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Introduction on Local Funding and Financing Strategies	Best Practices for Incorporating Funding and Finance into Integrated Planning	Overview of Funding and Financing Options for Implementing Integrated Plans	Benefits, Challenges, and Ideal Uses of Cost Reduction and Revenue Stream Strategies	Four Examples of Blended Finance Strategies for Implementing Hazard Mitigation and Water Resource Projects	Resources and Tools for Incorporating Finance Strategies into Planning

Strengthening Hazard Mitigation Plans through Water Resource Management

Module #6: How to Incorporate Funding and Financial Strategies into Integrated Plans

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Module Purpose

This module will accomplish the following:

1. Demonstrate to mitigation planners and water quality professionals the importance of incorporating financing strategies into integrated hazard mitigation and water resources management plans as a way to leverage funding and reduce costs.
2. Introduce funding and financing strategies that are likely to apply to most jurisdictions and show how they align with hazard mitigation and water resources management planning.

The purpose of this module is to show various solutions for how state, local and tribal jurisdictions can pay for integrated hazard mitigation and water resource projects. While finance and budgeting is often considered a last step in developing a project or program, incorporating a financing strategy early on in any planning process can help ensure long-term project success.

- If your community has already assessed their climate risks and vulnerabilities and developed an integrated hazard mitigation plan to preserve government services and protect infrastructure, property, lives, and local businesses; the information in this module can help identify opportunities to pay for those proposed strategies and recommendations.
- If your community has not yet completed an integrated hazard mitigation plan; the information in this module can inform the plan development process and enable you to incorporate funding and financing strategies directly into the plan recommendations.

Communities across the Country are facing increasing costs associated with the management of nonpoint source pollution, while simultaneously being threatened by failing infrastructure systems and the risks associated with extreme weather events. In order to address these growing concerns, communities will need to mobilize support and resources around comprehensive watershed and hazard mitigation plans. Rather than maintaining the typical planning process, whereby a community develops the plan first and then considers implementation and costs after the fact, leaving local jurisdictions to chase funding wherever available, communities should incorporate finance and implementation into the planning process. Incorporating funding and financing strategies into an integrated hazard mitigation plan will enable communities to successfully implement projects, build resilience, and respond to potential threats, while maximizing efficiency.

Module Learning Steps

Overview of Module Steps

Step 1.0: Examine the financial benefits of integrated hazard mitigation and water resource planning.

Step 2.0: Review basic best practices for incorporating funding and finance into integrated planning.

Step 3.0: Consider appropriate funding and financing options for implementing integrated hazard mitigation and water resource projects.

Step 4.0: Become familiar with the benefits, challenges, and ideal uses related to specific funding and financing strategies.

Step 5.0: Explore community examples on how taking a blended finance approach can leverage public, private and philanthropic dollars to increase the amount of capital directed at hazard mitigation and water resource implementation.

Appendices 1 and 2 provide useful summaries of the information presented in Steps 1-5, and Appendix 3 provides a compilation of funding-financing resources that can be accessed by communities to help them through the process.

Module Step 1.0 Examine the Financial Benefits of Integrated Hazard Mitigation And Water Resource Planning.

As discussed in previous modules, integrating hazard mitigation and water resource planning comes with a number of community co-benefits including minimizing the hazard impacts, improving the natural environment, efficiently addressing water quality, and increasing community resilience. But integrated hazard mitigation is also a significant opportunity to leverage funding and reduce costs.

Generating an integrated portfolio of projects can help your community:

- Coordinate available project funding to accomplish more than one goal.
 - “Dig Once” approach - refers to the objective that green infrastructure (GI) projects be installed while the ground is already disturbed or excavated for other infrastructure projects. This approach leads to greater efficiency and overall cost benefits, but also requires a high level of collaboration and integration between municipal departments. By streamlining municipal processes and planning, a community can improve the chance of successful green infrastructure implementation.^{1,2}
- Leverage different funding sources that may not have been considered for a single-benefit program and increase access to financing options.
 - Integrated plans can allow your community to tap into and combine funding and financing from various sources that may be interested in specific outcomes and benefits. Funding can take the form of grants and loans, but assistance can also be provided as technical assistance or in-kind contributions. Some projects may require a combination of your community’s financial resources, State and Federal grant programs, and non-governmental funding assistance. Some actions may leverage a combination of funding sources with other local departments or federal agencies, particularly those that can

- result in multiple benefits for the community (for example, acquiring flood prone properties to be maintained as a public park or recreational area).³
 - FEMA and EPA MOU. In 2019 the Federal Emergency Management Agency (FEMA) and the Environmental Protection Agency (EPA) announced a Memorandum of Understanding that will streamline coordination among both agencies and enable funding from EPA's State Revolving Funds to be quickly available for water infrastructure projects after a Presidential-declared disaster.^{4,5}
- Scale water and hazard mitigation projects to facilitate access to additional resources, attract large-scale investors, and potentially shift from funding to financing.⁶
 - Consider integrating plans among utilities, with other communities in the area, or with a partner organization.⁷
 - In order to pay for green infrastructure projects, Washington DC issued in 2016 the country's first environmental impact bond that shares performance risk with investors by linking their returns to the project's success. Success is measured by the level of environmental improvements and benefits generated by a total of 20 acres of multiple green infrastructure projects implemented throughout the city.⁸
 - Regional Climate Collaboratives - To address the problems of increasing extreme weather events, communities across the country have started to work together at a regional scale to put in place coordinated policies across multiple jurisdictions. By moving beyond fragmented planning and development programs, communities can achieve integrated solutions to address climate change while overcoming limited resources and technical capacity needs.

Module Step 2.0 Review Best Practices for Incorporating Funding and Finance into Integrated Planning.

1. Identify costs in your implementation plan and develop a budget

Insufficient funding and the lack of a strategic financing plan is often a barrier to implementing hazard mitigation and water management plans that integrate nature-based solutions such as green infrastructure and low impact development (GI/LID) into traditional infrastructure projects. However, once your community has identified specific hazard and water resource concerns and developed potential interventions to address these concerns, you can determine cost estimates of specific actions and overlapping strategies.

- Strategize and prioritize projects for funding.
 - Keep in mind that project implementation will often require cooperation from private property owners. Communities should develop an outreach strategy to engage the public in their planning efforts and recruit interested property owners to participate in hazard mitigation and/or water management implementation projects. Maintaining an updated list of private property owners interested in participating in project implementation can help ensure that a community is able to take advantage of available funding opportunities.
- Identify overlapping strategies and interventions.
- Consider the types of costs for each planned intervention, including:
 - Capital (i.e. equipment, project identification, land acquisition)
 - Labor (i.e. new and existing staff, contractors, and other service providers)
 - Operations and maintenance (i.e. software, supplies, equipment maintenance)

- Develop a comprehensive budget for the first year, as well as a ten-year budget projection to include inflation and additional contingencies.⁹

2. Identify benefits in your implementation plan and conduct a benefit-cost analysis (BCA)

Funding will likely depend on the benefits or avoided losses that your community can demonstrate. Understanding the expected outcomes of your integrated hazard mitigation and water resource strategies can help your community prioritize projects with the greatest impact and focus implementation on high impact practices.

- Assess the qualitative and quantitative benefits of the proposed implementation strategies
 - Review historical loss records, national case studies, and other available data sources
 - Include up-to-date climate change projections to accurately account for future risks mitigated by the proposed implementation strategies.
 - Attempt to monetize typically unquantified social and environmental benefits
- Consider potential funder guidelines for benefit valuation
 - FEMA benefits are mainly the avoided losses of NFIP-insured structures which are easily quantified and they have very specific guidelines for benefit valuations to generate a numeric BCA value.
 - Other funding sources, such as EPA grants and loans, do not use formal numeric benefit-cost analysis but have more qualitative requirements for assessing project benefits.
- Compare the future benefits of proposed projects to implementation costs.^{10,11}
 - If the BCA is greater than 1.0, the likelihood of securing funding is improved. If the BCA is less than 1.0, it may be advantageous to look at alternatives to increase benefits (such as identify more stakeholders or co-benefits) or reduce costs (such as partially funding the project from another source, or identifying in-kind services to reduce the funds requested).^{12,13}
 - If possible, consider doing a “total cost benefit analysis” that attempts to monetize typically unquantified social and environmental costs and benefits; and that estimates costs and benefits over the lifetime of an asset rather than over a specified time period.¹⁴
 - For FEMA funding, BCA guidance requires economic, social and environmental values of a project are only considered if an asset still has at least 75 percent of its useful life left.¹⁵

3. Prepare and incorporate a funding strategy

It is important to identify a wide set of funding and financing mechanisms and determine how to best combine them to cover costs and allow you to prioritize options.¹⁶ A well-defined funding strategy may be required by specific funding sources, and even if it is not required, developing a detailed funding strategy will help match projects with appropriate funding sources and ensure efficient implementation of the integrated hazard mitigation and water resource plan.

- Consider cost-saving approaches, revenue streams, and innovative strategies.
- Avoid limiting your options too soon. See what is out there and think about a blended portfolio approach that combines multiple sources of funding and financing options to cover the costs.
- Understand how funding sources can, and cannot, be combined. For example, some federal grants are not to be combined with other federal grants to fund a single project, and there are restrictions on what can be used as cost share or matching funds.

- Cost share that is required by many grants can be difficult for small communities to obtain, preventing them from obtaining grants and loans. Understand the alternatives available to your community for cost share under “2 CFR § 200.306 - Cost sharing or matching” and be aware of requirements such as documentation of the match.¹⁷
- Identify available clearinghouses for your state’s grants and loans.
 - EPA has a Water Finance Clearinghouse that lists both state and federal sources of funds.¹⁸
- Evaluate strategy for any major funding gaps and develop recommendations for addressing gaps.

Module Step 3.0: Consider Appropriate Funding and Financing Options for Implementing Integrated Hazard Mitigation and Water Resource Projects.

To develop a financing and funding strategy that delivers sufficient and sustainable support for the integrated hazard mitigation and water resource plan, a community will need to consider many factors, including desired activities and associated budget needs, existing sources of funding or in-kind support, and the community’s appetite for new revenue programs. Just as these conditions vary from one community to the next, the appropriate financing and funding strategy will be rooted in local context and may look different from one jurisdiction to the next.

It is important to understand what funding and finance options are available to your community.

Funding and Finance

- Funding: Providing “one way” financial resources to support a need, program or project. “One way” refers to the characteristic of not requiring repayment (i.e. taxes, fees and grants)
- Financing: The “two-way” acquisition of money for a program or project (i.e. loans and bonds). “Two-way” refers to the characteristic of requiring repayment of principal and interest.¹⁹

Assembling the appropriate mix of funding and financing strategies is highly dependent on a community’s particular needs and characteristics. To develop a financing strategy that delivers sufficient and sustainable support for an integrated hazard mitigation and water resources program, a jurisdiction will need to consider many factors, including desired implementation projects and associated budget needs, existing sources of funding or in-kind support, and the community’s appetite for new revenue programs.

State policies and programs also affect how local jurisdictions create, fund, and maintain hazard mitigation and water resources management initiatives. States differ in terms of the goals, enabling legislation, policies, incentives, and funding programs that they offer in support of hazard mitigation and water resource management. It is important to understand the state specific context which can affect local implementation and funding in your community.

Below are the key financing mechanisms that are discussed throughout this module. As you proceed through the rest of the sections, keep in mind that you are building an understanding of the various financing and funding mechanisms so that you can identify appropriate funding and financing options for implementing integrated hazard mitigation and water resource projects. These financing mechanisms can and should be combined to leverage strategy strengths and help reinforce the

implementation of comprehensive projects. Assembling the appropriate mix of cost reduction and funding strategies is highly dependent on a community’s needs and characteristics.

- **Cost Reducers:** Cost reduction strategies increase a program’s efficiency and reduce its overall costs. While not explicitly sources of funding, these approaches help stretch public funds and leverage outside resources.
- **Revenue Streams:** Revenue streams are mechanisms to generate and access capital for project implementation.
- **Blended Finance:** Blended finance simply refers to the idea of combining multiple finance and funding sources. Having a diverse funding portfolio can help ensure the implementation of projects.

Financing Mechanisms	
Cost Reducers	Revenue Streams
Comprehensive Planning	Taxes
Capital Improvement Programs	Fees
Cooperative Procurement and Inter-local Resource Sharing	Bonds and Loans
Public Private Partnerships	Grants
Incentives - Rebates and Tax Credits	Crowdfunding
Regulations and Policy	Offsite Crediting Programs

It is wise to incorporate a diverse mix of funding sources as well as cost saving approaches into the financing strategy. Diversification provides stability and helps sustain budgets in the face of unexpected cuts to any one funding source due to leadership changes, shifting budget priorities, or other uncertainties. In addition to being diversified and sustainable, effective funding programs will be designed to raise enough revenue to support all program elements, including planning, design, implementation, and maintenance. This helps to deliver promised program outcomes and reinforce public support for continued funding.

Module Step 4.0: Become Familiar with the Benefits, Challenges, and Ideal Uses Related to Specific Funding and Financing Strategies.

This module step will present a number of different funding and financing strategies along with examples of communities that are successfully utilizing these approaches for implementing components of an integrated hazard mitigation plan.

The strategies below will not be relevant to all jurisdictions and it is important to determine what options are available and appropriate both for your community and their specific project needs. Tables in Appendix 1 and 2 summarize these strategies and offer guidance on how to assess whether a particular strategy is appropriate for your community.

Cost Reducers

Cost reduction strategies can increase effectiveness and reduce spending. While not explicitly sources of funding, these approaches help stretch public funds and leverage outside resources. It is important to think comprehensively and creatively as well as to incorporate multiple objectives and long-term needs when looking for mechanisms to reduce costs. Some cost reducers may require larger initial investment of time and resources, but it is important to incorporate the long-term savings that they may generate. Cost reducers include comprehensive planning, capital improvement programs, cooperative procurement and inter-local resource sharing, public private partnerships, incentives - rebates and tax credits, and setting regulations and policy.

Comprehensive Planning

When developing comprehensive community plans that address growth and land use needs, it is important that planners incorporate the increasing challenges and potential solutions posed by water resource management and increasing extreme natural events. All states have established guidelines which require certain elements to be incorporated into local Comprehensive Plans, some of which may directly relate to hazard mitigation and water resources. Local jurisdictions can use the comprehensive planning process to explicitly address their hazard mitigation and water resource needs, integrating strategies, where appropriate, throughout the planning process and incorporating solutions into integrated long-term plans; increasing cost effectiveness and saving unnecessary expenses in future years.

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Helps to identify priorities - Codifies community's long-term commitment - Establishes strategy for achieving goals - Opportunity to engage community stakeholders - Coordinates departmental efforts 	<ul style="list-style-type: none"> - Requires advanced coordination and commitment from leadership - Does not provide direct revenue for implementation - May require state enabling legislation 	<ul style="list-style-type: none"> - Setting broad goals - Outlining commitment to integrated hazard and water management - Identifying cross departmental co-benefit strategies

Examples

- Washington State established a Growth Management Act in 1990. Under the guidelines of the act, each city and county within the State has to prepare a comprehensive plan that is reviewed once every seven years and requires participation of planners and citizens. The plans establish development regulations which regulate development, conserve natural resources, and guide economic growth. Development is concentrated in 'urban growth areas and cities and counties must designate 'critical areas' for protection including wetlands, frequently flooded areas, geologically hazardous areas, critical aquifer recharge areas and habitat conservation areas.^{20,21,22}
- Maryland's Smart Growth legislation, enacted in 1997 focused on incentives rather than regulation by targeting state funding to encourage growth and investment in existing urbanized areas or 'Priority Funding Areas' while encouraging the preservation of 'Rural Legacy Areas.' At the time, this legislative package approach was considered innovative. Maryland established goals to take advantage of compact building design, create walkable communities, and preserve open space, farmland, natural beauty, and critical environmental areas. Using tools such as the

transfer of development rights, zoning, and ‘Priority Funding Areas,’ Smart Growth helped to concentrate development and conserve open space.²³ While the Priority Funding Areas require sewer and water plans, all of which aim to limit sprawl and reduces impervious surface and pollution from runoff, which helps stormwater systems and water quality, the statute did not restrict development outside of Priority Funding Areas and offered little explicitly guidance regarding integrating transportation and land use policy which could have a larger impact today.²⁴

Capital Improvement Programs

A Capital Improvement Program (CIP) identifies and prioritizes a community’s needs for publicly financed physical infrastructure and determines how and when they will be funded. Capital projects traditionally include streets as well as water facilities, buildings, sewers, equipment, or the purchase of land. CIP funding generally provides funds for the initial building of a project but not for the long-term maintenance of such projects.²⁵ Capital projects are usually financed by borrowing, such as by issuing bonds, and provide services over a long period of time.

When developing capital improvement plans, officials should be taking into consideration the risks of natural hazards and how they can mitigate these risks by incorporating solutions into their planning efforts. For example, highways and roads comprise the largest portion of spending at the state and local government level.²⁶ Adopting the “Dig Once” approach and integrating green infrastructure to address stormwater runoff into larger transportation projects, such as road construction, has the potential to lower the costs of implementation and provide funding through transportation resources. Municipalities could develop CIP evaluation criteria that prioritizes projects that address hazard mitigation and water quality concerns to ensure these considerations are embedded in all future capital projects. Planning for ‘green streets’, -or public rights-of-way that incorporate green infrastructure in order to improve water quality, is being implemented in a number of municipalities across the country.²⁷

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Aligns community priorities with long-term capital funding plan - Increases efficiency - Overall cost benefits - Incorporates GI into other projects such as utilities, schools and parks - Establishes criteria for CIP project funding that prioritizes hazard mitigation and water resources 	<ul style="list-style-type: none"> - Requires more coordination and collaboration among departments - May require training government leaders and staff to think about integrating hazard mitigation into other local planning 	<ul style="list-style-type: none"> - Setting specific requirements for capital improvements - Identifying projects with multiple co-benefits - Coordinating project outcomes across departments

Examples

- Prince George’s County, Maryland amended its County Code in 2012 with a new ordinance that incorporates green streets and pedestrian safety under the planning for roads and sidewalks. The ordinance directs county officials to incorporate environmental site design into road, trail, sidewalk, and transit construction projects to ensure that stormwater runoff is well-managed and that roads are accessible to everyone.²⁸ The program is also innovative with regards to its financing mechanism (see below Public Private Partnerships)
- The State of Vermont established its Hazard Mitigation Plan in 2018 which will be implemented by collaborative efforts among different state agencies. The goals of the plan are to create a common understanding of – and coordinated approach to – mitigation planning and action; and to promote healthy and resilient ecosystems and built environments. Among other measures, municipal planning and capital improvements will incorporate the use of a river corridor tool and a road infrastructure tool designed to identify sites most vulnerable to flood damage. Among the top priority actions identified in the plan are the development of a cross-sector buyout program and the identification and protection of critical headwater and floodplain storage areas.²⁹
- The Rhode Island CWSRF has adopted a “Programmatic Financing” (or “Pro-Fi”) approach to fund the Narragansett Bay Commission’s (NBC) capital improvement program. NBC, who operates the state’s two largest wastewater treatment facilities, received a \$35M Pro-Fi loan to finance an estimated 28 projects, representing roughly two-thirds of their identified 2020 CIP needs. The estimated costs for NBC’s CIP for FY 2021-2025 comes to a total of \$507M.³⁰

Cooperative Procurement and Inter-local Resource Sharing

Cooperative procurement and inter-local resource sharing are tools that local jurisdictions can use to reduce time, administrative overhead, and other costs, while leveraging the experience and expertise of those with specialized knowledge in a sector. Cooperative purchasing combines the requirements of two or more public entities to leverage the benefits of volume purchases, delivery and supply chain advantages, best practices, and the reduction of administrative time and expenses. Cooperatives can pool demand for a product or service in order to get lower prices from suppliers. This procurement process can decrease costs for the cooperative as it puts them in a better negotiating position and brings benefits to the supplier by providing a better understanding of the volume levels and reliability of a customer.

In order to aggregate their demand and purchasing power, municipalities can either develop a joint solicitation to bid with neighboring jurisdictions, “piggyback” off of previously established contract, or partner with a cooperative purchasing organization.

- Cooperative solicitation. Two or more agencies combining their requirements to obtain volume pricing, such as all schools in a county ordering paper supplies in one bulk order.
- Cooperative contract. Multiple organizations “piggybacking” off a single contract award, such as a school buying automobiles through a state contract.
- Cooperative organization. Buying off a contract offered by an organization whose sole purpose is to promote cooperative purchasing, such as a school district purchasing school furniture through U.S. Communities.

The U.S. Communities Cooperative Purchasing Alliance, the National Association of State Procurement Officials (NASPO), and the National Cooperative Purchasing Alliance (NCPA) are all leading national cooperative purchasing organizations working to reduce the cost of goods and services by leveraging the purchasing power of public agencies in all 50 states.

In addition to cooperative procurement, local jurisdictions may consider inter-local service agreements where the participants agree to share service responsibility or contract with a neighboring government to provide the service to the other jurisdiction. Sharing services with a neighboring community is another proven way to lower costs and increase fiscal and operational efficiency. Cooperating with a neighboring community, with the local school district or the county government can produce direct savings in the costs of providing services. Similar to cooperative purchasing, inter-local service agreements benefit economies of scale that can help provide high service levels, optimization of facilities and increased accountability.

Cooperative purchasing and inter-local service agreements are not without their challenges. Both require a careful legal framework outlining the terms of the cooperation, and attention to compliance issues. Local legal and political barriers may also need to be overcome. In the case of purchasing this could include concerns from small and minority/disadvantaged businesses and in-state vendors or resellers. In the case of inter-local service agreements, a great deal of public trust is needed and partners should be selected carefully. Ultimately, both cooperative strategies are effective cost reducing tools with great potential if structured properly.

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Reduced costs for goods or services - Reduced administrative burden - Exchange and share resources and technical information 	<ul style="list-style-type: none"> - Legal compliance concerns when working with multiple entities - May contradict “Buy local” policies - Identifying an appropriate lead - Aligning procurement values - Limits competition 	<ul style="list-style-type: none"> - General reoccurring needs such as office supplies, fuel, and technical services - Aggregating shared service needs and purchasing preferences across jurisdictions - Equipment or facility needs shared by neighboring jurisdictions

Examples

- The Minnesota Watershed districts are special government entities run by an appointed board of managers in Minnesota that monitor and regulate the use of water. The districts are defined by the boundaries of watersheds, instead of political boundaries, allowing a holistic approach to water protection and management and a more efficient use of resources. Watershed districts have provided cost-share funding to cities, counties and other entities for stormwater management practices (i.e. Rice Creek Watershed District and Nine Mile Creek Watershed District). In addition, the Minnesota Cities Stormwater Coalition was formed to help cohorts of cities manage their requirements under the Federal MS4 Permit Requirements, guide them through the process and create their own stormwater pollution prevention programs and adopt best management practices.³¹

- In the state of California, two or more existing public agencies from different jurisdictions can establish a formal legal agreement known as a Joint Powers Agency or Authority (JPA) in order to jointly implement programs, build facilities, or deliver services.³² There are multiple PFAs throughout the state. For example, the San Francisquito Creek Joint Powers Authority was established between three cities, one county and a water district to address flooding, environmental and recreation issues in the San Francisquito watershed.³³
- The Washington Department of Ecology provides sustainable purchasing guidance to state agencies, local governments, and business on how to buy green products. This guidance includes access to the State’s Master Contracts Usage Agreement.³⁴
- The U.S. Communities Cooperative Purchasing Alliance, the National Association of State Procurement Officials (NASPO)³⁵, and the National Cooperative Purchasing Alliance (NCPA) are all leading national cooperative purchasing organizations working to reduce the cost of goods and services by leveraging the purchasing power of public agencies in all 50 states. Municipalities can piggyback or join a solicitation for climate resilience and sustainability purchasing solutions.

Public Private Partnerships

Public-private partnerships (P3s) are formal, contractual agreements between a government entity and a private company for the implementation of public infrastructure. While many people think that public-private partnerships are a financing mechanism, they are actually a cost-reducer. The value of a public-private partnership is the ability to bundle together the design, building, financing, operations, and maintenance of an infrastructure asset in a more cost-effective way than the public sector can do it.

³⁶

A well-structured P3 will have both partners sharing the risks and rewards of the implemented projects. The local jurisdiction usually maintains ownership over the asset and the private company is responsible for one or more aspects of the project implementation that may include design, financing, construction, operation, or maintenance. The private company receives from the local jurisdiction a regularly scheduled concession payment, usually funded by a toll, user fee, rate payment or tax revenue. P3s have been used extensively to meet transportation, solid waste, energy and drinking water/wastewater infrastructure needs. Municipalities are attracted to P3s because they can defer up-front costs and investors are attracted because of the high level of transparency, investment premiums, and secured repayment streams.³⁷

In addition to the traditional P3, local jurisdictions may want to explore Community Based Public Private Partnerships (CBP3s). CBP3s include many features of the conventional P3 approaches for financing, procurement, contract, and program management. The significant difference is that a CBP3 is a “relational contract” built on long-term trust and confidence that both parties will act as partners. A conventional P3 approach uses a “transactional” contract approach with discrete and static metrics for reimbursement that cannot address the flexibility and complexity required for stormwater retrofit programs.³⁸ Though CBP3s are based on the traditional P3 model, they go beyond the basic requirements to include alignment of goals, accountability, transparency, and sustainability, efficient use of funds, commitment, and value driven. CBP3 thus address the unique requirements of stormwater management systems and incorporate additional community benefits into the projects. These modifications include a focused effort to invest in green infrastructure while providing community and economic benefits.

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Leverages public capital to incentivize private investment - Shared risk between public and private sector - Shared responsibility can increase project efficiencies - Potential cost and time savings 	<ul style="list-style-type: none"> - Rigorous request for proposal process can limit opportunities for smaller firms - Requires large-scale projects - Perceived or actual loss of public control - Long-term deals can constrain policymaking options for decades - Requires commitment to monitoring and evaluation - Benefits are highly speculative 	<ul style="list-style-type: none"> - Large-scale infrastructure or operation and maintenance projects - Project should have limited and quantifiable risk - Projects with a realistic chance for a positive revenue stream - Projects with well-defined shared vision of what success looks like - Projects that are complex or require innovative technology solutions

Examples

- In 2012 Prince George’s County, Maryland created the Clean Water Partnership (CWP) as a groundbreaking community-based public-private partnership (CBP3) program to meet regulatory requirements by leveraging private-sector resources and promoting operational efficiencies and innovation in design, construction, and maintenance.³⁹

The CBP3 with the private entity Corvias Solutions, was established in order to address significant investments needed in stormwater infrastructure. The county needed to retrofit 15,000 acres of impervious surface area in order to comply with Clean Water Act regulations, but were also interested in investing into communities and building a local workforce capable of maintaining green infrastructure. The public-private partnership relies on funding from a stormwater utility, the county provides the oversight and Corvias Solutions is in charge of managing the infrastructure investments, providing ways to streamline costs and improve the efficiency of the investments.

Rebates and Tax Credits

Incentives such as rebates and tax credits can help stimulate private investment in achieving the communities’ hazard mitigation and water management goals and as such, act as a match to reduce the cost of investment to the local jurisdiction.

Rebates and tax credits, deductions or exemptions provide incentives for private property owners to make investments or adopt certain best management practices that benefit the community. By helping people to get part of their money back, in the form of rebates and tax relief of various kinds, local jurisdictions can make it easier for residents to spend money on or contribute to environmental projects, both reducing the costs to the jurisdiction and increasing positive outcomes. Additionally, projects implemented on private properties can complement those on public lands and reduce the need for larger public investments.

Rebates are a return, refund, or reduction on any fees already paid on a particular product. They have traditionally been used by municipal governments to incentivize the purchase or adoption of a particular best management technology, such as water or energy efficient products. When designed well, rebate programs can lead to both private investments in best management practices beyond what would have been achieved in the absence of the rebate program, this is known as “additionality,” and to private investment into related best management technologies that are unsubsidized, known as an “acceleration effect”.⁴⁰ More recently, municipalities have developed rebate programs to incentivize the implementation of water conservation and stormwater management practices. Stormwater utility fees often include these types of incentives that are applied to those who implement approved mitigation practices in their properties.

Tax incentives have been used to encourage landowners to put aside land with environmental or conservation value and to implement best management practices on their lands to improve watershed health. Tax incentives can be offered by any level of government that levies taxes: federal, state or province, county, or community. They can be aimed at businesses, organizations, individuals – any entity that pays taxes.

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Way to incentivize the purchase of new technology, service, or practice - Speaks to businesses and individuals’ self-interest - More politically feasible than increasing taxes - Leverages private investment to achieve community goals 	<ul style="list-style-type: none"> - One-time funds related to specific purchases - Typically offsets only a portion of the cost - Difficult to determine additionality 	<ul style="list-style-type: none"> - Encourage, limit, or manage growth - Promote a specific technology or practice - Part of a coordinated outreach strategy to mobilize resident action

Examples

- The Borough of West Chester in Pennsylvania implemented a Stream Protection Fee in 2016 to partially fund its stormwater management system and comply with regulatory permit requirements. The system contains incentives in the way of credits and rebates for property owners who install and maintain stormwater management practices on their properties. The initial fee is directly proportional to the total impervious surface area of the parcel and discounts of up to 60% of the fee are provided for those that implement green infrastructure practices.⁴¹
- The City of Lancaster, Pennsylvania implemented a stormwater management fee in 2014 based on the measurement of impervious surface on their property. Stormwater credits are available to property owners that install a green infrastructure technology on their property to manage stormwater. Based on the effectiveness and capacity of the technology, stormwater fees can be reduced by up to 50%.⁴²
- Anne Arundel County, Maryland has both a Stormwater Remediation Fee and a Stormwater Property Tax to pay for stormwater management practices. Property owners receive credits towards both if they implement practices on their properties to control stormwater runoff
- In Pennsylvania, the Resource Enhancement and Protection (REAP) Program, provides farmers, landowner, and businesses tax credits for implementing BMPs that will enhance farm production and protect natural resources.⁴³

- The Community Rating System (CRS) of FEMA’s National Flood Insurance Program (NFIP) rewards communities that undertake floodplain and watershed management activities that exceed the minimum floodplain management requirements of the NFIP. Residents obtain increased discounts on their flood insurance premiums based on the increased amount of hazard mitigation activities they implement (See Module 2 for more information on CRS).

Regulations and Policy

Policies and ordinances can be adopted by local jurisdictions to formalize the community’s hazard mitigation and water management goals, reduce the capital costs of implementing integrated hazard mitigation plans, and encourage private sector investment in the community. Updating codes, instituting “dig-once” policies, and streamlining permitting processes can help advance a community’s goals without significant investment of public dollars, and they can even provide a funding stream in the form of enforcement fines, mitigation payments and in-lieu-of payments.

Incorporating updated standards and having local codes that require or allow developers to minimize impervious cover, conserve natural areas and use runoff reduction practices to manage stormwater runoff, can help reduce construction costs, leverage private investment for implementing projects with a public benefit, and ensure more resilient communities.

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Embed goals into new projects - Minimize maintenance cost to the community - Puts benefit and costs onto the developer - Environmental and societal benefits as a result of improvements 	<ul style="list-style-type: none"> - Local regulatory approach preferences - Maintaining updated and adaptable requirements - Staff capacity and knowledge - Public awareness and Enforcement - May require state enabling legislation 	<ul style="list-style-type: none"> - Encourage, limit, or manage growth - Require specific standards - Engage private sector

Examples

- In 2014, both the Tree Canopy Law and the county’s Roadside Tree Protection Law went into effect in Montgomery County, Maryland. These two laws, in addition to the state-mandated Forest Conservation Law, are important tools to enhance tree canopy, reduce canopy losses, and mitigate for environmental impacts of development. Montgomery County’s Tree Canopy Law ties into the county’s sediment control permit requirements. Permit applicants must satisfy mitigation requirements based on the area within the limits of disturbance by planting trees on the property or paying fee-in-lieu into a dedicated account. The county is required to use the fee-in-lieu to purchase, install, and establish shade trees on private property anywhere within the county.

As of fiscal year 2018, mitigation fees paid because of the Tree Canopy Law totaled approximately \$2.2 million. These fees are dedicated funds for purchasing, installing, and establishing shade trees to enhance shade and canopy, including on private property, multifamily and homeowner association properties, businesses, and schools. DEP staffs Tree Montgomery, the planting program funded through the Tree Canopy Law. Tree Montgomery

staff meet with eligible property owners to select species and location for shade trees. A contractor completes all planting work, and Tree Montgomery staff inspect each tree after planting. By the end of fiscal year 2018, Tree Montgomery had planted more than 2,100 shade trees.⁴⁴

Montgomery County's Roadside Tree Protection Law protects street trees during development activity and provides funds to replace roadside trees removed during development. This law applies for any activity requiring a right-of-way, sediment and erosion control, or building permit. Permit applicants must have an approved plan to protect critical root zones of roadside trees and, if a tree is removed, the law requires they plant one replacement roadside tree at or near the location of the removed tree and pay for two additional roadside trees.

Revenue Streams

Revenue streams are mechanisms to generate and access capital for project implementation. In general, local jurisdictions rely on two methods of funding or financing infrastructure: pay-as-you-go (cash) and pay-as-you-use (debt). The primary sources of revenue state and local jurisdictions use to cover the cost of services can be broken down as taxes, fees, and bonds. A local jurisdiction's size, geography, land use, legal framework, coverage of government services, and citizens' preferences can all influence its revenue structure.⁴⁵ It is important to develop a well-balanced finance and funding strategy that accounts for a government's unique revenue structure taking into account that maybe only a few of the revenue streams discussed below may be applicable in a particular jurisdiction.

Taxes

Tax revenue is commonly used to pay for government services as well as design, construction, and maintenance of local infrastructure. When taxes are directly allocated to projects, this is known as pay-as-you-go capital financing, which means using cash or other current assets rather than debt issuance to fund capital projects. It is most commonly used in cases when capital project sizes are small, project sponsors have limited access to debt, local jurisdictions are closely approaching their debt limits, or there are prohibitions on use of debt.

General funds are typically the main source of income for municipal governments and generally come from property, income and sales taxes. Municipalities, through the typical budget process, decide what portion of these revenues will be allocated specifically towards water management, hazard mitigation and/or resilience programs. Using general tax revenues to finance hazard mitigation implementation has the advantage of employing large tax bases and relatively stable and predictable tax revenues. However, tax revenue is highly competitive with regards to its allocation to different municipal programs. Many times, environmental problems are not considered priorities, or priorities may change when new local officials are elected.

Stormwater management programs, for example, have traditionally been funded from taxes paid into their general funds leading to unstable resource allocation in many cases. Additionally, hazard mitigation and water management costs have been increasing at a higher pace than general funds and relying exclusively on these will most likely prove insufficient.⁴⁶

In addition, in many cases, increases in these general taxes are subject to voter approval. This approval process may face considerable public resistance and take longer, delaying the timely construction of

needed infrastructure and may also have the potential to impose a disproportionate burden on lower-income consumers.⁴⁷

Narrowly-based taxes such as new taxes or special assessments. Local jurisdictions can use more narrowly-based taxes that are either part of the general fund or can even be in a special fund to dedicate specific revenues to fund local infrastructure. Often deposited into a special revenue fund, narrowly-based taxes are effectively reserving the funds for a particular project. Earmarking special tax revenues protects local infrastructure projects from competition from other uses of these funds. Selective sales taxes, such as those levied on the sale of commodities and services, can be used to generate new revenue and in some circumstances, such as hotel taxes, can charge nonresidents for using local infrastructure.⁴⁸ However, disadvantages include volatility of special revenue sources and earmarking financing, which may restrict the flexibility and discretion of local officials in the fiscal planning.

Special assessment taxes are local-level taxes imposed on residents in order to fund an infrastructure or other project that will improve the community. Given enough public support, it may be possible to levy a special assessment on property owners based on linear feet of street frontage, or other metric, depending on what the funds will be used for. Special assessment taxes should be linked to the cost of providing the service or infrastructure and applied uniformly to all beneficiaries. Even if designed carefully, however, such assessments may be perceived as unfair or as unduly adding to residents' tax burden.

Tax Increment Financing Districts or Special Improvement Districts. Another option is to include water management projects in special assessment districts, such as Tax Increment Financing Districts (in which the costs of improvements are paid back by future tax increases), or Landscape and Lighting Assessment Districts. Tax Increment Financing (TIF) is a financial tool widely used by local jurisdictions to promote economic development and redevelopment. TIF uses taxes on future gains in real estate values to pay for new infrastructure improvements and relies on incremental revenues from private economic development and property value appreciation. Funding is created by borrowing against the future increase in property-tax revenues. Urban regeneration projects funded through tax increment financing have the potential to incorporate hazard mitigation and water management components such as GI that provide both environmental and social/aesthetic value.

Property owners may also voluntarily form Special Improvement Districts in which members of the group are assessed fees in order to pay for desired benefits, including green space and trees.

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Taxes are consistent from year-to-year and use an existing funding system - Can be earmarked for a specific service provided 	<ul style="list-style-type: none"> - Taxes can be unpopular and revenue generated is typically not allocated to a specific cause - Some general taxes may impose a larger cost burden on low-income people than on higher-income people. - May require state enabling legislation 	<ul style="list-style-type: none"> - Operations and Maintenance - On-going programs - Small infrastructure projects - Limited access to debt

Examples

- Fairfax County, Virginia implemented a stormwater tax in 2010 which assessed 1 cent per \$100 of property value on properties within a designated assessment district, the tax is currently assessed at 3.25 cents per \$100 of assessed real estate value. More stringent regulatory requirements and essential reinvestment in the county's aging infrastructure resulted in the need to establish a funding mechanism that was independent of the general fund.⁴⁹
- Like several other municipalities in Ohio, Cincinnati imposes a special assessment on all properties adjacent to public rights-of-way, as authorized by state statute, in order to finance urban tree programs. The City raises about \$1.9 million per year via its assessment, which is set at 21 cents per foot of street frontage.⁵⁰

Fees

Fees differ from taxes in that they are assessed in order to recover some of the cost of providing a service to a beneficiary, rather than simply raising revenue for general funds or dis-incentivizing undesired activities. Using dedicated fees is preferable because it avoids competing with other programs and needs that compete for general funds. Local jurisdictions can levy fees for a variety of reasons. Ideally, in order to be better accepted, fees should be linked directly to the cost of providing the service and used exclusively for that service, as well as applied uniformly and fairly to all beneficiaries.⁵¹

Permit Fees are fees assessed by local jurisdictions to raise revenue directly from any proposed development or construction that may worsen stormwater impacts. They are levied to compensate for the impact of development and can be used to fund green infrastructure projects or other mitigation efforts. The fees allow local jurisdictions to raise revenue directly from any proposed development or construction project. Permit fees can decrease during a time of slow construction and therefore may not be a consistent source of income.⁵²

Stormwater Utility Fees. More than 400 cities, towns, and utility districts nationwide utilize parcel-based stormwater billing practices that charge property owners stormwater fees based entirely or in part on the amount of impervious area on their property. Some stormwater fees provide property owners the opportunity to obtain a credit, or discount, on their stormwater fees by installing stormwater management practices on their property and can motivate private property owners to manage their own stormwater.⁵³ Additional guidance on how to implement such fees, local examples and lessons learned can be found in the Local Government Stormwater Financing Manual and in EPA's Managing Wet Weather with Green Infrastructure Municipal Handbook.^{54, 55}

Impact Fees. Impact fees are used extensively across the country and are traditionally one-time charges to developers used to pay for improvements to services and amenities necessary to serve new development. These fees have the potential to take into consideration projected environmental impacts due to development and can be used, in part, to mitigate such impacts, for example by incorporating green infrastructure.⁵⁶

Fee In-Lieu. A Fee In-Lieu is a fee that a developer or other person/entity must pay, in order to compensate for the environmental impact a development project may have. The in-lieu sponsor is usually a public agency or non-profit organization that collects these funds from multiple sites and then allocates them to other projects, such as green infrastructure, that compensate for the loss at the developed site. Prince Georges County, Maryland, has a fee-in-lieu program that collects payments from developers when trees are damaged or destroyed. The funds go to Woodland Conservation Fund that funds the County's tree programs.⁵⁷

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Fees are allocated to a specific service provided - Fees are often easier to adopt than taxes - Can help support projects with on-going maintenance needs 	<ul style="list-style-type: none"> - Fees may not generate sufficient funds and require administrative capacity for assessing and collecting - May require state enabling legislation 	<ul style="list-style-type: none"> - Discrete use case - Project provides a direct community service

Examples

- Northampton, Massachusetts established a Stormwater and Flood Control Utility in 2014 supported by a controversial new fee which provides a rare example of a new funding stream to support integrated stormwater and resilience efforts at a smaller municipal scale.⁵⁸ Instead of calculating the fee based on the amount of impervious surface for each property, the average runoff for single-family, two-family and three-family homes was determined and fees were based on those averages.
- Missouri’s hazard mitigation plan says it funds stream restoration projects with a mitigation requirement for developers that impact streams. Fees and credits are assessed using their own watershed categorization systems to limit service areas and define watersheds. Mitigation may include paying into fee in lieu or mitigation banks. Fee-in-lieu is sometimes used for stormwater management programs – if there is a retention requirement, at times it can be met by paying fee in-lieu for an increased amount of stormwater storage and infiltration offsite.⁵⁹
- Vermont uses Motorboat Fees to fund the Vermont Aquatic Nuisance Control Grants and the State of Vermont Conservation License Plates voluntary fees are used to fund the Watershed Grants Program.
- Pennsylvania Act 13 Marcellus (Natural Gas) Shale Flood Mitigation Assistance Funding. In 2012, Pennsylvania’s Act 13 established impact fees on unconventional gas wells in the Marcellus Shale. Part of the revenues from these fees are being used to implement environmental projects across the state, including watershed restoration and flood control. In 2016, for example, \$14 million was awarded to support a total of 94 projects including over \$2 million for watershed restoration.⁶⁰

Bonds and Loans

Debt, either through bonds or loans, is another source of capital for local jurisdictions. Bonds and loans are debt-financing, used to borrow money to finance a specific project and spread the repayment over time. There are differing attitudes over whether to use a “pay-as-you-use” strategy (issuing debt and paying off the debt over the project’s lifetime) because debt increases the total cost of the asset through interest payments, but it also allows you to save time and build capital projects sooner by borrowing up-front, and spreading out payments over a long time helps smooth out expenses and create a more predictable cash flow.⁶¹

Municipal bonds or loans are a popular way to bring in capital because it means the local jurisdiction or state does not have to raise taxes. However, the local jurisdiction or state ends up paying more for the project in the long run because they have to pay interest on the bonds or loans. Some projects might be expected to pay for themselves in the long run because they increasing revenue. For example, a new public train system might be financed by bonds but be expected to draw in more investment into the local jurisdiction, which would bring in more tax revenue than the train system cost.

You might consider using long-term debt-financing for capital improvements that will benefit both current and future citizens whose life expectancy is longer than the term of indebtedness. While bonds and loans can pay for up-front capital costs, you should also consider long-term maintenance costs over the project's anticipated life. It is generally advisable to require all debt proposals to identify the future operating and maintenance costs and how they will be paid.

Green Bonds (or Climate Bonds) are bonds whose proceeds are earmarked specifically for green projects and can be issued as general obligation or revenue bonds and are backed by the taxing authority of the community or a state. They can include energy efficiency, pollution control, habitat restoration, and climate adaptation projects.

While green bonds do not necessarily represent an additional financing benefit to the community, they signal to the public that the community is committed to environmental improvements and can attract investors who are looking to invest in projects that provide positive environmental and social impacts.⁶² Green bonds that earmark proceeds for green purposes have grown exponentially the last few years. Key to the success of green bonds is that investors do not have to choose between financial returns and environmental benefits, as green bonds offer the same financial terms as other bonds, with the added bonus that their green label enables investors to identify them as environmentally beneficial investments.⁶³

Municipalities should be aware that they will need to generate sufficient cash flows to repay bond obligations and may need to undergo third-party verification to certify that proceeds from bond sales are funding environmental projects, which may add to the cost of capital. The certification is essentially a marketing tool that helps sell the bond to those who are interested in green investments. To maintain the certification, the borrowers must update investors every year.⁶⁴

State and local jurisdictions can buy green bonds from markets that are already established including the World Bank and the International Finance Corporation. The Climate Bond Initiative, a certifier of green bonds, provides a map showing the location of different bond selling entities it has verified.⁶⁵

Environmental Impact Bonds (EIB) are another instrument for financing large projects that pay returns based on outcomes, they are a form of pay-for-success debt financing. Like Green Bonds, they are commonly used to raise funding for environmentally sustainable projects, such as green infrastructure. Unlike Green Bonds, however, the financial return of the investment is tied directly, and potentially augmented by the achievement of a desired environmental outcome. In other words, investors can only collect a return on their investment if the project proves to be successful. In the case of financing green infrastructure projects using an EIB, investors see a financial return when a demonstrable difference to the environment is achieved. In practice, most EIBs function similarly to more traditional bonds or other debt, with a fixed interest rate and term, except with an additional “performance payment” made to investors if projects achieve greater-than-expected performance.⁶⁶

State Revolving Funds (SRF)

One important source of debt-financing for water infrastructure projects is the Clean Water State Revolving Fund (CWSRF). The federal government provides grants to capitalize the 51 state CWSRF programs. States then contribute a 20 percent funding match and administer and operate the programs. The state programs function as infrastructure banks: repaid principal and interest from loans to water quality improvement projects is returned to the state program, allowing the state to finance new water

quality improvement projects ranging from wastewater treatment plant upgrades to various project types that address nonpoint source pollution.

Many CWSRF assistance options deliver significant incentives to borrowers but may vary depending on the state program. Some incentives include loan forgiveness (a portion of or up to the project amount), coverage of up to 100 percent of project costs, and deeply discounted loans that are well below the market interest rate, among others. State CWSRF loans may also be used to provide match for federal or state grants.

Many states use their SRF to support green infrastructure projects by prioritizing these projects for CWSRF funding. Since each state CWSRF program is different, please find state-specific program links here: <https://www.epa.gov/cwsrf/forms/contact-us-about-clean-water-state-revolving-fund-cwsrf#state>

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Can support large-scale shovel-ready projects - Provides a steady funding stream over time that can help smooth out expenses and create a more predictable cash flow - Low-interest financing - Allows you to save time and build capital projects sooner by borrowing up-front 	<ul style="list-style-type: none"> - Requires access to debt - Requires full repayment plus interest - May require voter approval - Contingent on credit record - Limited in scope, typically on suitable for large-scale shovel-ready infrastructure projects - Can require capacity for meeting reporting requirements - Increased risk as future revenues may change 	<ul style="list-style-type: none"> - Large-Scale Shovel-Ready Projects - Infrastructure Projects With A Revenue Stream - Municipalities with Good Credit

Examples

- In 2010, The Oregon CWSRF made a \$3.8-million loan to the City of Cannon Beach to purchase and preserve 800 acres of land in order to protect water quality in Ecola Creek, West Fork Ecola Creek, and North Fork Ecola Creek.⁶⁷
- In 2019, The Virginia CWSRF provided over \$20 million in funding for the Cumberland Forest Project. The Virginia Department of Environmental Quality, which houses the state’s Clean Water Revolving Loan Fund program, partnered with the Virginia Department of Forestry and The Nature Conservancy to purchase and permanently protect 22,856 acres in Southwest Virginia. This is the largest open space easement ever recorded in Virginia.⁶⁸
- The Lower Montoyas area of New Mexico has a large-scale regional flood control facility that completed a successful green infrastructure project in September 2015. Located at the downstream end of the largest watershed within Southern Sandoval County Arroyo Flood Control Authority jurisdiction, this facility was designed to handle flows of up to 6,500 cubic feet per second during the 100-year-storm event. This project was funded by the New Mexico CWSRF and incorporated three key concepts: permeable project elements that mimic the natural water cycle, water harvesting, and incorporation of vegetation as part of the treatment process.⁶⁹

- The City of Cocoa Beach, Florida received a \$1.7 million CWSRF loan at 0.315% interest used to provide match for a Section 319 Nonpoint Source grant. This funding went to construction of the Minuteman Causeway Project, an urban stormwater project that treats an 8.34-acre watershed using three major Low-Impact Design best management practices in its treatment trains. These include native landscape bioswales/tree filters, underground exfiltration, and pervious pavers. This large green infrastructure project reduced nutrient loading for the Indian River Lagoon and has added aesthetic value along the City's streets, making it more attractive to new businesses.
- The State of Massachusetts was the first U.S. jurisdiction to issue green bonds in June 2013.⁷⁰ They sold \$100 million of 20- year notes with maturities ranging from 5 to 17 years to finance environmentally beneficial projects in clean water, energy efficiency, and land remediation, among other areas⁷¹
- DC Water and Sewer Authority issued \$350 million in green bonds in July 2014 with a 100-year final maturity to finance a portion of its Clean Rivers Project⁷² and in 2016 the city issued the country's first EIB that shares performance risk with investors by linking their returns to the project's success.⁷³
- The City of Cleveland, OH issued its first \$32.4 million green bond for wastewater management with maturities spanning from 1-20 years. Projects are expected to include stormwater projects and sewer infrastructure upgrades.⁷⁴
- The City of Atlanta has recently issued a \$14 million EIB as a way to finance natural and engineered green infrastructure projects. After two major back to back rain events in 2012 which caused massive flooding in the city, including surface flooding and combined sewer surcharges in low areas, Atlanta embarked in one of the largest green infrastructure efforts in the country. This effort has included the largest known retrofit of streets using interlocking permeable pavers.

The Atlanta EIB ties the amount the City pays out on the bond directly to benefits related to the volume of stormwater the projects successfully manage. By sharing both the performance risk of the green infrastructure and the value of its benefits among the City and investors, the Atlanta EIB ensures alignment with Atlanta's broader objectives to revitalize communities and improve resilience.⁷⁵

Grants

Grants are non-repayable funds that are disbursed or gifted by one party to another and are usually used to fund specific programs or projects. Funds for grants can come both from the public and private sectors. Grants from the public sector include federal, state and publicly funded agencies; while grants from the private sector include foundations, non-profits, and private for-profit companies.

There are a number of federal grants, as well as various types of local grant programs on a state-by-state basis, available for specific issues, such as hazard mitigation planning, stormwater management, and developing community resilience. FEMA, for example, has several non-disaster preparedness grant programs which can support citizens and first responders to ensure that communities are able to prepare for, protect against, respond to, recover from and mitigate all hazards. EPA Section 319 nonpoint source grant program provides funds aimed at improving water quality through improved stormwater management and the use of green infrastructure.

While grants are often sought after because communities do not have to repay the funds, the process of winning a grant can be quite competitive and time consuming and usually requires writing proposals, following strict specific guidelines, which are then evaluated by the funding agency. Once awarded, grants often require recipients to follow specific implementation timelines and reporting guidelines and many federal funding programs require non-federal matching funds to leverage the programs federal dollars. A community should carefully consider possible match sources, such as leveraging grants from private funders, partnering with other organizations who can provide a qualifying match, or leveraging matching funding for any grants they may receive.

Coordinating grants and leveraging multiple funding programs to implement integrated hazard mitigation and water management initiatives or using grants to pay for demand studies and deal structuring are examples of how grants can lay the groundwork for additional investment opportunities. While these funds are best suited for discrete projects and are not a long-term or stable source of funding, grants can provide critical one-time funds to round out an integrated hazard mitigation and water management plan implementation. Aligned grants can be critical to unlocking additional investment capital, thereby stretching the dollars going into the community.

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Does not require repayment - Widely available for various projects 	<ul style="list-style-type: none"> - Competitive and limited in availability - Often project specific and time-constrained - Can require match and capacity for meeting reporting requirements 	<ul style="list-style-type: none"> - Discrete mid-to-small projects - Pilot projects - As part of a larger capital stack - Outreach and education projects

Examples

- The Environmental and Energy Study Institute developed a fact sheet for nature-based solutions to climate change. This fact sheet provides a survey of federal funding and technical assistance available to help state and local governments and agencies, tribes, non-governmental organizations, universities, and individuals implement nature-based solutions for climate resilience. Many of these sources of federal support allow communities to develop projects, which draw on the multiple, interrelated benefits of nature-based solutions. This fact sheet also identifies the types and attributes of projects the programs support.⁷⁶

Crowdfunding

In recent years, crowdfunding or civic crowdfunding has made an appearance as a means to raise cash for programs that focus on the common good. Campaigns are typically launched for projects that don't require a substantial amount of funds (typically aiming to raise between \$5,000 and \$30,000. The chief advantage of crowdfunding is raising awareness and public support for projects, but funds can also be used as match for larger grants. Crowdfunding may be most appropriate for pilot projects designed to test concepts before making substantial public investments.⁷⁷

Examples

- In 2013 Central Falls, RI launched a crowdfunding campaign to raise funds to beautify and clean up a city park. Within weeks it had raised \$10,000 to buy trash and recycling bins designed by local artists.⁷⁸

- The Philadelphia Parks and Recreation Department’s Youth Urban Agriculture Program raised \$2,163 to add a 500 square foot fruit garden to its plan. In this successful campaign they learned the importance of establishing well-defined project objectives with a specific community.⁷⁹
- Denver raised \$35,000 to help construct a bike lane⁸⁰
- There are several platforms a community can use to launch their own crowdfunding campaign. Civic crowdfunding websites include Citizeninvestor (<https://angel.co/citizeninvestor>), ioby (<https://www.ioby.org>), and Chuffed (<https://chuffed.org/movement/climate-change>).
- Neighbor.ly (<https://neighborly.com>) has launched a “community investment program” which does not raise cash contributions but rather facilitates the purchase of bonds by individuals.

Benefits	Challenges	Ideal Use
<ul style="list-style-type: none"> - Does not require repayment - Appropriate for pilot projects or test concepts - Promotes civic engagement and raises awareness - Can be used as match 	<ul style="list-style-type: none"> - Requires capacity to develop and manage an effective campaign - Can be unpopular if government already collects taxes or fees associated with project goal - Raises only small amounts of funds 	<ul style="list-style-type: none"> - Cost share/matching funds - Projects with a strong community outreach component - Small discrete projects

Off-site Crediting Programs

Mitigation banking compensates for ecological loss resulting from off-site development activities. The National Mitigation Banking Association defines mitigation banking as “the restoration, creation, enhancement, or preservation of a wetland, stream, or other habitat area undertaken expressly for the purpose of compensating for unavoidable resource losses in advance of development actions, when such compensation cannot be achieved at the development site or would not be as environmentally beneficial.” Following the completion of the project, credits are generated and then purchased by permittees to compensate for impacts associated with projects in other sites. A mitigation bank can be created by a government agency, corporation or nonprofit organization and mitigation projects can be sited on public or private lands.⁸¹

Following the mitigation banking system, some state and local jurisdictions have begun to develop off-site stormwater crediting programs as alternative mechanisms to implement on-site stormwater management practices. Local jurisdictions and water districts can invest in green infrastructure projects that provide stormwater management services and generate mitigation credits. Like wetland compensatory mitigation approaches, regulators can implement off-site stormwater controls along three main pathways: privately arranged off-site controls, purchase of credits through an approved crediting or banking program, or payment to an approved in-lieu fee program. These approaches can facilitate sustainable stormwater control projects, increasing capacity to capture, treat, and reuse stormwater; enhance flood control functions; or achieve other public objectives.⁸²

While the wetlands and stormwater programs are very different, lessons learned from implementing wetland compensatory mitigation can inform the development of effective off-site stormwater crediting programs.

Examples

- New York City recently established a wetlands mitigation bank for the Saw Mill Creek watershed area. This is part of the City’s resiliency plans in the aftermath of Hurricane Sandy which includes rehabilitating wetlands to help absorb storm surges. If a developer or landowner faces unavoidable environmental impacts caused by waterfront development, the purchase of “credits” to help restore the Saw Mill Creek Marsh enables them to move forward with their work.⁸³
 - In Minneapolis, the Capitol Region Watershed District allows companies to purchase and sell credits for ongoing projects, especially related to green infrastructure. The crediting system is designed for areas where it is difficult for new development to implement stormwater systems, like in developed downtowns. This credits banking system fits here because most of the district is fully developed. Developers there can purchase credits that contribute to projects in other locations. In less developed areas, companies can volunteer new green infrastructure (as one project example) that reduces their own municipal stormwater fees and is paid for in part with credits purchased through the Capitol Region Watershed District.^{84,85}
- The City of Chattanooga, Tennessee has recently developed a crediting system or Stay on Volume (SOV). SOV Credits are generated after 1-inch of rainfall volume is retained onsite through bioretention. Credits can either be sold (price is not regulated; the market determines the price) or the developer can receive a credit coupon and apply the coupon to another site in the same watershed. The first Stay on Volume (SOV) credits were earned in 2019 by the firm A.D. Engineering. The firm constructed 12 new environmentally responsible homes where the majority of stormwater falling on the site is captured and infiltrated back into the ground, bypassing the City of Chattanooga’s storm system.^{86,87}

Module Step 5.0: Explore community examples on how taking a blended finance approach can leverage public, private and philanthropic dollars to increase the amount of capital directed at hazard mitigation and water resource implementation.

Blended finance simply refers to the idea of combining multiple finance and funding sources, typically this goes beyond just having a diverse portfolio of financing strategies, and instead it indicates an approach that allows different types of capital, to invest alongside each other while each achieving their own objectives.

Municipalities should aim to incorporate a diverse mix of funding sources as well as cost saving approaches into the hazard mitigation and water resource management financing strategy. Diversification provides stability and helps sustain budgets in the face of unexpected cuts to any one funding source due to leadership changes, shifting budget priorities, or other uncertainties. In addition to being diversified and sustainable, effective funding programs will be designed to raise sufficient revenue to support all program elements, including planning, design, implementation, and maintenance. This helps to deliver promised program outcomes and reinforce public support for continued funding.

Ideally, this approach can mobilize private capital investment in the community. By taking a blended finance approach, a community can weave in public dollars, philanthropic giving, and private investment in order to fund integrated hazard mitigation and water management plans and increase a community’s resilience.

The following case studies are examples of how communities are blending federal and local grant funds, state revolving loan funds, local fees, and philanthropic dollars to implement large-scale community projects.

Background

The risks of flooding in different area of the City of Charlotte, Mecklenburg County, are posed by a network of multiple streams crossing the city and county, and frequent heavy rainfall events, including those of hurricanes. Before building restrictions were implemented for floodplain areas multiple housing and commercial buildings were built in these floodplains.

In 1999, in order to address repeated flooding of multiple buildings after heavy rainfall, the county’s Storm Water Services division decided to start to buy and tear down those properties that were most vulnerable to flooding. To date, the county has used \$67 million in federal and local money to buy more than 400 residential and commercial lots in flood-prone areas. The county has been working to restore these floodplains and incorporated them into its greenway system.

The Problem at Briar Creek

Two apartment complexes located in the Briar Creek floodplain had experienced four repeated devastating flooding events between 1995 and 2008. Engineering studies confirmed that it wasn’t possible to prevent repeated floods from happening and if the highest-risk units remained, future flood damages would be 400% higher than the cost of the buying them out. Additionally, there was a need to address non-point source pollution coming from impervious surfaces at Briar Creek. The Creek is a tributary to Upper Little Sugar Creek which was on the federally impaired list.

The Solution

The high-risk apartments were purchased and torn down by the Mecklenburg County Stormwater Services between 2008 and 2011.

The floodplain and stream channels were restored and water quality enhancements, including a pond and a wetland, were constructed to improve water quality in Briar Creek and one of its tributaries. The project area is now the Chantilly Ecological Sanctuary, comprising 24 acres, and home to thriving ecosystems. The project has also been highlighted because it included multiple stakeholder participation including the input of various organizations and community members.

Funding Sources

- **Buyouts**

Total buyout cost= \$14.3 million = \$9.7 (land purchase) + \$4.6 (tenant relocation/demolition)

FEMA Pre-Disaster Mitigation Grant	\$8.9 million	62.2%
Charlotte-Mecklenburg Storm Water Services	\$5.4 million	37.8%

- Floodplain restoration (stream restoration, pond and wetland)

Total restoration cost = \$4.55 million

City PCSO mitigation fees (fee-in-lieu)	\$ 2.1 million	46.2%
County Utility Fees	\$ 1.9 million	41.8%
City Stormwater Utility Fees	\$ 450,000	9.9%
NC Dept of Environment & Natural Resources 319 grant	\$ 100,000	2.2%

The City and County Utility Fees are paid by the feepayers based on impervious area on their property. The City's Post Construction Stormwater Ordinances (PCSO) established a mitigation fee to be paid by developers who utilize the option to pay-in-lieu of providing onsite stormwater management.

For further information contact:

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Chantilly Ecological Sanctuary conceptual design (Photo source: City of Charlotte)

Background

The City of Dubuque, Iowa, is located on the banks of the Mississippi River at the junction of the states of Iowa, Illinois, and Wisconsin. Although different parts of the city have experienced basement flooding problems, residences of the Bee Branch watershed were found to be especially vulnerable to such flooding. Dubuque's 6.5 square mile Bee Branch Watershed drains to the Bee Branch Creek and is located entirely within the city limits. This watershed area includes the city's most developed areas where over 50% of Dubuque residents either live or work. The watershed encompasses historic neighborhoods offering some of the community's most affordable workforce housing.

The Problem at Bee Branch

Between 1999 and 2010, the area was hit five times by flash floods during significant rain events leading to serious floods. A drainage basin master plan completed in 2001 determined that 1,150 homes and business of the Bee Branch watershed were especially vulnerable to severe flooding.

The Solution

The drainage basin master plan also recommended major infrastructure projects to eliminate the risk of flood damage. In 2003 a citizen advisory committee was set up to determine the best solution for the watershed: an open waterway or an underground sewer were considered as possible options. The final decision was to create an open channel solution and a consulting firm was hired to design the project. Restoration was planned in two phases. The Lower Bee Branch section was completed in 2011 and includes a large expanse of open water that wraps around a former industrial site, which will be privately redeveloped as a retail center. The project also includes a multiuse hike/bike trail and a system of floating vegetated islands made of recycled plastic. The Upper Bee Branch Creek Restoration Project was completed in July 2017 and is designed to take on storm water during rain events and move it safely through the area without flooding adjacent properties. It features a 1,938-foot long creek and floodplain, a multi-use trail system, a play area, scenic overlooks, gardens and an outdoor amphitheater.

Funding Sources

The project's total costs are \$219 million. To date, the City has received \$161 million to help fund and finance the project, including \$52.1 million of federal and state funds, \$98.5 million in the form of state sales tax increment financing spread over 20 years. Additionally, the Clean Water State Revolving Fund's Sponsored Projects Program allowed the City to reallocate \$9.4 million, which was to be paid in interest for another project, to instead be used to construct more than 70 green alleys in the Bee Branch Watershed. Finally, private donations of \$165,000 were raised through the America's River III campaign to plant trees and build amenities along the watershed. Increments in the city's stormwater utility fees are contributing to fund additional costs of the project.

Total Cost: \$ 219 million

Funded and financed: \$161 million

Funding and Financing Sources

State Sales Tax Increment Financing	\$98.5 million	61.2%
Federal and State Funds (see breakdown below)	\$52.9 million	32.9%
CW SRF (interest payment reallocation)	\$9.4 million	5.8%
Private Donations (America's River III)	\$165,000	0.1%

*Percent of total funded and financed

Federal and State Funds Breakdown

HUD National Disaster Resilience Competition (NDRC) -	\$31.5 million	59.5%
U.S. EPA Clean Water State Revolving Fund (SRF) Green Project	\$5.9 million	11.2%
U.S. Dept. of Transport. Investment Generating Economic Recovery (TIGER) Grant	\$5.6 million	10.6%
I-Jobs II Grant	\$3.96 million	7.5%
River Enhancement Community Attraction and Tourism (RECAT) Grant	\$2.25 million	4.3%
U.S. Economic Development Administration Disaster Relief Opportunity Grant	\$1.22 million	2.3%
U.S. Department of Transportation National Scenic Byways Grant	\$1.0 million	1.9%
Dubuque Metropolitan Area Transportation Study (DMATS)	\$940,000	1.8%
U.S. Environmental Protection Agency (EPA) Brownfield Cleanup Grants	\$400,000	0.8%
State Recreational Trail Grant	\$100,000	0.2%

*Percent of total federal and state funds

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Bee Branch Restored floodplain (Photo source: City of Dubuque)

Background

Montgomery County, with a population of approximately one million people, is the most populous county in the state of Maryland, and a northern suburb of Washington DC. The Sligo Creek subwatershed encompasses 11.1 square miles of highly developed land in the County. Sligo Creek is one of 14 tributaries to the Anacostia River, which flows into the Potomac River, one of the major tributaries of the Chesapeake Bay. The Anacostia River, one of the most urbanized and polluted rivers in the country by the late 1800s, became the focus of large-scale restoration efforts in the 1980s.

The Problem

Sligo Creek's watershed has been dramatically modified by high density commercial and residential areas developed before today's environmental standards for stream valley protection and stormwater management, uncontrolled stormwater was eroding remaining stream banks. In 2000, a study of the health of Sligo Creek declared it biologically impaired after only four species of fish, all tolerant to high levels of pollution, were present in the creek.

The Solution

In order to restore stream health, efforts were initiated to control urban runoff and restore habitat areas along the stream. Montgomery County efforts begun in 1989 and have continued to present day. The creek restoration has also been part of the joint regional efforts to restore the Anacostia Watershed undertaken by Montgomery County, Maryland Department of the Environment, Maryland National Park and Planning Commission, Washington Metropolitan Council of Governments, Interstate Commission on the Potomac River Basin, U.S. Army Corps of Engineers and U.S. Environmental Protection Agency. The regional efforts which were completed in five different phases between 1989 and 2007 included improving existing detention wet ponds and constructing new ones; restoring forest, stream and wetland habitats; installing low impact development stormwater management; implementing vegetated controlled practices and re-introducing native fish. These practices have led to a 41 percent reduction in peak flow discharge in the upper watershed; improvements in water quality and in streambed and bank stability; improvements in-stream habitat; and recovery of macroinvertebrate and fish populations, with 14 species of fish present currently.

Restoration of Sligo Creek has continued to date. Montgomery County has implemented multiple projects both through its Department of Parks and its Department of Environmental Protection. Efforts have included stream restorations, installing retrofits along the stream's parkway and planting trees in the park. Other authorities involved in stream restorations have included the City of Takoma Park, the Metropolitan Washington Council of Governments and the Washington Suburban Sanitary Commission.

Funding Sources

In the 1989-2007 restoration efforts completed in five separate phases, approximately \$3 million (excluding monitoring costs) were invested in the upper Sligo Creek restoration effort, including \$1.8 million from the Montgomery County capital budget, \$1 million from the MDE's Small Creeks and Estuaries Reserve cost share program, and \$256,000 from the U.S. Army Corps of Engineers.

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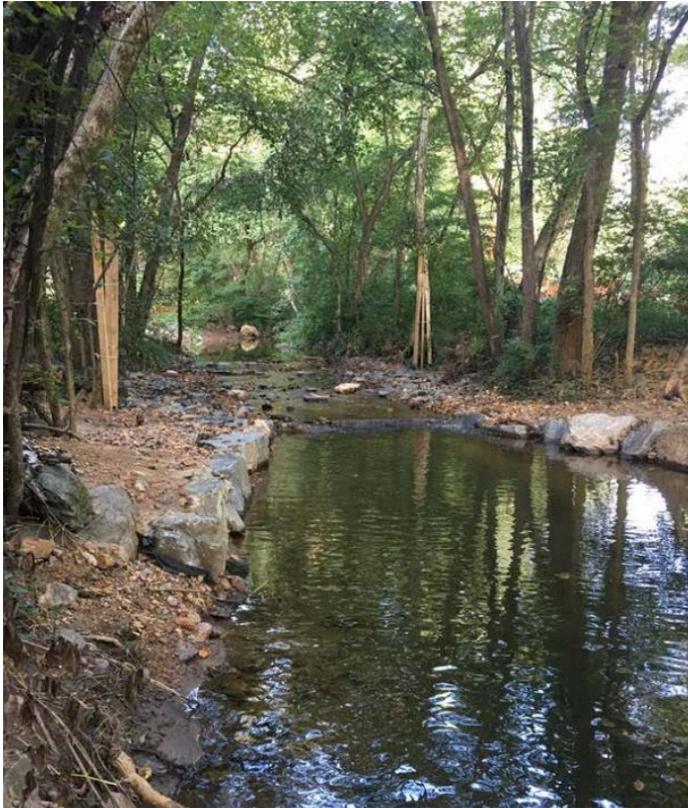
For Current Restoration Efforts in Sligo Creek:

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Montgomery County Department of Parks

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Restoration site in Sligo Creek (Photo source: Erin McArdle)

Vermont – Hazard Mitigation Statewide Effort

Following tropical storm Irene’s destructive path through the State in 2011, Vermont Emergency Management became proactive in managing natural hazards. The State not only started a buyout effort to purchase flood damaged and flood vulnerable properties in 2012, but more recently also started a mitigation initiative that addresses vulnerability in a more comprehensive way by restoring streams and floodplains. Floodplain restoration will conserve critical areas and watershed functions so water can spread out to low-lying areas after heavy rainfall events, which will benefit not only the natural system, but also reduce vulnerability of buildings and infrastructure that would otherwise be in harm’s way. The priority actions were established in the 2019 Vermont State Hazard Mitigation Plan (SHMP) by a steering committee comprised of multiple stakeholders from across state agencies and non-profit organizations.

Since 2012, the state has been able to acquire and demolish close to 160 flood-vulnerable properties and complete approximately 70 infrastructure improvement projects. FEMA has funded 75% of most of these buyouts and the rest has come from different federal and state programs.

Buyouts

Federal and State Funds Breakdown	Amount funded
FEMA	Approx \$20 million (since 2012)
HUD’s Community Development Block Grants	\$7 million
Vermont’s Housing and Conservation Board	\$2+ million

The stream restoration and conservation efforts are often carried out in land where the flood-vulnerable or flood-damaged structures used to be located and are funded through the various federal and state programs, to include FEMA, Vermont Housing Conservation Board, Vermont’s Ecosystem Restoration Grant Program, and more. Leveraging multiple funding sources has resulted in improved flood resilience in Vermont, as these floodplain and wetland restoration projects aim to reduce flood levels in developed areas. Vermont’s River Corridor Conservation Program aims to conserve areas in the River Corridor through adoption of bylaws at the municipal level which prevent development in these areas. In preventing development in these hazardous locations, Vermont is obviating the need for future buyouts.

Additional funding is provided by the Emergency Relief and Assistance Fund. ERAF is not used for buyouts but as an incentive program to determine the State-based match for municipalities following a declared disaster to repair damaged public infrastructure and to reward communities that have taken mitigation measures. Communities are eligible to receive as much as 17.5 percent of the costs from the state if they have taken significant flood mitigation measures.

In order to provide communities with the resources they need to understand their flood risks and help them plan and implement mitigation projects, the state has developed a website, Flood Ready, which provides information and resources for communities. The website includes a page that provides specific information on funding sources (https://floodready.vermont.gov/find_funding).

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Greenway Trail Bridge in Cambridge, VT was replaced and the floodplain restored to reduce future flooding in historic downtown Jeffersonville
Photo Credit: Seth Jensen, LCPC

Photo Source: Vermont State Hazard Mitigation Plan - 2018

Conclusions

There is no simple single solution to funding and financing municipalities' efforts to address their water resource management problems and to reduce the risks of natural hazards. Each locality will have differing community priorities and hazards to plan but the need to fund projects that will protect water quality, and the desire to expand the use of nature-based solutions for sustainable hazard mitigation, are common to all localities. By looking at these problems in a holistic way and integrating plans across departments, municipal officials can potentially reduce the costs of dealing with such problems and simultaneously increase the chances of accessing new sources of funding.

Early in the planning process it is important to look for ways to reduce costs by integrating projects across departments, working with adjacent municipalities and/or bringing in the private sector to provide services in a more efficient way. When addressing funding or financing needs it is important to remain flexible and explore various potential funding and financing sources and evaluate which ones may be accessible and worth implementing given the realities of each unique community. Though prioritizing one or two funding sources may seem like the simplest option, it is important to understand that this may not always prove to be sufficient considering the increasing costs around water management and the increasing risks posed by more frequent extreme natural events. Working to identify potential sources of funding early on in the planning process may allow to access additional funding sources and to combine these sources in a better way.

If it is not possible to initially fund all planned mitigation projects, prioritizing such projects in order of urgency, and funding potential, can jump start hazard mitigation efforts and get communities working in the right direction towards solving these problems.

Key Takeaways

- Consider funding options early in the planning process
- Diversify funding options by adopting integrated planning efforts
- Establish a portfolio of viable implementation projects.
- Evaluate and prioritize funding options
- Reduce costs by aligning efforts to avoid duplicating projects, integrating projects into the annual budgeting process, sharing resources and technical services across jurisdictions, leveraging private partners, offering incentives, and adopting strategic policy goals
- Identify funding and financing options that are available in your community
- Develop a blended finance strategy by mixing various funding and finance strategies to implement projects

References

Note: All links to references were last accessed on 5/29/20

- ¹ Alliance for the Chesapeake Bay. 2016. "Streamlining Integrated Infrastructure Implementation 'Dig Once' Strategy Development Workshop." Workshop Report. https://www.chesapeakebay.net/documents/GI_Integration_Final_Workshop_Report.pdf
- ² Alliance for the Chesapeake Bay. "Successful Green Infrastructure Implementation Enhancing Municipal Processes & Planning." 'Dig Once' One Pager. https://www.chesapeakebay.net/channel_files/19528/dig_once_one_pager.pdf
- ³ Federal Emergency Management Agency. 2013. Local Mitigation Planning Handbook. <https://www.fema.gov/media-library/assets/documents/31598>
- ⁴ U.S. Environmental Protection Agency. 2019. "EPA Signs MOU with FEMA to Support Rapid Recovery and Restoration of Water Infrastructure After Disaster Strikes." News Releases from Headquarters. <https://www.epa.gov/newsreleases/epa-signs-mou-fema-support-rapid-recovery-and-restoration-water-infrastructure-after>
- ⁵ U.S. Department of Homeland Security and U.S. Environmental Protection Agency. 2019. Memorandum of Understanding between the United States Environmental Protection Agency (EPA) and the Department of Homeland Security Federal Emergency Management Agency (FEMA). https://www.epa.gov/sites/production/files/2019-06/documents/epa_-_fema_mou_factsheet-06-04-2019.pdf
- ⁶ J. Martin et al. 2018. From Projects to Portfolios, Mainstreaming Large-Scale Investment in Integrated Infrastructure. Earth Economics. https://static1.squarespace.com/static/561dcdc6e4b039470e9afc00/t/5c50ae954ae237e26d90a55c/1548791453440/ProjectsToPortfolios_EarthEconomics_012919-W.pdf
- ⁷ U.S. Environmental Protection Agency. 2017. Financing Options for Nontraditional Eligibilities in the Clean Water State Revolving Fund Programs. https://www.epa.gov/sites/production/files/2017-05/documents/financing_options_for_nontraditional_eligibilities_final.pdf
- ⁸ U.S. Environmental Protection Agency Water Infrastructure and Resiliency Finance Center. 2017. DC Water's Environmental Impact Bond: A First of its Kind. <https://www.epa.gov/waterfinancecenter/dc-waters-environmental-impact-bond>
- ⁹ Environmental Finance Center-University of Maryland. Stormwater Financing 101. Municipal Online Stormwater Training Center. <https://mostcenter.umd.edu/>
- ¹⁰ U.S. Environmental Protection Agency. 2013. Case Studies Analyzing the Economic Benefits of Low Impact Development and Green Infrastructure Programs. https://www.epa.gov/sites/production/files/2015-10/documents/lid-qi-programs_report_8-6-13_combined.pdf

-
- ²³ Smart Growth Network. 2002. "Getting to Smart Growth: 100 Policies for Implementation" International City/County Management Association. <https://www.epa.gov/smartgrowth/getting-smart-growth-100-policies-implementation>
- ²⁴ Rolf Moeckel and Rebecca Lewis. 2017. Two decades of smart growth in Maryland (U.S.A): impact assessment and future directions of a national leader. Urban, Planning and Transport Research. Vol. 5. <https://www.tandfonline.com/doi/full/10.1080/21650020.2017.1304240>
- ²⁵ U.S. Environmental Protection Agency. 2014. "Getting to Green: Paying for Green Infrastructure Financing Options and Resources for Local Decision-Makers". EPA 842-R-14-005. https://www.epa.gov/sites/production/files/2015-02/documents/gi_financing_options_12-2014_4.pdf
- ²⁶ J. Martin et al. 2018. From Projects to Portfolios, Mainstreaming Large-Scale Investment in Integrated Infrastructure. Earth Economics. https://static1.squarespace.com/static/561dcdc6e4b039470e9afc00/t/5c50ae954ae237e26d90a55c/1548791453440/ProjectsToPortfolios_EarthEconomics_012919-W.pdf
- ²⁷ Cynthia R. Harris and Christina Libre. 2019. "Giving Green Streets the Green Light: Improving Water Quality through Capital Improvement Policies." Environmental Law Institute. <https://www.eli.org/sites/default/files/eli-pubs/green-streets-report.pdf>
- ²⁸ Ibid.
- ²⁹ Vermont Emergency Management. "Vermont Stronger: 2018 Vermont State Hazard Mitigation Plan." https://vem.vermont.gov/sites/demhs/files/documents/2018%20Vermont%20State%20Hazard%20Mitigation%20Plan%20-%20Final%20Adopted_Interactive.pdf
- ³⁰ U.S. Environmental Protection Agency Office of Water. 2018. States Use Innovative Programmatic Financing Approach to Maintain Stable CWSRF Demand. Clean Water State Revolving Fund Activity Update. https://www.epa.gov/sites/production/files/2018-02/documents/profi_activity_update_final.pdf
- ³¹ Minnesota Pollution Control Agency. 2017. About the Minnesota Stormwater Manual. https://stormwater.pca.state.mn.us/index.php?title=About_the_Minnesota_Stormwater_Manual
- ³² Trish Cypher and Colin Grinnell. 2007. Governments Working Together A Citizen's Guide to Joint Powers Agreements. California State Legislature Senate Local Government Committee. <https://sqf.senate.ca.gov/sites/sqf.senate.ca.gov/files/GWTFinalversion2.pdf>
- ³³ San Francisquito Creek Joint Powers Authority. Agency Overview. <http://sfcjpa.org/about/agency-overview/>
- ³⁴ Department of Ecology State of Washington. Buying green- sustainable purchasing page provides guidance to state agencies, local governments, and businesses on how to buy green products. <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Sustainable-purchasing>
- ³⁵ National Association of State Procurement Officials. <https://www.naspo.org>

-
- ³⁶ Kriston Capps. 2017. "How Local Government Came to Embrace Business Partnerships." CityLab. <https://www.citylab.com/solutions/2017/11/local-governments-partner-with-business/542487/>
- ³⁷ Environmental Consulting Technology, Inc. 2014. "A Business Model Framework for Market-Based Private Financing of Green Infrastructure." <https://stormwater.wef.org/wp-content/uploads/2015/01/Final-Report-on-A-Business-Model-Framework-for-MarketBased-Private-Financing-of-Green-Infrastructure.pdf>
- ³⁸ U.S. EPA Region 3 Water Protection Division. 2015. "Community Based Public-Private Partnerships (CBP3s) and Alternative Market-Based Tools for Integrated Green Stormwater Infrastructure, A Guide for Local Governments." https://www.epa.gov/sites/production/files/2015-12/documents/qi_cb_p3_guide_epa_r3_final_042115_508.pdf
- ³⁹ Prince George's County Department of the Environment. 2016. "Prince George's County's Approach to Meeting Regulatory Stormwater Management Requirements, Using a Community-based Public-Private Partnership Business Model." <https://thecleanwaterpartnership.com/wp-content/uploads/2016/06/PGC-CBP3-Clean-Water-Partnership.pdf>
- ⁴⁰ M. Pérez-Urdiales and K.A. Baerenklau. 2019. "Additionality Effects of Rebate Programs in the Residential Water Sector: Indoor vs. Outdoor." MDPI Water. <https://www.mdpi.com/2073-4441/11/6/1170/htm>
- ⁴¹ Borough of West Chester, Chester County Pennsylvania. SPF Credit and Rebate Program page. <https://west-chester.com/538/SPF-Credit-and-Rebate-Program>
- ⁴² City of Lancaster Stormwater Management. <https://cityoflancasterpa.com/stormwater-management/>
- ⁴³ Pennsylvania Department of Agriculture. 2019. Resource Enhancement and Protection Program page. https://www.agriculture.pa.gov/Plants_Land_Water/StateConservationCommission/REAP/Pages/default.aspx
- ⁴⁴ Environmental Finance Center and the Alliance for the Chesapeake Bay. 2019. "Financing Urban Tree Canopy Programs, Guidebook for Local Governments in the Chesapeake Bay Watershed." http://chesapeaketrees.net/wp-content/uploads/2019/04/FinancingUrbanTreeCanopyPrograms_LowRes_040919.pdf
- ⁴⁵ National League of Cities. Local Revenue Structures page. <https://www.nlc.org/local-revenue-structures>
- ⁴⁶ Environmental Finance Center. 2014. "Local Government Stormwater Financing Manual: A Process for Program Reform." [https://efc.umd.edu/assets/efc_stormwater_financing_manual_final_\(1\).pdf](https://efc.umd.edu/assets/efc_stormwater_financing_manual_final_(1).pdf)
- ⁴⁷ U.S. Environmental Protection Agency Office of the Chief Financial Officer Environmental Finance Program. 2008. "Guidebook of Financial Tools: Paying for Environmental Systems." <https://bit.ly/34mL58j>

-
- ⁴⁸ Can Chen and John R. Bartle. 2017. "Infrastructure Financing: A Guide for Local Government Managers." International City/County Management Association (ICMA).
https://icma.org/sites/default/files/308902_Infrastructure%20Financing%20-%20A%20Guide%20for%20Local%20Government%20Managers.pdf
- ⁴⁹ Environmental Finance Center. 2017. "Strategies for Financing Chesapeake Bay Restoration in Virginia." <https://www.fairfaxcounty.gov/publicworks/stormwater/stormwater-service-district>
- ⁵⁰ Monroe Trombly. 2017. "Tax for Cincy's tree program may be going up."
<https://www.cincinnati.com/story/news/2017/12/19/cincinnati-pay-more-taxes-bolster-citys-street-trees-program/961121001/>
- ⁵¹ Environmental Finance Center. 2017. "Strategies for Financing Chesapeake Bay Restoration in Virginia." <https://www.fairfaxcounty.gov/publicworks/stormwater/stormwater-service-district>
- ⁵² Georgetown Climate Center. Green Infrastructure Tool Kit page.
<https://www.georgetownclimate.org/adaptation/toolkits/green-infrastructure-toolkit/how-to-pay-for-green-infrastructure-funding-and-financing.html?chapter>
- ⁵³ Alicia Valderrama and Larry Levine. 2012. Financing Stormwater Retrofits in Philadelphia and Beyond. Natural Resources Defense Council.
- ⁵⁴ Environmental Finance Center. 2014. "Local Government Stormwater Financing Manual: A Process for Program Reform." [https://efc.umd.edu/assets/efc_stormwater_financing_manual_final_\(1\).pdf](https://efc.umd.edu/assets/efc_stormwater_financing_manual_final_(1).pdf)
- ⁵⁵ U.S. Environmental Protection Agency. 2008. "Managing Wet Weather with Green Infrastructure Municipal Handbook, Funding Options" <https://bit.ly/2PLvHwP>
- ⁵⁶ U.S. Environmental Protection Agency. 2014. "Getting to Green: Paying for Green Infrastructure Financing Options and Resources for Local Decision-Makers." EPA 842-R-14-005.
https://www.epa.gov/sites/production/files/2015-02/documents/gi_financing_options_12-2014_4.pdf
- ⁵⁷ Environmental Finance Center and the Alliance for the Chesapeake Bay. 2019. "Financing Urban Tree Canopy Programs, Guidebook for Local Governments in the Chesapeake Bay Watershed."
http://chesapeaketrees.net/wp-content/uploads/2019/04/FinancingUrbanTreeCanopyPrograms_LowRes_040919.pdf
- ⁵⁸ David Levy. 2018. "Financing Climate Resilience: Mobilizing Resources and Incentives to Protect Boston from Climate Risks." Sustainable Solutions Lab University of Massachusetts Boston.
https://www.umb.edu/editor_uploads/images/centers_institutes/sustainable_solutions_lab/Financing_Climate_Resilience_April_2018.pdf
- ⁵⁹ Environmental Law Institute, Stream Mechanics, and The Nature Conservancy. 2016. "Stream Mitigation: Science, Policy, and Practice." <https://www.eli.org/sites/default/files/eli-pubs/stream-mitigation-science-policy-and-practice-final-report.pdf>

-
- ⁶⁰ David Misner. 2016. Governor Wolf Announces More Than \$14 Million in Shale Impact Fee Funding for Conservation, Environmental Protection, and Local Development Projects. Pennsylvania Department of Community and Economic Development. <https://dced.pa.gov/newsroom/governor-wolf-announces-14-million-shale-impact-fee-funding-conservation-environmental-protection-local-development-projects/>
- ⁶¹ Municipal Research and Services Center (MRSC). Debt Management Policies page detailed guidance to local governments in Washington State to develop and adopt debt management policies, including key questions to consider and sample policies. <http://mrsc.org/Home/Explore-Topics/Finance/Debt/Debt-Management-Policies.aspx>
- ⁶² Farrah Andersen et al., “Unlocking Private Capital to Finance Sustainable Infrastructure.” Environmental Defense Fund and Meister Consultants Group. <https://cadmusgroup.com/papers-reports/unlocking-private-capital-to-finance-sustainable-infrastructure/>
- ⁶³ Green City Bonds Coalition. “How to Issue a Green Muni Bond, The Green Muni Bonds Playbook.” <https://www.nrdc.org/sites/default/files/greencitybonds-ib.pdf>
- ⁶⁴ Laura O’Connell and Kyle Connors. 2019. “Financing Climate Resilience, Funding and Financing Models for Building Green and Resilient Infrastructure in Florida.” Harvard Kennedy School of Government. https://ash.harvard.edu/files/ash/files/financing_climate_resilience_final_report.pdf
- ⁶⁵ Climate Bonds Initiative. Climate Bonds Standard and Certification page. <https://www.climatebonds.net/standard>
- ⁶⁶ Environmental Defense Fund and Quantified Ventures. 2018. “Financing Resilient Communities and Coastlines: How environmental impact bonds can accelerate wetland restoration in Louisiana and beyond.” https://www.edf.org/sites/default/files/documents/EIB_Report_August2018.pdf
- ⁶⁷ Marian Martinez. 2018. “Using State Revolving Funds for Land Conservation.” Conservation Finance Network. <https://conservationfinancenetwork.org/sites/default/files/2019-02/CFN%20Toolkit%20-%20State%20Revolving%20Funds%20Rev.pdf>
- ⁶⁸ Virginia Governor Ralph S. Northam. 2019. “Commonwealth of Virginia and The Nature Conservancy Partner to Permanently Protect 22,856 Acres in Southwest Virginia.” A Common Wealth of Virginia Website, News Releases. <https://www.governor.virginia.gov/newsroom/all-releases/2019/august/headline-844184-en.html>
- ⁶⁹ U.S. Environmental Protection Agency Clean Water State Revolving Fund Branch Office of Water. 2016. “Funding Stormwater Management with the Clean Water State Revolving Fund.” https://www.epa.gov/sites/production/files/2016-11/documents/funding_stormwater_management_with_the_clean_water_state_revolving_fund.pdf
- ⁷⁰ Florida Department of Environmental Protection. 2018. “City of Cocoa Beach SRF Project Recognized for Excellence and Innovation in Clean Water Infrastructure.” <https://floridadep.gov/wra/wra/news/city-cocoa-beach-srf-project-recognized-excellence-and-innovation-clean-water>

-
- ⁷¹ The World Bank. 2015. "What are Green Bonds?" <http://documents.worldbank.org/curated/en/400251468187810398/pdf/99662-REVISED-WB-Green-Bond-Box393208B-PUBLIC.pdf>
- ⁷² Ibid.
- ⁷³ 2019. Case Study DC Water. Quantified Ventures. <https://static1.squarespace.com/static/5d5b210885b4ce0001663c25/t/5e136b61f2afef61e95e7472/1578331001269/DC+Water+Case+Study+Quantified+Ventures>
- ⁷⁴ Sean Kidney. 2016. "GB Market Rpt: Water, water everywhere! Cleveland \$32.4m, Saint Paul \$7.7m, Indiana \$115.8m, Columbia Uni \$50m, California \$411m, Massachusetts Water \$682m! US municipal green bonds issuance is dominated by water." Climate Bonds Initiative. <https://www.climatebonds.net/2016/04/gb-market-rpt-water-water-everywhere-cleveland-324m-saint-paul-77m-indiana-1158m-columbia>
- ⁷⁵ Cory Rayburn. 2019. "Slipping Through the Cracks: Atlanta's innovative use of permeable roadways solves flooding." WaterWorld Urban Water Management. <https://bit.ly/2RVu0Qd>
- ⁷⁶ Savannah Bertrand, Katie Schneer. 2020. "Federal Resources for Nature-Based Solutions to Climate Change." Environmental and Energy Study Institute. <https://www.eesi.org/papers/view/fact-sheet-federal-resources-for-nature-based-solutions-to-climate-change>
- ⁷⁷ Lindsay Drew. 2015. "Local Governments and Nonprofits Test Crowdfunding for Civic Projects." The Chronical of Philanthropy. www.philanthropy.com/article/Local-Governments-and/152005
- ⁷⁸ Charles Luzar. 2013. "How a Rhode Island Town Used Crowdfunding for a Public Works Project." Crowdfund Insider. <https://www.crowdfundinsider.com/2013/12/28650-central-falls-citizeninvestor-public-works/>
- ⁷⁹ Sarah Glover. 2013. "Philadelphia Uses 'Crowdfunding' to Complete Civic Projects." NBC 10 Philadelphia. <https://www.nbcphiladelphia.com/news/local/Philly-Projects-Crowdfunding-200081891.html>
- ⁸⁰ Lindsay Drew. 2015. "Local Governments and Nonprofits Test Crowdfunding for Civic Projects." The Chronical of Philanthropy. www.philanthropy.com/article/Local-Governments-and/152005
- ⁸¹ Laura O'Connell and Kyle Connors. 2019. "Financing Climate Resilience, Funding and Financing Models for Building Green and Resilient Infrastructure in Florida." Harvard Kennedy School of Government. https://ash.harvard.edu/files/ash/files/financing_climate_resilience_final_report.pdf
- ⁸² Janet Parrish. 2018. "Offsite Stormwater Crediting: Lessons from Wetland Mitigation" U.S. Environmental Protection Agency, Region 9. https://www.epa.gov/sites/production/files/2018-10/documents/off-site_stormwater_crediting_lessons_from_wetland_mitigation-2018-04.pdf
- ⁸³ Waterfront Alliance. 2017. "NYC's First Wetlands Mitigation Bank is Open for Business." Waterwire news and Stories about Waterways of New York and New Jersey. <https://waterfrontalliance.org/2017/10/20/nycs-first-wetlands-mitigation-bank-is-open-for-business/>

⁸⁴ Janet Parrish. 2018. "Offsite Stormwater Crediting: Lessons from Wetland Mitigation" U.S. Environmental Protection Agency, Region 9. https://www.epa.gov/sites/production/files/2018-10/documents/off-site_stormwater_crediting_lessons_from_wetland_mitigation-2018-04.pdf

⁸⁵ Capitol Region Watershed District. Watershed Rules page. <https://www.capitolregionwd.org/permits/watershed-rules/>

⁸⁶ The Chattanooga.Com. Business. 2019. A.D. Engineering Earns 1st SOV Stormwater Credits From City Of Chattanooga. <https://www.chattanooga.com/2019/2/6/384285/A.D.-Engineering-Earns-1st-SOV.aspx>

⁸⁷ Arcadis of New York, Inc. 2017. Stormwater In-Lieu Fee and Credit Banking and Trading Feasibility Report. Albany Pool Communities and the Capital District Regional Planning Commission. <http://cdrpc.org/wp-content/uploads/2017/12/Stormwater-ILF-and-Credit-Banking-Feasibility-Report.pdf>

Appendices

Appendix 1: Summary Matrix of Financing Mechanisms

Financing Mechanisms	Brief Description	Cost Reducer	Revenue Stream	Requires			Consider using for Projects that are focused on		
				Enabling Legislation	Access to Debt	Cost Share	Coordination/ Planning	Small - Mid Size	Large Size
Comprehensive Planning	Incorporate hazard mitigation and water resource solutions into integrated long-term plans.	x		x			x	x	x
Capital Improvement Programs	Prioritize hazard mitigation and water resource needs in publicly financed infrastructure.	x					x		x
Cooperative Procurement and Inter-local Resource Sharing	Share hazard mitigation and water resource related procurement contracts and/or service responsibility with other jurisdictions.	x					x	x	x
Public Private Partnerships	Contract with a private company for the implementation of public hazard mitigation and water infrastructure.	x				x	x		x
Rebates and Tax Credits	Offer a monetary concession to stimulate private investment in hazard mitigation and water management projects.	x				x		x	
Regulations and Policy	Require specific hazard mitigation and water management solutions for the public and private sector.	x		x			x	x	x
Taxes	Use cash or other current assets to fund hazard mitigation and water resource projects.		x	x				x	
Fees	Impose the cost of providing a specific hazard mitigation and water resource service exclusively on the beneficiaries of that service.		x					x	
Bonds and Loans	Borrow money to pay for a specific hazard mitigation and water resource project and spread the repayment over time.		x		x				x
Grants	Apply for funds that are disbursed or gifted by one party to another to support specific hazard mitigation and water resource projects.		x			x		x	
Crowdfunding	Raise cash, awareness and public support for hazard mitigation and water resource projects.		x			x	x	x	
Offsite Crediting Programs	Develop and/or enhance natural habitat for the purpose of compensating for unavoidable resource losses in advance of development actions.		x				x		x

Appendix 2: Steps and criteria to help develop a funding and finance strategy

Any community can incorporate funding and financial strategies into integrated hazard mitigation and water resource management plans.

Consider the following questions to determine which type of finance mechanisms might be best for you.

1. Identify specific hazard and water resource concerns

- Conduct a vulnerability assessment to evaluate the existing conditions of civic infrastructure and determine the potential impacts threats, such as flooding and extreme storms, may have on your physical infrastructure, as well as the health and safety of your community.

2. Embed hazard mitigation and water resource management into your community plans

- Consider developing a specific integrated hazard mitigation and water resource plan and/or incorporate hazard mitigation and water resources solutions into your jurisdiction's long-term **Comprehensive Plan**.
- Identify specific projects and strategy solutions to address the concerns identified in your vulnerability assessment.
 - For each strategy solution estimate project costs and conduct a benefit cost analysis of potential solutions where appropriate.
 - For each project consider the capital, labor, and operations and maintenance costs.
 - Assess if there are any overlapping strategy solutions and consider the multiple co-benefits.
- If your jurisdiction has a Capital Improvement Program (CIP) develop CIP evaluation criteria that prioritizes projects that address hazard mitigation and water quality concerns through green infrastructure approaches to ensure these considerations are embedded in all future capital projects.

3. Develop a funding and finance strategy

- For each hazard mitigation and water resource management project and strategy solution identified, consider options for funding and financing. The below tables can help make decisions on which funding and finance mechanisms to consider for various types of projects.
- Consider funding opportunities from various sources such as:
 - Federal agencies (EPA, FEMA, HUD, DOT, Federal Highway, Federal Transit)
 - State Revolving Funds or Section 319 grant program
 - Regional programs and opportunities to pass new narrow-based taxes or local utility and permit fees
 - If you have bonding authority, green bonds or disaster impact bonds

4. Re-evaluate and re-prioritize projects

- As you implement projects and programs, continually re-evaluate and re-prioritize your hazard mitigation and water resource management projects based on costs and available funding and financing. Assess new overlaps, community priorities, and improved technologies to determine if there are new cost savings and/or new funding and financing opportunities.

Evaluation criteria to help determine appropriate funding and financing strategies

<i>This hazard mitigation and water resources project has:</i>	Comprehensive and Capital Improvement Planning	Cooperative Procurement and Inter-local Resource Sharing	Public Private Partnerships	Rebates and Tax Credits	Regulations and Policy	Taxes and Fees	Bonds and Loans	Grants	Crowdfunding	Offsite Crediting Programs
Overlap with a number of community priorities and has a number of co-benefits	x	x	x	x	x	x	x	x	x	x
Ongoing procurement and/or service needs	x	x	x			x				
Research or planning goals	x	x				x		x		
Private sector engagement goals	x		x	x	x	x				x
Outreach and behavior change goals	x			x	x	x		x	x	
Small to medium capital costs		x				x		x	x	
Large upfront capital costs	x		x			x	x			x
A longer useful life							x			

Cost Reducers Benefits, Challenges, and Ideal Uses Summary Table

Cost Reducers		
Benefits	Challenges	Ideal Use
Comprehensive Planning		
<ul style="list-style-type: none"> • Helps to identify priorities • Codifies community’s long-term commitment • Establishes strategy for achieving goals • Opportunity to engage community stakeholders • Coordinates departmental efforts 	<ul style="list-style-type: none"> • Requires advanced coordination and commitment from leadership • Does not provide direct revenue for implementation • May require state enabling legislation 	<ul style="list-style-type: none"> • Setting broad goals • Outlining commitment to integrated hazard and water management • Identifying cross departmental co-benefit strategies
Capital Improvement Programs		
<ul style="list-style-type: none"> • Aligns community priorities with long-term capital funding plan • Increases efficiency • Overall cost benefits • Incorporates GI into other projects such as utilities, schools and parks • Establishes criteria for CIP project funding that prioritizes hazard mitigation and water resources 	<ul style="list-style-type: none"> • Requires more coordination and collaboration among departments • May require training government leaders and staff to think about integrating hazard mitigation into other local planning 	<ul style="list-style-type: none"> • Setting specific requirements for capital improvements • Identifying projects with multiple co-benefits • Coordinating project outcomes across departments
Cooperative Procurement and Inter-local Resource Sharing		
<ul style="list-style-type: none"> • Reduced costs for goods or services • Reduced administrative burden • Exchange and share resources and information 	<ul style="list-style-type: none"> • Legal compliance concerns when working with multiple entities • May contradict “Buy local” policies • Identifying an appropriate lead • Aligning procurement values • Limits competition 	<ul style="list-style-type: none"> • General reoccurring needs such as office supplies, fuel, and technical services • Aggregating shared service needs and purchasing preferences across jurisdictions • Shared equipment or facility needs

Benefits	Challenges	Ideal Use
Public Private Partnerships		
<ul style="list-style-type: none"> • Leverages public capital to incentivize private investment • Shared risk between public and private sector • Shared responsibility can increase project efficiencies • Potential cost and time savings 	<ul style="list-style-type: none"> • Rigorous request for proposal process can limit opportunities for smaller firms • Requires large-scale projects • Perceived or actual loss of public control • Long-term deals can constrain policymaking options for decades • Requires commitment to monitoring and evaluation • Benefits are highly speculative 	<ul style="list-style-type: none"> • Large-scale infrastructure or operation and maintenance projects • Project should have limited and quantifiable risk • Projects with a realistic chance for a positive revenue stream • Projects with well-defined shared vision of what success looks like • Projects that are complex or require innovative technology solutions
Incentives - Rebates and Tax Credits		
<ul style="list-style-type: none"> • Way to incentivize the purchase of new technology, service, or practice • Speaks to businesses and individuals self-interest • More politically feasible than increasing taxes • Leverages private investment to achieve community goals 	<ul style="list-style-type: none"> • One-time funds related to specific purchases • Typically offsets only a portion of the cost • Difficult to determine additionality 	<ul style="list-style-type: none"> • Encourage, limit, or manage growth • Promote a specific technology or practice • Part of a coordinated outreach strategy to mobilize resident action
Regulations and Policy		
<ul style="list-style-type: none"> • Embed goals into new projects • Minimize maintenance cost to the community • Puts benefit and costs onto the developer • Environmental and societal benefits as a result of improvements 	<ul style="list-style-type: none"> • May require state enabling legislation • Local regulatory approach preferences • Maintaining updated and adaptable requirements • Staff capacity and knowledge • Public Awareness and Enforcement 	<ul style="list-style-type: none"> • Encourage, limit, or manage growth • Require specific standards • Engage private sector

Revenue Streams Benefits, Challenges, and Ideal Uses Summary Table

Revenue Streams		
Benefits	Challenges	Ideal Use
Taxes		
<ul style="list-style-type: none"> Taxes are consistent from year-to-year and use an existing funding system Fees are allocated to a specific service provided 	<ul style="list-style-type: none"> Taxes can be unpopular and revenue generated is typically not allocated to a specific cause Some general taxes may impose a larger cost burden on low-income people than on higher-income people. May require state enabling legislation 	<ul style="list-style-type: none"> Operations and Maintenance On-going programs Small infrastructure projects Limited access to debt
Fees		
<ul style="list-style-type: none"> Fees are allocated to a specific service provided Fees are often easier to adopt than taxes Can help support projects with on-going maintenance needs 	<ul style="list-style-type: none"> Fees may not generate sufficient funds and require administrative capacity for assessing and collecting May require state enabling legislation 	<ul style="list-style-type: none"> Discrete use case Project provides a direct community service
Bonds and Loans		
<ul style="list-style-type: none"> Can support large-scale shovel-ready projects Provides a steady funding stream over time that can help smooth out expenses and create a more predictable cash flow Low-interest financing Allows you to save time and build capital projects sooner by borrowing up-front 	<ul style="list-style-type: none"> Requires full repayment plus interest May require voter approval Contingent on credit record Limited in scope, typically on suitable for large-scale shovel-ready infrastructure projects Can require capacity for meeting reporting requirements Increased risk as future revenues may change 	<ul style="list-style-type: none"> Large-Scale Shovel-Ready Projects Infrastructure Projects With A Revenue Stream Municipalities with Good Credit

Benefits	Challenges	Ideal Use
Grants		
<ul style="list-style-type: none"> • Does not require repayment • Widely available for various projects 	<ul style="list-style-type: none"> • Competitive and limited in availability • Often project specific and time-constrained • Can require match and capacity for meeting reporting requirements 	<ul style="list-style-type: none"> • Discrete mid-to-small projects • Pilot projects • As part of a larger capital stack • Outreach and education projects
Crowdfunding		
<ul style="list-style-type: none"> • Does not require repayment • Appropriate for pilot projects or test concepts • Promotes civic engagement and raises awareness • Can be used as match 	<ul style="list-style-type: none"> • Requires capacity to develop and manage an effective campaign • Can be unpopular if government already collects taxes or fees associated with project goal • Raises only small amounts of funds 	<ul style="list-style-type: none"> • Cost share/matching funds • Projects with a strong community outreach component • Small discrete projects

Strengthening Hazard Mitigation Plans through Water Resource Management	
Cost Reducers	
Comprehensive Planning	
<p>Storm Smart Cities: Integrating Green Infrastructure Into Local Hazard Mitigation Plans - EPA provides an overview of Local Hazard Mitigation Planning; captures an approach used to establish a planning team; identifies lessons learned and important considerations for other communities interested in pursuing this approach; and provides a crosswalk between the steps in Local Hazard Mitigation Planning, considerations for integrating green infrastructure, and examples from the Huntington, West Virginia Case Study.</p> <p>https://www.epa.gov/sites/production/files/2018-04/documents/storm_smart_cities_508_final_document_3_26_18.pdf</p>	guidance
<p>Integrated Planning for Municipal Stormwater and Wastewater - EPA resources for integrating stormwater management into town plans.</p> <p>https://www.epa.gov/npdes/integrated-planning-municipal-stormwater-and-wastewater</p>	guidance
<p>Community Solutions for Stormwater Management: A Guide for Voluntary Long-Term Planning - EPA report designed to help local governments in developing new or improving existing long-term stormwater plans.</p> <p>https://www.epa.gov/sites/production/files/2016-10/documents/draftlongtermstormwaterguide_508.pdf</p>	guidance
<p>Natural Hazard Mitigation Association (NHMA) Roadmap - NHMA is a non-profit organization of professionals dedicated to reducing the impacts of natural disasters NHMA promotes natural hazard risk reduction & climate adaptation through planning, adaptation, and mitigation. NHMA has produced the publication Building Your Roadmap to a Disaster Resilient Future which helps community stakeholders navigate through the varied array of pre- and post-disaster resources and programs available to reduce the impact of natural, technological, and human made events.</p> <p>http://nhma.info/ http://nhma.info/wp-content/uploads/2017/10/Roadmap_20171001.pdf</p>	guidance
<p>EPA Smart Growth Resource Site - an in-depth look at Smart Growth, including strategies communities can use to promote Smart Growth, key tools and resources to help communities implement more sustainable practices, and links to grants and potential funding for Smart Growth initiatives.</p> <p>https://www.epa.gov/smartgrowth/tools-and-resources-sustainable-communities http://www.epa.gov/smartgrowth/smartlocationdatabase.htm</p>	guidance/ funding/ tool
<p>EPA Mapping Tools for Communities - tools for communities to use to identify assets and hazards in local areas. Links provided for a number of great resources.</p> <p>https://www.epa.gov/sites/production/files/2015-02/documents/team-ei-mapping-tools.pdf</p>	technical assistance/ map
<p>An Introduction to FEMA Coastal Floodplain Mapping - help you better understand how to read and use flood maps in coastal communities</p> <p>https://www.arcgis.com/apps/MapSeries/index.html?appid=89d2e393f2c64d7cae07264f4d00c19d</p>	guidance/map

<p>FEMA's National Flood Hazard Layer (NFHL) - digital flood plain viewer</p> <p>https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd</p>	<p>technical assistance/ map</p>
<p>US Army Core of Engineers- Silver Jackets Team - interagency team to address hazard mitigation and natural resource planning</p> <p>http://silverjackets.nfrmp.us/About-the-Silver-Jackets-Program.cfm</p>	<p>technical assistance/ implementation</p>
<p>Local Comprehensive Plan Evaluation for Sustainable Stormwater Management and Flood Mitigation - outlines steps for integrating sustainable stormwater management principles into the local comprehensive planning and plan quality evaluation.</p> <p>https://oaktrust.library.tamu.edu/bitstream/handle/1969.1/156476/KIM-DISSERTATION-2015.pdf?sequence=1&isAllowed=y</p>	<p>guidance</p>
<p>American Planning Association Hazard Planning Information Exchange - there are different webinars such as Planning Integration for Resilience webinars and different publications on the website.</p> <p>https://www.planning.org/nationalcenters/hazards/planninginformationexchange/pastwebinars.htm</p>	<p>guidance/ training</p>
<p>Naturally Resilient Communities - a guide of nature-based solutions and included case studies of successful projects from across the country to help communities learn more and identify which nature-based solutions might work for them.</p> <p>http://nrcsolutions.org/</p>	<p>guidance</p>
<p>Vibrant Cities Lab - resources and tools to help plan and account for urban forest services</p> <p>https://www.vibrantcitieslab.com/</p>	<p>guidance/tool</p>
<p>The Watershed Resource Registry - an interactive mapping tool to characterize and prioritize natural resource management opportunities using a watershed approach.</p> <p>http://watershedresourcesregistry.com/</p>	<p>technical assistance/map</p>
<p>Capital Improvement Programs</p>	
<p>Integrating Resilience into Local Capital Improvement Programs - section in the Eastern Shore Land Conservancy (ESLC) Mainstreaming Sea Level Rise report that outlines best practices for embedding climate risk assessments into capital improvement planning processes at the municipal and county level, as a cost-effective means of building community resilience to climate-related threats. This process can also be applied to more general sustainability goals.</p> <p>https://www.eslc.org/wp-content/uploads/docs/coastal-resilience/regional-sea-level-rise-study-2019.pdf</p>	<p>guidance</p>
<p>“Dig Once” Strategy Development Workshop Report - Explore better ways to integrate green infrastructure (GI) into other infrastructure projects.</p> <p>https://www.chesapeakebay.net/documents/GI_Integration_Final_Workshop_Report.pdf</p>	<p>guidance</p>
<p>Rivers & Roads, Opportunities to Better Integrate Green Infrastructure into Transportation Projects in Atlanta, GA and Toledo, OH - American Rives has produced a publication that evaluates how to better integrate green infrastructure for stormwater management into roads and highways with specific recommendations for two cities: Atlanta, GA and Toledo, OH. (2015)</p> <p>https://s3.amazonaws.com/american-rivers-website/wp-content/uploads/2017/02/13102437/Rivers26Roads_A.pdf</p>	<p>guidance</p>

MOST Dig Once: Integrating Capital Improvement Planning into Green Infrastructure - online training module outlines strategies for integrating green infrastructure into capital projects such as roads, utilities, parks, and schools.
https://www.chesapeakebay.net/channel_files/19528/dig_once_one_pager.pdf
<https://mostcenter.org/courses/integrating-green-infrastructure-capital-improvement-planning>

training

Cooperative Procurement and Inter-local Resource Sharing

Strength in Numbers: An Introduction to Cooperative Procurements - an issue brief designed to provide public procurement officials, elected officials, government executives, government suppliers and citizens with an introduction to cooperative purchasing—particularly its definition, purpose, authority, value, and best practices.
https://www.naspo.org/dnn/portals/16/documents/Cooperative_Purchasing0410update.pdf

guidance

Responsible Purchasing Network (RPN) - promotes and practices responsible purchasing by identifying best practices, developing effective purchasing tools, educating the market, and using collective purchasing power to maximize environmental stewardship, protect human health, and support local and global sustainability. This network can help states develop a cooperative purchasing scheme and more. tools and resources on sustainable purchasing policies, practices, and guides.
<http://www.responsiblepurchasing.org>

technical assistance/
implementation

The Cooperative Purchasing Network (TCPN) -This brings up a pull-down menu with the cooperative purchasing laws for each of the 50 states.
<http://www.tcpn.org/>

technical
assistance/implementa
tion

CoProcure - a central platform where local governments can find, compare, and use cooperative public contracts from the federal government, national and regional purchasing cooperatives, states, and local agencies. Our free technology platform helps public servants save time and taxpayer dollars and lowers the costs of selling into the government market for suppliers.
<https://www.coprocure.us/>

technical
assistance/implementa
tion

National Association of State Procurement Officials (NASPO) Green Purchasing Guide - recommended steps and proven strategies to enable the implementation of a green purchasing program with links to other resources offering detailed information on elements of the process.
<https://www.naspo.org>
<http://www.naspo.org/green/index.html>

technical
assistance/implementa
tion

U.S. General Services Administration (GSA) Green Purchasing page - Federal resources to aid in green procurement and acquisitions.
<https://www.gsa.gov/about-us/regions/welcome-to-the-rocky-mountain-region-8/sustainability-in-action/green-purchasing>

technical
assistance/implementa
tion

U.S. Communities Government Purchasing Alliance, and OMNIA Partner - the nation’s largest and most experienced cooperative purchasing organization for the public sector.
<http://www.uscommunities.org>

technical
assistance/implementa
tion

National Cooperative Purchasing Alliance (NCPA) - government purchasing cooperative working to reduce the cost of goods and services by leveraging the purchasing power of public agencies in all 50 states. technical assistance/implementation
<http://www.ncpa.us/>

Survival through Regionalization: Effective Models for Intergovernmental Cooperation and Group Purchasing - introduce and review the results of a mutual sharing pilot study in Southern New Hampshire, to advance and promote the practice of mutual sharing and group purchasing within the state. guidance
<https://www.nhmunicipal.org/town-city-article/survival-through-regionalization-effective-models-intergovernmental-cooperation>

Inter-Local Agreements: A Tool for Expanded Learning Opportunities? - a report examining how school districts and municipalities in Nebraska may leverage inter-local agreements as a way to structure collaboration on expanded learning opportunities for students in their communities. guidance
<http://ppc.unl.edu/wp-content/uploads/2017/07/Inter-Local-Agreements-A-Tool-for-Expanded-Learning-Opportunities.pdf>

A County Manager's Guide to Shared Services in Local Government - this report gives five recommendations to help county leaders form and maintain successful shared service relationships. guidance
https://www.naco.org/sites/default/files/event_attachments/Additional%20Service%20Sharing%20Resources.pdf

Public Private Partnerships

Community Based Public-Private Partnerships (CBP3s) and Alternative Market-Based Tools for Integrated Green Stormwater Infrastructure: A Guide for Local Governments - EPA presents a model Community Based Public Private Partnership (CBP3) program, with a variety of emerging market-based tools, that will help municipalities in the Chesapeake Bay region meet their stormwater management regulatory and community development municipal stormwater management program needs Region 3 Water Protection Division. guidance
https://www.epa.gov/sites/production/files/2015-12/documents/gi_cb_p3_guide_epa_r3_final_042115_508.pdf

Public-Private Partnerships Guide - website designed to inform state and local public infrastructure project decision makers when the use of a Public-Private Partnership (P3) infrastructure procurement and delivery model makes sense for their constituents. guidance/tool
<https://www.p3guide.com/>

Prince George's County's Approach To Meeting Regulatory Stormwater Management Requirements: Using A Community-Based Public-Private Partnership Business Model - document describes the creation of the Prince George's County's CWP, the drivers that influenced program development, and items to consider for municipalities who want to adopt a P3 for implementing large stormwater infrastructure projects. guidance
<https://thecleanwaterpartnership.com/wp-content/uploads/2016/06/PGC-CBP3-Clean-Water-Partnership.pdf>

Private Capital, Public Good Drivers Of Successful Infrastructure Public-Private Partnerships - this paper is intended to serve as a guide to executing PPPs in the public interest. It provides an overview of basic PPP structure, how to consider proper risk and reward sharing, the purpose and the rationale behind these arrangements, and nine recommendations for public leaders as they consider PPPs.

guidance

https://www.brookings.edu/wp-content/uploads/2016/07/BMPP_PrivateCapitalPublicGood.pdf

Incentives - Rebates and Tax Credits

Community Tool Box Section 3. Using Tax Incentives to Support Community Health and Development - a free, online resource for those working to build healthier communities and bring about social change. Learn how to use tax incentives to promote community health and development and explores resources that can be applied to a number of sustainability initiatives.

guidance/ tool

<https://ctb.ku.edu/en/table-of-contents/implement/changing-policies/tax-incentives/main>

Managing Wet Weather with Green Infrastructure Municipal Handbook, Incentive Mechanisms - a list of incentive mechanisms currently being used by municipalities around the United States.

guidance/funding

https://www.epa.gov/sites/production/files/2015-10/documents/gi_munichandbook_incentives.pdf

Regulations and Policy

Updated Code and Ordinance Worksheet for Improving Local Development Regulations - a tool to help communities evaluate their local development regulations to identify revisions that allow (or require) site developers to minimize impervious cover, conserve natural areas and use runoff reduction practices to manage stormwater runoff.

guidance

<https://www.cwp.org/updated-code-ordinance-worksheet-improving-local-development-regulations/>

Revenue Streams

Taxes

Fees

Local Government Stormwater Financing Manual: A Process for Program Reform - provide a foundation for local officials to move forward by focusing on leadership and the ability to move communities towards effective action. This guidance document addresses Reducing costs through the use of performance-based financing; Establishing effective stormwater rebate and credit programs; Using markets and offsets in an urban environment; and, Maximizing stormwater benefits through the use of green infrastructure practices.

guidance

[https://efc.umd.edu/assets/stormwater_projects/2efc_stormwater_financing_manual_final_\(1\).pdf](https://efc.umd.edu/assets/stormwater_projects/2efc_stormwater_financing_manual_final_(1).pdf)

Bonds

Clean Water State Revolving Fund (CWSRF) - EPA webpage provides information and resources on the CWSRF program, a federal-state partnership that provides communities a permanent, independent source of low-cost financing for a wide range of water quality infrastructure projects.

funding

<https://www.epa.gov/cwsrf>

<https://www.epa.gov/cwsrf/funding-land-conservation-projects-cwsrf>

EPA-Water Infrastructure Finance Act (WIFIA) - EPA webpage provides information and resources on the WIFIA program which accelerates investment in our nation’s water infrastructure by providing long-term, low-cost supplemental loans for regionally and nationally significant projects.
<https://www.epa.gov/wifia>

funding

How to Issue a Green Muni Bond, The Green Muni Bonds Playbook - U.S. green bond primer describes what is a green bond, the current market, and best practices to implementation.
<https://www.mayorsinnovation.org/images/uploads/pdf/6 - How to Issue a Green Muni Bond.pdf>

guidance

Grants

Federal Resources for Nature-Based Solutions to Climate Change - Fact sheet from the Environmental and Energy Study Institute that provides a survey of federal funding and technical assistance available to help state and local governments implement nature-based solutions for climate resilience.
<https://www.eesi.org/papers/view/fact-sheet-federal-resources-for-nature-based-solutions-to-climate-change>
https://www.eesi.org/files/FactSheet_Nature-Based_Solutions_Funding.pdf

funding/ guidance

Mitigation Planning Program Resource List - FEMA resources including financial assistance, for State, local, and tribal governments to engage in mitigation planning to identify risks associated with natural disasters and to develop long-term strategies for protecting people and property from future hazard events.
<https://www.fema.gov/media-library/assets/documents/131310>

funding

FEMA’s Hazard Mitigation Assistance (HMA) Grant Programs - this page provides general information on hazard mitigation and the HMA grant programs. Within the HMA grant program, communities can access funding for pre-disaster mitigation through the Pre-Disaster Mitigation (PDM) Grant Program and the Flood Mitigation Assistance (FMA) Grant Program
<https://www.fema.gov/hazard-mitigation-assistance>
<https://www.fema.gov/flood-mitigation-assistance-grant-program>
<https://www.fema.gov/pre-disaster-mitigation-grant-program>

funding

EPA Section 319 Nonpoint Source (NPS) Pollution Grant Program for States and Territories - states, territories and tribes receive grant money that supports a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific nonpoint source implementation projects.
<https://www.epa.gov/nps/319-grant-program-states-and-territories>

funding

EPA’s Urban Waters Small Grants Programs - to help local residents and their organizations, particularly those in underserved communities, restore their urban waters in ways that also benefit community and economic revitalization. Awarded every two years with individual award amounts up to \$60,000.
<https://www.epa.gov/urbanwaters/urban-waters-small-grants>

funding

NOAA’s Coastal and Marine Habitat Restoration Grants - the Community-based Restoration Program supports restoration projects that use a habitat-based

funding

approach to rebuild productive and sustainable fisheries, contribute to the recovery and conservation of protected resources, promote healthy ecosystems, and yield community and economic benefits.

<https://www.fisheries.noaa.gov/grant/coastal-and-marine-habitat-restoration-grants>

The Department of Housing and Urban Development (HUD) Community Development Block Grants (CDBGs) - provides communities with resources to address a wide range of unique community development needs. The CDBG program provides annual grants on a formula basis to 1209 general units of local government and States to ensure decent affordable housing, to provide services to the most vulnerable in our communities, and to create jobs through the expansion and retention of businesses.

https://www.hud.gov/program_offices/comm_planning/communitydevelopment/programs

funding

U.S. Department of the Interior Bureau of Reclamation WaterSMART grants - provides 50/50 cost share funding to irrigation and water districts, tribes, states and other entities with water or power delivery authority. Projects conserve and use water more efficiently; increase the production of hydropower; mitigate conflict risk in areas at a high risk of future water conflict; and accomplish other benefits that contribute to water supply reliability in the western United States. Projects are selected through a competitive process and the focus is on projects that can be completed within two or three years.

<https://www.usbr.gov/watersmart/weeg/>

funding

USDA - Agricultural Conservation Easement Program (ACEP) - helps local governments, landowners, land trusts, and other entities protect, restore, and enhance wetlands, grasslands, and working farms and ranches through conservation easements.

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/>

funding

USDA- Conservation Reserve Program - a land conservation program administered by FSA with 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. 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.

<https://www.fsa.usda.gov/programs-and-services/conservation-programs/conservation-reserve-program/>

funding

USDA Natural Resources Conservation Service (NRCS) – provides financial and technical assistance to agricultural producers and landowners to help them improve, protect and conserve natural resources on their lands. NRCS has different programs that provide financial assistance in the form of grants.

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/>

funding

USDA's Environmental Quality Incentives Program (EQIP) - provides financial and technical assistance to agricultural and forestry producers to address natural resource concerns and deliver environmental benefits such as improved water

funding

and air quality, conserved ground and surface water, reduced soil erosion and sedimentation, and improved or created wildlife habitat.

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/equip/>

US Army Corps of Engineers Public Services - explains how the Corps of Engineers may help resolve water resource problems and provide technical assistance.

Funding/ technical assistance

<https://www.nae.usace.army.mil/Missions/Public-Services/>

Crowdfunding

Ioby "in our backyards" - online platform that gives local leaders the ability to crowdfund the resources they need to build real, lasting change from the ground up.

funding/tool

<https://ioby.org/>

Offsite Crediting Programs

Multiple Funding Sources

Financing Urban Tree Canopy Programs Guidebook for Local Governments in the Chesapeake Bay Watershed - practical strategies for funding and financing municipal urban tree canopy, case studies, and regional resources.

guidance

http://chesapeake-trees.net/wp-content/uploads/2019/04/FinancingUrbanTreeCanopyPrograms_LowRes_040919.pdf

Pennsylvania Department of the Environment's Grants, Loans, and Rebates

funding

<https://www.dep.pa.gov/Citizens/GrantsLoansRebates/Pages/default.aspx>

Washington State Department of Ecology Grants and Loans office

funding

<https://ecology.wa.gov/About-us/How-we-operate/Grants-loans>

Virginia Department of Conservation and Recreation, Dam Safety and Floodplain Management Grants - Flood Prevention and Protection Assistance Funds can be used for projects like planning, ordinance updates, engineering modeling, etc.

funding

<https://www.dcr.virginia.gov/dam-safety-and-floodplains/dsfpm-grants>

Michigan Department of Environment, Great Lakes and Energy grants and loans page

funding

https://www.michigan.gov/egle/0,9429,7-135-3307_3515---,00.htm

EPA Water Finance Clearing House - an easily navigable web-based portal to help communities locate information and resources that will assist them in making informed decisions for their drinking water, wastewater, and stormwater infrastructure needs. Contains two searchable databases: one for available funding sources for water infrastructure and the second for resources, such as reports, weblinks, webinars etc. on financing mechanisms and approaches that can help communities access capital to meet their water infrastructure needs.

guidance/funding

<https://www.epa.gov/waterdata/water-finance-clearinghouse>

EPA Water Infrastructure and Resiliency Finance Center - an information and assistance center, helping communities make informed decisions for drinking water, wastewater, and stormwater infrastructure to protect human health and the environment.

guidance

<https://www.epa.gov/waterfinancecenter>
<https://ofmpub.epa.gov/apex/wfc/f?p=165:1:10459219463489:::>

Georgetown Climate Center-Green Infrastructure Toolkit – How to Pay for Green Infrastructure: Funding and Financing - information on how local jurisdictions can pay for green infrastructure programs and projects. guidance
<https://www.georgetownclimate.org/adaptation/toolkits/green-infrastructure-toolkit/how-to-pay-for-green-infrastructure-funding-and-financing.html>

Climate Resilience Funding Guide - Funding sources for climate adaptation Model Forest Policy Program. This resource provides guidance to assist communities in identifying potential funding sources for climate adaptation projects and highlights a collection of funding sources that have evolved to provide funding for climate adaptation activities. funding
<http://www.mfpp.org/wp-content/uploads/2017/07/Climate-Resilience-Funding-Guide.pdf>

From Projects to Portfolios, Mainstreaming Large-Scale Investment in Integrated Infrastructure - A blueprint for increased investment in green infrastructure, actionable steps that must be taken to grow our urban portfolios of green infrastructure assets to scale. guidance
https://static1.squarespace.com/static/561dcdc6e4b039470e9afc00/t/5c50ae954ae237e26d90a55c/1548791453440/ProjectsToPortfolios_EarthEconomics_012919-W.pdf

EPA - Financing Alternatives Comparison Tool - a financial analysis tool that helps municipalities, utilities, and environmental organizations identify the most cost-effective method to fund a wastewater or drinking water management project. FACT produces a comprehensive analysis that compares financing options for these projects by incorporating financing, regulatory, and other important costs. funding/tool
<https://www.epa.gov/cwsrf/financing-alternatives-comparison-tool>

Financing Climate Resilience, Funding and Financing Models for Building Green and Resilient Infrastructure in Florida - identifies and evaluates twelve creative funding and financing models that can help accelerate investment in infrastructure projects that incorporate resilient design features. guidance
https://ash.harvard.edu/files/ash/files/financing_climate_resilience_final_report.pdf

Playbook 1.0: How Cities Are Paying for Climate Resilience - challenges and strategies for funding climate resilience in eight cities. guidance
<https://static1.squarespace.com/static/5736713fb654f9749a4f13d8/t/5d275d9135b62f0001df44b5/1562860947122/Playbook+1.0+How+Cities+Are+Paying+for+Climate+Resilience+July+2019.pdf>

EPA - Getting to Green: Paying for Green Infrastructure Financing Options and Resources for Local Decision-Makers - identifies various funding sources that can be used to support stormwater management programs or finance individual projects. guidance
https://www.epa.gov/sites/production/files/2015-02/documents/gi_financing_options_12-2014_4.pdf

A Business Model Framework for Market-Based Private Financing of Green Infrastructure - report identifies the barriers to private investment in green infrastructure and recommends how best to eliminate those barriers. guidance
<https://stormwater.wef.org/wp-content/uploads/2015/01/Final-Report-on-A-Business-Model-Framework-for-MarketBased-Private-Financing-of-Green-Infrastructure.pdf>

- Unlocking Private Capital to Finance Sustainable Infrastructure** - framework to mobilize private finance for sustainable infrastructure projects guidance
http://business.edf.org/files/2017/09/EDF_Unlocking-Private-Capital-to-Finance-Sustainable-Infrastructure_FINAL.pdf
- Environmental Finance Center** - University of Maryland based outreach and research center providing communities with the tools and information necessary to manage change for a healthy environment and an enhanced quality of life. technical assistance
<https://efc.umd.edu/>
- Municipal Online Stormwater Training Center** - online platform to provide stormwater education and training that includes tools, resources, and brief educational videos for the purpose of increasing awareness and empowering its stakeholders to take action toward effective stormwater management. training
<https://mostcenter.org/>
- Antioch University Climate Change Resilience Series** - a series of online courses focused on the fundamentals of climate change resilience and sustainable development. training
<https://www.antioch.edu/new-england/resources/centers-institutes/center-climate-preparedness-community-resilience/climate-change-resilience-series/>
- Lessons in Regional Resilience: Case Studies on Regional Climate Collaboratives** - an analysis of six such regional approaches that describes how they developed, what roles they have, their structure and decision making methods and funding sources. guidance
https://www.georgetownclimate.org/files/report/GCC-Lessons-in-Regional-Resilience-Synthesis-Jan_2017.pdf
- EPA - Water Infrastructure Financial Leadership: Successful Financial Tools for Local Decision Makers** - guidance for local officials on how to identify what is needed for financial planning, determine how to fund and finance a project, and consider which strategic approaches can be used to protect local investments. This document also compiles existing resources and descriptions of successful community examples as tools to help inform your water infrastructure investment decisions. guidance
https://www.epa.gov/sites/production/files/2017-09/documents/financial_leadership_practices_document_final_draft_9-25-17_0.pdf
- Financing Integrated Green Stormwater Infrastructure to Improve Community Health, Resiliency - Getting the Best Deal for the Money!** - paper that describes the needs and effective financing solutions for building a comprehensive integrated green stormwater infrastructure program that combines the strengths of green and grey solutions to provide multiple community benefits, including mitigation and rehabilitation of critical infrastructure damaged by extreme wet weather events. guidance
https://www.epa.gov/sites/production/files/2016-10/documents/bloomberg_bna_financing_gi_greeninfoc2016.pdf