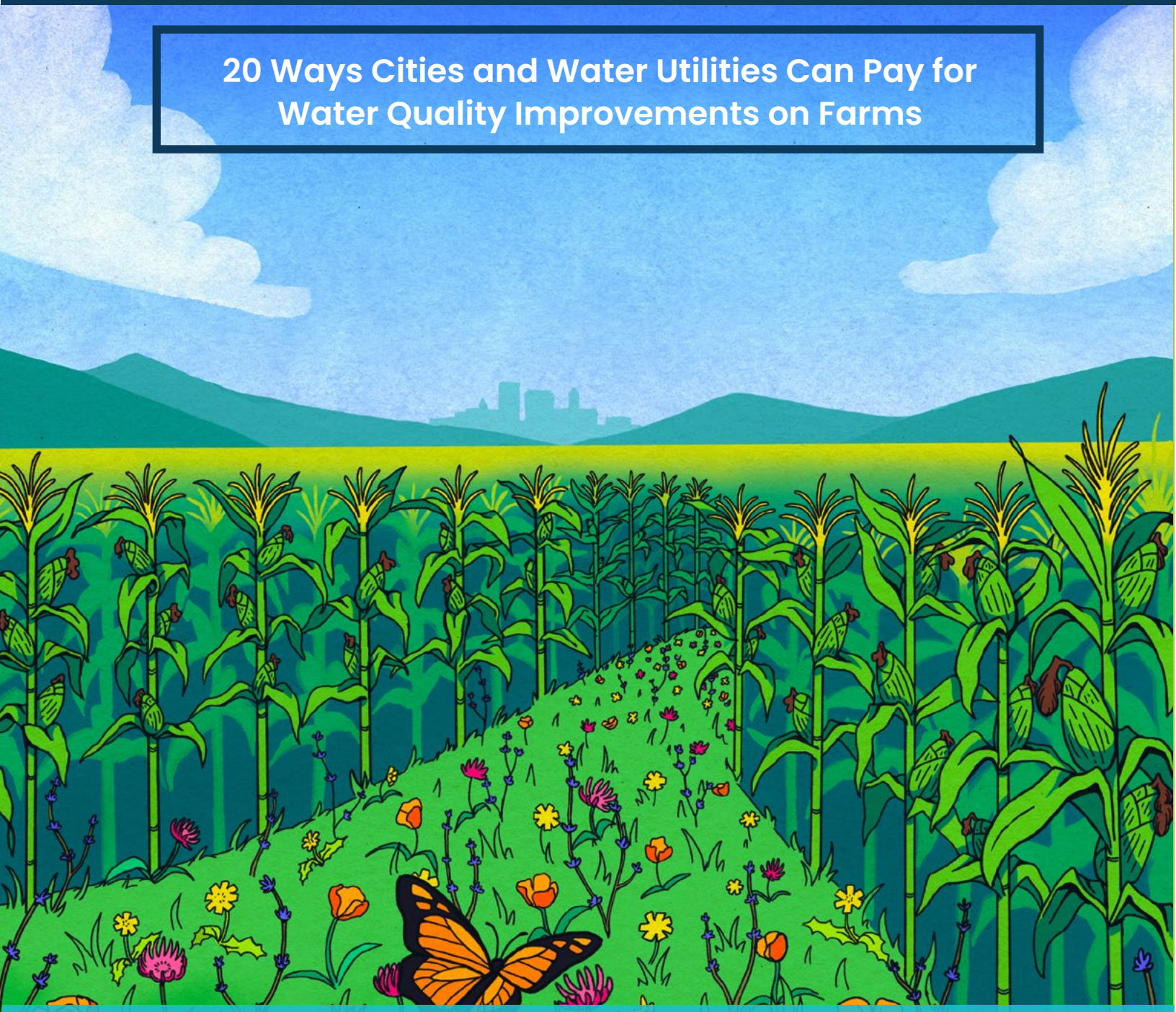
STRENGTHENING URBAN–RURAL CONNECTIONS:

20 Ways Cities and Water Utilities Can Pay for Water Quality Improvements on Farms



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SAND COUNTY FOUNDATION

ENVIRONMENTAL POLICY INNOVATION CENTER

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About the **Environmental Policy Innovation Center**

The mission of the Environmental Policy Innovation Center is to build policies that deliver spectacular improvement in the speed and scale of conservation.

We believe that innovation and speed are central to broadening efforts to conserve wildlife, restore special natural places, and to deliver people and nature with the clean water they need to thrive. To achieve those goals, conservation programs must evolve to accommodate our modern understanding of human behavior and incentives, and the challenges posed by humanity's expanding footprint. EPIC is a fiscally sponsored project of Sand County Foundation.

About the Sand County Foundation
Sand County Foundation inspires and enables a growing number of private landowners to ethically manage natural resources in their care, so that future generations have clean and abundant water, healthy soil to support agriculture and forestry, plentiful habitat for wildlife and opportunities for outdoor recreation.

This work was supported through a grant from the Walton Family Foundation.

Cover image by Taylor Anderson

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EXECUTIVE SUMMARY

For Decades...

America's cities, towns, public water utilities, and private companies have been working to clean up water pollution so that water is safe to drink, lakes are safe to swim in, and our ecosystems are healthy. In many parts of the country, we still have a long way to go.

While new technologies and time-tested treatment facilities will continue to be the principle strategy to address much of that pollution, new opportunities and momentum have appeared that expand the use of natural and watershed-scale activities to meet some of our water quality goals. Planting trees reduces pollution. A rooftop of plants on an urban skyscraper soaks up stormwater. A farm with carefully planted buffers on the downhill side of a corn field filters runoff.

As never before:

- The Environmental Protection Agency and some state water quality regulators are actively encouraging the use of these approaches to achieve water quality and regulatory goals.
- More data is showing that the costs of these approaches are often dramatically lower than traditional treatment technology.
- Cities and others are seeking out the co-benefits to recreation, flood risk reduction, and real estate values that come from natural and watershed-scale activities that benefit water quality.
- Cities and rural communities are voluntarily working together on programs that provide financial benefits, strengthen neighbor relationships and produce regional benefits from which everyone wins.

Dozens of programs are already making use of these approaches to achieve water quality goals, including in Wisconsin, Iowa, California, Delaware, Pennsylvania, Virginia, Maryland and potentially soon in every state.

A key question that city leaders or others may raise is how to pay for this approach. Borrowing money to build or rebuild a wastewater treatment plant is familiar. Funding or financing options for this approach may seem less so. The reality is that almost all the same tools, borrowing, and other options that exist to fund traditional infrastructure also exist to fund green infrastructure and watershed approaches.

This report summarizes twenty (20) funding mechanisms, financing (borrowing) mechanisms and procurement approaches that are in use across the country and allow cities, utilities and industry to finance effective natural and watershed-scale water quality practices.

20 Funding, Financing and Procurement Strategies for Funding Clean Water Projects on Farmland

This report is meant to serve as a starting point for urban, utility or industry leaders who want to understand their options to pay for cost effective green infrastructure and watershed-scale approaches and some of the next steps necessary to decide which approach to pursue.

Americans are worried about clean water.

INTRODUCTION

Americans are worried about clean water. Indeed, water pollution is consistently ranked as the top environmental concern among Americans, with water pollution ranking higher than both air pollution and climate change in Gallup Polls.[1] Since the 1960s, the U.S. government has invested more than $1.9 trillion as part of ongoing efforts to decrease pollution in rivers, lakes, and other surface water. While these efforts have proven effective in curbing the amount of toxic pollution entering U.S. waterways,[2] major water quality problems remain. According to the U.S. Environmental Protection Agency (EPA), 46% of U.S. rivers and streams and 21% of lakes and reservoirs are currently impaired.[3]

The primary source of surface water quality impairment in the U.S. is nutrient pollution. Nutrient pollution is a type of water pollution in which too many nutrients (commonly nitrogen and phosphorous) are introduced into bodies of water. The presence of excessive nutrients in water is problematic because it can spur the overgrowth of algae, leading to harmful algal blooms. Algal blooms produce dangerous toxins that can sicken or kill people and animals, create oxygen-poor waters that threaten aquatic life, increase treatment costs for drinking water, and impair industries dependent on clean water.

The prevalence of nutrient pollution in the U.S. is staggering; more than 100,000 miles of rivers and streams, nearly 2.5 million acres of lakes, reservoirs, and ponds, and over 800 square miles of bays and estuaries in the U.S. have poor water quality due to nutrient pollution.[4] Moreover, scientific research indicates that, in recent years, the frequency and geographic distribution of harmful algal blooms have been increasing nationally.[5]

[1] McCarthy, *Climate Change Concerns Higher in the Northeast, West U.S.*
[2] Keiser et al., *The low but uncertain measured benefits of US water quality policy*
[3] U.S. Environmental Protection Agency, *National Water Quality Inventory: Report to Congress*
[4] U.S. Environmental Protection Agency, *Where Nutrient Pollution Occurs*
[5] National Oceanic and Atmospheric Administration, *State of the Science FACT SHEET: Harmful Algal Blooms*; National Office for Harmful Algal Blooms at Woods Hole Oceanographic Institution, *Recent Trends: National Changes; Diaz and Rosenberg, Spreading Dead Zones and Consequences for Marine Ecosystems*

In 2014, a major algal bloom in Lake Erie caused the city of Toledo, Ohio, to issue a "do not drink" order for tap water that left more than 500,000 people without drinking water for two days. In the summer of 2016, an algal bloom in Washington's Lake Tapps caused a dozen swimmers to become ill.[6] According to the EPA, algal blooms cost the U.S. tourism industry nearly $1 billion annually.[7]

Sources of nutrient pollution include agricultural runoff, wastewater discharges, and urban stormwater runoff. Agriculture is a large source of nitrogen and phosphorus entering rivers, streams, lakes, and ponds.[8] Looking forward, heavy precipitation events are projected to increase through the 21st century, with predicted levels at 50% to as much as 300% above the historical average.[9] One study predicts that offsetting this increase in nitrogen runoff would require an additional 33% reduction in nitrogen inputs.[10]

Water Quality Regulatory Drivers

Most efforts aimed at solving the problem of nutrient pollution focus on both "point" sources and "nonpoint" sources. Point sources usually refer to industrial and municipal wastewater treatment plants, while nonpoint sources refer to stormwater runoff from urban or suburban roads, rooftops and other impervious surfaces, and also agricultural runoff. Regulations meant to curb water quality contamination have focused primarily on the municipal and industrial sectors. Wastewater, drinking water, and stormwater utilities are faced with increasingly stringent nutrient discharge and treatment standards under the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA).[11]

Clean Water Act (CWA)

Under the Clean Water Act, states are required to identify a total maximum daily load (TMDL) of pollutants. The TMDL is the combined amount of pollution from point and nonpoint sources that the state believes a water body can accept without significantly negatively impacting water quality. The TMDL applies to point sources and nonpoint sources in the watershed. Point sources receive wasteload allocations, which are incorporated as water-quality-based effluent limitations in National Pollution Discharge Elimination System (NPDES) permits.

The EPA cannot require the reduction of nonpoint source pollution because the Clean Water Act explicitly exempts runoff from agricultural fields from federal permitting. However, some states have independent statutory authority to regulate nonpoint sources. Even for those states that do have mandatory regulatory measures for nonpoint sources, however, the discharge limits are not numeric or assigned to specific properties. Instead, states may require implementation of best management practices (BMPs), development of conservation plans, or provide grants or assistance to adopt BMPs.

Initially, urban stormwater runoff and Municipal Separate Storm Sewer Systems (MS4s) were also considered nonpoint sources, but in 2010, the EPA declared that MS4s should be considered a point source and, accordingly, should be assigned wasteload allocations during TMDL plan development. As a result, TMDL wasteload allocations are increasingly integrated into MS4 permits, similar to more traditional point sources such as wastewater and industrial discharges.

The long-term costs of implementing TMDL requirements can be staggering. For example, the estimated cost for Maryland to fully implement its portion of the Chesapeake Bay TMDL is $7.39 billion for stormwater utilities, $3.72 billion for septic tank upgrades, $2.37 billion for municipal wastewater utilities, and $0.9 billion associated with agricultural best management practices.[12]

[6] Andrews, *People urged to stay out of Lake Tapps after dozen people sickened, toxic algae found*
[7] U.S. Environmental Protection Agency, *The Facts about Nutrient Pollution*
[8] *x*
[9] Easterling et al., *Ch. 7: Precipitation Change in the United States. Climate Science Special Report: Fourth National Climate Assessment, Volume I*
[10] Sinha et al., *Eutrophication will increase during the 21st century as a result of precipitation changes*
[11] Bartak, *Connecticut River's Nitrogen Reduction Dilemma Demands a New Dynamic with Regulatory Partners*
[12] Maryland Department of the Environment, *Maryland's Phase II Watershed Implementation Plan for the Chesapeake Bay TMDL*

The EPA estimates that America's water infrastructure requires a
20-YEAR INVESTMENT
of $473 billion for drinking water systems & $271 billion for wastewater systems.

Safe Drinking Water Act (SDWA)

The SDWA requires the EPA to set drinking water standards for harmful contaminants, and it requires that public water utilities meet those standards through water filtration and treatment or through source water protection. Source water protection, an analogue to watershed management, is a concept promoted by the SDWA, through which states assess all waters used as sources of public drinking water for human consumption. These source water assessments provide water utilities and their customers with information to plan and implement local actions to reduce potential contamination of drinking water sources from chemicals, pathogens, sediment, or nutrients. Source water protection is voluntary and implemented at the local level.

Public water utilities are required to monitor their water quality and report results and violations to the state and consumers. For example, the current federal drinking water standard for total nitrate is 10 mg/L and 1.0 mg/L for nitrite and utilities must report on the levels of these and other pollutants. The State can issue citations, orders (enforcement actions), and fines for a violation of water quality standards. For example, in Minnesota, 10% of well water samples exceeded the 10 mg/L nitrate standard.[13] Nationally, the annual number of reported violations of EPA standards have ranged from 517 and 1,163 (between 1998 and 2008).[14]

Rising Costs of Gray Infrastructure

It is critically important for municipalities to restore safe and healthy local water conditions. However, the cost of chemical and facility ('gray') infrastructure upgrades needed to ameliorate contamination issues is often very expensive. On a national scale, the cost of removing nitrate from drinking water is estimated at more than $4.8 billion annually.[15]

Some examples of local costs include:

- ***Pretty Prairie, Kansas (population 650)***
  Pretty Prairie needs an improved water treatment system to address nitrate levels. The cost of this system is $2.4 million - roughly $3,600 per resident. This is a substantial burden in a town where the median annual income is $33,000.

- ***Richmond, Virginia***
  Richmond invested approximately $120 million in wastewater treatment plant upgrades to meet the state's requirements to reduce nitrogen and phosphorus discharges and prepare the City for necessary reductions in the Chesapeake Bay TMDL.[16]

[13] Minnesota Department of Health, Nitrate in community water systems
[14] State-EPA Nutrient Innovations Task Group, *An Urgent Call to Action*
[15] Ribaudo et al., *Nitrogen in Agricultural Systems: Implications for Conservation Policy*
[16] National Association of Clean Water Agencies, *Richmond Elevates Beyond Compliance with Nutrient Reduction Program*

- *Northeast Missouri*
  The Clarence Cannon Wholesale Water Commission spends roughly $130,000, annually, on a chemical additive to remove atrazine (an herbicide) from a local drinking water source that serves 15 towns and cities.[17]

- *Minnesota*
  In response to elevated nitrate levels in source water, five small municipal water suppliers in Minnesota have constructed nitrate removal systems. Construction costs resulted in charges of $350 to $1000 per resident. On top of construction costs, annual operating costs for these small communities tripled.[18]

In addition to the circumstances noted in the examples above, municipalities are also faced with costs associated with updating and replacing aging infrastructure, preparing for and responding to natural disasters, and responding to new and emerging contaminants. The EPA estimates that these costs amount to a 20-year investment of $472.6 billion for drinking water systems and $271.0 billion for wastewater systems.

While the cost of restoring safe and healthy water can be very high, there are several options for financing these efforts. One newer strategy involves collaboration across utilities within watersheds, rather than relying on independent efforts within a community's borders. This report focuses on ways cities or water utilities (or industry) can finance voluntary and collaborative efforts by farmers, dairies, and ranchers to prevent nutrient pollution and for the funder to receive the credit under their permits for those water quality improvements.

This report focuses on ways cities or water utilities (or industry) can finance voluntary and collaborative efforts by farmers, dairies, and ranchers to prevent nutrient pollution and for the funder to receive the credit under their permits for those water quality improvements.

[17] Fentress Swanson, *What Is Farm Runoff Doing To The Water? Scientists Wade In*
[18] Minnesota Department of Agriculture, *Nitrate Contamination: What is the Cost?*

AGRICULTURE-MUNICIPAL PARTNERSHIPS

New collaborations with agricultural and other partners are helping water and wastewater utilities reduce the loss of nutrients and other pollutants. The U.S. Department of Agriculture (USDA) estimates that reducing nitrate concentrations in source waters by 1% would decrease water treatment costs in the U.S. by over $120 million per year.[19]

REDUCING NITRATE CONCENTRATIONS IN SOURCE WATERS BY 1% WOULD DECREASE WATER TREATMENT COSTS IN THE U.S. BY OVER $120 MILLION PER YEAR

Agricultural Best Management Practices are Effective

There is a long history of U.S. agricultural conservation programs working toward improving water quality and other environmental priorities.[20] Federal programs like the USDA's Conservation Reserve Program and Environmental Quality Incentives Program have been helping farmers install and maintain agricultural BMPs. These practices include, but are not limited to: conservation tillage,[21] crop nutrient management,[22] pest management,[23] conservation buffers,[24] irrigation management,[25] grazing management,[26] animal feeding operations management,[27] and erosion and sediment control.[28]

Although there have been regional-based estimates of conservation practice effectiveness, the nutrient reduction potential of conservation and nutrient management practices is field specific based on landscape characteristics and practice design.[29] As a means to meet nutrient reduction goals set out by the Gulf of Mexico Hypoxia task force, state-level efforts have generated state-specific literature reviews on conservation practice efficacy.[30] For example, a recent USGS-USDA study demonstrated that BMPs in the Upper Mississippi River have been effective in reducing nitrogen in surface water by up to 34% in the basin.[31]

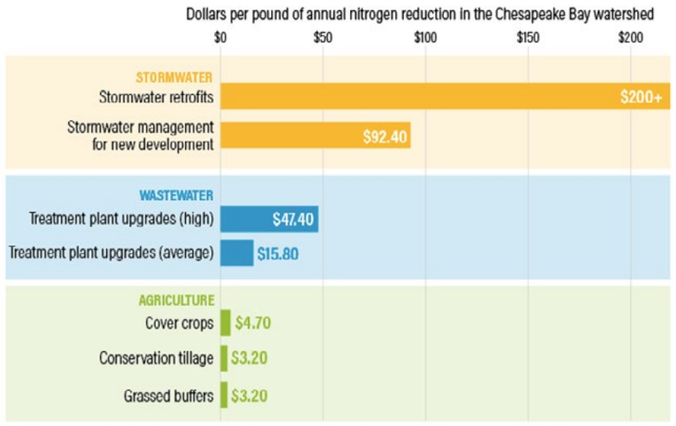
The Agricultural Research Service recently launched the Conservation Practice Effectiveness (CoPE) Database, a compilation of data on the effectiveness of innovative practices developed to treat contaminants in surface runoff and tile drainage water from agricultural landscapes.[32] The database was developed to aid watershed modelers evaluate the impact of conservation practices, particularly novel or developing conservation practices, on runoff or tile drainage water quality. The database is a valuable step toward reaching our water quality goals. It can continue to be populated with ongoing practice effectiveness research data to better refine estimates which could then be used to inform decision makers about potential tradeoffs associated with implementing conservation practices.

[19] Ribaudo et al., *Nitrogen in Agricultural Systems: Implications for Conservation Policy*
[20] Claassen et al., *Cost-effective design of agri-environmental payment programs: U.S. experience in theory and practice; Johansson and Cattaneo, Indices for Working Land Conservation: Form Affects Function*
[21] The practice of leaving harvested plant materials on the soil surface to reduce runoff and soil erosion.
[22] Managing all nutrient inputs helps ensure that nutrients are available to meet crop needs while reducing nutrient runoff.
[23] Using various methods for managing pests while protecting soil, water, and air quality.
[24] Using vegetation strips to provide additional barriers of protection, which prevents potential pollutants from running off into surface waters.
[25] Increasing irrigation efficiency can reduce non-point source pollution of ground and surface waters.
[26] Managing livestock grazing to lessen the water quality impacts (e.g. reduce erosion potential).
[27] Using runoff control, proper waste storage, and nutrient management to minimize the impacts of animal feeding operations.
[28] Lenhart, C., Gordon, B., Peterson, J., Eshenaur, W., Gifford, L., Wilson, B., Stamper, J., Krider, L., and Utt, N. 2017. Agricultural BMP Handbook for Minnesota, 2nd Edition. St. Paul, MN: Minnesota Department of Agriculture.
[29] Dodd, R.J. and A.N. Sharpley. 2016. Conservation practice effectiveness and adoption: unintended consequences and implications for sustainable phosphorus management. Nutrient Cycling in Agroecosystems 104(3):373-392.
[30] Christianson, R., L. Christianson, C. Wong, M. Helmers, G. McIsaac, D. Mulla, and M. McDonald. 2018. Beyond the nutrient strategies: Common ground to accelerate water quality improvement in the Upper Midwest. Journal of Environmental Management 206:1072-1080.
[31] García et al., *Regional Effects of Agricultural Conservation Practices on Nutrient Transport in the Upper Mississippi River Basin*
[32] Smith, D., M. White, E. McLellan, R. Pampell, and D. Harmel. 2019. Conservation Practice Effectiveness (CoPE) Database. Ag Data Commons. https://doi.org/10.15482/USDA.ADC/1504544.

Agricultural nonpoint source policies typically emphasize voluntary adoption of BMPs and include programs to facilitate BMP adoption through technical and financial support to farmers. Some BMPs result in longer-term economic benefits due to lower input costs that may lead farmers to adopt them; however, typically practice implementation has an initial up-front expense to the farmer. These costs along with other barriers[33] have led to a slow adoption rate of some BMPs.[34] With farmers seeking to survive and thrive in competitive agricultural markets, cost-sharing or additional financial incentives are needed for more wide-spread BMP adoption.

While the cost of BMP adoption may be a barrier for farmers, the opposite is true for cities and towns; the price per pound of nutrient reductions on agricultural land is significantly lower than the costly technological upgrades necessary to reduce nutrients in water and wastewater plants. In the Chesapeake Bay watershed, for example, one study found that each pound of nitrogen reduction would cost farmers $1.50 to $22. In contrast, each pound of nitrogen reduction would cost wastewater utilities $15.80 to $47 through conventional treatment approaches. Similarly, Ohio's Great Miami River Nutrient Management project reported a $1.50 per pound cost for nitrogen reductions on farms in that watershed. In contrast, the cost for structural retrofits for stormwater cleanup would be more than $200 a pound (Figure 1).[35] This cost differential in nutrient-management interventions supports a strong business case for ag-municipal partnerships for water quality improvements.

Figure 1: Nitrogen Reduction Costs Differ Across Sectors



Source: Jones et al., *How Nutrient Trading Could Help Restore the Chesapeake Bay*

Partnerships are Effective

Unlike urban-centric approaches to water quality interventions, collaborative or partnership approaches in agricultural settings relies on trust building among stakeholders. Many water and wastewater utilities across the country have begun collaborating with their watershed partners to implement BMPs. Some examples include the following:

- ***Oconomowoc and Waupaca, Wisconsin***
  The Oconomowoc wastewater treatment plant hired a crop consultant to work with farmers to develop plans to keep nitrate runoff low. The city started these agreements in the 1990s and has not had to remove nitrates at the treatment plant since.[36]

[33] American Farmland Trust, *The Adoption of Conservation Practices in Agriculture*
[34] Wade et al., *Conservation-Practice Adoption Rates Vary Widely by Crop and Region*
[35] Jones et al., *How Nutrient Trading Could Help Restore the Chesapeake Bay*
[36] Force, *How Cover Crops Can Solve Nutrient Pollution Problems*

- ***Green Bay, Wisconsin***
  Green Bay's Metropolitan Sewerage District faced new permit requirements to decrease phosphorus and sediment discharge. Plant upgrades were estimated at more than $100 million. In 2014, the District launched a pilot program to support BMPs in adjacent farmland.[37] The cost of the program is roughly $1 million, annually, and the District is currently expanding the project to a large-scale 20-year watershed program covering 31,000 acres. The program is expected to save utility customers over $50 million compared to traditional compliance alternatives.[38]

- ***Cedar Rapids, Iowa***
  Cedar Rapids is currently participating in the Middle Cedar Partnership Project.[39] The project involves 17 partners, including farmers, Iowa Farm Bureau, the Iowa Soybean Association, several local conservation districts, and others. This project will make $4.3 million available from 2015-2020, with three objectives:

  1. Develop watershed plans to target agricultural best management practices (BMPs) for the greatest source water protection benefit.
  2. Provide assistance to implement these BMPs, with an emphasis on reducing nitrate loads.
  3. Conduct outreach to help spread the word and foster implementation of these and other BMPs.

- ***Medford, Oregon***
  Medford conducted an analysis of three options for meeting temperature TMDL requirements and determined that riverside (i.e. riparian) restoration was the most cost-effective option compared to wastewater discharge, lagoon storage, and mechanical chillers. The City is currently engaged in a water quality trading program to improve and protect the quality of the Rogue River, which is used as a supplemental drinking water source for the city.[40]

- ***Northwest Arkansas***
  The Beaver Water District in Northwest Arkansas has worked with partners to form the West Fork White River Watershed Project, a project designed to reduce sediment and nutrient loadings. The project involves 13 partners and has generated more than $8.5 million to protect source waters. The Water District is currently contributing just over $1 million, with its investment leveraged nearly nine times.[41]

- ***Hendersonville and Asheville, North Carolina***
  Since the early 2000s, drinking water utilities in Hendersonville and Asheville have continued to work in partnership with private landowners and state and nonprofit partners to reduce agricultural runoff in the Mills River. The project was recently awarded additional federal funding to support streambank restoration activities and the construction of an agrichemical handling facility.[42]

[37] Hemphill, *Green Bay project promises answers for thorny questions about agricultural runoff*
[38] Sigmund, *Charting the New Course: How NEW Water's Vision Shifted From Compliance to Innovation on Its Journey to Become a "Utility of the Future"*
[39] Morelli, *Cedar Rapids tries collaborative approach to water quality*
[40] The Freshwater Trust, *Medford Water Quality Trading Program*
[41] American Water Works Association, *USDA Tools to Support Source Water Protection*
[42] American Water Works Association, *USDA Tools to Support Source Water Protection; U.S. Environmental Protection Agency, Section 319 Nonpoint Source Program Success Story: North Carolina*

Collaborative approaches with farmers rely on trust building among all partners to work.

Changes that Make Ag-Municipal Partnerships Easier

Conditions are ripe for ag-municipal partnerships. Recent advances in technologies and data analytics are resulting in improvements in best management practices, while federal policy has begun to provide greater regulatory certainty for states and municipalities that want to use them to meet water quality goals, and more funding opportunities are now available to support collaborative efforts.

Advances in Science and Technology

Advances in understanding the physical, chemical, and biological processes influencing water quality, coupled with improvements in hydrologic data collection and analysis, have significantly improved both farmer and regulator confidence in BMP performance. For example, recent USDA-USGA database integration and analysis has helped validate the potential downstream benefits of agriculture BMPs on water quality.[43]

Furthermore, the introduction of precision agriculture technologies has promoted an increase in the use of soil conservation tillage, erosion reduction, and nutrient control practices. For example, variable rate technologies have allowed farmers to make more customized land management decisions, enabling more efficient use of inputs such as seeds, fertilizers, and pesticides under variable infield conditions. These technologies allow farmers to manage their inputs foot-by-square-foot, rather than field-by-field, and enable practices that both save money on inputs and reduce the on- and off-field impacts of those inputs. By 2016, between 15% and 40% of U.S. farms, depending on the crop, used variable-rate application equipment.[44]

Regulatory Flexibility & Support

In December 2018, the EPA and USDA issued a joint announcement urging state agricultural and environmental directors to better engage in market-based and other collaborative approaches to reduce excess nutrients in the nation's waterways.[45] Both agencies voiced their support for identifying opportunities for greater regulatory flexibility in areas such as TMDL implementation and additional support for financial and technical assistance for developing new ag-municipal partnerships. Federal support for these efforts is especially critical in the current farm economy in which farmers experience prolonged periods of low commodity prices that may limit the resources available for voluntary BMP investment.

EPA and the Clean Water Act

For several years, the EPA has been working with state regulators to develop new approaches to permitting that allow for greater flexibility for utilities to meet multiple Clean Water Act requirements:[46]

[43] U.S. Environmental Protection Agency, *Mississippi River/Gulf of Mexico Watershed Nutrient Task Force 2017 Report to Congress*
[44] Hellerstein et al. *Agricultural Resources and Environmental Indicators, 2019*
[45] Ross and Northey, *Agency Engagement in Addressing Nutrient Pollution*
[46] National Association of Clean Water Agencies, *Nutrients & Farm Bill: Pursuing New Tools to Address Nutrient-Related Water Quality Challenges*

Integrated Planning:
Integrated planning provides communities with the flexibility to prioritize and sequence water infrastructure investments. Through integrated planning, a community can define an optimal path to implement the most cost-effective solutions to pollution.[47] Multiple efforts can be integrated into one manageable plan and, potentially, one permit. This includes: discrete regulatory drivers under various NPDES permits, sanitary sewer and combined sewer overflows, municipal separate stormwater sewer systems and publicly owned treatment works discharges, and capacity, management, operations, and maintenance performance efforts.

If greater environmental benefits and lower costs can be achieved by addressing pollution from nonpoint sources upstream instead of treatment upgrades, an integrated plan would allow a community to choose the former option and avoid expensive and less effective projects. Ultimately, all wastewater and stormwater planning can be based on a cost-per-unit pollutant removed and could be considered across NPDES obligations.[48]

In January 2019, Congress codified the EPA's 2012 Integrated Planning process into the law, providing crucial legislative certainty to local communities seeking to develop an Integrated Plan to better manage costs and prioritize their clean water investments.[49]

Conditions are ripe for ag-municipal partnerships.

Water Quality Trading
For nearly two decades, the EPA and some states have recognized the value of watershed-based solutions, including the need to develop watershed-based NPDES permits that account for nonpoint pollutant reduction benefits for point sources of pollution. In 2003, the EPA developed guidance for and began promoting water quality trading.[50, 51] Water quality trading is a market-based approach that allows point sources that face high pollutant control costs to meet their permit obligations by purchasing pollutant reduction credits from other sources (point and nonpoint) that can generate these reductions at lower cost, thus achieving the same or better overall water quality improvement. Despite the EPA's efforts to support these types of flexible solutions, they have not yet been widely implemented.

In 2019, the EPA released a memo[52] and new draft guidance[53] reiterating their support for water quality trading and additional flexibility in developing trading programs. The memo outlined a new vision for market-based approaches to water quality improvement. Specifically, they encouraged NDPES permit writers to include a compliance schedule in the permit. This compliance schedule would account for the time required for nonpoint source partners (like agricultural producers) to generate sufficient pollutant reduction credits or offsets to achieve permit compliance.[54] The newly proposed guidance aims to expand the 2003 policy to allow nonpoint sources (where TMDL load allocations are established) to immediately generate credits (and point sources to use these credits) for certain pollutant reduction efforts, provided there is reasonable assurance that overall load reductions will be met over time.[55]

[47] Watts et al., *Clean Water for Less: Integrated Planning Reduces the Cost of Meeting Water Quality Goals in New Hampshire*
[48] Henderson, *What Is Integrated Planning? An Intelligent Approach to Receiving Water Quality*
[49] National Association of Clean Water Agencies, *NACWA Scores Clean Water Win: Congress Incorporates Integrated Planning Into Clean Water Act; Farm Bill Advances Watershed Solutions*
[50] U.S. Environmental Protection Agency, *Water Quality Trading*
[51] U.S. Environmental Protection Agency, *Water Quality Trading Toolkit for Permit Writers*
[52] U.S. Environmental Protection Agency, *Water Quality Trading Memos*
[53] *"Water Quality Trading Under The National Pollutant Discharge Elimination System Program"* Federal Register 84: 182
[54] U.S. Environmental Protection Agency, *Water Quality Trading (PowerPoint Presentation)*
[55] The 2003 Water Quality Trading Policy "recommended that individual **nonpoint sources** were to make their portion of the … the "load allocation," called the "baseline," ***before*** [they] could generate credits or offsets." The 2019 draft Policy "recommends that **nonpoint sources** be allowed to generate credits for any pollutant reductions … that are not included in the assumptions that support the TMDL load allocation…any such pollutant reductions would be ***immediately*** available for use by point sources as credits."

USDA and the 2018 Farm Bill
The most recent Farm Bill included provisions to facilitate ag-municipal partnerships that use efficient and cost-effective BMPs to address water quality challenges. For example, the bill allows municipalities to gain greater and more appropriate recognition from the federal government for ag-municipal partnerships that advance water quality improvements.
The bill states that it is the:

"Sense of Congress that the federal government should recognize and encourage partnerships at the watershed level between nonpoint sources and regulated point sources to advance the goals of the Clean Water Act and provide benefits to farmers, landowners, and the public."

Additional key provisions include direction to USDA for enhanced measurement, evaluation, and data collection of BMPs; increased use of precision agriculture technology; and the prioritization of source water protection.

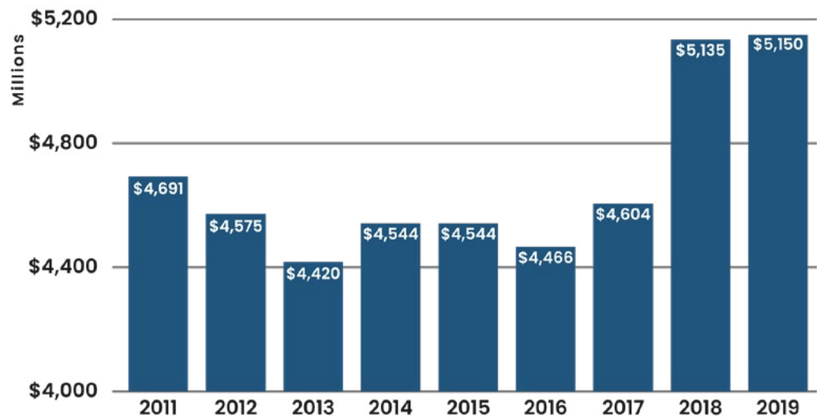
In 2018, Congress declared that: "The federal government should recognize and encourage partnerships at the watershed level between nonpoint sources and regulated point sources to advance the goals of the Clean Water Act and provide benefits to farmers, landowners, and the public."

Additional Financial Incentives & Technical Assistance

In addition to the regulatory flexibilities and programmatic realignments mentioned above, EPA and USDA have also made available additional financial and technical support resources to states, municipalities, and agricultural producers to help implement innovative partnerships for water quality improvement.

The EPA has seen continued Congressional support for its water infrastructure and water quality programs **(Figure 2)**. Resources provided through the federal Clean Water and Drinking Water State Revolving Loan Funds to capitalize and assist state revolving funds have been steadily increasing. **See Figures 3 and 4 from EPA**. The bump in funding in 2018-19 can be attributed to the newly established Water Infrastructure Finance and Innovation Act (WIFIA) program.

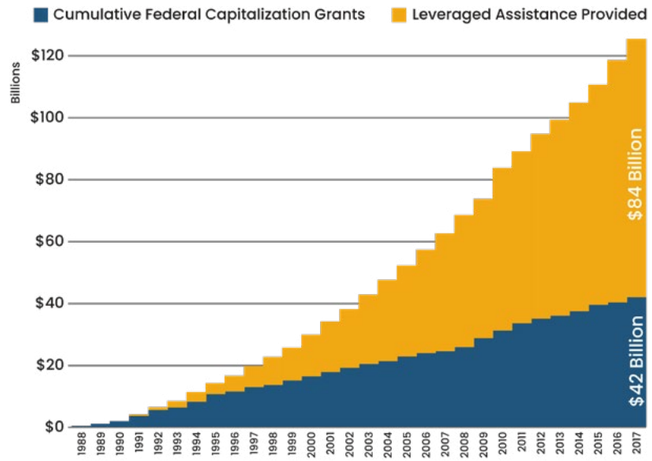
Figure 2: U.S. EPA Funding for Water



Annual appropriations, not adjusted for inflation, for CWSRF grants, drinking water SRF grants, special project grants, the Water Infrastructure Finance and Innovation Act (WIFIA) program, and Clean Water Act Section 319 grants.

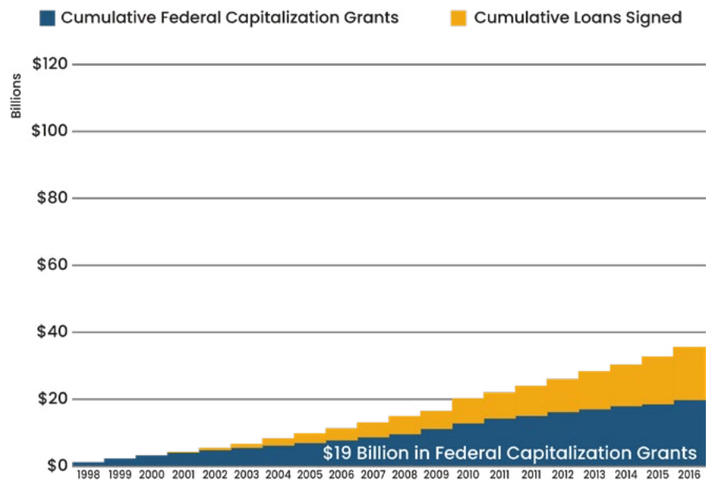
Sources: https://www.everycrsreport.com/reports/96-647.html and https://www.epa.gov/nps/319-grant-program-states-and-territories

Figure 3: Annual Assistance Provided by the Clean Water SRF



Source: Adapted from EPA CWSRF 2017 Annual Report: https://www.epa.gov/sites/production/files/2018-03/documents/final_2017_cwsrf_annual_report_for_web2.pdf

Figure 4: Annual Assistance Provided by the Drinking Water SRF



Source: Adapted from EPA CWSRF 2017 Annual Report: https://www.epa.gov/sites/production/files/2018-08/documents/20th_anniversary_dwsrf_report_final_508.pdf

The 2018 Farm Bill included significant increases in funding for water-related agricultural conservation practices. The bill specifically directs 10% of USDA's Natural Resources Conservation Service (NRCS) conservation funding (roughly $4 billion over the next 10 years) to conservation practices that protect drinking water sources. The bill also includes funding changes that continue a trend of "rebalancing" conservation efforts from programs designed to move land out of production (e.g., Conservation Reserve Program) to programs designed to support farmers who use resource-conserving practices on land in crop and livestock production (e.g., Environmental Quality Incentives Program and the Conservation Stewardship Program). **See Figure 5**. This shift highlights the agency's commitment to supporting the adoption of BMPs among agricultural producers.

Figure 5: The 2018 Farm Bill maintain the long-run shift toward funding BMPs[56]

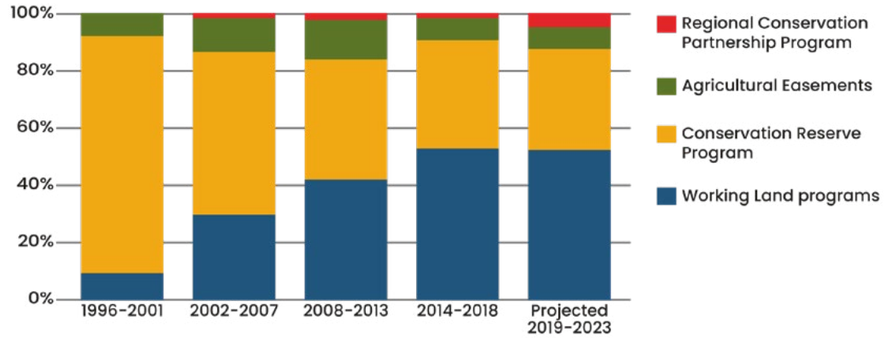


Chart includes data for predecessor programs. "Working land" programs include the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program (CSP), shown together because they are combined in the Congressional Budget Office (CBO) estimates.

Source: Adapted from USDA, Economic Research Service Analysis of USDA, Office of Budget and Policy Analysis (OBPA) data for 1996-2018, OBPA estimates for 2019, and CBO estimates for 2020-2023.

The Bill also increases funding for and reforms the Regional Conservation Partnership Program (RCPP). The RCPP is an important program that facilitates partnerships among water utilities and farmers involving watershed-based investments. Changes include direction to USDA to simplify the contract/application process, expedite contract extensions, and allow in-kind work to be counted towards the partner's match.

[56] U.S. Department of Agriculture, *The 2018 Farm Act maintains the long-run shift toward funding of working lands conservation*

FUNDING & FINANCING STRATEGIES

Municipalities can employ many funding and financing strategies to support ag-municipal partnerships for water quality improvement. The most appropriate funding and financing strategy for a municipality will depend on many factors, including: community size and characteristics, regulatory constraints, debt capacity, system ownership profile, competing priorities, location, and the scope and type of activities to be funded. Some municipalities may need to rely more heavily on grant funding to support this work, while others will need to employ a hybrid of funding and financing options."

The difference between "funding" and "financing" according to the EPA's Water Infrastructure and Resiliency Finance Center[57]

FUNDING:

Funding refers to the provision of "one-way" financial resources to support a need, program, or project. This term is used when 1) a utility fills the need for funds by generating its own internal revenues and reserves. The use of rate revenues, cash reserves, and fees is referred to as "pay as you go" or "Pay Go" funding. 2) The recipient obtains a grant or similar form of funds that do not require repayment and do not carry an interest expense.

FINANCING:

Financing refers to the "two-way" acquisition of money for a program or project. The term financing is used when the monetary resource need is filled from borrowed money where principal and interest are owed to the source of funds. This includes loans, municipal bonds, and other sources of monetary resources that require repayment of principal and interest. Typically, these resources will tie to a capital asset (like a farm BMP) and will not be available for supporting ongoing operational expenses.

[57] U.S. Environmental Protection Agency and the Environmental Counsel of the States, *Water Infrastructure Financial Leadership: Successful Financial Tools for Local Decision Makers*

Any ag-municipal programmatic strategy to fund BMPs should consider the following:

Revenue Sources: Unless the municipality has readily available capital to deploy, it will need to identify new streams of revenue to support its long-term goals.

Funding and Financing Options: A municipality should consider the costs and benefits of different funding and financing options, whether it chooses to fund its ag-municipal work through Pay-Go, financing, or a combination of both.

Mechanisms for Procurement: A municipality should develop a strategy for deploying its funds in order to "procure" the water quality benefits it is seeking from the adoption of BMPs on agricultural land. Some of these approaches are truly transactional, while others may be bundled with a funding or financing strategy.

Table 1 summarizes how the different approaches described in the following section fall within these three decision points:

Twenty Ways for Cities to Pay for or Procure Water Quality Improvements on Agricultural Lands

APPROACH	FUNDING/REVENUE APPROACH	FIANCING	PROCUREMENT MECHANISM
General Fund Appropriations	X		
New Taxes	X		
Stormwater Utility Fees	X		
Special Purpose District	X		
Source Water or Watershed Protection Fee	X		
Permit Review, Development Inspection, and other Special Fees	X		
Innovative Revenue Generating Approaches	X		
Municipal Bonds		X	
Drinking Water State Revolving Fund		X	
Clean Water State Revolving Fund		X	
WIFIA		X	
USDA Rural Development Water and Waste Disposal Loan & Grant Program		X	
Private Financing		X	
Public Private Partnerships		X*	X
Pay-For-Success Contracts/Bonds		X	X*
Direct Procurement			X
Joint Benefits Authority			X
Pooled Water Fund			X
Water Quality Trading	X*		X
Revolving Water Fund			X

* May not always be true, dependent on design or activity.

Local Funding Through New or Existing Revenue Sources

Revenue is essential for any funding or financing strategy to support water quality projects. Whether a municipality decides to use Pay-Go or debt financing, revenue will be needed sooner or later. As noted previously, there are numerous grant opportunities available to localities looking to invest in BMPs (Appendices 1 & 2), but this report focuses on self-sustaining municipal funding and financing strategies.

1. General Fund Appropriations

General Fund revenues are the most common source of funding for ongoing operations and maintenance of water systems and infrastructure, as well as municipal stormwater programs. General Fund revenues represent a viable source of funding to support ag-municipal partnerships. The revenues in the General Fund are derived from a variety of taxes, such as income taxes and property taxes. General Fund resources are subject to market values of taxable properties and economic conditions for income and general sales-based revenues.

Advantages and Disadvantages of General Fund Appropriations[58]

ADVANTAGES	DISADVANTAGES
• Most communities have established general fund revenue programs, thus making the process of supporting new and expanding programs familiar and uncomplicated • Few constraints on usage • Has capacity to fund entire project or program	• All municipal programs will compete with water quality projects and those are typically a lower priority • Generally not dedicated to long term use and sustained multi-year funding needs • General fund dollars typically can't support growing stormwater program costs without increasing taxes or diverting existing resources to the program • General fund budgets are subject to reallocation, shifting with political priorities • Tax exempt properties do not contribute and may not fully reflect contribution to water quality challenges • Growing communities (or those with growing property values) miss out on the chance to use financing through State Revolving Fund or low cost bonds to borrow more cheaply

2. New Taxes

Dedicated levies, based on property or sales taxes, are sometimes used to fund stormwater management programs or source water protection programs. Tax levies may be subject to the same limits on increase as are municipal taxes that support the general fund.

- ***Los Angeles County, California*:**
  In November 2018, Los Angles County voters passed a referendum allowing for the creation of the Safe Clean Water Program funded by a parcel tax of $0.025 per square foot of impervious surface.[59] The tax is estimated to generate $300 million for stormwater projects in the county. The tax has built-in protection for low-income senior citizens and credits for property owner-led water quality projects.

[58] Environmental Finance Center, University of Maryland, *Local Government Stormwater Financing Manual: A Process for Program Reform; Amec, Storm Water Utility Feasibility, City of Urbana*
[59] *"Safe Clean Water Program," County of Los Angeles*

- ***City of Lenexa, Kansas*:**
  In November 2018, Los Angles County voters passed a referendum allowing for the creation of the Safe Clean Water Program funded by a parcel tax of $0.025 per square foot of impervious surface. The tax is estimated to generate $300 million for stormwater projects in the county. The tax has built-in protection for low-income senior citizens and credits for property owner-led water quality projects.[60]

- ***Pitkin County, Colorado*:**
  In 2008, voters in Pitkin County approved a $0.1 sales tax initiative to fund water quality and quantity protection and improvement projects in the Roaring Fork watershed. Revenues from the tax are allocated to the Healthy Rivers and Streams Fund. The Fund is administered by the Board of County Commissioners with the advice of a citizens board.[61]

Advantages and Disadvantages of New Tax Levies

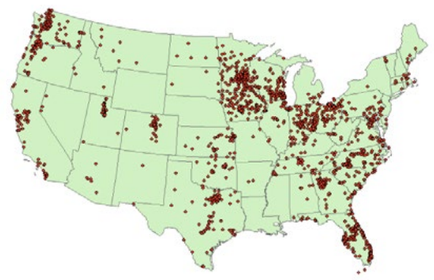
ADVANTAGES	DISADVANTAGES
• Creates a dedicated source of revenue • Not competing with other tax-generated revenues • More flexibility with how revenue can be deployed	• Often requires voter approval • Some jurisdictions require that sales tax increases be imposed in relatively large increments, which may disincentivize pursuit of this funding source, or make passage of new initiatives difficult[62]

3. Stormwater Utility Fund/Enterprise Fund

Some communities include stormwater management costs within their water or wastewater utility budgets, often basing fees on metered water flow. However, a property's metered water flow usually bears no relationship to the stormwater runoff it generates. For example, the stormwater runoff from the impervious area of a shopping center's buildings and parking lots is significant, but its use of metered water is relatively small.

There is a growing trend in the U.S. to establish stormwater utilities, which operate as dedicated enterprise funds. An enterprise fund is simply a government fund that has a dedicated revenue source to provide a service in a self-sustaining way. There are currently 1,716 stormwater utilities in the U.S., more than half of which are in jurisdictions within the Mississippi River watershed ***(see Figure 6)***.[63] Stormwater utilities have typically been set up in towns and smaller communities serving populations under 50,000 residents. Significantly more communities created stormwater utilities in 2019 compared to a decade prior – there was a 270% increase in the number of utilities from 2009 to 2019. However, there is still a long way to go - less than 10% of the incorporated cities and towns in the U.S. have adopted stormwater utilities.

Figure 6: Stormwater Utilities in the United States, 2019



Source: Campbell, Western Kentucky University Stormwater Utility Survey 2019

[60] *"Rain to Recreation"* City of Lenexa, Kansas
[61] *Pitkin County Healthy Rivers*; MacDonald, *Pitkin County's Healthy Rivers and Streams Fund (PowerPoint Presentation)*
[62] Hopper, *Local greenprinting for growth: using land conservation to guide growth and preserve the character of our communities*
[63] Campbell, *Western Kentucky University Stormwater Utility Survey 2019*

Stormwater utilities charge fees, which are typically based on property type, area, or area of impervious surface, provide for regulatory compliance (MS4, CSO, TMDL, etc.), and operation and maintenance costs. Fees are typically charged to both tax-paying and tax-exempt properties. In other words, a town's universities and churches do not pay property taxes, but would pay a stormwater fee. Nationwide, the average monthly single-family residential fee was $5.85, with fees ranging from zero up to $45 per month.[64]

Types of Utility Fee Structures[65]

One of the most important decisions a stormwater utility will face is how to develop its rate structure. Stormwater utility fees (SUFs) are charged to customers as flat fees or variable rates. Municipalities may employ a combination of these methods based on their needs. For instance, many municipalities adopt a flat fee for residential properties and a variable fee for non-residential property types, with variations in fee calculations.[66]

- **Flat Rate:** the customer pays a fixed amount for stormwater services, regardless of actual usage. There are two methods to assess fees in this structure - flat or tiered fees. Under a flat fee, consumers pay the same fee amount. The use of flat fees is more common for residential properties,[67] especially in small towns, and is popular in municipalities with lower home values.[68] In tiered fees, all properties are categorized by use or size of the property and charged accordingly.

  » Flat rate systems are also inequitable ones, in that a lower income resident on a smaller parcel often pays the same rate as a wealthy homeowner on a larger residential property. No stormwater utility has tried to build an equitable rate structure yet, but principles similar to those built into drinking water and wastewater rates in Philadelphia[69] and other cities could also be applied to stormwater fees.

- **Variable Rate:** the system usage is determined by the volume of stormwater runoff produced by the customer's land. Several parameters, some of them directly related to the amount of runoff, may be used by municipalities. These parameters include: the impervious area, percentage of imperviousness, amount of runoff, water consumption, and intensity of development. The most commonly used parameter is the impervious area on a property.[70] The most common methods for calculating these rates are:

  » **Equivalent Residential Unit (ERU):** The ERU is calculated based on the average impervious area on residential parcels in a municipality.[71] Each parcel's fee is calculated based on the impervious area as a share of the ERU area. To determine the number of billable ERUs for non-residential parcels, their impervious areas are divided by the impervious area of an average residential parcel.[72] This method is the most common, with approximately 80% of stormwater utilities employing this method.[73]

  » **Residential Equivalent Factor (REF):** A REF is determined by the ratio of runoff volume generated by one acre of land to runoff volume generated by one acre of low-density residential land.[74] The total monthly charge combines the REF, the base rate, and the net area. This method is popular in municipalities with higher home values.[75]

Utility Fee Credits and Discounts[76]

Stormwater Utility Fees are often paired with credits or discounts that provide incentives to promote private stormwater management. Customers can receive discounts or credits through installation of BMPs that reduce stormwater runoff or improve water quality,[77] provide education or take on maintenance responsibility,[78] or purchase of stormwater credits through local stormwater credit trading markets.[79]

[64] Campbell, *Western Kentucky University Stormwater Utility Survey 2019*
[65] Zhao et al. *Stormwater Utility Fees and Credits: A Funding Strategy for Sustainability*
[66] National Association of Flood and Stormwater Management Agencies, *Guidance for Municipal Stormwater Funding; New England Environmental Finance Center, Stormwater Utility Fees: Considerations & Options for Interlocal Stormwater Working Group (ISWG)*
[67] New England Environmental Finance Center, *Stormwater Utility Fees: Considerations & Options for Interlocal Stormwater Working Group (ISWG)*
[68] Kea et al., *An Analysis of Patterns and Trends in United States Stormwater Utility Systems*
[69] Water Center at the University of Michigan, *Water Affordability Based on Income: The Tiered Assistance Program in Philadelphia*
[70] Fedorchak et al., *The Financial Impact of Different Stormwater Fee Types: A Case Study of Two Municipalities in Virginia;* National Association of Flood and Stormwater Management Agencies, *Guidance for Municipal Stormwater Funding;* U.S. Environmental Protection Agency, *Funding Stormwater Programs*
[71] Fedorchak et al., *The Financial Impact of Different Stormwater Fee Types: A Case Study of Two Municipalities in Virginia;* U.S. Environmental Protection Agency, *Getting to Green: Paying for Green Infrastructure Financing Options and Resources for Local Decision-Makers;* Campbell, *Western Kentucky University Stormwater Utility Survey 2019*
[72] U.S. Environmental Protection Agency, *Funding Stormwater Programs*
[73] Kea et al., *An Analysis of Patterns and Trends in United States Stormwater Utility Systems*
[74] WSB & Associates, Inc., *Justification Report: Stormwater Utility Fee*
[75] Kea et al., *An Analysis of Patterns and Trends in United States Stormwater Utility Systems*
[76] This section pulls heavily from: Zhao et al. *Stormwater Utility Fees and Credits: A Funding Strategy for Sustainability*
[77] The city of Minneapolis, MN offers up to 50% credit to customers that implement on-site stormwater management that improve water quality and 50% or 100% credit for practices that address stormwater quantity. U.S. Environmental Protection Agency, *Getting to Green: Paying for Green Infrastructure Financing Options and Resources for Local Decision-Makers*
[78] The City of Urbana, IL offers credits to institutions that provide approved stormwater educational program for students ($5 credit per student—maximum 50% discount)
[79] Washington DC Stormwater Retention Trading Program: *https://doee.dc.gov/sr*

Advantages and Disadvantages of Stormwater Utility Fund/Enterprise Fund

ADVANTAGES	DISADVANTAGES
• Directly related to stormwater impacts • Dedicated funding source • Stable funding source • Creates funding that can be leveraged to meet grant and bond requirements • Stormwater utilities are better positioned to raise rates than municipalities are to raise taxes if stormwater obligations increase • Credits and discounts can be an effective incentive that leads property owners to make stormwater management improvements on their own land • Encourages local government officials to be disciplined in keeping the dedicated revenue for its dedicated use	• Requires upfront costs to develop an implementation plan, fee structure, and administration strategy • Requires a vote from local governing body • Tax exempt / non-taxed ratepayers tend to oppose • Has been given the negative term "rain tax" by opponents

4. Special Purpose District

As an alternative to developing a stormwater utility, sometimes special assessment or government districts function as separate governmental entities that manage specific resources (e.g., watersheds, drainage areas, stormwater, etc.) within well-defined geographical areas. These districts have been established by state or local governments or by voters through a ballot process. These entities are authorized to raise operating funds through taxes, fees, charges, or by issuing new debt.[80] Districts can also establish credit and discount programs. Although the creation of special districts is only authorized in some states and, once established, their funding and financing strategies mirror those described elsewhere, we mention them here because they are employed in specific circumstances.

- ***Fairfax County, Virginia:***
  In 2010, the Fairfax County Board of Supervisors established a Stormwater Service District as their primary revenue for stormwater. The County cited more stringent regulatory requirements and essential reinvestment in the county's aging infrastructure for the need to establish a funding mechanism that was independent of the general fund. The District taxes residents $0.0325 per $100 of assessed real estate value.[81]
- ***Kootenai County, Idaho:***
  In January 2007, Kootenai County established the Rathdrum Prairie Aquifer (RPA) Protection District. The aquifer protection district boundaries correspond to the areas over the aquifer and adjacent upland areas. Its creation allowed Kootenai County to charge an annual fee to residences and businesses with the boundary. The money is used to fund aquifer protection programs and activities.[82]
- ***Ventura County, California:***
  The Ventura County Watershed Protection District funds the implementation of the County's Integrated Watershed Protection Plans through property taxes (the district received 1% of assessed property value), benefit assessments (fees based on the proportion of stormwater a parcel of land contributes to the overall stormwater runoff) , and land development fees.[83]

[80] The Nature Conservancy, *A Compendium of Financing Sources and Tools to Fund Freshwater Conservation*
[81] *"Stormwater Service District"* Fairfax County, Virginia
[82] *"Rathdrum Prairie Aquifer Boundary" Idaho Department of the Environmental Quality*
[83] *"Benefit Assessment for WPD"* Ventura County Public Works; Ventura County Watershed Protection District, *Ventura County Watershed Protection District Report on Benefit Assessment Program Fiscal Year 2018/2019*

Advantages and Disadvantages of Special Purpose Districts

ADVANTAGES	DISADVANTAGES
• Once in place, provides a stable revenue source (depending on how revenue is generated, taxes are more susceptible to economic changes) • Is flexible and can be adjusted to reflect service level and community changes • Political boundaries rarely represent watershed ones, and Districts allow sharing of costs of the program across several municipalities or unincorporated areas that contribute to the stormwater problem	• Requires voter approval • Depending on service area and governing structure, may relinquish typical municipal authority/control to the county or the special district • Smaller and/or poorer districts may not have sufficient tax or revenue base needed to support full programs

5. Source Water or Watershed Protection Fees

Some water and wastewater utilities have created a source water or watershed protection fee or surcharge that is added to their customer's water bills.[84] Rate surcharges are fees applied to the volume of water usage or with a fixed fee per customer. These fees have historically been utilized by drinking water utilities for source water protection (e.g., protecting forests around reservoirs) and typically support land acquisitions and conservation easements. Recently, some municipalities began using these types of fees to support their stormwater programs. These fees can be used for watershed activities if they contribute to water quality protection or improvement. Below are a few examples:

- ***City of Raleigh, North Carolina:***
  Since 2011, City of Raleigh has charged drinking water customers a Watershed Protection Fee of $0.1122 per 100 cubic feet of water and raises over $3.5 million annually to support source water protection initiatives, treatment system improvements, and protective restoration projects.[85]
- ***Central Arkansas Water, Arkansas:***
  The utility charges customers a Watershed Protection Fee to fund its Watershed Protection Plan. The fee is based on the customer's meter size which can vary from $0.60 per month for 5/8" meters to up to $48.00 for 10" meters.[86]
- ***City of Bellingham, Washington:***
  Bellingham's water utility charges customers a bimonthly Lake Whatcom Watershed Fee, which is applied to combined water, wastewater, and stormwater utility bill. The watershed fee is composed of a base rate for single family households ($172 per year for city customers and $258 per year for outside city customers) and a combination base rate and consumption-based rate for non-single family and irrigation customers ($72 per year base rate + $0.76 per 1 CCF for city customers; $107 per year base rate + $1.14 per 1 CCF for outside city customers).[87] Revenues support land acquisition and other land preservation measures in the City's watershed to help preserve water quality.
- ***Oxford County, Ontario (Canada):***
  To fund the County's four Source Protection Plans, water and wastewater customers are charged a monthly fee of $0.03/m3, with a minimum charge of $1.20 per month.[88] A portion of the revenue generated by the fee is used to support the implementation of BMPs on private land. The County's incentive program offers to cover up to 70% of total project costs with a cap of $35,000 per property.[89]

[84] Delgado-Perusquia et al., *Communicating and Investing in Natural Capital using Water Rates*
[85] *"Utility Rates, Deposits & Other Charges"* City of Raleigh
[86] *"Little Rock and North Little Rock Water Rates"* Central Arkansas Water
[87] *"2020 Metered Water, Sewer, Stormwater, and Lake Whatcom Watershed Rates"* City of Bellingham, Washington
[88] *"Water/wastewater rates for 2019"* Oxford County
[89] *"Source Water Protection"* Oxford County

Advantages and Disadvantages of Source Water or Watershed Protection Fees

ADVANTAGES	DISADVANTAGES
• Provides a steady revenue stream without raising water or wastewater rates • Conveys the value and magnitude of the utility's investments in source water or watershed protection to customers • Often provides significant co-benefits in the form of protected recreational areas, fishing opportunities, and other amenities valued by ratepayers	• May experience community push-back if purpose and outcomes are not properly communicated • Small systems may need to charge fees significantly higher than larger system because they simply cannot spread the costs of watershed protection over as large of a customer base

6. Permit Review, Development Inspection, and other Special Fees

Permit review and other service-related fees apportion the costs only among those who require the service or contribute to the need for the regulatory measure.[90] Below are a few common examples:

- **Permit and Inspection Fees:**
  Collecting permit fees to finance site-inspections and maintenance is a long standing funding procedure. Most municipalities can establish and collect fees to obtain operating funds for services. Many inspection services (most notably the construction inspection of erosion and sediment control measures and permanent drainage and runoff management facilities) are financed, in part, through fees collected by permitting agencies. There should be a direct link between the permit fees collected and the permitted project.[91]

- **In-Lieu of Construction Fees:**
  An in-lieu of fee is an approach that allows a developer or permit holder to pay a fee to a government agency as a substitute for on-site stormwater mitigation, such as detention storage.[92] They may be used when an on-site system is feasible, but an offsite system in the watershed is preferable or more cost-effective.

- **Impact Fees:**
  Also known as capital recovery, tap fees, or expansion fees, impact fees pay for off-site stormwater projects where impacts cannot be solved on-site.[93] Impact fees are typically considered to be a charge on new development and need to be charged at a rate that is sufficient to pay for offsite stormwater improvements.[94]

Advantages and Disadvantages of Permit Review, Development Inspection, and Other Special Fees

ADVANTAGES	DISADVANTAGES
• Revenues from smaller projects can be combined to be used on a regional basis, or where measures can have the most water quality impact	• Likely only covers costs to offset new impacts, not address historic ones • May not provide sufficient funding for full program • implementation (construction or maintenance), and likely would need to be combined with additional funding sources • Depending on the type of fee, may not be a consistent source of revenue, as they may decrease during a time of slow development • Agencies have a history of under-budgeting in lieu fees, leaving new stormwater impacts unmitigated, and it is difficult to raise fees once a structure has been established • • Some states have statutes that impose limitations on the use of certain fee types, especially those that impact developers

[90] National Association of Flood and Stormwater Management Agencies, *Guidance for Municipal Stormwater Funding*
[91] Chagrin River Watershed Partners, Inc., *Funding the Long-Term Operation and Maintenance of Stormwater Best Management Practices);* City of Portland, Oregon, *% for Green, available at https://www.portlandoregon.gov/bes/article/341452*
[92] Albany Pool Communities and the Capital District Regional Planning Commission, *Stormwater In-Lieu Fee and Credit Banking and Trading Feasibility Report*
[93] National Association of Flood and Stormwater Management Agencies, *Guidance for Municipal Stormwater Funding*
[94] Shady Shores, Texas, *The Nuts and Bolts of Impact Fees*

7. Innovative Revenue Generating Approaches

The EPA highlights a number of innovative revenue-generating approaches municipalities can employ, such as leasing advertising space on water towers, selling grid service to a local electric utility, selling fertilizer made from sewage sludge, selling water and wastewater line protection, and offering consulting or system management expertise to other utilities.[95] Revenue generated from these approaches may offset new budget allocations aimed at supporting ag-municipal partnerships, but there are few examples of this happening so far.

Advantages and Disadvantages of Innovative Revenue Generating Approaches

ADVANTAGES	DISADVANTAGES
• Potential flexibility in how funds can be used • Environmental nature of some of these approaches may facilitate the use of funds for broader watershed-based activities that generate multiple environmental benefits	• May require significant time and capital to develop and implement • May not provide sufficient funding for full program implementation (construction or maintenance), and likely would need to be combined with additional funding sources • At risk if buyers decide to discontinue future services or product purchases

[95] U.S. Environmental Protection Agency and the Environmental Counsel of the States, *Water Infrastructure Financial Leadership: Successful Financial Tools for Local Decision Makers*

Traditional Public Financing

Municipalities have historically relied on a variety of bond and other borrowing to fund water programs. Taking on debt makes sense where the benefits of today's investment will also benefit future ratepayers and taxpayers. Debt spreads out costs on both current and future generations who benefit. In addition, borrowing is an attractive way to fund more work than can be financed through Pay-Go approaches alone. This is especially important for cases in which larger investments have direct and indirect benefits in reducing future costs. For example, using borrowing to pay for $10 million in stormwater and flood-reducing watershed projects in the short-term will reduce flooding risks throughout the next 50 years, whereas spending only $1 million per year is unlikely to lower flooding risks by much, missing perhaps a decade of benefits by funding work slowly. To put it another way, just as you can't build 5% of a library each year and get much value out of it, there are many cases where you cannot build tiny increments of stormwater projects and get much value.

Below we review municipal bonds, **Clean Water and Drinking Water State Revolving Funds, WIFIA.**

Municipal and county finance directors and water utility chief financial officers are already deeply familiar with borrowing as a strategy. The following information highlights the utility of these approaches in supporting ag-municipal partnerships, some of which may not be well-known methods of financing watershed-based projects on farms. These activities count as appropriate types of infrastructure to fund with bond proceeds under government accounting rules.

8. Municipal Bonds

A municipal bond is a debt obligation issued by a municipality, county, or state to finance its capital expenditures. Municipal bonds can be thought of as loans that investors make to local governments for a defined period at a variable or fixed interest rate. The interest paid on municipal bonds is tax-exempt, making them an attractive, predictable, and low-risk source of low returns on investment.

The two most common bonds used by municipalities are general obligation bonds and revenue bonds. General obligation bonds are backed by the "full faith and credit" of the issuing agency. All revenues and resources of the entity, including various taxes, may be used to repay a general obligation debt. In contrast, revenue bonds are supported only by specified revenues. For example, creation of a separate fee or tax that is earmarked specifically for stormwater would allow a jurisdiction to sell revenue bonds and investors would only look at the ability of the dedicated revenue (e.g. a stormwater fee) to pay back the bond before investing.

San Antonio, Texas:

Since 2000, residents of San Antonio have approved four ballot initiatives to authorize new bonds to provide upfront financing for the Edwards Aquifer Protection Program, which supports watershed protection and preservation projects. The bonds are repaid through funds set aside from a $0.125 sales tax (up to $90 million).[96]

GASB 62

In 2018, the Governmental Accounting Standards Board (GASB) clarified that green and distributed infrastructure can be bond-financed using the Regulated Operations approach in GASB 62. This allows municipalities to treat natural infrastructure the same way as steel and concrete: as a capital asset. Many finance directors and CFOs remain unaware of this guidance, but despite that, stormwater projects or public or private land, including green infrastructure designs or farm-based BMPs, could be financed with municipal bonds.

Learn more here: *Go Green: Muni Bond Financing for Consumer Rebates and Other Distributed Water Investments* by Earth Economics and WaterNow Alliance

[96] Woolworth, *San Antonio Provides Financing for Source Water Protection*; The Nature Conservancy, *Beyond the Source: The environmental, economic and community benefits of source water protection*; City of San Antonio, *About the Edwards Aquifer*

A municipality may wish to market or certify their bond as a "green bond." It is not clear that green bonds offer a distinguishable pricing advantage over non-green bonds to municipalities;[97] however, the marketing of the bond as "green" could help generate local voter or legislative support for the bond issuance given that there is clear market demand from bond purchasers for green bonds. Investor demand for green bonds currently exceeds the supply of green bonds available for sale.

Advantages and Disadvantages of Municipal Bonds

ADVANTAGES	DISADVANTAGES
• Allows expenditures that far exceed current revenues and resources • Construction of major improvements can be expedited in advance of what could be funded from annual budget appropriations by spreading the costs over time • Can be a much faster source of debt capital compared to other sources • May result in significant cost saving if flooding, other damaging impacts, and inflation of land acquisition and construction costs are avoided • Flexibility in design of debt service • Predevelopment and planning loans are available • Ensure future rate or taxpayers also contribute to the costs of providing a service that benefits them	• Finance charges and interest payments increase the overall capital cost of the project • May have restrictions on use or reallocation of funds • Generally speaking, don't support long-run ongoing operating, maintenance, or monitoring and enforcement costs • There typically exists either legal or self-imposed limits on the total amount of funds governmental entities at all levels can generate through borrowing

9. Drinking Water SRF

The Drinking Water State Revolving Fund (DWSRF) is one of the largest sources of low-cost financing dedicated to a wide range of drinking water infrastructure projects. The Drinking Water fund finances drinking water infrastructure and source water protection. Congress appropriates funding into the programs, which is passed along to state revolving fund accounts, by a formula, matched with state funding, and then provided to jurisdictions in the form of loans. The borrowed capital is repaid and, in turn, used to fund new projects.

Many jurisdictions are not aware that it be used to finance watershed-based work like ag-municipal partnerships. In fact, financial assistance is available for project planning and construction, including source water protection, nonpoint source pollution prevention, and watershed remediation.

The Drinking Water State Revolving Fund functions like an infrastructure bank, providing extremely low interest loans to communities for improvements in their drinking water infrastructure. Loan repayments then cycle back into the state account, allowing more projects to be financed. The fund can finance a variety of local land use controls and other management tools for source water protection,[98] and can be used to acquire land or conservation easements, support voluntary incentive-based source water protection measures, and promote best management practices. In addition, many state funds have provided an even lower interest rate for projects involving green infrastructure, including work on agricultural lands.

- ***Sussex County, Delaware*:**
  The Delaware DWSRF program partnered with the Sussex County Conservation District and the Delaware Rural Water Association to conduct a source water protection pilot. The objective was to work with both the agriculture and water utility communities to ensure all agricultural land surrounding high-risk public wells participated in a cover crop program. They completed GIS mapping of high-risk public wells and financially supplemented cover crop payments on farm properties near wells. This $250,000 pilot paid for 5,500 acres of cover crops. The state plans to expand the program to two other Delaware counties.[99]

[97] S&P Global, *Why Corporate Green Bonds Have Been Slow To Catch On In The U.S.*
[98] U.S. Environmental Protection Agency, *Protecting Source Water with the Drinking Water State Revolving Fund Set-Asides*
[99] U.S. Environmental Protection Agency, *Protecting Source Water with the Drinking Water State Revolving Fund Set-Asides*

10. Clean Water State Revolving Fund

The Clean Water State Revolving Fund (CWSRF) is one of the largest sources of low-cost financing dedicated to a wide range of wastewater infrastructure projects. SRF programs are administered by states using federal grant money, matching state funds, and loan repayments that 'revolve' back into the state-held account to fund new projects. Congress appropriates funding into the programs, which is passed along to state revolving fund accounts, by a formula, matched with state funding, and then provided to jurisdictions in the form of loans. The borrowed capital is repaid and, in turn, used to fund new projects.

The CWSRF was established to fund water quality improvement projects and has traditionally been used to fund the construction of publicly owned wastewater treatment facilities. Many jurisdictions are not aware that it can be used to finance watershed-based work like ag-municipal partnerships. The CWSRF can fund a wide range of agricultural BMP activities that address runoff and erosion from agricultural cropland and animal feeding operations. This includes feedlot runoff control, manure management, conservation tillage, and erosion control.[100] State Clean Water funds have provided over $272 million for animal agricultural best management practices and over $468 million towards best management practices on farmland.[101]

Financial assistance is available for project planning and construction, including source water protection, nonpoint source pollution prevention, and watershed remediation. In addition, many state funds have provided an even lower interest rate for projects involving green infrastructure, including work on agricultural lands.

In 2018, the average interest rate for the Clean Water State Revolving Fund was 1.5% compared to the average market rate of 3.7%

The revolving fund can offer many types of financial assistance to fund agricultural BMP projects. While direct lending is one option, they can also use conduit-lending through commercial and public entities to reach certain borrowers, such as farmers.[102] In a conduit arrangement, a government agency is effectively putting their name and assets behind financing for a third party. These lending arrangements fall roughly into three categories:

- **Pass-Through Lending** channels CWSRF fund through a state agency or local government entity to an end borrower. The State of Washington's CWSRF program has provided loans to pass-through entities including counties and conservation districts. The pass-through entities then provide sub-loans to farmers to implement agricultural BMPs, such as direct seeding.[103]
- **Linked Deposit Lending** is similar to pass-through loans except the CWSRF works with a bank instead of a state agency or local government entity. The bank then loans out the deposited funds (at a slightly higher interest rate) to individuals for smaller-scale water quality projects. The State of Maine has used linked deposit financing through the CWSRF to fund implementation of forestry best management practice and purchase of green forestry equipment for logging professionals.
- **Sponsorship Lending** pairs traditional publicly owned utility projects with nontraditional ones, often nonpoint source projects.[104] The utility receives a loan with a reduced interest rate as compensation for also undertaking (i.e., sponsoring) a nontraditional project. The utility can pass on the interest rate savings to a non-profit partner or set-aside to use for direct assistance.[105]

[100] U.S. Environmental Protection Agency, *Funding Agricultural Best Management Practices with the Clean Water State Revolving Fund*; U.S. Environmental Protection Agency, I*nnovations in Agriculture in Oregon: Farmers Irrigation District Improves Water Quality, Maximizes Water Conservation, and Generates Clean, Renewable Energy*
[101] U.S. Environmental Protection Agency and U.S. Department of Agriculture, *Innovative Financing Strategies for Reducing Nutrients (PowerPoint Presentation)*
[102] U.S. Environmental Protection Agency, *Activity Update: Innovative use of Clean Water State Revolving Funds for Nonpoint Source Pollution*
[103] U.S. Environmental Protection Agency, *Financing Options for Nontraditional Eligibilities in the Clean Water State Revolving Fund Programs*
[104] U.S. Environmental Protection Agency, *Sponsorship Lending and the Clean Water State Revolving Fund*
[105] U.S. Environmental Protection Agency, *Funding Nonpoint Source Activities with the Clean Water State Revolving Fund*

- ***City of Driggs, Idaho*:**
  The Idaho CWSRF sponsorship program provides incentives to address nonpoint source water quality issues while also implementing point source upgrades. In 2011, the City of Driggs received a $10.5 million CWSRF loan for a point source project to improve treatment and transmission capabilities at the Teton Valley Regional Wastewater Treatment Plant. This project was combined with a $150,000 nonpoint source project to stabilize over a mile of previously damaged streambed. The city's sponsorship of this project provided funding to Friends of Teton River (a non-profit), to reconstruct part of the floodplain, stabilize 5,600 feet of stream channel and 11,200 feet of eroding stream banks, build and restore pools and riffles for fish habitat, and re-vegetate more than 10 acres of floodplain with native vegetation. Not only was water quality improved in both Teton Creek and the Teton River, but the possibility of flooding was reduced and stream function and habitat quality were improved, subsequently benefiting Yellowstone cutthroat trout and other native fish and wildlife species. The financing was provided with zero interest and $1,877,284 of principal forgiveness. These funding terms allowed for the completion of the nonpoint source project without impacting city ratepayers.[106]

- ***City of Northwood, Iowa*:**
  In 2015, the City of Northwood supported a sponsored project in conjunction with its application for nearly $9 million of sewage treatment upgrades. The project provided $900,000 in State Revolving Fund support for wetland restoration that would remove nutrient removal from Worth County Drainage Districts. The City will cover future expenses related to monitoring the wetland site and documenting nutrient reduction. The wetlands are enrolled in IDALS Conservation Reserve Enhancement Program (CREP). The Worth County Drainage District secures the mitigation plan and agreement and manages and maintains the wetland site as required by the USDA. With CREP and other nonpoint matching funds, the agricultural nutrient control activities are funded at $2.1 million, with the sponsorship funding provided as a grant.[107]

State Spotlight: Iowa

The Iowa Finance Authority (which administer the CWSRF and DWSRF) has partnered with local lending institutions and the Iowa Department of Agriculture and Land Stewardship's local Soil and Water Conservation Districts to administer their Stormwater Best Management Practices Loan Program. The program uses conduit lending to offer low-interest loans for stormwater runoff projects, including detention basins, grassed waterways, infiltration practices, pervious paving systems, ponds or wetland systems, soil-quality restoration, and other practices that are shown to improve or protect water quality.[108]

Success Stories[109]

A certified organic dairy farmer with 665 acres of cropland financed a new 1.5 million gallon manure storage facility to capture cattle waste and store it until an appropriate time to use it as fertilizer on his crops. The manure storage makes running the dairy operation easier while also reducing the potential for nutrients to reach waterways.

Near Fairfield, Iowa, a farmer was able to cut planting time in half by creating terraces on 85 acres. The work was funded with a linked deposit loan through the Local Water Protection Program. The funds were used to construct earthen ridges, or terraces, to hold water back, slow runoff, and allow nutrients and pesticides to filter out before entering streams. It also creates more efficient pathways for farm machinery to move in the field.[110]

[106] U.S. Environmental Protection Agency, *Sponsorship Lending and the Clean Water State Revolving Fund*
[107] Environmental Law Institute, *Iowa Overview – Innovative Finance Opportunities for Nutrient Reduction*
[108] U.S. Environmental Protection Agency, *Financing Green Infrastructure: A Best Practices Guide for the Clean Water State Revolving Fund*
[109] Environmental Council of the States, *Iowa's Linked Deposit Loans*
[110] https://www.ecos.org/wp-content/uploads/2016/06/Iowa-Linked-Deposit-Loans.pdf

11. Water Infrastructure Finance Innovation Act (WIFIA)

WIFIA is a new federal loan program established by Congress in 2014 and administered by the EPA. It is designed to issue long-term, low-interest loans or loan guarantees to a wide variety of water infrastructure projects.[111] Eligible borrowers under WIFIA can include: the state revolving funds themselves, corporations, partnerships, joint ventures, trusts, and other government agencies. Generally, applicants must have better credit-worthiness for WIFIA loans compared to SRF programs. Projects must generally be at least $20 million to be eligible, but communities with fewer than 25,000 inhabitants can use the program for smaller projects (i.e., $5 million). The EPA advertises WIFIA funding each year and sets priorities for the kinds of projects or infrastructure they seek to fund.

WIFIA can fund multiple discrete construction projects through a single loan, but the EPA views such circumstances as one project for purposes of program eligibility, loan size, and other requirements.[112] This mechanism could be useful to municipalities seeking financial support to implement a large portfolio of BMPs, or for states seeking to help multiple communities raise funding for BMP installation. Bundled loans require a common security pledge, a common purpose, and similar construction timeframes.

Advantages and Disadvantages of WIFIA Financing

ADVANTAGES	DISADVANTAGES
• Because the loans are secured at Treasury rates, the cost of borrowing is likely to be much lower compared with borrowing on the municipal bond market • Can co-finance with SRF and other federal programs as long as the total federal assistance does not exceed 80% of the project's costs • Can be paired with tax-exempt financing • Loans can have very long-term payback times of up to 35 years • Repayment can be delayed (without interest costs) for 5 years after substantial completion of the project. • Municipal governments can come together under one application with a common security pledge	• Minimum project/program size may be too high for some borrowers • The maximum portion of eligible project costs that WIFIA can fund is capped, therefore additional financing or funding must be secured • Must be repaid from dedicated revenue sources • The program is new and thus application processes and details may be challenging for states, counties or small communities to negotiate • Transaction costs are high • Projects must comply with National Environmental Policy Act, Davis-Bacon, American Iron and Steel, and all other federal cross-cutter provisions

12. USDA Rural Development Water and Waste Disposal Loan & Grant Program

The Rural Development Water and Waste Disposal Loan and Grant program finances drinking water, stormwater drainage (including BMPs), and wastewater systems for rural communities with 10,000 or fewer residents.[114] USDA adjusts interests rates depending on a community's financial hardship. For example, USDA reported rates between 2.5% and 4.25% in early 2019.[115] The program is administered by state USDA offices and applications are accepted year round.

Advantages and Disadvantages of USDA Rural Development Financing

ADVANTAGES	DISADVANTAGES
• Loan terms are up to 40 years or the useful life of the project • Interest rates are typically below market rate • Easy online application process • Technical assistance is usually available to help with applications	• Population requirements may restrict some rural communities • While the program's capacity to fund natural infrastructure exists, there is little evidence to suggest it has been used in this way. Therefore, a municipality may need to allocate time in exploring eligibilities with local USDA Rural Utility Service Staff before applying for a loan

[111] U.S. Environmental Protection Agency, *Learn About the WIFIA Program*
[112] U.S. Environmental Protection Agency, *WIFIA Program Handbook*
[113] An SRF loan made from capitalization grant funds would be subject to the 80% limitation on federal funding for a WIFIA project. An SRF loan from other sources would not be considered federal funding and can be used to exceed 80%. This means that SRF programs, when using non-federal sources of funding, can provide loans for the non-WIFIA share of 51% of eligible project costs.
[114] U.S. Department of Agriculture, Rural Development, *Water & Waste Disposal Loan & Grant Program*
[115] U.S. Environmental Protection Agency and U.S. Department of Agriculture, *Innovative Financing Strategies for Reducing Nutrients (PowerPoint Presentation)*

Private Financing & Procurement

Government borrowing is a great source of low-cost capital, however, it currently cannot meet existing demand in the water sector. Private financing is often viewed as a viable alternative to fill this funding gap. Private finance can come from many sources, can drive innovation, and can help reduce performance risks (i.e., risks associated with whether water projects will or won't work in producing their intended outcomes). However, private financing often comes at a cost: namely, higher interest terms compared to public financing. Private financing can also create more transaction costs – time and money – in setting up and securing the financing. In contrast, it can also result in lower transaction costs once financing is secured and projects are underway.

A source of private capital specific to the water sector is called "impact investment capital."[116] Impact investors seek to provide capital to projects that will produce a measurable social or environmental impact that investors value, alongside a financial return. Institutional investors (e.g. Goldman Sachs), corporations, and philanthropists are examples of impact investors. Roughly $500 billion of impact capital has already been invested in projects around the globe. Unlike traditional private financing, impact investment rate terms range from below market-rate to market-rate, depending on the investing organization's strategic goals and the project's risk.

[116] Schultz, *Investing in Water for Impact*

The focus on environmental impact and outcomes in private financing is also reflected in emerging procurement (municipal contracting or grants). Traditional procurement mechanisms familiar to municipal leaders reimburse for actions (finished project construction, etc.). For example, a city hires engineering and design contractors to plan a stormwater project's design and then hires a construction firm, supervised by a city or utility engineer, to build the stormwater project. The contractors are paid as they invoice for labor and materials on a monthly basis, and also paid when the construction is certified as complete.

New procurement models are embracing the concept of "pay-for-performance" or "pay-for-success," where reimbursement is based on measurable outcomes **(Figure 7)**. For example, a Request for Proposals structured as pay-for-success procurement might pay based on gallons of stormwater captured by a project and the city would not make any payments until that outcome is measured. Alternatively, a contract might make payments only for fully completed projects that meet preset design characteristics, with the municipality effectively buying finished products much the way they purchase computers or vehicles.

We combine this discussion of private financing options with procurement approaches, because there is an inherent synergy between the two. For example, private finance may be as inexpensive, or nearly as inexpensive, as bond funding because the procurement structure allows partners to find cost-effective techniques or locations for projects that have lower real estate costs or restoration costs. If they are able to save money on delivery costs compared to what a utility would have spent to plan and build the same project, they may effectively be offering a discount on the total budget for the project.

Figure 7: Pay-for-Success Procurement Process

Pay-for-success contracts require non-government funding to initiate and deliver pre-determined environmental outcomes, paid for by government at a pre-determined price when the outcomes are achieved.

Some financing mechanisms inherently have significant transactional costs around structuring deals that have a measurable impact while providing a return on investment. These high transactional costs create natural barriers to smaller projects being funded. New governance structures are needed to aggregate systems and provide the rate base for large scale, private finance to become viable.

When financing ag-municipal partnerships, especially for regulatory compliance, it makes sense to focus on outcomes rather than actions.

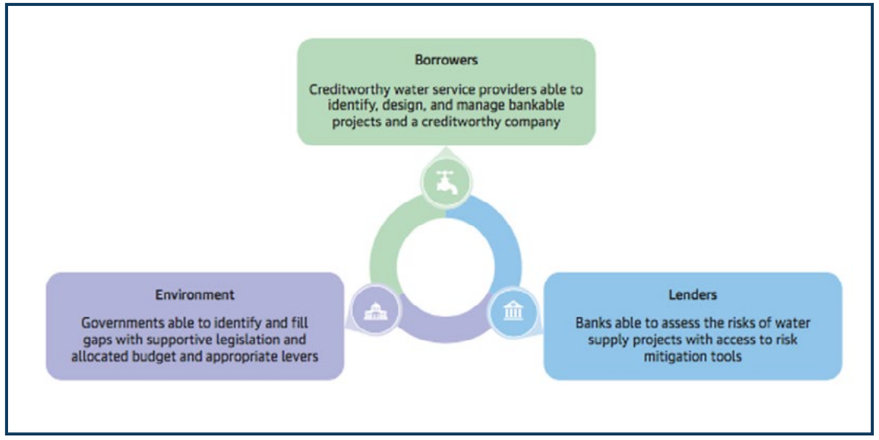
13. Private Financing

Private finance has historically provided a source of capital for water infrastructure projects. Cobank, for example, has committed $2.2 billion to rural water projects.[117] Private financing for public infrastructure projects involves a municipality borrowing money from private investors to pay for specific projects. A variety of investors provide private finance, including banks, insurers, pension funds, and private equity firms. While bank investments declined after the 2007/2008 financial crisis, institutional investors (such as insurers and pension funds) developed a greater interest in financing infrastructure projects.

To secure private financing in the water sector, a utility or municipality needs to meet the following criteria:[118]

- A utility or municipality should be creditworthy and be able to identify, design, and manage projects.
- Investors should be able to access relevant operational and financial information about utilities in order to assess financing risks.

Figure 8: Utility Capacity Needed to Access Private Finance[119]



Source: Bender, *Introducing Commercial Finance into the Water Sector in Developing Countries*

Advantages and Disadvantages of Private Financing

ADVANTAGES	DISADVANTAGES
• Private financing can accelerate program operations following the establishment of initial financing arrangements • Private financing is more accessible to small cities that may have limited access to the bond market or can't afford the costs of bond issuance • Loan terms can often be tailored to meet the needs of the borrower • The revenue in a municipal enterprise fund can serve as a low risk source of capital to repay private investment	• Interest rates may be higher for private compare to public financing • Some sources of private financing may not provide long-term loans • Water utility assets (pipes, treatment facilities, etc.) are often owned by the government. As such, these assets are not on the balance sheet of the water service provider. Therefore, even if the assets are owned by the water service provider, they usually can't be used for loan collateral. Moreover, once they are built, assets have low resale market value.[120] • The commercial viability of BMPs may not be sufficient to secure a loan because they do not generate or secure an ongoing source of revenue for the utility

[117] CoBank, *Water*
[118] Bender, *Introducing Commercial Finance into the Water Sector in Developing Countries*
[119] Bender, *Introducing Commercial Finance into the Water Sector in Developing Countries*

14. Public-Private-Partnerships (P3)

Public-Private-Partnerships (P3s) are "performance-based" contracts that allocate risks more equally between contractors and municipalities and link public payments to contractual performance criteria set forth in the partnership documents and contracts.[121] Under a P3, a partner typically leads all phases of project development, from design through construction (often including long-term maintenance or operations). Thus, P3s can reduce the risk of cost-overruns occurring, costs which would typically be borne by the partner under the terms of the contract.

P3s are relatively rare. Municipalities typically use a procurement method called "design-bid-build" for developing and constructing infrastructure with private contractors. Under this process, there are two rounds of public contracting. The first round involves designing projects and setting up the planning documents necessary for construction bids, while the second round involves opening a bidding process under which any qualified party can submit proposals to build the project. The majority of risks associated with the delivery and operation of the project are retained by the municipality. Public works engineers and utility engineers like this approach because it gives them a role. However, the work is slow because there are two rounds of contracting on each project and longer timelines for each phase of work. They have higher government staffing costs and frequent cost overruns billed to the government. In contrast, P3s don't leave government to pay for any cost overruns and project completion generally happens much faster.

Municipalities can use many forms of P3s to design, build, operate, maintain, and/or finance a water project, program, or entire utility system. **Table 13** highlights some of the different functions a municipality can include in a P3. **Figure 9** illustrates how risk allocation changes depending on the structure of the P3. Risk transfer comes with a price that is reflected in the bid. Compared to traditional procurement, this may result in lower cost to the municipality. Although the private partner will require compensation for assumed risks, the amount of control municipalities have over project site selection, design, and construction can allow for cost savings throughout different project stages, which can make up for estimated risk-based costs. Although we are not aware of any published studies of comparative costs, our anecdotal experience is that P3s (and similar arrangements) can provide a 25-50% cost savings for local governments.

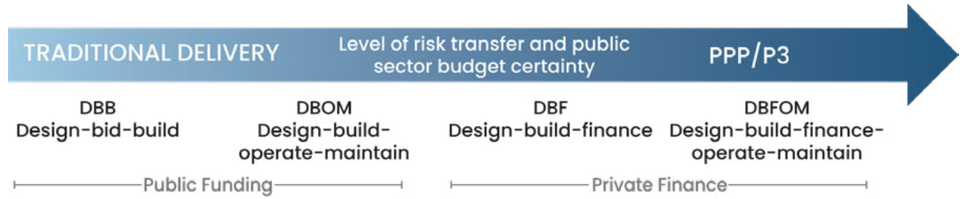
Municipalities can use many forms of P3s to design, build, operate, maintain, and/or finance a water project, program, or entire utility system.

Examples of P3 Contract Function Types[122]

FUNCTIONS	DESCRIPTION
Design	Developing construction-ready design specifications using the project's initial concept and output requirements
Build	Constructing the designed specifications and installing equipment
Finance	Funding all or part of the project's capital expenditures
Maintain	Maintaining the infrastructure asset up to a certain standard over the life of a contract
Operate	Operating the asset to continue providing services to either a government off-taker, direct users, or simply by providing technical support
Transfer	Transferal of asset ownership from the private entity to the public agency after completion

[120] U.S. Environmental Protection Agency, *Learn About the WIFIA Program*
[121] American Water Works Association and Ernst & Young Infrastructure Advisors, LLC, *To P3 or not to P3 A water industry view on the relevance of public-private partnership delivery models*
[122] International Bank for Reconstruction and Development / The World Bank, Asian Development Bank, and Inter-American Development Bank, *Public-Private Partnerships Reference Guide Version 2.0*

Figure 9: Allocation of P3 Performance Risk[123]

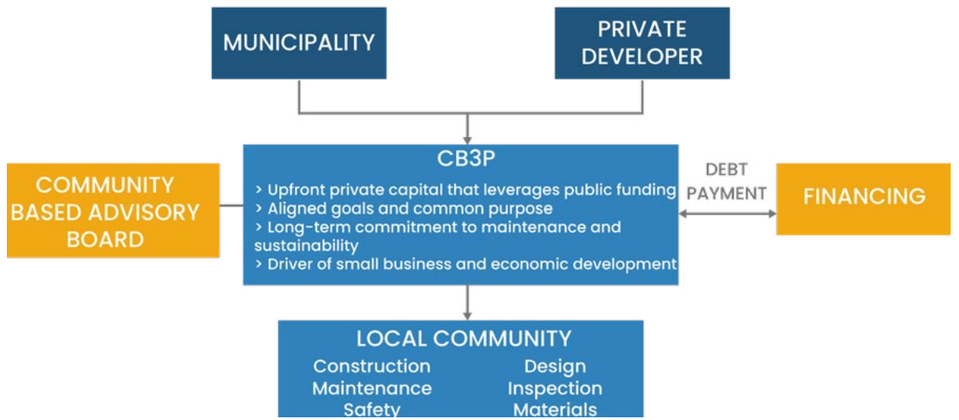


Source: Adapted from American Water Works Association and Ernst & Young Infrastructure Advisors, LLC, *To P3 or not to P3 A water industry view on the relevance of public-private partnership delivery models*

A municipality can choose to fund or finance a P3 itself or require the private partner to provide financing. When the private partner is self-financed, it can drive better performance and innovation, and benefit both parties.[124] P3 contracts that are self-financed are often structured with public payments that reward subsequent performance, and these performance-based financial incentives can drive efficiency. This type of contract structure may result in the successful procurement of outcomes desired by the municipality, it may come with higher or lower costs compared to other procurement mechanisms. If a municipality is very prescriptive about project location and project design features, costs (e.g., real estate) are more likely to be higher than if they allow their private partner to innovate.

Recently, a new P3 model known as Community-Based Public-Private Partnerships (CBP3) has emerged in the stormwater sector.[125] This model includes features of traditional P3s, but incorporates more contract features aimed at building long-term trust and confidence between partners.[126] CBP3s focus on achieving stormwater management goals and creating measurable local community benefits. For example, a CBP3 might include metrics that facilitate local job creation, community outreach, and educational advancement for underserved communities.[127]

Figure 10: CBP3



This model displays the multi levels of stakeholders and involvement within a public and private partnership. It involves the municipalities and private developers at the front of the relationship and their financing mechanisms to help drive local economies and increase capacities.

Source: Adapted from Bender, *Introducing Commercial Finance into the Water Sector in Developing Countries*

[123] American Water Works Association and Ernst & Young Infrastructure Advisors, LLC, *To P3 or not to P3 A water industry view on the relevance of public-private partnership delivery models*
[124] U.S. Environmental Protection Agency, *Perspective: "The Financial Impact of Alternative Water Project Delivery Models" in the Water Sector*
[125] U.S. Environmental Protection Agency, *Community Based Public-Private Partnerships and Alternative Market-Based Tools for Integrates Green Stormwater Infrastructure*
[126] U.S. Environmental Protection Agency, *Community Based Public-Private Partnerships and Alternative Market-Based Tools for Integrates Green Stormwater Infrastructure*
[127] Ajami et al., *Water Finance: The Imperative for Water Security and Economic Growth*

Some utilities have begun using CBP3s to implement all or a portion of their stormwater program:

- ***Prince George's County, Maryland:***
  In 2014, Prince George's County was required to treat stormwater runoff from 15,000 acres by 2025, as part of a MS4 permit requirement to achieve TMDL standards for the Chesapeake Bay. The estimated cost of this work was $1.2 billion. The County formed the Clean Water Partnership, a 30-year CBP3 between the County and Corvias, Inc., a Rhode Island-based company.[128] The first three years of the $100-million partnership concluded successfully in 2018. Corvias created 2,000 acres of green stormwater infrastructure and allocated 87% of its expenditures to minority-owned businesses located within the county or owned by county residents. And it did all of this under-budget, claiming implementation costs are down by 40% on average per acre compared to traditional procurement.[129]

  The County's $100 million cost was financed almost exclusive through County issued municipal revenue bonds. The County also pursued CWSRF financing to support project instillations.[130] The County's debt associated with the P3 is backed by revenue from the County's stormwater utility fees (the "Clean Water Act Fees"), which is collected from property owners (a flat administrative fee and ERU fee).[131]

  The P3 exceeded its stormwater and local economic development goals by delivering an extra 100 acres of stormwater treatment, returning some cost savings to the County, and creating a $183 million economic benefit. The firm has now won a second $120 million contract for the next stage of the P3 and retains long-term maintenance responsibilities for the completed stormwater projects over the next decade.

- ***The City of Chester, Pennsylvania:***
  In 2016, the City of Chester developed a $50 million P3 with Corvias, Inc. to build and maintain green stormwater infrastructure over the next 20-30 years on approximately 350 acres.[132] The program seeks to achieve water quality standards outlined in their NPDES permit, improve neighborhood quality of life, assist small, minority-owned businesses, and drive economic growth.

  The P3 uses a Design-Build-Finance-Operate & Maintain P3 approach (meaning that Corvias, Inc. is responsible for all project stages, from design through maintenance, with supervision from the city). Additional funding was used to help the city plan the P3; the City contributed $50,000, the EPA provided a grant of $150,000, and the Pennsylvania CWSRF provided a $1 million grant.

  Corvias , Inc. is building a pipeline of projects in close coordination with the City, limited by the City's funding; thus far, the City has raised $24 million to implement the program. Financing includes a mix of long-term, low-interest rate loans and grants. This includes a $15 million loan (2018) and a $9.9 million loan (2019) from the CWSRF.[133] The City's debt for this program is backed by a stormwater utility fee that is based on impervious coverage by parcel.

- ***Milwaukee, Wisconsin:***
  In 2019, the Milwaukee Metropolitan Sewerage District (MMSD) issued a Request for Proposals (RFP) for CBP3 to help expand the District's green infrastructure instillation efforts.[134] The District's most recent MS4 permit sets a goal of establishing 50 million gallons' worth of green infrastructure capacity within five years.

  Previously, the District relied on P3s to construct green stormwater infrastructure, but those P3s were structured on a project-by-project basis. Their new Community Benefits P3 seeks a single partner to create a minimum of 20 million gallons of green infrastructure-based stormwater capture capacity within three years. It also expects a reduction of capture costs below its current cost of $1.76 per gallon, and to engage at least 25% small and veteran-, women-, and minority-owned businesses.

  They established a four-phase process for the CBP3 that allows the District to terminate the partnership if it's not satisfied with progress.[135] The phases are (1) visioning, (2) preliminary engineering/design and financial plan development, (3) engineering services during construction, and (4) post-construction vegetation establishment and long-term strategy. The District issued a contract to Corvias, Inc. only for the first phase, with additional contracts to be issued at its discretion.

[128] *"The Clean Water Partnership"* Prince George's County and Corvias
[129] P3 Great Lakes Initiative, *New approaches to large-scale green stormwater infrastructure investment build climate resilience*
[130] In 2019, the County was awarded a $35 million CWSRF loan to support the CWP: Tuser, *Maryland Allocated $38.4 Million for Water Infrastructure Projects*
[131] Prince George's County, *Fee Structure*
[132] Corvias, *Stormwater Authority of Chester*
[133] Corvias, *Corvias And Stormwater Authority Of Chester Improve Local Stormwater Infrastructure*
[134] Corvias, *Stormwater Authority Of Chester And Corvias Announce Continued Investment To Improve Local Stormwater Infrastructure*; Milwaukee Metropolitan Sewerage District, *Request for Proposal: Planning, Design, and Implementation of Community-Based Green Infrastructure (CBGI)*
[135] P3 Great Lakes Initiative, *New approaches to large-scale green stormwater infrastructure investment build climate resilience*

Municipalities interested in exploring P3s to implement ag-municipal partnership programs can incorporate many of the concepts highlighted in the stormwater examples above. Municipalities may wish to seek implementing partners that would be responsible for coordinating with agriculture producers, implementing desired program requirements, etc. The P3 contract may include performance metrics related to: the number of farmers/acres engaged, types of BMP projects or practices deployed, tons of nutrients reduced, monitoring frequency, and maintenance, among others.

Advantages and Disadvantages of Public Private Partnerships

ADVANTAGES	DISADVANTAGES
• Provides a great degree of flexibility • Allows for the allocation of risks among the appropriate parties • Incentivizes efficiency which can result in expedited project delivery • Can accommodate investment requirements in underserved communities • Increases scale of implementation • Shares performance risk • Expands expertise and innovation • Increases opportunity for implementation – private partners may have more flexibility in negotiating terms with private land owners • Potential cost savings • Access to private project financing	• Not suitable for small, low-cost projects • Transparency and accountability can be a concern because contracts often contain proprietary information that can't be released to the public • Increased financing costs • Few bidders/providers • Not well understood by customers/the public

15. Pay for Success Contracts/Environmental Impact Bonds

Pay-for-Success contacts or bonds are becoming a popular finance and/or procurement mechanism for those seeking more accountability and experimentation. Pay-for-Success models encourage risk-taking because investors (rather than the government) provide the capital necessary to implement projects, and repayment levels are contingent upon actual project outcomes. In this way, Pay-for-Success models are also a form of risk management, as they reduce performance risks for municipalities. This model may be particularly attractive to municipalities looking to hedge agriculture BMP performance risk as a means of protecting limited public dollars.

For Pay-for-Success models to be successful, municipalities need to set clear performance goals. This often requires up-front analysis of existing data, modeling projects, and baseline setting. Pay-for-Success models typically include an independent third-party evaluator that monitors performance against agreed-upon benchmarks. Environmental Incentives has developed a toolkit for municipalities pursuing this type of procurement model.

Additioal Resources:

- Winrock International's Conservation PFS how-to guide (for agricultural pollution)
- https://enviroincentives.com/wp-content/uploads/2017/05/Pay-for-Performance-Contract-Mechanisms-for-Stormwater.pdf

A municipality can decide to use Pay-for-Success to access private capital and implement the project itself (with a third party evaluator), or, it can contract with a company or service provider to implement the project. Below are a few examples of how this model has been used by the water sector.

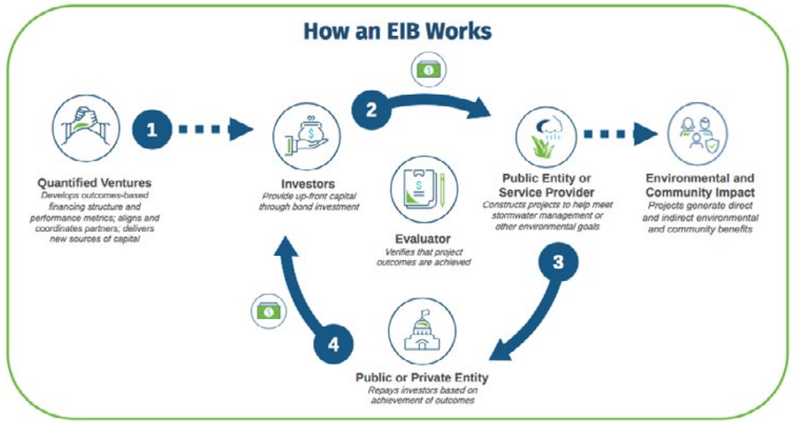
In 2016, in partnership with Quantified Ventures, DC Water issued a $25 million EIB to finance the construction of green infrastructure to manage stormwater runoff and help bring the city back into Clean Water Act compliance. The EIB investors included Goldman Sachs and the Calvert Foundation. Using the bond proceeds, DC Water will pay for construction costs and the EIB will be used to mitigate risks through a three-tiered performance-driven approach.

During the five-year construction and monitoring phase, the bond will pay investors a 3.43% interest rate, which is equivalent to DC Water's 30-year cost of capital **(See Figure 12)**. After project completion, an independent third party will measure the project's performance. The bond will then be bought back by DC Water at a rate dependent on the project's performance (Figures 10 and 11). If the highest performance tier is achieved (greater than 41.3% runoff reduction), DC Water will make a payment to investors in the amount of $3.3 million; if the middle performance tier is achieved (18.6% to 41.3% runoff reduction), no adjustments are made to bond repayments; and if only the lowest performance tier is met (less than 18.6% runoff reduction), investors will reduce the bond repayment interest by $3.3 million.

Advantages and Disadvantages of Pay for Success Contracts Bonds/Environmental Impact Bonds

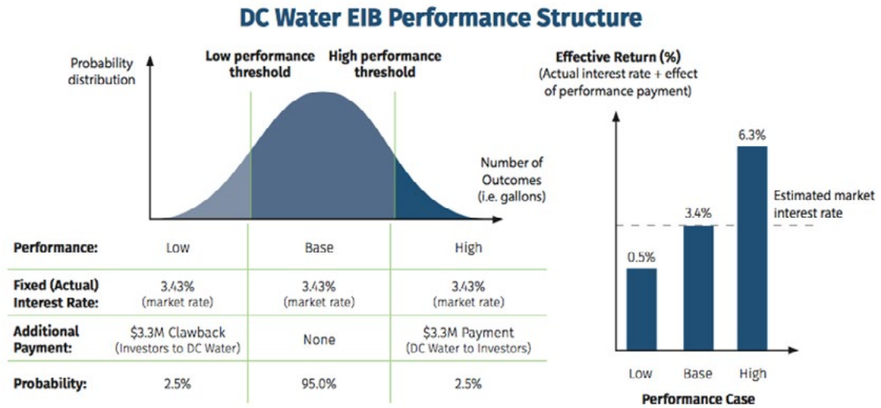
ADVANTAGES	DISADVANTAGES
• Reallocates performance risk to private investors • Can blend finance with project/program implementation • Can secure financing for projects that are innovative or difficult to finance	• Defining and agreeing upon performance metrics and goals can be difficult and time consuming • Transaction costs (time and money) of designing structure can be high • Cost of capital may be greater than public-financing • External expertise is needed to develop contracts

Figure 11: How an EIB Works



Source: https://www.quantifiedventures.com/blog/what-is-an-environmental-impact-bond

Figure 12: DC Water's EIB Performance Structure[136]



Performance:	Low	Base	High
Fixed (Actual) Interest Rate:	3.43% (market rate)	3.43% (market rate)	3.43% (market rate)
Additional Payment:	$3.3M Clawback (Investors to DC Water)	None	$3.3M Payment (DC Water to Investors)
Probability:	2.5%	95.0%	2.5%

Source: Quantified Ventures *Case Study: DC Water*

[136] Quantified Ventures *Case Study: DC Water*

Following the launch of DC's EIB, the cities of Atlanta and Baltimore also adopted the Environmental Impact Bond (EIB) model to fund the implementation of green infrastructure practices for stormwater management.

Forest Resilience Bond

The Forest Resilience Bond (FRB), developed by Blue Forest Conservation in partnership with World Resources Institute, uses a Pay-for-Success model to raise private capital to finance forest restoration and reduce the risk of severe fire in the future.[137] In 2018, the first FRB secured $4.6 million in blended private finance to fund the restoration of 15,000 acres of forest in the North Yuba River Watershed in California.[138] The funds raised through the FRB are managed by the National Forest Foundation, which will hire contractors and manage forest restoration work, while multiple beneficiaries share the cost of reimbursing investors over time **(Figure 11)**.[139]

Over the course of five years, investors are paid back (with interest rates ranging from 1-4%) by those who benefit from the work and have contracted with Blue Forest Conservation (e.g., the U.S. Forest Service, the California Department of Forestry and Fire Protection, and the Yuba Water Agency). The Yuba Water Agency has committed up to $1.5 million toward cost-share for source water protection benefits accrued by this project.[140] Less debris and sediment can translate into big savings for Yuba Water; after heavy rains in the spring of 2017, the agency spent more than $5 million removing debris and sediment from its reservoirs.

Procurement Mechanisms (no direct finance)

At some point in program implementation, a municipality will need to determine how to "procure" the water quality improvements it seeks on agricultural land. Strategy-wise, a municipality has two simple options: direct procurement or procurement through an "implementation" partner or aggregator. Direct procurement places the responsibility of executing an ag-municipal partnership program on municipal staff – working directly with agriculture producers. Procurement through a partner or aggregator distributes program implementation, where private non-profit partners are responsible for securing relationships with agricultural producers.

Procurement mechanisms can help municipalities leverage additional sources of funding, access new sources of financing, or facilitate cost-sharing, thus reducing the cost-burden. For example, the Forest Resilience Bond example above is a procurement mechanism designed to leverage cost-sharing among multiple beneficiaries of a project.

The following section highlights procurement mechanisms that municipalities may want to consider. Unlike some of the prior examples, these options do not incorporate financing elements in which municipalities provide security for loans. Therefore, municipalities must have current funding or financing strategies to support these procurement mechanisms.

It is important to note, however, that many of the procurement mechanisms detailed below rely on implementing partners. These partners (often NGOs) have the ability to secure their own financing, from both public and private sources. The ability of these partners to secure their financing can limit a municipality's financial risk exposure, provide sufficient up-front capital, and facilitate program scaling.

[137] Blue Forest Conservation, *Forest Resilience Bond: Fighting Fire with Finance a Roadmap for Collective Action*
[138] *"Forest Resilience Bond to Help Fund $4.6 Million Restoration Project to Mitigate Wildfire Risk in Tahoe National Forest"* World Resources Institute
[139] Koren, *Start-up Blue Forest secures funding for first privately financed forest fire bond*
[140] Yuba Water Agency, *Blue Forest Resilience Bond*

16. Direct Procurement

PA direct procurement strategy entails project or program implementation in which all responsibilities are assumed by the municipality. Some municipalities opt to work directly with farmers, while others establish grant programs that cover all, or a portion of, BMP costs.

- Currently, Central Arkansas Water engages directly with landowners, rather than through intermediaries, for its conservation easement efforts, but is considering future partnerships with land trusts. Investors should be able to access relevant operational and financial information about utilities in order to assess financing risks.[141]
- The City of Pitkin County, Colorado (mentioned above) supports watershed projects through its Healthy Rivers and Streams Fund. The Fund is administered by the Board of County Commissioners with input provided by a citizens board.[142]
- The St. Johns River Water Management District offers several cost-sharing programs that create sustainable water resources, provide flood protection, and enhance conservation efforts.[143] The District offers a 33% match for water supply, water quality, flood protection, and natural systems project; and 50% match for water conservation projects, with a cap of $1.5 million per project and per applicant.

Advantages and Disadvantages of Direct Procurement

ADVANTAGES	DISADVANTAGES
• Complete project/program control • May be effective for pilot projects	• May need to hire new staff or develop in-house expertise to implement • Relationship building between the municipality and agricultural community may be difficult without a trusted liaison • May not have the capacity to scale

17. Joint Benefits Authority

The Joint Benefits Authority (JBA) is a new concept developed by The World Resources Institute, Encourage Capital, and the San Francisco Public Utility Commission. Essentially, a JBA is a mechanism that allows multiple departments within a city to jointly plan, implement, and fund projects that produce a range of benefits for each agencies' mandates **(Figure 13)**.[144] For example, a utility may be hesitant to fund an entire ag-municipal BMP implementation project that provides multiple community benefits, such as water quality improvements, public health protection, air quality improvements, and habitat restoration. In cases such as this, a JBA can unite multiple municipal departments behind the project and allow each department to pay for the project outcomes that will benefit their specific department. This has the potential to lower costs for any one agency, leverage resources, increase the focus on co-benefits of BMPs, and accelerate the deployment of BMPs.

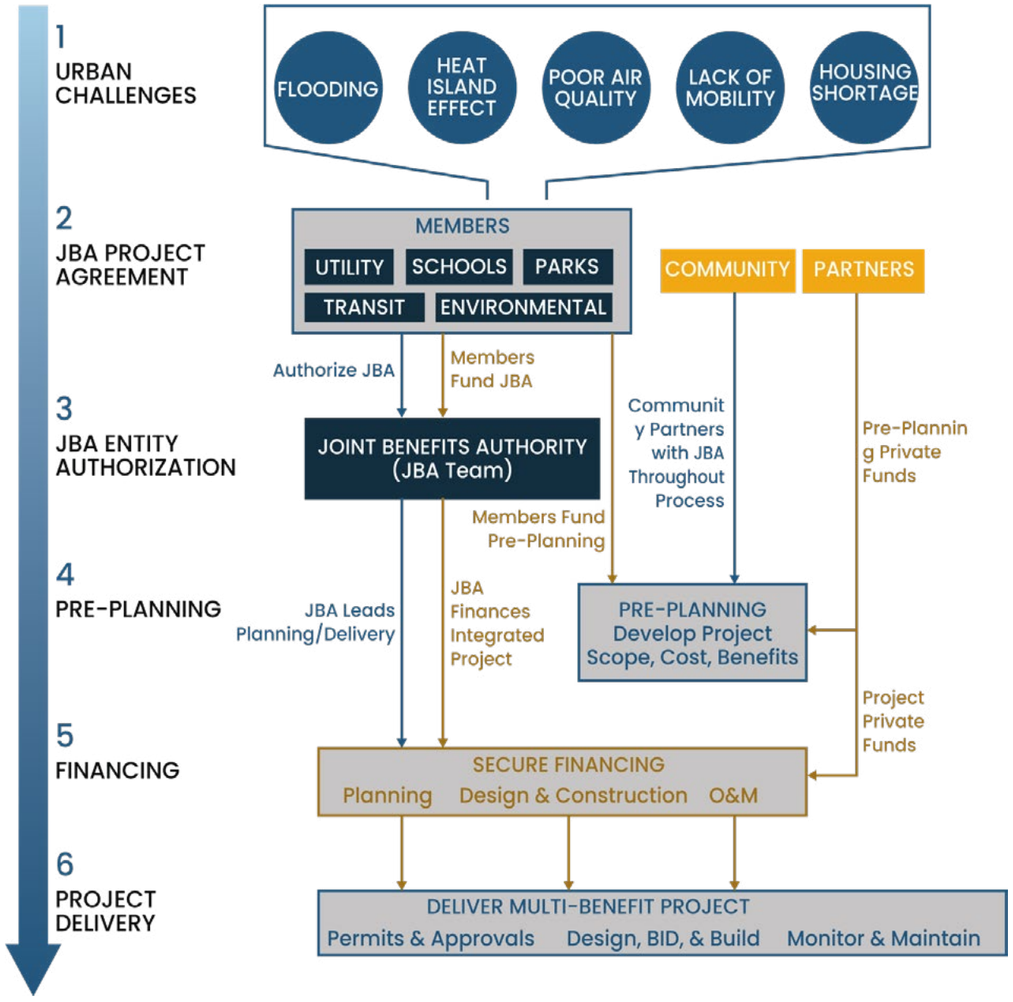
Depending on how the JBA is structured, it may be possible to leverage funding from participating departments and to seek out grant opportunities that may not have been available to one individual department. The JBA could also develop its own financing strategy – issuing municipal bonds or seeking public or private financing, etc.

Advantages and Disadvantages of Joint Benefits Authority

ADVANTAGES	DISADVANTAGES
• Potential to pool funds from other city departments • Develop projects that align with cross-department priorities • Leverage funds to access new sources of funds and financing	• May be difficult to secure participation and funding from other city departments • Municipality is still largely responsible for administrative responsibilities

[141] Blue Forest Conservation, *Forest Resilience Bond: Fighting Fire with Finance a Roadmap for Collective Action*
[142] *"Forest Resilience Bond to Help Fund $4.6 Million Restoration Project to Mitigate Wildfire Risk in Tahoe National Forest"* World Resources Institute
[143] Koren, *Start-up Blue Forest secures funding for first privately financed forest fire bond*
[144] Yuba Water Agency, *Blue Forest Resilience Bond*

Figure 13: Joint Benefits Authority Process



Source: World Resources Institute, *Joint Benefits Authority: Integrated Public Investments for Livable Cities*

18. "Pooled" Water Fund

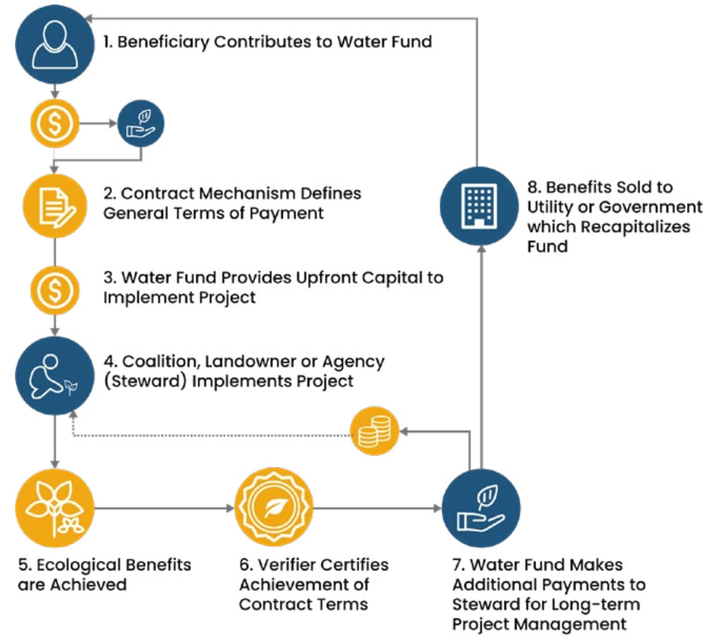
Unlike water funds that are solely funded by a municipality or group of municipalities, a Pooled Water Fund pools municipal, philanthropic, and private funding to support source water and water quality watershed restoration activities.[145]

A Pooled Water Fund acts as a link between beneficiaries (those who want to manage business risks or support watershed improvements) and stewards (those whose practices can improve the provision of nature's benefits). A Pooled Water Fund also helps identify priority restoration locations and BMPs for enhancing those locations in watersheds. Local businesses, individuals, and organizations (beneficiaries) that have a need for improved water quality or source water protection invest into the Pooled Water Fund. The Fund then matches the investment with landowners, watershed coalitions, public land managers, and other land managers (stewards) who implement new, expanded, or improved practices on their lands to meet the beneficiaries' goals.[146]

Pooled Water Funds share three primary organizational components: (1) a funding mechanism, (2) a multi-stakeholder governance structure (for joint planning and decision-making), and (3) a watershed management mechanism to carry out funded conservation and management activities.[147] The Pooled Water Fund may choose to employ a "pay-for-success" model for funding projects, in which case payments to BMP implementers are based on performance outcomes **(Figure 15)**. Alternatively, a Water Fund may choose to directly fund or provide cost-sharing for watershed protection projects or activities **(Figure 14)**.

Water funds are developed during a five-phase process that includes multi-stakeholder governance, science-based decision-making, strategies and mechanisms to ensure long-term sustainable financing, implementation of water fund activities, and communication of the water fund outcomes. The Nature Conservancy launched water funds globally and has created a toolbox to guide participants regarding how to scope, design, and operate water funds.

Figure 14: Pooled Water Fund that Employs Pay-for-Success[148]



Source: "edited" from Peaks to People Water Fund, *Operations Manual*

[145] In literature and in practice, this model if often referred to simply as "water fund." For the purposes of this report, we have called it "pooled water fund" to distinguish it from other water fund models that do not rely on additional sources of funding to support the fund.
[146] Peaks to People Water Fund, *Operations Manual*
[147] The Nature Conservancy, *Water Funds Around the World*
[148] Peaks to People Water Fund, *Operations Manual*

How the Pooled Water Fund Pay-for-Success Model Works

1. A beneficiary, through the Pooled Water Fund, provides upfront capital to the Fund.
2. The Pooled Water Fund solicits project proposals and a contract is executed between the Fund and the selected stewards (landowner, public agency, or watershed coalition), which define project requirements and terms of payment for both upfront primary payments and secondary payments upon verification that the project achieves the requirements described in its contract and produces the expected environmental benefits.
3. The Pooled Water Fund pays the steward as specified in the contract based on terms for primary payments.
4. The steward implements the project and meets contract terms.
5. The treatment, as defined in the Stewardship Agreement and project design, creates ecological benefits.
6. The outcomes are verified by a third party.
7. The Pooled Water Fund makes final payment to steward.

- ***Rio Grand Water Fund, New Mexico:***
  Established in 2014, the Rio Grande Water Fund supports the implementation of watershed protection and forest fire risk reduction activities to protect the reliable supply of high-quality Rio Grande water for multiple beneficiaries.[149] The Fund was created and supported by a diverse mix of public and private stakeholders, including the Albuquerque Bernalillo County Water Utility Authority, which has committed $1 million to the Fund.[150]

  As of 2019, the Fund includes more than 80 partner entities working together to restore 30,000 acres of forested watershed annually — a 1000% increase since 2014. And, for every private dollar raised to support this effort, $10 in public funding is leveraged and invested in on-the-ground projects.

- ***Savannah River Clean Water Fund:***
  Established in 2014, the Savannah River Clean Water Fund supports conservation, protection, and enhancement of water quality in the Savannah River Basin, which provides drinking water to over 1.5 million people in Georgia and South Carolina.[151]

  Thus far, five water utilities from Georgia and South Carolina have pledged a total of $1.133 million per year for three years to the Fund to support land conservation, better land management practices, and science and research in the Savannah River valley.[152] In addition, municipal water utilities are key members of the Fund's management and advisory structure, along with state and federal agencies, land trusts, environmental NGOs, and philanthropic foundations.

[149] *http://riograndewaterfund.org*
[150] Rio Grande Water Fund, *Rio Grande Water Fund Wildfire and Water Source Protection Annual Report, 2017*
[151] Central Savannah River Land Trust, [Interview with] *Executive Director, Braye Boardman: Savannah River Clean Water Fund; "Savannah River Clean Water Fund: Conserving Land for Clean Water"* Stewards Newsletter: Shoreline
[152] City of Savannah, Beaufort Jasper Water and Sewer Authority, City of Augusta, City of North Augusta, SC and Columbia County.

Table 18: Advantages and Disadvantages of Pooled Water Funds

ADVANTAGES	DISADVANTAGES
• Leverages public funds to attract private and philanthropic funding • Fewer restrictions on funding deployment (not subject to municipal regulations) • Municipality is not responsible for administrative responsibilities	• Less control over project/program implementation • Requires significant stakeholder engagement and planning to establish • Municipality will need to ensure adequate monitoring of outcomes to meet regulatory obligations or local water quality objectives

19. Water Quality Trading

Water Quality Trading (WQT) is when a buyer purchases quantified and verified "reduction in pollutant load" credits to comply with water-quality-based permit limits. Credits may be generated at other point sources (permitted facilities) or by reducing nonpoint pollutant loading, such as through installation of conservation BMPs on upstream agricultural land. Trades used to meet the limits within a NPDES permit are subject to the U.S. EPA 2003 trading policy (the EPA is currently updating). Credits may also be purchased by non-governmental organizations (NGO) or through corporate social responsibility programs.

To participate in trading, a WQT Program must exist. WQT Programs are often defined in NPDES permits or through policy at the watershed or state-level. The WQT trading program creates a market by providing rules for transactions between buyers and sellers or credits.

A municipality can work with its NPDES permit writer to develop a WQT program. One approach is to create a watershed NPDES permit where all point sources are grouped under one permit and each point source is assigned individual source limits, the sum of which defines a cap for the whole watershed permit. Individual NPDES limits are waived as long as the overall sum of discharges from the compliance group stays below the cap. Group participants are able to trade pollutant allowances with one another, thus creating market-like conditions.

WQT can facilitate point source-to-point source exchanges, but it can also accommodate point source-to-nonpoint-source trading as well. Conditions where the cost of point source management practices, such as retrofits to stormwater systems, are more costly than nonpoint source management practices, like agricultural BMPs, enable this type of training. This cost difference creates the market incentives necessary to encourage farmers and landowners to implement BMPs, creating the water quality benefits and credits, which can then be purchased by municipalities.

One notable example of this approach is the Freshwater Trust's approach to managing stream temperature in Oregon. In this case, thermal loading from industrial water outfalls (i.e., a temperature point source) is offset by riparian tree-planting, which creates shade, thus reducing nonpoint source thermal inputs.

Although the number of water quality trading schemes has increased substantially over the last two decades, nearly all are point source-to-point source trading programs and nearly all have been characterized by low trading volumes.[153] There is, however, substantial interest in the point source-to-nonpoint-source WQT markets.

EPA's new Water Quality Trading Guidance (currently under development) may help address some of the barriers limiting the expansion of WQT. The agency is strongly promoting this strategy as a means of assisting communities in achieving cost-effective permit compliance.

Resource for municipalities Interested in WQT:

- Building a program: https://wriorg.s3.amazonaws.com/s3fs-public/buiding-a-water-quality-trading-program-nn-wqt.pdf; https://willamettepartnership.org/wp-content/uploads/2014/09/In-It-Together-Part-3_2012-07-31.pdf
- Mapping demand for WQT: https://www.forest-trends.org/publications/mapping-potential-demand-for-water-quality-trading-in-the-united-states/

[153] The Aspen Institute and Duke University, *Conservation Finance & Impact Investing for U.S. Water: A Report from the 2016 Aspen-Nicholas Water Forum*

Watershed Water Quality Trading: Ohio's Greater Miami Watershed Trading Pilot Program[154]

Launched in 2005, Ohio's Greater Miami Watershed Trading Pilot Program provided regulated point sources with the opportunity to purchase nutrient-reduction credits from agricultural nonpoint sources under favorable terms, in advance of expected new regulations that would tighten in-stream nutrient criteria. Studies at the time indicated that the estimated cost to meet these new criteria would cost wastewater utilities in the watershed $422.5 million, compared to $46.5 million if trading was enabled from point source to nonpoint source. It was estimated that, on average, point sources would pay $23.37 to reduce one pound of phosphorus with biological nutrient removal compared to $1.08 for agriculture BMPs. For nitrogen, point source unit costs were $4.72 per pound compared to $0.45 per pound for agriculture.[155]

The Miami Conservancy District (MCD) managed the Trading Program, which received more the $3 million in funding from several sources including wastewater utilities, the Ohio Department of Natural Resources, USDA, and the EPA. The MCD used its funding to buy pollution-reduction credits from agricultural sources. Purchased nutrient-reduction credits were then transferred to point sources. They also conduct periodic reverse auctions to purchase credits and provide post-award oversight.

The program encouraged early participation through trading ratios incentives. Point source dischargers that purchase credits before new, more stringent NPDES restrictions were imposed can, with some exceptions, do so at a ratio of 1:1. Once the new restrictions were imposed, the ratio increased to 3:1. To promote credit supply, the Soil and Water Conservation Districts worked with farmers to develop projects and submit bids.

The voluntary trading process generally works as follows:[156]

- Soil and Water Conservation District (SWCD) staff members suggest practices such as conservation tillage, cover crops, or grassed waterways to local farmers upstream of participating wastewater utilities.
- These farmers agree to voluntarily change their farming practices or implement projects that reduce phosphorus and nitrogen runoff.
- SWCDs submit project applications that describe the scope of the new practice and estimate the amount of phosphorus and nitrogen the practice will keep out of local waterways.
- Farmers provide a bid for each project that states the amount of money they are willing to accept to install the practice.
- Projects are then reviewed and selected for funding by an advisory committee with members representing wastewater treatment plants, agricultural producers, Ohio Farm Bureau Federation, Ohio Water Environment Association, community-based watershed organizations, county soil and water conservation districts, Ohio DNR and the USDA.
- The projects generate credits that wastewater utilities can use to meet regulatory requirements.
- Projects are selected based on the lowest cost per pound of nutrients prevented from entering the river or stream.

As of December 2015, 467 agricultural projects had been contracted generating more than 1.14 million credits over the life of the projects. More than $1.76 million dollars had been paid to agricultural producers for these credits. This translated into a 626 ton reduction in nutrient discharges to rivers and streams and other benefits, including more sustainable farming operations and an array of ancillary environmental benefits.

Unfortunately, the expected tightening of water quality standards for point sources did not occur, the state prioritized other approaches (including litigation) and the initiative is currently stalled.

[154] Wainger and Shortle, *Local Innovations in Water Protection: Experiments with Economic Incentives;* Miami Conservancy District, *Water Quality Credit Trading Program: A common sense approach to reducing nutrients*
[155] Miami Conservancy District, *Water Quality Credit Trading Program: A common sense approach to reducing nutrients*
[156] AGree, National Association of Clean Water Agencies, and the U.S. Water Alliance, *Collaborating for Healthy Watersheds How the Municipal & Agricultural Sectors are Partnering to Improve Water Quality*

MS4 Water Quality Trading: Washington DC

According to the National Network on Water Quality Trading, stormwater trading "is an alternative compliance approach used by jurisdictions subject to MS4 permits, which are one type of NPDES permit". A stormwater crediting program may be established to provide compliance flexibility for development sites subject to post-construction regulations, or to achieve regional water quality objectives in a cost effective manner. These programs are not subject to EPA trading policy unless the MS4 permittee is a credit buyer. Credits might be generated through the installation of urban green infrastructure or through agricultural conservation practices. Stormwater credit buyers include municipal governments, real estate developers, and departments of transportation."[157]

In 2013, the Department of Energy and Environment (DDOE) updated its performance standards on stormwater retention requirements on site for new developments bigger than 5,000 sq ft and launched its Stormwater Retention Credit Trading Program to provide property owners flexibility in meeting these new requirements. This program, the first of its kind in the country, encourages new developments to surpass their stormwater retention requirements, often with green infrastructure. That allows them to sell Stormwater Retention Credits (SRC) to older developments that cannot retain all of their stormwater on site.

The District of Columbia charges property owners an annual fee, which is based on the amount of stormwater runoff (in gallons) from a property. Owners must mitigate at least half of their runoff on site, if technically feasible. They can account for the other half by either paying a fee per gallon per year or purchasing SRCs from another site. Since SRCs are generated by voluntarily installing green infrastructure and can be sold in an open market, they help finance green infrastructure and encourage retention in areas that need it the most.

Each SRC has a unique serial number, and their trade, transfer, and use are overseen by the DOEE. One credit corresponds to one gallon of stormwater retention for one year. The one-year lifespan of an SRC begins with its use, which implies that SRCs can be banked for future use without expiration.

How It Works:[158]

- A private entity interested in implementing a stormwater retention project on their property (referred to as an SRC generator) designs the green infrastructure in accordance with the Stormwater Management Guidebook by creating a Stormwater Management Plan
- DOEE reviews and approves of proposed Stormwater Management Plan
- A SRC generator installs the green infrastructure and applies for SRCs
- DOEE does a post-construction inspection and, if the project passes, the SRC generator is granted SRCs for up to three years
- A SRC generator sells SRCs to parties that need them for offsite retention
- SRC generators can reapply for SRCs at the end of the term. If the project is verified as being maintained, the SRC generator is granted SRCs for another three years

[157] Willamette Partnership, Forest Trends, & the National Network on Water Quality Trading, *Breaking Down Barriers: Priority Actions for Advancing Water Quality Trading*
[158] Environmental Incentives, *Technical Brief: Pay for Performance Contract Mechanisms for Stormwater Management*

Table 19: Advantages and Disadvantages of Water Quality Trading

ADVANTAGES	DISADVANTAGES[159]
• Gives municipalities flexibility in timing and methods used to control water pollution • Creates an economic incentive for landowners to implement BMPs • May be more cost effective • Allows municipalities to take advantage of economies of scale • Municipalities are not responsible for up-front costs of BMP implementation • Creates a market where municipalities can generate credits for plant upgrades (thus providing a new revenue source)	• High cost (time and administrative) to create – must coordinate with state permit writers and other key stakeholders • May be difficult to convince board, city council, and rate payers to participate in a market to meet regulatory requirements • Farmers need to access upfront financing/funding to implement BMPs before credits are generated • Regulatory risk may still exist (e.g., the purchase of credits may not satisfy permit requirements) • Potential inadequate supply of, or demand for, credits as a result of economic and regulatory conditions • There may be a lack of a TMDL in the targeted waterbody • Difficulty measuring pollutant releases and reductions and converting this information into appropriate equivalency factors or trading ratios

20. Revolving Water Fund

The Revolving Water Fund expands upon the Pooled Water Fund model by (1) harnessing Pay-for-Success structured public and/or private financing and (2) calculating the economic value of BMP conservation measures and monetizing these values to create environmental service credits (i.e. nutrient credits, carbon credits, etc.).

Similar to Pooled Water Funds, Revolving Water Funds can use philanthropic and public funds to capitalize its Fund. Revolving Water Funds can also tap into public or private financing to provide the up-front capital needed to implement BMPs in targeted watersheds. Therefore, a municipality is not responsible for securing the capital needed to fund the up-front costs of BMP implementation.

The Revolving Water Fund and its implementing partners secure contracts with agricultural producers to construct or implement BMPs. The water quality benefits and environmental services generated through each BMP will be quantified and packaged into distinct environmental credits. The credits generated from projects are then sold to "beneficiaries" (municipalities, government agencies, private companies, etc.) according to pre-determined contract terms.

With regulatory approval, beneficiaries can use procured credits to meet water quality obligations under their NPDES permits. This regulatory flexibility can only be achieved if the Fund develops and adopts a method for quantifying and monetizing BMP performance that provide regulators and municipalities a certain level of outcome certainty. The Fund may rely upon measurement and pricing guidelines developed by State regulators or practices harnessed by existing WQT markets. If markets or state standards don't exist, the Fund will need to develop its own methodology.

The revenue generated from credit sales will revolve back into the Fund, covering administration costs, additional restoration activities, and to pay back any public or private investors that provided the capital to support up-front costs. Financing sources may choose to keep repaid funds or reinvest in an additional round of project financing.

- ***Brandywine-Christina Revolving Water Fund:***
  The Brandywine-Christina Revolving Water Fund was launched in 2019 to dramatically increase the pace, scale, and efficiency of water-quality conservation in the Brandywine-Christina watershed, which provides source water for over half a million people in Delaware and Pennsylvania.[160] The Water Fund was capitalized using philanthropic funding but is designed to harness public and private financing in the future.

  Delaware and Pennsylvania did not have active WQT markets or state guidelines on load reduction measurement methodologies for the Fund to utilize as a baseline for regulatory compliance needs. The Water Fund team worked with both states to develop a pollution reduction calculator to measure and monetize "Environmental Impact Units" generated by on-farm BMPs that all stakeholders felt comfortable with.

[159] U.S. Environmental Protection Agency, *EPA Water Quality Trading Evaluation Final Report*
[160] The Water Fund was the result of years of cooperation between NGOs and regulators in the Delaware River watershed, as well as strategic infusions of philanthropic and federal grant funding to develop the model and bring it to the pilot stage.
https://www.revolvingwaterfund.com; Wrocklage, *Revolving Water Fund Pilots PFS Approach for Water Quality Improvements*

The Water Fund completed its first pilot project with the City of Newark, Delaware in 2019. The project implemented several BMPs on the Hutchison farm near Landenburg, Pennsylvania to protect the source-stream that transects the farm.[161] Newark contributed $20,000 from its 2017 municipal budget for source water protection and MS4 compliance. The Water Fund provided an additional $10,000, utilizing a grant from the DuPont Company.

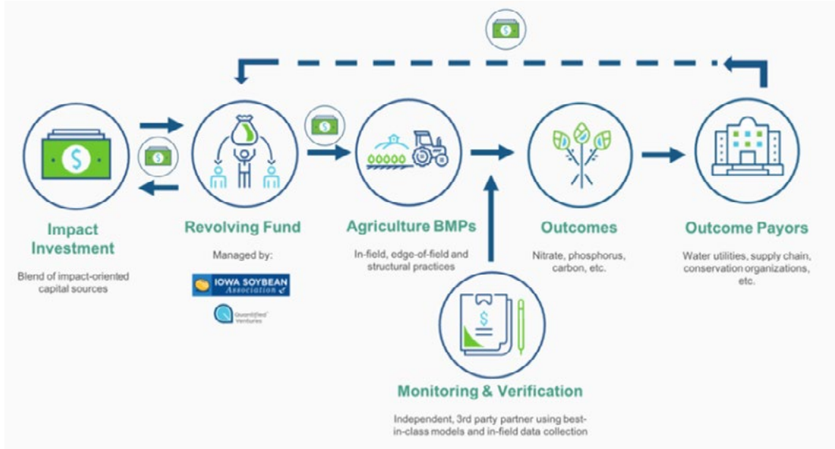
- ***Soil and Water Outcomes Fund:***
  Launched in 2019 by the Iowa Soybean Association and Quantified Ventures, the Soil and Water Outcomes Fund operates statewide in Iowa, rather than in one specific watershed.[162] Similar to the Brandywine-Christina Revolving Water Fund, capitalization dollars were provided by a philanthropic funder, but the fund is designed to harness public and private financing in the future.

  The Outcomes Fund recognizes that a common barrier to farmer participation in BMP implementation is the lack of funding or financing to cover all up-front costs. Often, public funding only covers a portion of the cost to implement BMPs on-field or edge-of-field. To secure more farmer participation, the Outcomes Fund maximizes the return on investment by measuring and monetizing multiple ecological benefits accrued through funded projects or practices. For example, the Fund will generate both water quality (nutrient reduction) credits and carbon credits for its first round of projects. This allows the Fund to provide cost-competitive prices to its partners.

  The Outcomes Fund was able to utilize state-approved methodologies for measuring and monetizing nutrient-load reducing BMPs. This enabled the Fund to develop much more quickly than it otherwise would have. The participation of regulators helps provide the regulatory-certainty municipalities need to move forward in participating with the Fund.

- ***Peaks to People Water Fund, Colorado:***
  In Northern Colorado, the Peaks to People Water Fund (formerly the Colorado Conservation Exchange) was established to help channel investment from municipalities, private businesses (particularly breweries), and philanthropic donations into restoration projects in two crucial watersheds that were heavily impacted by the High Park Fire. The Fund is designed to operate either as a Pooled Water Fund or a Revolving Water Fund.

Figure 15: Revolving Water Fund Model[163]



Source: *"Soil & Water Outcomes Fund"* Iowa Soybean Association and Quantified Ventures

[161] The Nature Conservancy, *The Brandywine-Christina Revolving Water Fund Moves from Theory to Reality*
[162] *"Soil & Water Outcomes Fund"* Iowa Soybean Association and Quantified Ventures
[163] *"Soil & Water Outcomes Fund"* Iowa Soybean Association and Quantified Ventures

How the Revolving Water Fund Model Works[164]

1. The Revolving Water Fund establishes a "seed" fund through public or private funding or financing sources.
2. The Revolving Water Fund selects projects with the highest conservation potential and then works with the landowner to refine and finalize the project scope. A contract is signed.
3. The Revolving Water Fund provides upfront capital from the Fund to enable the landowner to implement the BMP project.
4. Landowner implements project, as defined by the contract terms in the stewardship agreement.
5. Ecological benefits materialize because of the project.
6. A third party verifies ecological benefits using Fund and state-approved methodologies.
7. A beneficiary purchases the credits generated according to pre-determined contract terms. Funds from the credit transaction are transferred to the landowner as a secondary payment for project implementation.
8. The landowner pays back the Revolving Water Fund for the upfront capital provided in Step 2, based on agreed-upon payment terms, and keeps any remaining funds.

Advantages and Disadvantages of Revolving Water Funds

ADVANTAGES	DISADVANTAGES
• Provides that up-front capital to agricultural producers whereas other funding approaches may struggle to find that capital • Verification of water quality improvements • Municipalities pay for water quality improvements, rather than practices • Administrative burden is borne by the Fund, not the municipality	• Willingness of State regulators to adopt a watershed/WQT approach to MS4/TMDL compliance is central to the viability of this model • Creation of the Fund may be costly and time consuming • "Seed" funding to capitalize the Fund will be needed • Variability in the price of credits generated may make it difficult for a municipality to financially plan how it will budget for future credit purchases • Pollution reductions must be well documented and organized into units that can easily be sold. The Fund must work with state regulators to come to an agreed measurement and monetization methodology. This can be a lengthy process and slow down BMP scaling

[164] Peaks to People Water Fund, *Operations Manual*

HOW TO DECIDE ON A FUNDING OR FINANCING STRATEGY

Municipalities must look carefully at available funding and financing alternatives and balance the pros and cons of each against the needs and priorities of their systems. A creative combination of funding and financing from a variety of sources may offer the best of both worlds, helping to capture the maximum benefits for ratepayers and agricultural producers at the lowest cost.

There is no one-size-fits-all funding strategy for municipalities pursuing ag-municipal partnerships. Rather, when choosing a strategy, a municipality should consider the following parameters:

(1) Size and Scope of Need

Your funding and finance strategy may vary depending on the scope of your undertaking. For example, a small pilot project may be best suited for grant and/or current revenue streams, while a watershed-scale program may require more sustainable funding.

- Understand the level of investment needed to meet current and anticipated needs over a desired time horizon. This may include an analysis of plant-upgrades vs. watershed restoration work.
- What is your business case for pursing ag-municipal partnerships?
- At what scale are you implementing your program? The scale will not only impact funding needs, but may necessitate engagement with multiple stakeholders, regulators, etc.

(2) Regulatory Environment

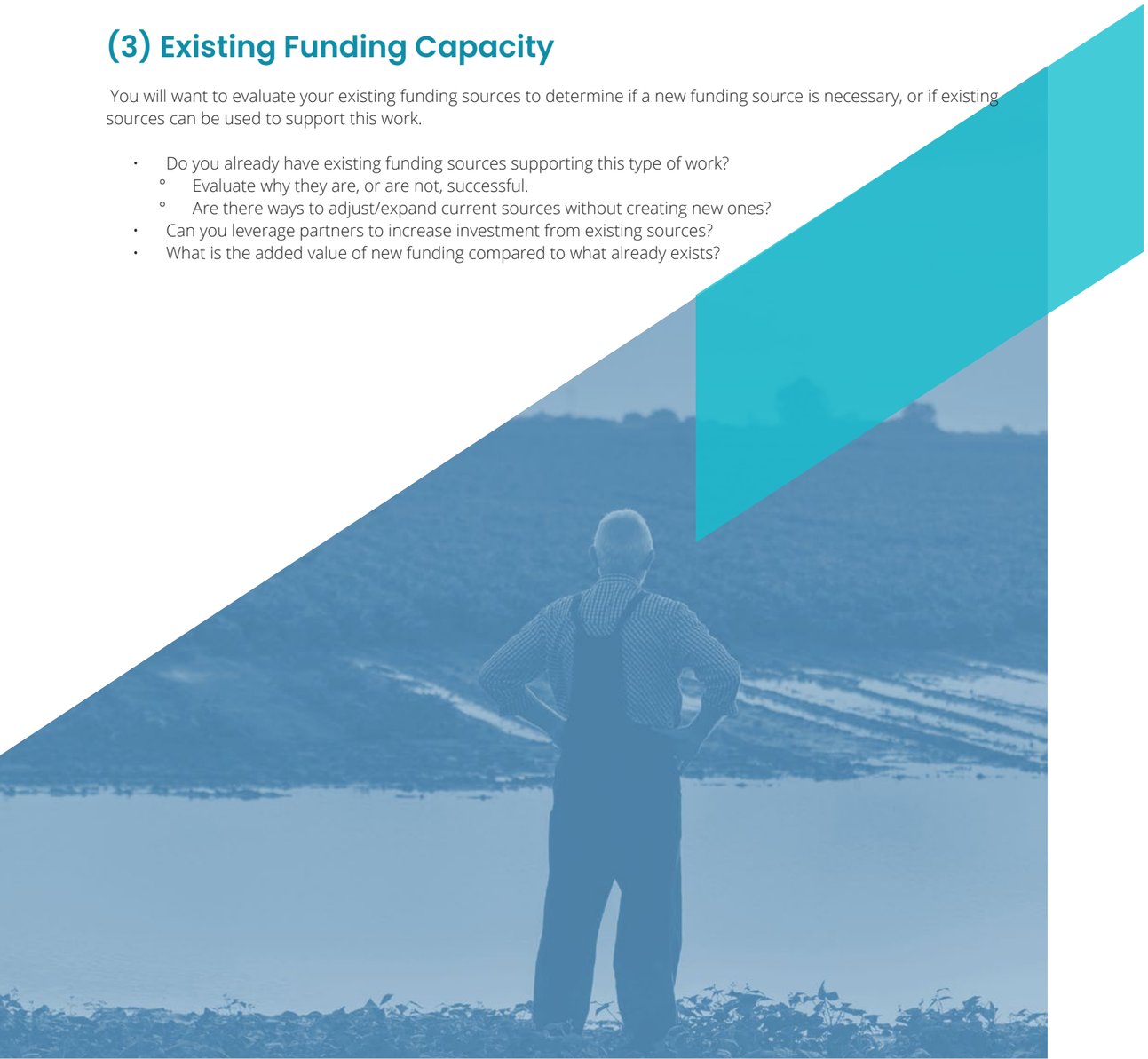
Your current regulatory environment will shape the options available to you. State guidance on WQT, NPDES permit flexibility, and local procurement policy may limit the funding and financing strategies you can employ. You should engage with your state regulators to explore options.

- Is WQT an option? Does your NPDES permit allow for trading and offsets? What compliance flexibilities are available to you?
- Can you establish a stormwater utility?
- Are there restrictions around engaging in a P3?

(3) Existing Funding Capacity

You will want to evaluate your existing funding sources to determine if a new funding source is necessary, or if existing sources can be used to support this work.

- Do you already have existing funding sources supporting this type of work?
  - Evaluate why they are, or are not, successful.
  - Are there ways to adjust/expand current sources without creating new ones?
- Can you leverage partners to increase investment from existing sources?
- What is the added value of new funding compared to what already exists?



(4) Available Grant Opportunities

You should explore available grant opportunities to support the design and implementation of an ag-municipal partnership. Many existing partnership programs rely on grant funding from a variety of federal, state, and regional sources. It is import to explore what is available to you and your agricultural partners. While grants are often critical for program development, they are not sustainable for long-term program implementation. A reliable revenue strategy should be explored as well.

- What projects are eligible for grant funding? Does the grant cover 100% of project costs?
- What planning and predevelopment grants are available to support the development of an ad-municipal partnership program?
- Who is eligible to apply for grants? There are many grant programs that are only available to agricultural producers or private landowners. While a municipality may not be eligible to receive funding, you can provide assistance in (1) raising awareness of grant programs, (2) providing matching or cost-share funding, and (3) providing technical assistance for submitting grant applications.
- How many resources will you commit to pursuing grant opportunities?

(5) Existing Funding Capacity

If you determine your existing revenues are insufficient to meet your needs, you should explore alternative revenue-generating strategies. You will want to evaluate the viability of each option:

- Is it legally permissible and likely to be unchallenged?
- Is it applicable?
- Is it equitable?
  - Is it proportional to the level of services that your customers will receive?
  - Does it take into consideration the needs of special groups of payers?
- Is it politically feasible?
- Is it sufficient to meet anticipated costs?
- Is it flexible (i.e., adjustable to changing conditions)?
- How costly is it to administer during the initial set up and for ongoing oversight and maintenance (e.g., what are the data requirements, and how compatible is it with existing data processing systems)?
- How consistent is it with other local funding and rate policies?
- How stable is it as a source of revenue?

(6) Availability of Implementation Partners

Developing an ag-municipal partnership requires a significant amount of relationship building, planning, data analysis, and political acumen. Working with an implementation partner that has experience with agricultural conservation, environmental markets, private finance, and/or collaborative watershed planning and restoration may help you overcome the administrative hurdles of developing a program.

- Identify internal and external resources available to undertake this effort. Capacity needs will vary depending on implementation phase or scope. What internal capacity gaps can be filled by an implementation partner?
- What additional sources of funding or financing can your implementation partner contribute to the effort? Often an implementation partner can leverage municipal contributions with other public and private funding opportunists. Thus reducing your cost-burden.
- Who has established relationships with agricultural producers you can leverage to build trust?
- Who can help you support your business case for establishing a program and securing revenues to support this work? A strong ally can go a long way in generating the political support needed to establish and maintain a program.

(7) Financing Costs & Benefits

Accessing debt capital can help scale your program and spread the costs of implementation. It is important to evaluate the costs and benefits of public and private financing to identify what best meets your needs. Public financing is far from certain and the process of obtaining it can add significant length to a project's timeline, yet it often offers the best financial terms. Interest rates for private funding are often higher, but borrowing through a commercial or private lender can significantly increase speed to market.

- Do you have the capacity to take on additional debt?
- How well does it pair with other sources of funding or financing?
- Different types of financing may be better suited for large-scale projects rather than pilot projects.
- How much time do you have to commit to securing financing, reporting, etc.?
- Understand project and borrower eligibilities - do they align with your program goals?
- Do the benefits of financing outweigh the costs? Pay-for-Success financing models may have terms that are more costly compared to public finance, but the benefits of risk-transfer, outcomes-driven payment structures, and procurement efficiencies may be worth it to you.

(8) Risk Management

When exploring different funding and financing approaches you should consider how much performance risk are you willing to accept. You can transfer a portion or all of performance risk by working with implementation partners, harnessing pay-for-success contracts or procurement mechanisms, or engaging in water quality credit trading. Certain risk transfer arrangements will cost more than others. You will want to think critically about the costs and benefits of different funding strategies in relationship to performance risk. This is particularly important when you are relying on the success of your ag-municipal partnership to meet regulatory obligations.

- How much performance risk are you willing to shoulder?
- Does your finance strategy involve your implementation partner? What type of procurement mechanism do you want to use to manage performance risk?
- Does your procurement strategy use a pay-for-success model?
- Will risk-sharing help you secure the political support you need to implement your program?

CONCLUSION

Because farming is a highly competitive and sometimes minimally profitable occupation, producers look to increase profits whenever possible. Some conservation practices are costly and contribute minimally to a farm's bottom line, but are necessary to protect water quality. Therefore, financial assistance is often needed to implement BMPs or to convince a producer to try a new practice that could save money or generate potentially lucrative environmental credits.

The best solution to this obstacle is to secure funding to cost-share or fully fund BMP implementation. The good news is that the current regulatory and financial landscape has evolved to further enable municipal funding of agricultural BMP implementation. With the expansion of grant opportunities, along with new sources of private capital, the time is ripe for municipalities to pursue collaborative up-stream water quality restoration and protection activities.

While federal and state grant programs are typically effective in securing producer participation, they often are not sufficient to achieve big watershed-wide goals because they lack sufficient coordination and technical support capacity. Municipalities pursuing ag-municipal partnerships will need to develop sustainable funding and financing strategies that pay for conservation activities and the program capacity necessary to reach as many farms as it takes to achieve program goals.

The options highlighted in this report are not mutually exclusive; a municipality should consider which combination of funding and financing approaches can best support its watershed-based objectives at the lowest-cost for its customers.

APPENDIX 1:
WATER AND WASTEWATER UTILITY ACCESSIBLE AGRICULTURE CONSERVATION PROGRAMS AND FUNDS

U.S. EPA

Clean Water State Revolving Fund (CWSRF)
Provides communities a permanent, independent source of low-cost financing for a wide range of water quality infrastructure projects. Contact your state CWSRF to learn more.

Drinking Water State Revolving Fund (DWSRF)
Provides communities a permanent, independent source of low-cost financing for a wide range of drinking water infrastructure and source water protection projects. Contact your state DWSRF to learn more.

Section 319 Nonpoint Source Implementation Grant Program
The 319 Program provides grants for source water protection activities including public education, urban and agricultural runoff treatment, wetland restoration, reforestation, and more.

USDA

Regional Conservation Partnership Program (RCPP)
Entities partner with producers to address soil, water, wildlife, and related natural resource concerns on regional or watershed scales.

Conservation Innovation Grants (CIG)
Funds development of tools, technologies, and strategies to support next-generation conservation efforts on working land. Grantees must match the CIG investment at least one-to-one.

National Water Quality Initiative (NWQI)
Works with landowners to implement conservation practices in priority watersheds to increase water quality.

Water Quality Landscape Initiatives
Uses Landscape Conservation Initiatives to accelerate the benefits of voluntary conservation programs, such as cleaner water and air.

Edge-of-Field Monitoring
Offers funding to assist in monitoring water quality at the edge of producers' fields to gauge effectiveness of conservation practices.

Rural Development Water and Waste Disposal Loan and Grant Program
Can fund storm water systems, land acquisition, drinking water sourcing, and other activities.

Source Water Protection Program (SWPP)
Is a joint project with USDA's Farm Service Agency and the National Rural Water Association, a non-profit water and wastewater utility membership organization. The SWPP is designed to help prevent pollution of surface and ground water used as the primary source of drinking water by rural residents.

Bureau of Reclamation

Cooperative Watershed Management Program
Provides funding to watershed groups to encourage diverse stakeholders to form local solutions to address their water management needs. Funding is provided on a competitive basis for watershed group development and planning as well as implementation of watershed management projects.

Water Marketing Strategy Grants
Provides assistance to states, tribes, and local governments to conduct planning activities to develop water marketing strategies that establish or expand water markets or water marketing activities between willing participants.

Small-Scale Water Efficiency Projects
Provides 50/50 cost share funding to irrigation and water districts, tribes, states, and other entities with water or power delivery authority for small water efficiency improvements that have been identified through previous planning efforts. Projects eligible for funding include installation of flow measurement or automation in a specific part of a water delivery system, lining of a section of a canal to address seepage, or other similar projects that are limited in scope.

APPENDIX 2:
AGRICULTURE-ONLY USDA GRANT PROGRAMS

Environmental Quality Incentives Program (EQIP)
Provides financial assistance to farmers who adopt or install conservation practices on land in agricultural production. Common practices include nutrient management, cover crops, conservation tillage, field-edge filter strips, and fences to exclude livestock from streams. Sixty percent of program funds are targeted to livestock-related practices and at least 5 percent are targeted to wildlife-related practices.

Conservation Technical Assistance (CTA)
Provides ongoing technical assistance to agricultural producers who seek to improve the environmental performance of their farms

Agricultural Conservation Easement Program (ACEP)
Provides long-term or permanent easements for preservation of wetlands and the protection of agricultural land (cropland, grazing land, etc.) from commercial or residential development.

Conservation Stewardship Program (CSP)
Supports ongoing and new conservation efforts for producers who meet stewardship requirements on working agricultural and forest lands. Farmers and ranchers must demonstrate a high level of stewardship to be eligible for the program and must agree to further improve environment performance over the life of the CSP contract (up to 10 years). Participants receive financial assistance for adopting new conservation practices and for stewardship, based on previously adopted practices and the ongoing maintenance of those practices.

Conservation Reserve Program (CRP)
In exchange for a yearly rental payment, farmers enrolled in the program agree to remove environmentally sensitive land from agricultural production and plant species that will improve environmental health and quality. Contracts for land enrolled in CRP are 10-15 years in length. The long-term goal of the program is to re-establish valuable land cover to help improve water quality, prevent soil erosion, and reduce loss of wildlife habitat.

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