades and 40 times cheaper than stormwater retrofits.[15] Additionally, a broad array of studies support the finding that natural infrastructure is as effective at flood prevention as grey infrastructure like sea walls, levees and dams, and is often more cost-effective in construction and restoration.[16]

There are three essential components to any strategy to deploy natural infrastructure to reduce flooding and water pollution in the MRB. First, the foundational social and physical science that helps communities plan where natural infrastructure should be located and quantify its impact on water quality and quantity. Second, watershed-level approaches to build connections between communities, farmers and other relevant stakeholders for the implementation of natural infrastructure. Finally, financing for natural infrastructure to implement it in a targeted and equitable way in accordance with the watershed plan. This third component is the focus of this report.

Natural infrastructure solutions are challenging to finance.

Financing natural infrastructure projects has been a challenge for states and municipalities, despite natural infrastructure's demonstrated economic and environmental benefits. Many federal and state water quality regulations and funding programs were not designed to incentivize these natural infrastructure solutions. For example, the Clean Water Act was primarily designed to address point sources that discharge to waterways, including wastewater treatment facilities. Many decades ago, these point sources were the largest contributor to water quality degradation. Investments in point source solutions have historically consisted of grey infrastructure solutions including treatment plants and upgrades. These solutions were successful in drastically reducing point source pollution, but nonpoint source pollution, such as agriculture runoff and municipal stormwater, has emerged as the leading cause of water quality impairment in the MRB.

Management of drinking water and wastewater is conducted by publicly- and privately-owned utilities. Drinking water utilities treat local lake and river water or groundwater and distribute the potable water to homes, businesses, schools and other users. Wastewater utilities capture wastewater from homes and businesses and treat the wastewater before it is safely released back into the environment. Across the MRB, municipalities face escalating costs in maintaining and upgrading existing water infrastructure to remove contaminants from drinking water.

Utilities pay for their day-to-day operations, infrastructure upgrades and new projects with user fees. The fees are collected from the people and businesses who use their services. Some projects and upgrades require significant investment that can be financed with federal and state loans provided through the EPA Clean Water State Revolving Fund (CWSRF) or Drinking Water State Revolving Fund (DWSRF). The revenue generated by user fees is then used by stormwater and wastewater utilities to pay back loans from SRFs. These loan payments to the SRF are then available to lend again to support new projects, creating the revolving mechanism.

The CWSRF program finances projects that improve water quality and public health. The program has played a key role in improving water quality in the United States by financing more than 44,500 projects since 1987. The CWSRF program provides EPA grants to state agencies in charge of administering the program. The EPA funds are matched by a 20% state investment. The state program provides loans to applicants to complete water quality projects such as wastewater treatment, stormwater and other natural infrastructure projects.[17]

15 Jones, Cy, et al. How Nutrient Trading Could Help Restore the Chesapeake Bay. World Resources Institute , 2010, www.wri.org/publication/how-nutrient-trading-could-help-restore-chesapeake-bay

16 Glick, P., E. Powell, S. Schlesinger, J. Ritter, B.A. Stein, and A. Fuller. 'The Protective Value of Nature: A Review of the Effectiveness of Natural Infrastructure for Hazard Risk Reduction.' National Wildlife Federation, Washington DC. Accessed 16 June 2022. https://legacy-assets.eenews.net/open_files/assets/2020/06/05/document_cw_03.pdf

17 US EPA. Clean Water State Revolving Fund. Accessed on August 17th, 2022. https://www.epa.gov/cwsrf

The vast majority of CWSRF funds go to traditional grey infrastructure. From 2016 to 2020, states allocated 3% of CWSRF commitments to green stormwater infrastructure and natural infrastructure.[18] Natural infrastructure investments have been more difficult for municipalities to finance with SRF loans than traditional grey infrastructure investments for several reasons. One challenge is the pervasive perception that natural infrastructure may be less proven than familiar grey infrastructure approaches. Another challenge is that grey infrastructure solutions are the familiar "go-to" solutions for public works managers, the engineer consultants they hire and SRF directors that finance projects. Often, these critical actors have not been trained on or worked directly on natural infrastructure projects, which creates an added element of perceived risk and an additional learning curve. In addition, many municipalities assume that only grey approaches can be used to meet permit requirements.

The final challenge to financing natural infrastructure projects for water quality improvements and flood risk reductions has been the lack of replicable forms of revenue generation. Financing requires clearly defined revenue streams to finance the investment. Without consistent and scalable forms of revenue generation, MRB municipalities can't tap into the SRF loans that are their primary mode of financing and thus can't install natural infrastructure at scale.

This report aims to address this barrier by identifying five replicable forms of revenue generation for natural infrastructure investments in the MRB and sharing examples of how each has been used in communities across the country. The report seeks to inform municipal public works managers, SRFs, state regulatory entities and environmental NGOs on these forms of revenue generation for natural infrastructure projects to help them take advantage of historic federal funding opportunities to finance natural infrastructure projects including the Bipartisan Infrastructure Law and the STORM Act.

BOX 2

THE BIPARTISAN INFRASTRUCTURE LAW PROVIDES A UNIQUE OPPORTUNITY TO INVEST IN WATER QUALITY AND FLOOD RISK ADAPTATION.

The Bipartisan Infrastructure Law (BIL) passed in November 2021 presents an unprecedented opportunity to fund and finance water quality improvement and flood risk reduction projects in communities along the Mississippi River. The BIL adds $11.7 billion in additional funding for the EPA Clean Water State Revolving Fund. The BIL also provides hundreds of millions of dollars in grant funding allocated to the Mississippi River mainstem states through a variety of programs. Additionally, BIL purposefully integrates natural infrastructure into other sectors, like transportation, that are typically geared towards grey infrastructure. The BIL is also required to follow President Biden's Justice40 Initiative, aimed at delivering 40% of the overall benefits of certain Federal investment programs to disadvantaged communities.[19]

Other emerging financing programs for water quality and flood risk reduction:

STORM Act

The replicable revenue streams identified in this report could also be used to finance flood risk reduction natural infrastructure projects through the resilience revolving loan funds established by the Safeguarding Tomorrow through Ongoing Risk Mitigation (STORM) Act in December 2021 and initially funded through BIL. The resilience revolving loan program will provide capitalization grants to states to create revolving loan funds. The loans will be provided to projects that reduce risks from disasters and natural hazards, including flooding. The program established by the STORM Act was developed after the CWSRF and DWSRF programs. Congress has approved $500 million for the capitalization grants for fiscal years 2022 and 2023.[20]

18 Environmental Policy Innovation Center (EPIC). 'Financing Green Stormwater and Natural Infrastructure with Clean Water State Revolving Funds'. Accessed 16 June 2022 https://www.policyinnovation.org/publications/cwsrf-financed-gsi-ni

19 The White House. Justice40. A whole of government initiative. Accessed on 8.16.2022. https://www.whitehouse.gov/environmentaljustice/justice40/

20 Quantified Ventures. 2021. Evaluating best practices from State Revolving Funds (SRFs) to support market- and nature-based approaches for flood risk reduction and water quality improvement. Accessed on August 17th, 2022 https://blogs.edf.org/growingreturns/2021/08/26/fema-resilience-finance-storm-act/

Photo: USDA

Emerging opportunities for investment in natural infrastructure

Five replicable forms of revenue generation can increase natural infrastructure investments

This report identifies five replicable forms of revenue generation that can be used to fund or finance natural infrastructure investments. These five forms of revenue generation have been used by municipalities, states and partnerships across the country to fund natural infrastructure projects and, in a few cases, finance them with SRF loans. After completing an analysis of multiple forms of revenue generation for natural infrastructure investments identified by EPA, municipalities and other environmental and conservation finance organizations, these five forms of revenue generation were selected as the most replicable across the MRB and the most feasible to use as repayment for natural infrastructure projects within SRF and resilience revolving fund loans. The most replicable natural infrastructure repayment mechanisms identified are:

1. **Municipal-agricultural watershed partnerships.**

2. **Stormwater utility funds.**

3. **Source water protection fees.**

4. **Interim financing grant/loan mix.**

5. **Environmental markets.**

The first three repayment mechanisms for natural infrastructure investments are modifications of the existing user fee financing model used by drinking water and wastewater utilities. They differ from the drinking water and wastewater utility financing model by specifically allocating user fees to watershed partnerships, stormwater protection and source water protection programs. These forms of revenue generation are well suited for utilities with a reliable base of user fees.

The fourth form of revenue generation, interim financing grant/loan mix, is well suited for projects that are eligible for grant funding but that require time-sensitive investments. The fifth form of revenue generation, environmental markets, is an emerging opportunity for states and municipalities to efficiently pay for water quality improvements by paying for outcomes at the source of the pollution.

The sections below describe each of these repayment mechanisms, their replicability, and examples of their successful implementation.

Municipal-agricultural watershed partnerships

Municipal-agricultural watershed partnerships are collaborations between municipalities, upstream farmers and watershed organizations that involve municipalities paying farmers for agriculture BMPs and edge of field natural infrastructure that contribute to improving downstream water quality and quantity improvements. The purpose of municipal-agricultural watershed partnerships is to reduce the cost of water quality improvements by investing in upstream nonpoint source pollution reduction instead of expensive water treatment upgrades. By creating these partnerships, municipalities are allocating their traditional forms of revenue towards lower-cost upstream solutions instead of making water treatment facility upgrades. The BMPs and natural infrastructure investments in municipal-agricultural watershed partnerships can include cover crops, conservation tillage, wetland restoration and buffer strips. Through these partnership arrangements, municipalities pay farmers for BMPs and natural infrastructure projects using funds generated by drinking water and wastewater utility user fees (Figure 2). Farmers receive compensation for the beneficial practices they use on their land and municipalities experience improvement of recreational waters to support tourism, improvements to drinking water source protection, meeting state nutrient targets and reduction of damage from flood events. Figure 2 demonstrates the exchanges that take place between different actors in municipal-agricultural watershed partnerships.

Municipal-agricultural watershed partnerships are highly flexible because of their ability to craft individual agreements based on what projects farmers are able and willing to implement and municipal water quality and flooding priorities, but the resources required to develop them vary by state. This flexibility supports municipal-agricultural watershed partnerships' replicability across the Mississippi River.

Photo: Conservation Media Library

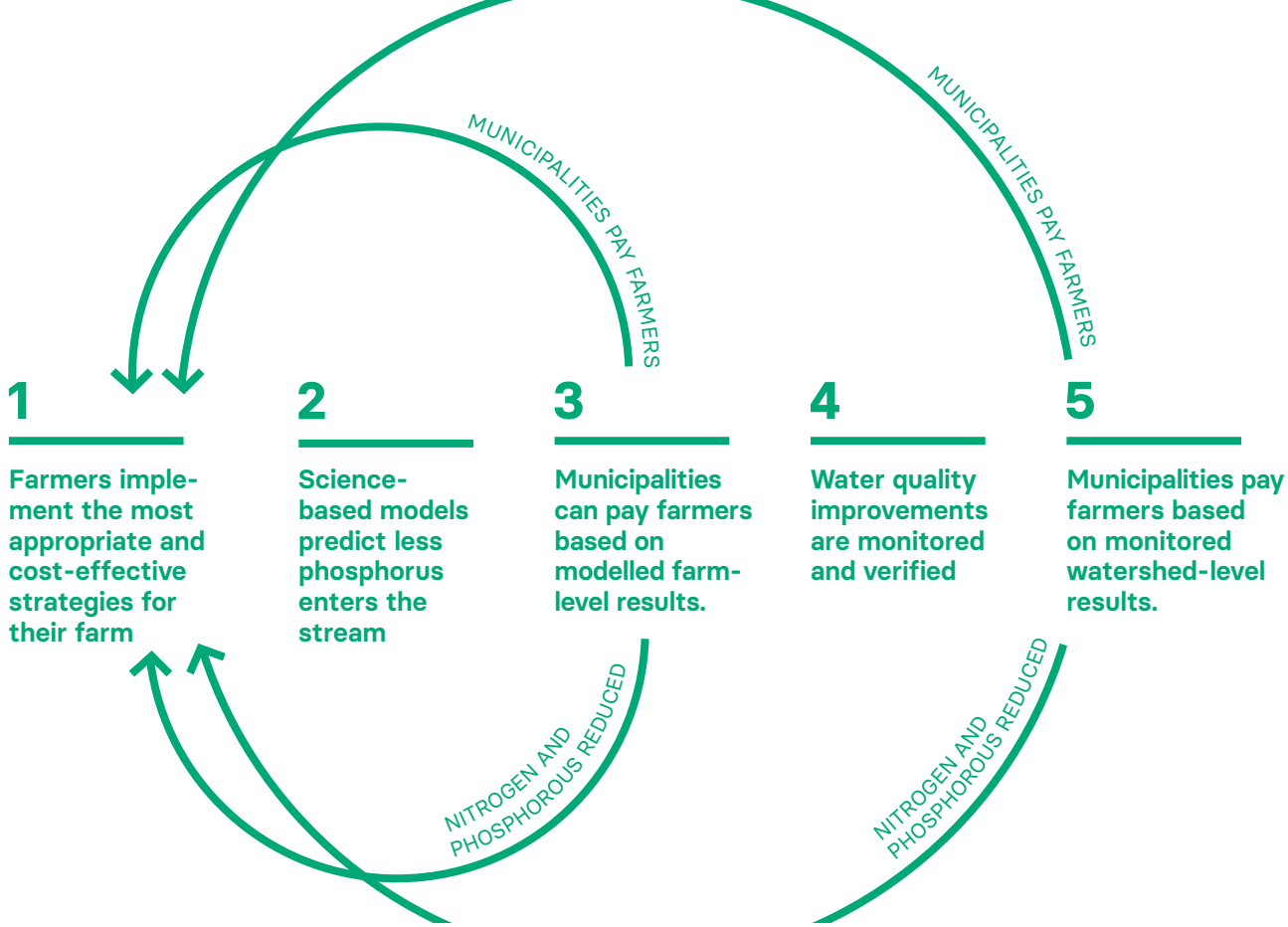


FIGURE 2: Visual depiction of the municipal-agricultural watershed partnership structure

If a municipality participates in this type of watershed partnership to address its regulatory discharge limits, this approach requires modeling and verification of nutrient reductions. While these investments are made with traditional wastewater and stormwater user fees, the innovation of this model is the unique upstream partnerships that offer more cost-effective ways to address water quality and quantity challenges.

Municipal-agricultural watershed partnerships are best suited to address flooding, poor downstream water quality due to agricultural runoff and drinking water source protection. They can be a good solution for communities that own and operate wastewater, stormwater and drinking water utilities and struggle with flooding. This approach can work well for communities in small to medium-sized watersheds where practice benefits can be observed. Communities in large watersheds or on the mainstem Mississippi River are less likely to observe practice benefits. This confluence of water challenges provides a strong incentive for a watershed approach.

There is great potential for municipal-agricultural watershed partnerships to simultaneously execute multiple groups of projects to be capitalized through new sources of BIL grants or SRF loans.

Examples of successful municipal-agricultural watershed partnerships include:

Cedar Rapids, IA — Cedar River Clean Water Partnership

The city of Cedar Rapids and several Soil and Water Conservation Districts that share the Cedar River are partnering with the Iowa Department of Agriculture and Land Stewardship to implement strategies for more sustainable water management financially supported by the city of Cedar Rapids. The city reached an agreement with the Iowa Department of Natural Resources to meet their wastewater treatment facility nutrient targets through upstream agricultural best management practices. Rather than expensive upgrades to the treatment plant, the city will invest in these partnerships. The partnership aimed for 60 water quality practices to be installed by 2020, primarily focused on the installation of edge-of-field practices such as bioreactors and saturated buffers that reduce nitrogen losses by a minimum of 40%.[21]

21 Mehaffey, Trish. 'City of Cedar Rapids joining in on Cedar River water quality project'. Published 2 March 2022. https://www.thegazette.com/community/city-of-cedar-rapids-joining-in-on-cedar-river-water-quality-project/

This partnership allows the city and the Conservation Districts to more efficiently complement each other's resources to implement projects by the city's contribution of funds to farmers and the Conservation Districts' contribution of technical assistance. The partnership has streamlined the project execution process by pooling watershed projects together into larger batches and simultaneously executing them with sustained funding from the city. This is a departure from the traditional practice of building projects one at a time and will increase the efficiency for contractors and engineers.
Lean more at: https://www.cleanwateriowa.org/

Wisconsin's Adaptive Management Option
The Wisconsin Department of Natural Resources (WiDNR) provides an Adaptive Management Option for point source phosphorus dischargers that allow a sewage treatment plant faced with costly investments in filtration or similar technologies to achieve permit compliance via a nonpoint source option. This option works by creating a verifiable watershed plan consisting of other point and nonpoint source solutions to obtain Wisconsin Pollutant Discharge Elimination System (WPDES) permit compliance.[22] The watershed plans can be completed over a timeframe of 20 years with nutrient reduction benchmarks to be verified every five years to ensure progress toward compliance with numerical targets. This framework creates not only an incentive for increased investment in nonpoint source projects but also elevates these investments on a municipality's capital improvement plans. This elevation results in municipalities' funding and financing valuing these more cost-effective options, making this method something of an indirect repayment mechanism.

This type of regulatory compliance does not come without its own challenges. Municipalities seeking to comply with their permit obligations must use state-approved monitoring and modeling data which may limit utilization of municipal-agricultural partnerships in smaller, under-resourced communities. These projects also involve coordination of multiple parties and private landowners which may make them more time-intensive to implement. Additionally, many states haven't established numerical criteria creating a regulatory driver for these relationships.
Learn more at: https://dnr.wisconsin.gov/topic/Wastewater/AdaptiveManagement.html

The Sand County Foundation, Environmental Policy Innovation Center and National Wildlife Federation have produced a project guide for watershed partnerships which includes several project examples of municipal-agricultural partnerships that utilize Wisconsin's Adaptive Management Option.
Learn more at: https://sandcountyfoundation.org/uploads/Watershed-Partnerships-Project-Guide-email.pdf

The Yahara Watershed Improvement Network (Yahara WINS) is one of the municipal-agricultural watershed partnerships that was formed through Wisconsin's Adaptive Management Option. Yahara WINS is a partnership between towns, villages, cities, nonprofit organizations and farmers in the Yahara watershed. In 2021, over $1 million dedicated by downstream towns, villages and cities was allocated to phosphorous reduction projects across the watershed. These projects included BMPs, buffers and nutrient management plans on farms. These upstream investments allowed the watershed to reduce over 38,000 pounds of phosphorous in streams, lakes and rivers.
Learn more at: https://yaharawins.org/

Stormwater Utility Funds or Fees

Many municipalities pay for their stormwater needs — including transportation, runoff treatment, ditches, catch basins and storm drains — using the revenue generated by stormwater utility fees or by charging an additional stormwater fee on the wastewater bill. Stormwater utilities manage stormwater programs and infrastructure funded by fees levied on property owners. The number of stormwater utilities has increased by 270% from 2009-2019 and has expanded particularly within states in the Upper MRB.[23] Rather than accounting

22 Parkhurst, Robert, Phoebe Higgins, Timothy Male, Kevin McAleese, Heidi Peterson, Jessica Norris. 'Advancing Innovative Finance Options for Improved Agricultural Water Quality'. Environmental Policy Center, Washington D.C. & Sand County Foundation, Madison WI. Accessed 16 June 2022. https://sandcountyfoundation.org/uploads/publications/CONSERVATION-FINANCE-REPORT-FINAL.pdf
23 Abhold, Kristyn and Timothy Male. 'Strengthening Urban-Rural Connections: How cities and water utilities pay for water quality improvements on farm.' Environmental Policy Innovation Center, Washington DC & Sand County Foundation, Madison, Wisconsin. Accessed 16 June 2022. https://sandcountyfoundation.org/uploads/publications/Strengthening-Urban-Rural-Connections_PDF-Digital-MID.pdf

Stormwater utilities fees are a compelling revenue stream for natural infrastructure investments since they raise funds specific to stormwater management improvements such as green stormwater infrastructure (GSI) (Figure 3). Most projects funded by stormwater utility fees are located within municipal boundaries and many communities default to grey stormwater opportunities. However, the recognition of GSI as a more cost-effective solution is growing. GSI projects include rain gardens, bioswales, pervious pavement and urban tree plantings. GSI are often cost-effective and resilient solutions to water quality and stormwater challenges. This infrastructure also provides additional economic, environmental and social benefits. For example, well-planned and well-maintained green and natural infrastructure can decrease flooding, stormwater overflows and combined sewer overflows (CSOs) as well as reduce pollution in lakes, rivers and aquifers, thereby making water usable for drinking or recreational purposes.

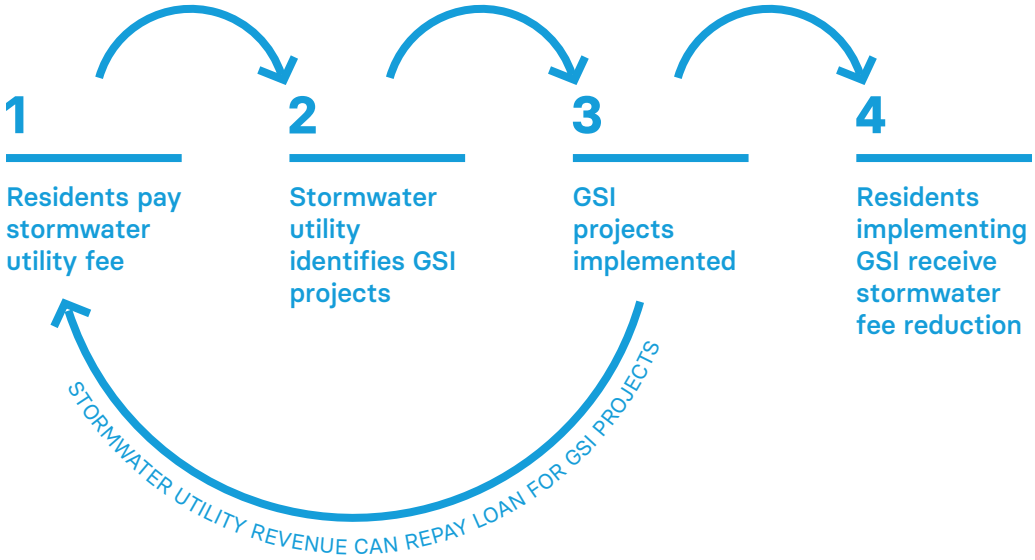


FIGURE 3: Visual depiction of stormwater utility funds revenue stream

State Revolving Fund loans have been used across the country by municipalities to finance stormwater management including rain gardens, parks and permeable surfaces in places like Camden, New Jersey and Sandoval County, New Mexico.[24]

Stormwater utility funds or fees are best suited to address stormwater runoff. They can be a good solution for communities that have a stormwater permit requirement to meet and are looking for more cost-effective options.

24 US EPA. July, 2016. Funding Stormwater Management with the Clean Water State Revolving Fund. Accessed on 8.16.22. https://www.epa.gov/sites/default/files/2016-11/documents/funding_stormwater_management_with_the_clean_water_state_revolving_fund.pdf

Examples of successful natural infrastructure projects funded by stormwater utilities or fees include:

Lancaster, Pennsylvania Stormwater Management Fee
Lancaster's stormwater management fee funds and incentivizes green stormwater infrastructure. Commercial properties that implement GSI solutions can receive a 50% discount on their stormwater utility fees. Further, residential homeowners receive grants of up to $2,500 per project to implement GSI solutions on their properties.[25] The stormwater management fee has funded 140 rain gardens and permeable pavement installations.
Learn more at: http://saveitlancaster.com/resources/stormwaterfee/

Arlington, Virginia — Tree Canopy Fund
In 2008, Arlington County issued a new municipal stormwater system (MS4) permit that allows the discharge of stormwater into waterways. As part of this compliance, the county committed to a goal of planting 2,000 trees by 2023 to help with stormwater attenuation. To pay for this natural infrastructure investment, the County established a stormwater fund, which is capitalized through a sanitary district tax.

The County invests more than $250,000 per year to its tree planting efforts and cites the financial benefits trees provide by filtering stormwater as their primary motivation.[26] This is an example of more cost-effectively meeting their regulatory requirements through natural infrastructure while simultaneously achieving multiple co-benefits such as reduced heat islands, increased recreational access and improved economic development opportunities.[27]
Learn more at: https://www.arlingtonva.us/Government/Programs/Sustainability-and-Environment/Trees/Plant-Trees/Tree-Planting-Programs/Grants-to-Plant-or-Maintain-Trees-on-Private-Property

Source Water Protection Fees:

A source water protection (SWP) area is land area that contributes drinking water supply to communities that are threatened by pollution. [28] A SWP area is delineated (or mapped) by drinking water providers to understand the area around a drinking water source that can influence water quality and where there are potential threats from pollution. SWP can be an important driver for natural infrastructure as a municipality can use this mapping to identify areas that could improve or protect water supplies by restoration or conservation. Source water protection includes a wide variety of actions and activities aimed at safeguarding, maintaining, or improving the quality or quantity of sources of drinking water. Examples of source water protection projects include land conservation, riparian buffers, wetland restoration and floodplain restoration.[29] Protecting source water from contamination helps reduce treatment costs and may avoid or defer the need for complex treatment.

SWP fees are surcharges added to customers' water bills to pay for these investments. The fees can be either based on a customer's water usage or a fixed fee per customer. Like a stormwater utility, SWP fees take advantage of the existing drinking water customer base to collectively fund projects supporting the broader watershed and source water protection. Communities typically invest in improvements within their SWP area, which is a defined area around their drinking water source that is susceptible to contamination.

SWP fees are used by the municipality to fund land acquisitions, conservation easements and other restorative projects designed to protect forests and other natural buffers surrounding reservoirs (Figure 4). These fees can also be used to fund other projects designed to maintain water protection or improve quality. Municipalities with dedicated SWP fees can use them as a repayment stream to loan investment opportunities through the influx of BIL financing sources.

25 Jersey Water Works Green Infrastructure Committee. 'Stormwater Utilities can Incentivize Green Infrastructure'. Published October 2021. https://cms.jerseywaterworks.org/wp-content/uploads/2022/02/Stormwater-Utilities-Can-Incentivize-Green-Infrastructure.pdf
26 EFC at University of Maryland. 'Financing Urban Tree Canopy Programs'. Published March 2019. https://chesapeaketrees.net/wp-content/uploads/2019/04/FinancingUrbanTreeCanopyPrograms_LowRes_040919.pdf
27 EcoAction Arlington. 'Tree Canopy Fund'. Accessed 16 June 2022. https://www.ecoactionarlington.org/community-programs/trees/
28 EPA. Delineate the Source Water Protection Area. Accessed 16 June 2022. https://www.epa.gov/sourcewaterprotection/delineate-source-water-protection-area
29 EPA. Source Water Protection Practices. Accessed 16 June 2022. https://www.epa.gov/sourcewaterprotection/source-water-protection-practices

FIGURE 4: Visual representation of source water protection fee revenue stream

SWP fees are best suited to address drinking water systems that are threatened by pollution. They can be a good solution for communities that face expensive drinking water treatment upgrades if the SWP is not protected. However, any community that is responsible for providing drinking water can benefit from these types of investments.

Examples of successful natural infrastructure projects funded by SWP fees include:

Raleigh, North Carolina — Watershed Protection Fee

The city of Raleigh put in place a watershed protection fee in 2011 to support source water protection, fund improvements to the city's treatment systems and increase natural resource restoration. This fee raises $3.5 million annually through charges to drinking water customers.[30] Revenue from Raleigh's watershed protection fee helps fund the city's Watershed Protection Program. To date, the program has helped protect 10,800 acres and 117 miles of streams.[31]

➲ **Learn more at:** https://raleighnc.gov/services/water-and-sewer/watershed-protection-program

Bellingham, Washington — Lake Whatcom Watershed Fee

Bellingham's water utility charges fees to water users to fund land acquisitions and other restoration methods to protect the Lake Whatcom watershed.[32] In 2021, its first year of collection, the Watershed fee raised approximately $870,000 in support of the Lake Whatcom Management Program with an expected increase in 2022.[33] The management program is focused on restoring Lake Whatcom through investments in 10 program areas of project implementation and monitoring. Examples of natural infrastructure funded by this watershed fee include reforestation, bio-infiltration swales and incentivizing homeowners surrounding the lake to implement further strategies that reduce runoff from their properties.[34]

➲ **Learn more at:** https://www.lakewhatcom.whatcomcounty.org/home

30 City of Raleigh, NC. Utility Rates, Deposits & Other Charges. Accessed 16 June 2022. https://raleighnc.gov/doing-business/utility-rates-deposits-other-charges
31 City of Raleigh, NC. Watershed Protection Program. Accessed 16 June 2022. https://raleighnc.gov/services/water-and-sewer/watershed-protection-program
32 Lake Whatcom Management Program. Accessed 16 June 2022. https://www.lakewhatcom.whatcomcounty.org/home
33 Lake Whatcom Interjurisdictional Coordinating Team. '2021 Lake Whatcom Management Program Progress Report'. Accessed 16 June 2022. https://drive.google.com/file/d/1JAx9q-uTIZuxfnwjZvxggjJ2mSVL1evA/view
34 Lake Whatcom Management Program. Capital Improvement Projects. Accessed 16 June 2022. https://www.lakewhatcom.whatcomcounty.org/our-programs/capital-projects

Central Arkansas Water Watershed Protection Fee

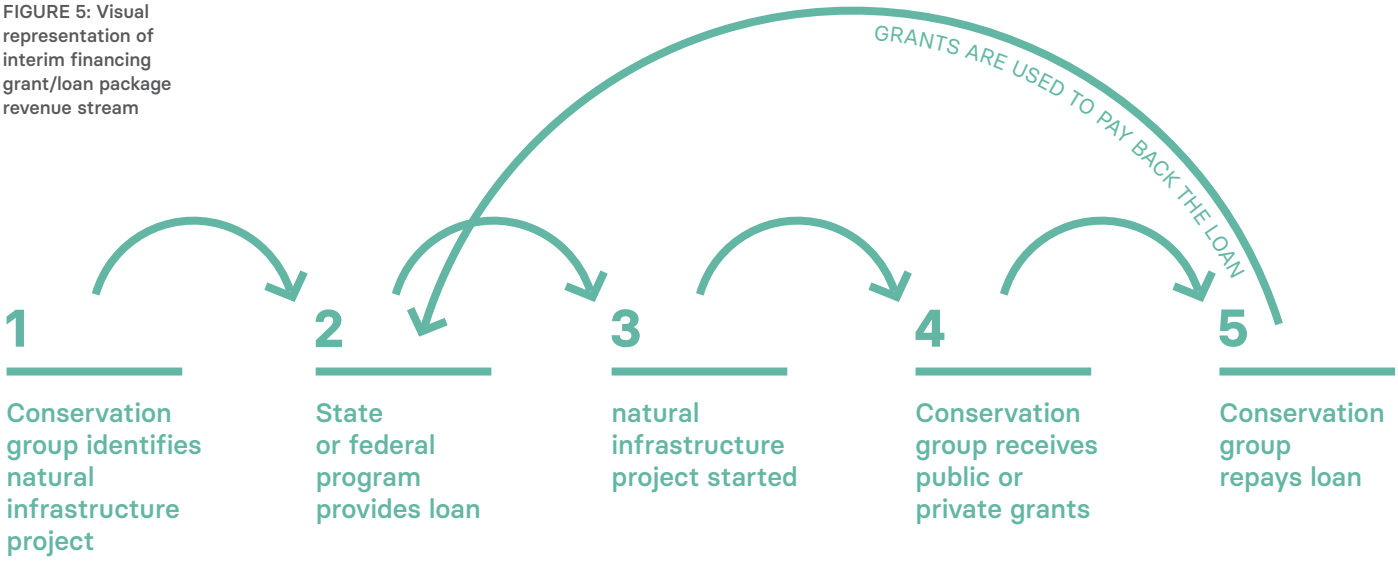
To protect source water surrounding Little Rock, Central Arkansas Water (CAW) created a Watershed Protection Plan. Projects carried out under this plan are funded by a Watershed Protection Fee instituted by the regional water utility, Central Arkansas Water, and paid by the drinking water users within the system. The protection fee is used to fund land conservation in the Lake Maumelle Watershed, which is part of the drinking water SWP area.[35] After the development of the watershed protection plan, CAW sought to establish protections for privately owned forested areas surrounding Lake Maumelle, a major source of drinking water threatened by encroaching development. However, funding from the Watershed Protection Fee did not raise revenue quickly enough to purchase the necessary land. In response, CAW issued the first green bond devoted to forest and water quality protection with the promise of repayment through CAW's watershed protection fee. Thirty-three percent of proceeds from the bond are devoted to natural solutions like forest acquisitions and conservation easements with 66% devoted to resilience improvements to existing infrastructure; a "grey-green approach" to source water protection.

Learn more at: https://tapin.waternow.org/resources/central-arkansas-water-watershed-protection-fee/

Interim Financing Grant/Loan Package

Land conservation organizations purchase properties containing forests and wetlands to protect source water, animal habitat, provide recreation and protect natural resources. Land conservation organizations will often include habitat and resource restoration projects to restore the ecosystem services of the property. Typically, it takes between two to five years for these non-profit or small private land conservation groups to access the grants needed to fully fund new land purchase and restoration projects. In this time, the projects will either be conventionally financed with high-interest rates, the project costs will increase significantly, or, more commonly, the land purchase opportunities will be lost. An interim financing grant and loan package is a financing mechanism that turns the traditional use of grants for conservation work into revenue for loan repayment. Examples of traditional grant sources may be federal, state or philanthropic grants. It allows conservation groups to take out a federal or state loan for urgent land purchases that can be repaid with future grants. An interim financing and loan package can allow municipalities and their watershed partners to increase upfront investments while buying time to find sufficient grants to repay the loan (Figure 5). A complete repayment package may also include a municipal contribution to the loan. Municipalities may be more likely to contribute to the overall project if their portion can be amortized over several years.

FIGURE 5: Visual representation of interim financing grant/loan package revenue stream



In some instances, the property purchased with this mechanism is then resold with conservation easements after restoration is complete, with the final sale value added to the repayment package. This strategy is also known as "Buy, Protect, Sell". The examples below allow for

35 WaterNow Alliance. 'Central Arkansas Water: Watershed Protection Fee'. Accessed 16 June 2022. https://tapin.waternow.org/resources/central-arkansas-water-watershed-protection-fee/

leveraged financing to make immediate purchase or implementation, saving additional years of environmental degradation and increased costs through inflation or lost opportunity costs.

Interim financing grant/loan packages are best suited to address multiple water quality challenges and investments, including source water protection and floodplain restoration, to alleviate downstream flooding. They can be a good solution for communities interested in natural infrastructure investments that have established relationships with watershed or conservation partners.

Examples of successful natural infrastructure projects funded by interim financing grant/loan packages include:

Huntington, Vermont Town Forest

In 2021, this project created a 245-acre community forest for the town of Huntington, Vermont. Benefits of the forest include significant recreation opportunities, an outdoor classroom for the local public school, as well as natural infrastructure components of wetland restoration, riparian buffers and protection of headwater streams for Lake Champlain and Winooski basin — both of which are also drinking water source protection areas. This project utilized a 100% forgivable CWSRF loan of $309,000, plus traditional grant sources and local municipal contributions for a funding package. In this case, the forgivable CWSRF loan functioned as a grant where the municipality received a loan for $309,000 and the entire amount was forgiven, resulting in no need to repay the loan.[36]

Learn more at: https://www.tpl.org/media-room/huntington-community-forest-provides-increased-access-outdoor-recreation-and-new-outdoor

Rhode Island Stormwater Project Accelerator

The Rhode Island Infrastructure Bank created a 0% loan fund that invests in green stormwater projects that will eventually be repaid by state grant funds. This saves significantly on implementation costs and leverages limited annual grant appropriations to make more substantial water quality and quantity improvements.[37]

Learn more at: https://riib.org/solutions/programs/stormwater-project-accelerator/

Vermont Land Trust's Farmland Futures Fund [38]

The Vermont Land Trust's Farmland Futures Fund has secured $15 million in investment capital, including a $10 million line of credit from the Vermont CWSRF to buy and hold for three to five years farms whose owners are retiring from farming, complete needed restoration and easement work, while providing support to new farmers to transition to more environmentally sustainable practices. This fund intends to transition 200 farms in the next decade. These loans are repaid by municipal watershed partnerships (see Repayment Stream #1), grants and land sales to new farmers.[39]

Learn more at: https://vlt.org/how-we-help/farmers-farmland/

The Nature Conservancy Cumberland Forest Project

In 2019, in the Cumberland Gap area of the central Appalachians, The Nature Conservancy (TNC) completed their largest impact investor-funded land transaction. The 235,000-acre, $130 million purchase spans across areas of Tennessee, Kentucky and Virginia. The land is now owned by a TNC impact investment fund and is under TNC management for 10 years, before it is to be sold to private and public owners with requirements for sustainable use. During the 10 year "holding period", TNC plans to build renewable energy projects on former mining sites and place new covenants and easements to ensure continued sustainable use. TNC also plans to generate returns on their investment by generating carbon credits through sustainable timber harvesting, selling recreational access passes, selling hunting and fishing licenses and by repurposing already cleared former mining sites for clean energy generation.[40]

Learn more at: https://www.nature.org/en-us/magazine/magazine-articles/cumberland-forest-project/

36 Trust for Public Land. 'Huntington Community Forest Provides Increased Access to Outdoor Recreation and New Outdoor Classroom'. Published 25 March 2021. https://www.tpl.org/media-room/huntington-community-forest-provides-increased-access-outdoor-recreation-and-new-outdoor

37 Rhode Island Infrastructure Bank. Stormwater Project Accelerator. Accessed 16 June 2022. https://riib.org/solutions/programs/stormwater-project-accelerator/

38 State of Vermont, Department of Environmental Conservation. FY2020 CWSRF Annual Report. Published 27 August 2020. https://swefcsrfswitchboard.unm.edu/resources/vermont/Vermont%20CW%20SRF%20annual%20report%20.pdf

39 State of Vermont, Department of Environmental Conservation. FY2021 CWSRF IUP. Published 15 July 2021. https://swefcsrfswitchboard.unm.edu/resources/vermont/2021/Vermont%20CWSRF%20IUP%20and%20PPL%202021.pdf

40 Elliston, Jon. 'Heart of Appalachia'. Published 21 October 2019. https://www.nature.org/en-us/magazine/magazine-articles/cumberland-forest-project/

Carbon and Environmental Markets

Carbon and environmental markets monetize environmental benefits by promoting exchanges of measurable environmental improvements. These markets include voluntary carbon markets, regulatory nutrient or sediment water quality outcomes, or other mitigation projects. Under this mechanism, financing is secured to implement a project that generates measurable environmental improvements, and those outcomes are measured and verified before being sold to an entity with an interest in securing the outcomes. The revenue for the natural infrastructure project or agricultural BMP practice is generated through the sale of the verified environmental outcome. Interested buyers of these verified outcomes can be federal or state agencies interested in more cost-effective projects with verified results. Other buyers may include municipal wastewater treatment facilities to support compliance with their regulatory nutrient limits. Carbon outcome buyers can also be for-profit corporations seeking to meet their own sustainability targets.

Environmental markets are best suited to address agriculture water runoff that causes water quality problems. They can be a good solution for communities that must meet regulatory nutrient limits.

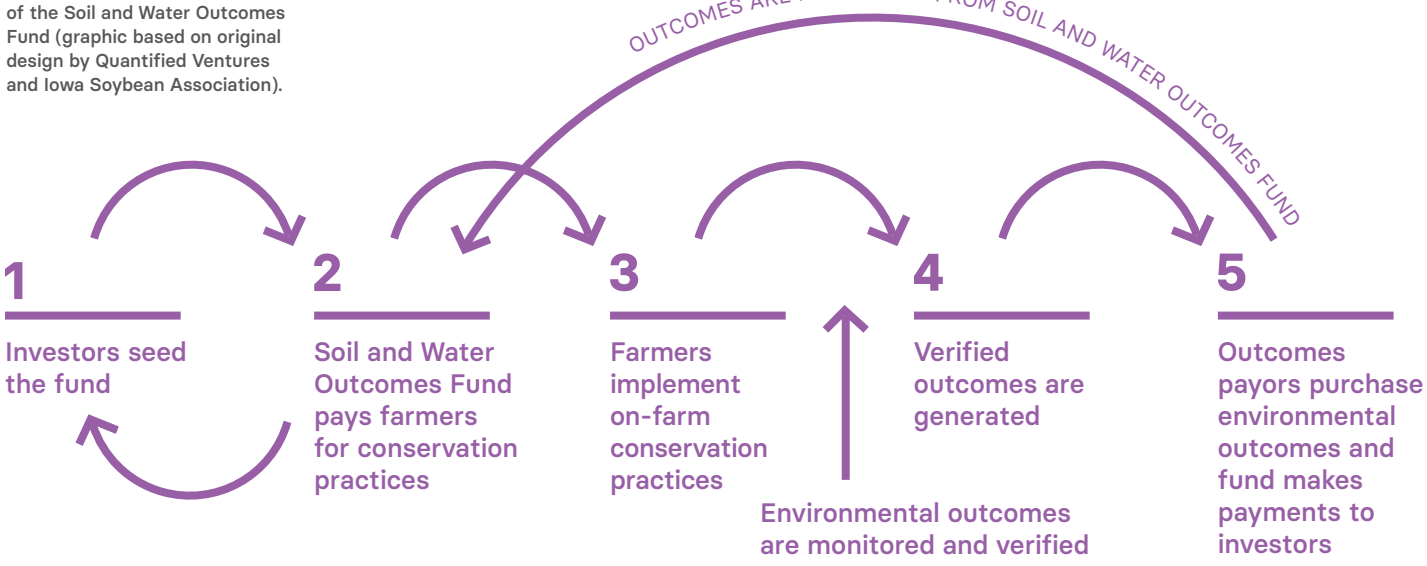
Examples of successful natural infrastructure projects funded by environmental markets include:

Soil and Water Outcomes Fund

The Soil and Water Outcomes Fund (SWOF) provides financial incentives directly to farmers who transition to on-farm conservation practices that yield measurable environmental benefits like carbon sequestration and water quality improvement.[41]

SWOF models the water quality outcomes for each farmer's intended practices, pays the farmer half up-front and sells these water quality outcomes to federal, state and local entities. The Iowa Finance Authority, which administers the Iowa SRFs, provided interim financing for SWOF's initial payments to farmers. Once the outcomes are verified on the ground with SWOF agronomists, the farmer receives the second half of their payment, and the outcomes are sold to both water and carbon outcome buyers. The buyers of the carbon outcomes are corporate partners seeking to meet their company's sustainability goals. By stacking together payments

FIGURE 6: Visual representation of the Soil and Water Outcomes Fund (graphic based on original design by Quantified Ventures and Iowa Soybean Association).



for water quality outcomes and carbon, SWOF can offer attractive per-acre payments to farmers, while delivering verified water quality improvements to governmental entities at a lower cost than traditional agriculture water quality projects. These government water quality and corporate carbon payments are then used to repay the initial SRF loan.

➲ **Learn more at:** https://www.theoutcomesfund.com/

41 Soil and Water Outcomes Fund. Accessed 16 June 16, 2022. https://www.theoutcomesfund.com/

Wisconsin Water Quality Trading

Wisconsin's Water Quality Trading (WQT) is a companion option to the state's Adaptive Management Option outlined previously in the Municipal-Agricultural Watershed Partnerships repayment stream. To provide Wisconsin discharge permit holders with greater flexibility and to avoid costly upgrades, the WQT allows utilities to pay for a pollution reduction by another discharging entity in the same water body.[42] Pilot trading programs have existed in the state since 1997, and the Wisconsin state legislature expanded the program state-wide in 2011 and is in the process of establishing a water quality trading clearinghouse.

To participate in a water quality trade, utilities first calculate the pollutant offset needed, which is the difference between the amount they are discharging and their permitted discharge limit. They then identify a credit broker to administer the trade — a role that is often played by county land conservation departments. The broker will pair this need with projects that generate water pollution reductions (quantified as credits) within the same watershed. Finally, the broker ensures there are sufficient credits to meet the utility's needs.

These types of regulatory market-based mechanisms provide a cost-effective mechanism for municipalities to invest in natural infrastructure.

Learn more at: https://dnr.wisconsin.gov/topic/Wastewater/WaterQualityTrading.html

Lessons from the repayment streams

The five replicable forms of revenue for natural infrastructure investments described in this report demonstrate opportunities for municipal public water works directors, SRFs and environmental NGOs to effectively finance natural infrastructure. The examples from municipalities across the country show the replicability and adaptability of these repayments streams to address the specific challenges faced by different municipalities in the MRB.

The first three forms of revenue generation (municipal-agricultural watershed partnerships, stormwater utility funds and source water protection fees) build upon financing strategies municipal public works managers and SRFs are familiar with. Building upon familiar financing strategies increases the likelihood of uptake. At first glance, it may seem that watershed partnerships, stormwater protection and source water protection programs add additional costs to utility customers' water bills. But it is important to consider that the alternative solution to water quality and stormwater issues, which is often expensive grey infrastructure improvements, will result in even higher costs to customers. Any improvement in water quality or flood protection will involve increased costs, but natural infrastructure investments using the repayment mechanisms described in this report can save water user rates when compared to grey infrastructure. In Box 3, an analysis of the Portland Water District's investment in Sebago Lake forest protection through a Watershed Land Conservation Program demonstrates the cost savings to users' water bills of investing in natural infrastructure compared to the grey infrastructure alternative.

BOX 3

PORTLAND WATER DISTRICT AND PARTNERS INVEST IN SEBAGO LAKE FOREST PROTECTION

The city of Portland, Maine receives its water from the Sebago Lake watershed, which is covered in forestland, lakes and streams. Because of the tremendous natural water filtration ecosystem services provided by the forestland throughout the watershed, Portland Water District has one of only about 50 Federal filtration exemptions. The forestland and the water filtration service it provides are under threat of conversion. In 2018, the University of Maine, The Nature Conservancy and Highstead Foundation estimated that if water deterioration continued, Portland Water District would need to invest in a $150 million water filtration plant.[43] This would increase water fee rates by 84% on average or more than $1.7 million per year for the top ten water users (mostly industrial sites) in the district. Instead, forestland conservation is estimated to yield between $4.80 and $8.90 in value for every dollar invested, including water quality preservation. The increased water rate costs from building a water treatment for the top 50 water users (again mostly industrial sites) in the district alone could instead invest in 1,950-2,480 acres of forestland conservation per year. At this rate, the target of conserving 160,000 acres to protect water quality could be met in just 25 years. This study demonstrated that there was a strong incentive for Portland Water District and the top water users to invest in land conservation instead of investing in a water treatment plant in the future. Considering these findings, Portland Water District developed a Watershed Land Conservation Program that uses water user fees to fund forestland conservation. Portland Water District and Sebago Clean Water, a coalition of organizations including the District, Highstead, The Nature Conservancy and The Trust for Public Lands, approved its first land purchase with a $345,000 conservation easement on a 1,417 acre property known as the Tiger Hill Community Forest.[44] The Portland Water District used the Maine DWSRF and acquisition loan program to receive a low-interest loan with up to $50,000 in principal forgiveness.

42 Wisconsin Department of Natural Resources. Wisconsin's Water Quality Trading. Accessed 16 June 2022. dnr.wisconsin.gov/topic/Wastewater/WaterQualityTrading.html

43 Daigneault, A., Stron, A. L. (2018). An economic case for the Sebago watershed water & forest conservation fund. Accessed June 30th, 2022. https://www.sebagocleanwaters.org/wp-content/uploads/2020/03/Sebago-Lake-Report.pdf

44 Environmental Protection Agency. Protecting source water with the drinking water state revolving fund set-asides. Accessed June 30th, 2022. https://www.epa.gov/sites/default/files/2019-10/documents/protecting_source_water_with_the_dwsrf_-_final.pdf

The last two forms of revenue, interim grant/loan financing and carbon and environmental markets are innovations that can be highly impactful when the right conditions are present. Flexible grants and loans from state SRFs and other programs are essential to help support the early stages of these forms of revenue for natural infrastructure financing. Grants are especially necessary to ensure the benefits of natural infrastructure and support the water quality and flood risk needs of under-resourced communities. Grants from the BIL should be prioritized in this context to under-resourced communities whose municipal water works user base is already economically burdened. Supporting the forms of revenue for natural infrastructure financing with state and federal grants directed to under-resourced communities can ensure they receive the benefits of the infrastructure investments without further burdening their user base in the community.

Photo: Bill Tanata

Photo: Iowa Flood Center

Recommendations for engagement

Engagement strategies to receive community and stakeholder buy-in for natural infrastructure investments

Replicating the forms of revenue described in this report across the MRB requires state agency officials, municipal leaders, agricultural stakeholders and conservation organizations to receive information, training, resources and technical support to evaluate the potential benefits of natural infrastructure investments in their watershed. To inform stakeholders' case for natural infrastructure investments, this report conducted interviews with state agency officials, municipal leaders and conservation finance organizations in states bordering the mainstem of the Mississippi River. These interviews were focused on answering the following questions:

- What are the primary motivating factors in the adoption of natural infrastructure approaches in your state?
- If you were to further pursue natural infrastructure solutions, what resources would you need to make that decision?
- What methods of communication or engagement have you found to be most compelling to state agencies, municipalities, communities and other stakeholders when discussing the investment in natural infrastructure?

It should also be noted that the type of communication needed varies by stakeholder audience. The table on page 21 represents the most promising communication strategies by target group, as identified by interviews, case studies and literature reviews.

Stakeholder	Strategy
Agricultural Producers	• Enlist local champions from within communities — knowing that something worked for a neighbor will result in a higher likelihood of uptake and participation. • Center cost-savings and the potential for financial incentives. Individuals are often receptive to best management practices (BMPs), but long-term benefits are often obscured by upfront investment costs. • Learn farmer priorities and meet them there. • Cater engagement by type and size of farming entity. • Support engagement groups that are trusted by farmers.

Municipal Leaders	• Ensuring local benefits is a dominant concern — provide information that can reinforce the local benefits of the project.
	• Tailor communication based on municipality's priorities:
	  • Municipalities with water quality regulatory requirements need to understand the cost savings of natural infrastructure.
	  • Municipalities with increasing flooding challenges will be best catered by projects that will reduce costs in these events.
	• Assess the technical capacity of state agencies to assist with modeled benefits before engaging with municipal leaders.
	• Communicate increased property values and tourism potential surrounding natural spaces.
	• Some natural infrastructure can sequester carbon and can help satisfy municipal net-zero targets.

Private Entities	• Communicate whether these projects will result in less expensive industrial costs. For example, for food or beverage companies, cleaner intake water is less expensive to filter. • Communicate if these projects can result in lower flood risks to the facility. • Natural infrastructure investment will help meet corporate sustainability goals.

Examples of Engagement Strategies, in Practice:
Listed below are a few examples of groups with demonstrated success in community engagement to accomplish natural infrastructure projects. Their approaches can be modeled by other organizations and public agencies working to increase engagement at a local level.

Practical Farmers of Iowa (PFI): PFI has a mission to help farmers build resilient farms and communities. Their community-centered approach is central to each of their programs. By utilizing strategies like farmer-led research initiatives and developing locally based resources for beginning farmers, PFI works to spread awareness of the benefits of sustainable farming and demonstrate that behavior change begins from a place of trust and mutual respect.

Illinois Indian Creek Watershed Project: Locally centered outreach and communication is central to the design of the Indian Creek Watershed project and exemplified through the efforts of Jim Ifft, the owner and operator of 1,600 acres of corn, soybean and wheat in the central IL watershed. After the successful implementation of cover crops and no till practices, Jim began hosting field days for other local farmers to experience the benefits of sustainable techniques firsthand. He describes his central lesson from this endeavor with, "Industry experts are good but hearing and seeing it from farmers means more."

How to engage with natural infrastructure finance solutions

Municipal public works managers, SRFs, state regulatory entities and environmental NGOs are presented with a tremendous opportunity to invest in natural infrastructure investments across the MRB via expanded funding and flexibility in the BIL. The forms of revenue generation for natural infrastructure described above can be replicated across the MRB to tap into loan financing from SRFs and other BIL programs. Replicating these forms of revenue generation can bring the benefits of natural infrastructure to communities across the Basin and help address their water quality and flood risk challenges.

Here are some immediate actions municipal public works managers, SRFs, state regulatory entities and environmental non-profit organizations can do to advance natural infrastructure solutions.

How **Municipal Public Works Managers** can engage on natural infrastructure finance:

Gain expertise: Read natural infrastructure reports and case studies that match your community's challenges. Listen to webinars and presentations by experts. Ask questions when "grey only" approaches are presented by other staff or consulting engineers.

Make connections with experts: Regardless of the water quality or quantity challenge facing your community, there is an expert organization willing to support feasibility of a natural infrastructure opportunity. Make connections with organizations like the Nature Conservancy, American Rivers or local watershed associations to learn from their expertise and create a network that can help you when a natural infrastructure project opportunity arises.

Require consideration of natural infrastructure: When evaluating potential solutions or developing shovel ready projects, require an evaluation of natural infrastructure options. This could include adding language to requests for proposals or other external contracting mechanisms or revising internal evaluation protocols.

Talk to the state: As BIL has increased funding for natural infrastructure, many states are interested in supporting watershed management and natural infrastructure approaches. Reaching out to your state environmental management organization should be an early step in reconsidering options.

Invest in a flood resilience study: These studies can provide recommendations for natural infrastructure projects that will avoid or mitigate flood risks, for a relatively low cost. The interventions featured in these resilience studies can justify up-front costs for avoided future costs, potentially increasing the likelihood of adoption and providing multiple benefits.

How **SRFs** can engage on natural infrastructure finance:

Support project development: Significantly more resources need to be devoted to project development, technical assistance and community engagement to meaningfully invest in natural infrastructure. States will have additional technical assistance funds as part of BIL to dedicate to natural infrastructure project development. State SRFs should use these funds to empower community advocacy and conservation groups to develop a viable natural infrastructure pipeline.

Tailor financing to match the intended recipient: As noted, not all loan applicants are the same. Most SRFs are constructed to serve municipalities with the administrative capacity to finance their grey infrastructure needs. As natural infrastructure may require significant support from partner organizations, simplifying requirements, providing additional state staff for hands-on support and designing tailored financing offerings can increase natural infrastructure investment through the SRFs.

Incentivize natural infrastructure projects that benefit under-resourced communities: With the influx of federal funds and the Justice40 directive, states should utilize loan forgiveness or grants to incentivize project development in small and under-resourced communities. Consider ways to prioritize natural infrastructure projects in ranking criteria or selection rubrics.

Reform IUPs and Ranking Criteria with natural infrastructure in mind: Intended Use Plans (IUPs) are used to document how a state will spend its SRF funds. Typically, the IUPs are heavily focused on grey infrastructure and only consider how much a community pays for wastewater services, not overall municipal burden, of a project in determining affordability. For this reason, if a natural infrastructure project is funded by a community's general fund, that financial burden may not be considered when determining a disadvantaged system. Additionally, many state ranking criteria only speak to grey infrastructure components and program requirements heavily favor engineered solutions. These IUPs and ranking criteria should be updated to better reflect a mix of natural infrastructure and grey infrastructure.

How **State Regulatory Entities** can engage on natural infrastructure finance:

Quantify project benefits: Establishing numerical criteria for Total Maximum Daily Loading (TMDL — the maximum amount of nutrient that can be received by a waterbody without causing problems), permitting and other regulatory requirements rather than broader goals of reduction can encourage innovative strategies for reductions if paired with greater and more accessible technical capabilities.

Think creatively about permitting: Flexible permitting that allows for natural components to achieve compliance, combined with verification requirements can allow for broader natural infrastructure adoption and broader benefits than just focusing directly on one area.

Build greater capacity to assist: Create additional technology and modeling resources for small communities to better understand where flood risk and nutrient pollution originates and how to quantify potential risk reduction from various project types. Support development and use of decision support tools for communities to prioritize the most effective projects.

How **Environmental Nonprofits** can engage on natural infrastructure finance:

Get involved in the SRF Process: Nonprofit organizations can be effective advocates for the communities they represent. Engaging with state SRF can allow these organizations to provide public comment for natural infrastructure support.

Partner with states on technical assistance: One of the most common barriers to natural infrastructure projects is stakeholder engagement. Technical assistance funds are available to help nonprofits support states in implementation of projects.

Build larger and more inclusive regional networks: Partner with other watershed and environmental justice organizations to develop and propose natural infrastructure and resilience projects. Project implementation strategy and barriers vary across communities and across watersheds. Better knowledge sharing increases the odds of being able to learn from similar projects and initiatives.

Conclusion

Communities across the MRB continue to face water quality and flood risk challenges that burden them economically, socially and environmentally. Increasingly severe and variable weather fueled by climate change will exacerbate the challenges these communities face. Historical prioritization for agricultural productivity, land development and mainstem navigation has reduced the ability of rivers and streams across the Mississippi River to filter pollutants and hold back flood waters. Investing in natural infrastructure can help communities throughout the MRB to restore those capacities in ways that complement existing flood mitigation and water infrastructure systems. Successfully increasing investments in natural infrastructure projects requires replicable forms of revenue that communities can use to secure project financing. In this report, we outlined three forms of revenue that build upon standard user fee structures that specifically dedicate that revenue to upstream water quality improvements, stormwater infrastructure and source water protection. We also described two forms of revenue that can be effective with the right conditions, such as when land acquisition is imminent to protect SWP areas and when environmental markets exist to help them buy upstream water quality improvements. Growing the use of these forms of revenue for natural infrastructure investments requires technical assistance and effective stakeholder engagement that supports the communities and important actors to value the benefits of natural infrastructure investments. The potential of these forms of revenue will be realized when municipal water works managers, state SRFs, state regulatory entities and environmental NGOs increase their knowledge, engagement and innovation for natural infrastructure financing. Putting these emerging forms of revenue to work can help catalyze a steady stream of natural infrastructure investments that support the water quality and flood resilience needs of communities within the MRB.

Photo: Chris M. Morris

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