Environmental Financial Advisory Board

Green Infrastructure Operations and Maintenance Finance

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Executive Summary

State, regional, and local governments across the United States have increasingly turned to green infrastructure (GI) as a means of controlling stormwater runoff, remediating sewer overflows, and preserving coastal environments. While GI is environmentally sensitive and cost- effective, many governmental entities struggle with the challenge of funding or financing ongoing operations and maintenance (O&M) costs. In this report, the Environmental Protection Agency's Environmental Finance Advisory Board (EFAB) defines GI, outlines the benefits of GI, introduces GI O&M costs, and, most importantly, identifies and evaluates diverse ways to fund/finance GI O&M costs.

Defining Green Infrastructure: GI controls stormwater runoff from impervious surfaces by collection, filtration, and purification in integrated networks designed to mimic natural processes. GI systems include bioretention (the retention and filtration of runoff in constructed ponding areas), wetlands, rain gardens, green roofs and walls, permeable pavement, rain barrels, downspout disconnection, vegetated swales, and tree planting.

Benefits of Green Infrastructure: GI is used to reduce the costs of stormwater control and, increasingly, remediate combined sewer overflows while generating multiple environmental and social benefits. Besides reducing costs and water pollution, GI, deployed at scale, can create natural habitat, mitigate urban heat island effects, enhance human health and productivity, reduce energy consumption, recharge groundwater, and generally contribute to local beautification and improvement of the quality of life. The installation and maintenance of GI also offers job opportunities to lower-income workers who have frequently found it difficult to secure traditional employment.

Operating and Maintaining Green Infrastructure: Program operating costs for GI include planning, budgeting, and ongoing administration, including the use of oversight personnel. Once installed, GI is maintenance-intensive. Porous pavements must be cleaned at least twice a year and most require annual vacuuming or power washing. Infiltration catch basins and inlets must be inspected, cleaned, and revegetated at least twice annually. Rain gardens must be mulched, trimmed, pruned, weeded, treated for pest damage, and inspected for erosion, sediment buildup, and vegetation health. Green roofs require fertilization, irrigation, and weeding. They also require inspection and remediation for leaks, blocked drains, sediment buildup, and debris. Landscaping and planting beds must be fertilized, weeded, and maintained to prevent disease and migration into porous pavement areas to avoid clogging or silting. Trees must be inspected, pruned, and treated for disease or pest infestation.

The Financing Challenge: A key issue confronting state, regional, and local governments in the use of GI is the financing of ongoing O&M. GI O&M has a number of characteristics that makes the funding of these expenditures particularly challenging. In particular, they:

- often lack dedicated revenue sources;
- increasingly require the involvement of both public and private entities; and

- commonly have diverse and widely distributed costs and benefits across a watershed, crossing municipal and private boundaries.

One of the biggest challenges in funding GI O&M expenses is the establishment of a dedicated and growing revenue source, such as general fund property taxes, utility district property tax assessments, stormwater utility or other user fees, or endowment income to cover these costs over time. In a recent EPA report that evaluated 22 GI projects, more than 40 percent did not have a dedicated source of revenue to cover O&M expenses.[1]

In addition, municipalities looking to implement GI projects are constrained under the tax code regarding the types of funds other than revenues that they can use for O&M expenses. Many GI funding sources – like tax-exempt general obligation and revenue bonds and Clean Water State Revolving Fund loans – provide funding for capital expenditures but cannot be used for ongoing O&M expenses. Similarly, most federal funding is restricted to capital costs.

Financing GI O&M: EFAB identifies in this report 14 potential strategies that local, regional, and state governments can use to finance GI O&M. Frequently, financing strategies are combined to assure an adequate revenue stream.

Each funding/financing mechanism has both pros and cons and will be useful to varying degrees, depending on the circumstances. If state, regional, or local governments are to select the most appropriate strategies, they must ask and answer a number of questions to determine their circumstances and goals. Examples of such questions include:

- How do they define GI?
- What are their goals in establishing a GI O&M program?
- Does political support and an enabling environment exist for the program?
- How many GI projects need to be monitored and maintained?
- What capacity exists to implement these activities?
- Are the GI projects on public and/or private land?
- What partnerships need to be formed to ensure success?

The 14 potential strategies EFAB identifies as well as their use considerations, advantages, and disadvantages are summarized in the funding matrix beginning on page 6. Case studies on the use of each strategy are also provided in the text. Strategies reviewed and identified by EFAB include:

- Publicly funded strategies: These include stormwater fees/utilities and the use of associated credits and discounts; and watershed improvement districts. These strategies rely exclusively on publicly mandated revenue streams.

[1] EPA Office of Water. (2013) The Importance of Operations and Maintenance for the Long-Term Success of Green Infrastructure: A Review of Green Infrastructure O&M Practices in ARRA Clean Water State Revolving Fund Projects. March.PA-832-R-12-007. Accessed 7/23/15 at https://www.epa.gov/sites/production/files/2015-04/documents/green_infrastructure-om_report.pdf

- Privately funded strategies, which rely exclusively on private revenue sources: Strategies in this group include the use of ordinances to require property owners to finance GI O&M on their land and buildings to control stormwater runoff, and the establishment of conservation land trusts to provide GI O&M.

- Strategies that can rely on public, private, or hybrid revenue streams: Eco-system service payments, for example, can be publicly mandated or established through voluntary private transactions or compliance-driven private systems. In addition to eco-system service payments, strategies that can be financed by either public, private, or combined revenue streams include water funds, endowments, and grant funding from public, philanthropic, or combined sources. EFAB also suggests that state, regional, and local governments consider adapting PACE (property assessed clean energy) financing, which can use private loans, government bonds, and philanthropic donations for the GI arena. A new class of property-assessed green infrastructure (PAGI) programs could be combined with PACE initiatives or administered independently.

- Partnership strategies: Partnering with private organizations can also be used to finance GI O&M. Under public-private partnerships (P3s) and community-based public-private partnerships (CBP3s), state, regional, and local governments can contract with private entities to provide GI O&M activities. Similarly, state, regional, and local governments can contract with social ventures to provide GI services.

- Capacity-building strategies: EFAB further recommends that state, local, and regional governments evaluate the use of credit enhancements to reduce the financing costs of GI O&M programs. In addition, environmental insurance settlements and judgments obtained under pollution control lawsuits can be used to capitalize GI O&M programs.

Green Infrastructure (GI) Operations and Maintenance (O&M) Funding/Financing Mechanisms Matrix

Funding Source	When to Use/Considerations	Key Advantages	Key Disadvantages	Examples & Resources
Public Funded				
1. Stormwater Utilities/Fees				
- Options range from simple fee on municipal bill to full utility structure - Rapidly expanding in use across the U.S.	- Strong champion exists among elected officials or senior municipal management - A documented need raises public awareness (e.g., flooding event, water body impairment, commission report, (etc.) impairment, commission report (etc.)	- Stable, dedicated source of revenue - Fee credits can create a strong incentive for the installation and maintenance of GI on private property - Fees on impervious areas provide a form of equity -Widely adopted with many examples	- Politically unpopular – "rain tax" - High levels of political will and resources required to successfully navigate the legal, technical, social, and financial issues to establish - The resources needed for GI O&M often competes with flood control and other capital investment needs within utilities' budgets	NAFSMA *Guidance for Municipal Stormwater Funding* 2006 Black & Veatch *2014 Stormwater Utility Survey*
2. Watershed Improvement Districts				
- Special purpose district; a political subdivision - Can impose taxes, user fees, or both - Can be established for	- State enabling laws may be required. Local laws are often required to set up districts and establish special assessments - New stand-alone operating districts need to hire management and	- Special purpose districts provide a stable, dedicated source of revenue for O&M activities - Fees are collected from property owners or utility customers who	- Smaller and/or poorer special purpose districts may not have sufficient tax or revenue base needed to support GI O&M programs - Political opposition and lack of public awareness may lead to the perception	Urban Drainage and Flood Control District, Denver Metro Area Urban Drainage and Flood Control District, About Us Eastmark Community Facilities District (Mesa, AZ area)

Funding Source	When to Use/Considerations	Key Advantages	Key Disadvantages	Examples & Resources
one municipality or a group of municipalities	staff and develop procedures to procure any outside venders - District will need to establish procedures to set initial and ongoing assessment levels and billing and collections systems - If district boundaries cross municipal jurisdictions, governance, member input, assessment, billing, and collections procedures may be more complex	directly benefit from the GI projects. - Fees can be based on property taxes or usage - Property owners who install GI and reduce their stormwater runoff can receive an offset against the district assessments - Revenues held by the district can be applied to GI expenditures without any other competing uses of the funds	that proposed district assessments are a tax rather than a user fee, thus diminishing support	
3. Fee Credits or Discounts against Stormwater Fees				
- Credits/ discounts to stormwater fees offered to property owners for GI installation and maintenance - Compliance enforced through inspection and/or reporting	- Must have a stormwater fee in place to offer credits against - Credit/discount policies may be subject to the ratemaking process - Directly linking fee/credit system with stormwater services provided	- GI maintained on private properties, increasing reach of the public sector program - O&M funding is provided by private property owners - Voluntary tool may avoid property/ privacy rights issues (versus requirements) - Can address implementing GI on developed property	- Issues with maintenance quality/consistency by private property owners - Public resources needed for inspection, outreach, education, and training	Portland, OR Clean River Rewards Program Northampton, MA Stormwater Utility Credit/Incentive Policy https://www.epa.gov/green-infrastructure/green-infrastructure-municipal-handbook American Rivers *Staying Green: Strategies to Improve O& M of GI in the Chesapeake Bay Watershed at* https://www.americanrivers.org/conservation-resource/operations-maintenance-green-infrastructure/

Funding Source	When to Use/Considerations	Key Advantages	Key Disadvantages	Examples & Resources
Private Funded				
4. Ordinances on Private Property				
- Green versions of detention/ retention maintenance standards have been used by municipalities for decades - Compliance enforced via inspection and/or reporting	- Compliance/ enforcement may be more effective with larger property owners/managers, such as commercial property owners, homeowners' associations, etc.	- GI is maintained on private properties, increasing the reach of public program - O&M funding provided by private property owners - O&M funding can be supported by government payments to private property owners (see Ecosystems Service Payments)	- Does not address existing development - Issues with maintenance quality/consistency by private property owners - Public resources needed for inspection, outreach, education, and training	Los Angeles Low Impact Development Ordinance EPA Green Infrastructure Operations & Maintenance web page at https://www.epa.gov/green-infrastructure/green-infrastructure-operations-and-maintenance Includes a model stormwater ordinance and sample GI O&M agreements for private property.
5. Conservation Land Trusts				
- Common nonprofit land restoration and preservation model across the U.S. - Brings charitable tax credits to the table as a funding source - Land owner-ship/control	- An existing land trust is available to partner with or a champion is willing to create a new one - Easements or land donations of land are desirable - Monitoring and maintenance capacity is needed - A source of monitoring and maintenance funds	- Can bring the capacity to accept donations of land and easements providing charitable tax credits - Can provide the capacity to monitor and maintain GI - Well established and exists for relatively easy adaptation to GI	- Requires coordination or partnership with local government - Source of monitoring and maintenance funding must be determined upfront - Effort needed to adapt this existing tool to GI	Land Trust Alliance: Benefits for Landowners web page http://www.landtrustalliance.org/what-you-can-do/conserve-your-land/benefits-landowners

Funding Source	When to Use/Considerations	Key Advantages	Key Disadvantages	Examples & Resources
ranges from easements to purchases	can be obtained through private donors or public funds			
Public or Private Funded				
6. Property Assessed Green Infrastructure (PAGI) [A proposed approach, similar to Property Assessed Clean Energy (PACE) programs.]				
- Adapted Property Assessed Clean Energy program model to green infrastructure - Several possible models, including establishing as a public agency with professional government administration or establishing as a nonprofit with nonprofit manager	- State enabling legislation may be required - Local legislation typically required to set districts, assessments, and billing and collections procedures - When district boundaries cross multiple municipal jurisdictions, governance, member input, assessment, billing, and collections procedures may be more complex - PAGI projects and O&M requirements likely to vary considerably depending on the type of participating property, increasing operating complexity	- Districts can be stable, dedicated revenue source for the centrally contracted management of GI on private property - Fees assessed on property owners or utility customers who directly benefit from the projects - Payment of fees is more secure as fees are collected with the local property tax or utility bill - Revenues held by the district are applied to GI without other competing uses - Economies of scale for GI O&M can lower cost to property owners in the program	- Voluntary mechanism: If property owner interest is limited, it could result in lower economies of scale from contracted GI O&M programs - Will most likely require state legislation to enable the establishment of PAGI districts - Project O&M activities may vary considerably across projects, increasing implementation complexity	Why Residential PACE is Growing NREL Energy Analysis: Property Assessed Clean Energy (PACE) Financing of Renewables & Efficiency PACENation: List of U.S. PACE Programs City of Berkeley, CA: Berkeley First Program

Funding Source	When to Use/Considerations	Key Advantages	Key Disadvantages	Examples & Resources
7. Water Funds				
- Mechanism to aggregate and distribute funds - Requires pooling and transferring funds between public and private entities	- Best if used when covering a watershed or region to maximize operational benefits - Need to have a viable business plan to make fund self- supporting over time	- Useful way to aggregate funds - This creates efficiencies, provides cost-effectiveness, and allows leveraging of resources from a variety of sources - Overcomes barriers that stop the flow of resources between public and private entities: supports public-private collaboration	- Relatively new concept in U.S. used for water quality restoration and conservation - Financial benefits difficult to document - Political viability of fund may be challenged if fund operates across jurisdictions	Brandywine-Christina Healthy Watershed Fund http://www.wra.udel.edu/brandywine-christina-healthy-water-fund/ The Nature Conservancy Rio Grande Water Fund http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/newmexico/new-mexico-rio-grande-water-fund.xml
8. Eco-system Service Payments				
- Payments for eco-system services can capitalize an endowment - Payments can be made by federal, state, or local government; by voluntary private transactions; or by private but compliance-driven transactions	- Appropriate and reliable revenue stream available to fund all or part of GI O&M program - Quantifiable, performance-based measures available/can be created, if required - Program sponsor has the technical expertise to design and manage the program	- Government payment programs can sometimes be identified to fund GI O&M by private property owners - Voluntary payment programs (fees) can create revenue streams for GI O&M - Compliance-based payment programs can create revenue streams linked to fulfillment of	- May be difficult to identify and capture reliable payment streams - Need for reliable forecasts of GI O&M costs - Significant technical expertise may be required, especially if quantifiable performance metrics are required	*Taking Stock: Payments for Forest Ecosystem Services in the United States* *Status of Mitigation Banking* *What is a Mitigation Bank?* *The Mitigation Rule Retrospective: A Review of the 2008 Regulations Governing Compensatory Mitigation for Losses of Aquatic Resources*

Funding Source	When to Use/Considerations	Key Advantages	Key Disadvantages	Examples & Resources
		environmental objectives, including GI		*Credit Guide for Wetland Mitigation Banks*
9. Endowments (used in conjunction with Ecosystem Service Payments of other dedicated revenue stream)				
- Ecosystem service pay-ments, private donations, or other funds are placed in an interest-bearing account - Interest is used to fund GI maintenance - The corpus of the account is protected to continue generating interest over time	- Appropriate, reliable revenue base/revenue stream needed to capitalize the endowment. - Sound forecasting of future contributions, GI O&M expenditures, and interest rates required - Appropriate investment program needed to lock in the desired yield over the life of the endowment	- Funds for GI O&M payments are set aside in advance - Interest income pays for/helps to pay for future maintenance costs	- Forecasting of Contribution revenues, GI O&M costs, and interest rates may not be accurate enough to deliver required GI O&M payments - Endowment funds are purpose-restricted; build-up	*Wetland Mitigation Banking Guidebook for Oregon, First Version*
10. Philanthropic and Federal Grants				
- One-time injections of capital to support a project - Could be used in conjunction with an endowment strategy	- Ability and time to complete the grant application in a professional manner - Ability to secure required matching funds and additional sources of funding or loan financing, if needed	- Supplements local revenues and does not require repayment - Can leverage additional grant funding or loan financing - May encourage beneficial partnerships with other organizations on GI issues	- Time needed to prepare application can be more than 30 days - No guarantee of winning award; uncertainty for the applicant/recipient - May require matching funds or contingent loan financing to win an award	Catalog of Federal Domestic Assistance Grants.gov Foundation Center Databases Funding Information Network

Funding Source	When to Use/Considerations	Key Advantages	Key Disadvantages	Examples & Resources
			- May need to locate additional sources of funding or financing	Guidestar Online Directory of Charities & Nonprofits National Directory of Nonprofit Organizations
Partnerships				
11. Private Equity Capital/Public-Private Partnerships (P3s) and Community-Based Public-Private Partnerships (CBP3s)				
- Government enters into a long-term contract with a private entity that brings capital and expertise in exchange for a negotiated return	- State enabling legislation passed - Value for money (VfM) or similar analysis shows that P3/CBP3 produces savings versus traditional contracting - Government has contracted for needed negotiation and implementation expertise	- Integrates project capital financing with long-term O&M funding: providing a one-stop solution for GI development and operation - Encourages the creation of integrated, least-cost solutions - May accelerate project delivery by better integrating planning, design, construction, and operating decisions - May attract additional private financing and allow greater flexibility in the use of financing structures	- Must raise revenues to pay for P3/ CBP3 contracts - May lack expertise to evaluate costs and benefits, negotiate contracts, and monitor and manage successful implementation - Transaction and ongoing monitoring costs may be high - Anticipated results and savings may not be delivered	State P3 Enabling Legislation Military Housing Privatization CBP3 CBP3 for GI: Prince George's County, MD

Funding Source	When to Use/Considerations	Key Advantages	Key Disadvantages	Examples & Resources
12. Social Ventures				
- Businesses that generate both a social and an economic return to enable GI program to accomplish multiple community goals	- Other important community goals need to be addressed (and can through GI program) - Better installation and maintenance options are not readily available - Brownfield sites are part of the potential GI program portfolio	- Enables a community to accomplish goals in brownfield remedia-tions, job training, and job creation for the hard-to-employ as well as environmental goals - Provides access to additional funding such as brownfield or job training grants or earned income via commodity sales	- Each Social Venture requires a social entrepreneur with significant capacity to establish and maintain the business over time - Many new ventures fail in the first few years - Social Ventures often experience tensions between their social and their business/financial goals that require juggling and compromise	https://www.americanrivers.org/assets/pdfs/reports-and-publications/staying-green-and-growing-jobs.pdf www.millenniumreserve.org/Priorities/**high-bridge** video.cnbc.com/gallery/?video=3000270133
Capacity Building				
13. Credit Enhancements (used in conjunction with other financing)				
- Improve the economics of GI projects by lowering financing costs - Can be a useful way to support GI maintenance and businesses/ social enterprises, reducing GI maintenance costs	- Expertise to identify a guaranty program or guarantor and to negotiate a satisfactory guaranty agreement with a guarantor and a lender - Availability of a guarantor entity or guaranty program	- Help to attract private financing - Reduce the risk and expense of financing	- A guarantor or guaranty program may not be available - Search and transaction costs may be high - Borrower may lack the expertise to identify a guarantor and/or to negotiate a guaranty agreement	New Markets Tax Credit Fact Sheet Utilizing SRF Funding for Green Infrastructure Projects Green Connecticut Loan Guaranty Fund Credit Enhancement for Green Projects

Funding Source	When to Use/Considerations	Key Advantages	Key Disadvantages	Examples & Resources
14. Environmental Insurance Settlements/Judgments				
- One-time injection of funds due to historic pollution - Could be used in conjunction with endowment strategy above	- Specialized legal counsel is available to pursue environmental remediation/historic insurance case, preferably on a contingent fee basis	- Provides financial resources that might not otherwise be considered for environmental remediation, including green infrastructure O&M - Contingent fee cases may result in a relatively modest financial outlay, although plaintiff may be responsible for non-attorney expenses, such as filing fees and deposition costs	- Applicable only to GI programs that stem from pollution/brownfield cases - Legal case can disrupt daily business due to volume and detail of records and information requests - Costly, unless a contingent fee arrangement is available - Litigation is lengthy, typically extending for years	A Guide to Insurance Coverage for Environmental Liability Claims Michael D. Goodstein and Stacey H. Myers, Hunsucker Goodstein PC, "Funding Remediation of Environmentally Impaired Properties," in *Environment and Climate Change Law*, International Comparative Legal Guides, 2013, pp. 15-20

I. What Is Green Infrastructure (GI)?

A. Definition of Green Infrastructure

Green infrastructure (GI), sometimes referred to in the context of Low-Impact Development (LID), describes an "integrated network of centralized and decentralized environmentally responsible wet-weather management systems" to control stormwater runoff from impervious surfaces in urban and suburban areas – roads, roofs, sidewalks and parking lots.[2] These systems are designed to mimic natural processes and help return urban areas to something like pre-development hydrologic conditions in which water is infiltrated, reused, and evaporates while velocity and temperature are reduced.

Although stormwater runoff is a species of nonpoint source pollution, a category of sources not within the reach of the Clean Water Act, in 1987 Congress decreed it to be point source pollution under Section 402(p), bringing it into the law's permitting program.[3] The law defines a "point source" as "any discernible, confined and discrete conveyance…from which pollutants are or may be discharged."[4] Think of the common image of a discharge pipe in the water. However, it specifically excludes "agricultural stormwater discharges and return flows from irrigated agriculture." Thus, point source discharges are regulated by federal law, but nonpoint source pollution – polluted runoff, say, from row crop agriculture – is not.

This action expanded EPA's responsibilities "by almost an order of magnitude."[5] Indeed, urban stormwater is "the primary source of water quality impairment for 13% of all rivers, 18% of all lakes, and 32% of all estuaries" based on 2002 reporting.[6] Yet, urban areas cover just 3 percent of all landmass of the United States. With continues population growth, development, and sprawl, there will be more imperviousness and resulting stormwater runoff that need to be managed, absent decisive action.

GI improves water quality by reducing pollutant runoff, mitigating combined sewer and sanitary sewer overflows, and preserving stream ecology. Examples of GI include bioretention, wetlands, rain gardens, green roofs and walls, permeable pavement, rain barrels, vegetated swales, and urban tree planting.

GI is complementary to traditional "gray" infrastructure, not always a substitute for it. According to Ken Kopocis, former EPA deputy assistant administrator for water, "No, green infrastructure is not the answer. Green infrastructure is a component of the answer." In other

[2] "Green infrastructure yields sustainable stormwater solutions," by James C. Schlaman, Jeff Henson, Les K. Lampe and Dave Koch (Black & Veatch), Word Water: Stormwater Management, Summer 2014, p. 10
[3] 33 U.S.C. Section 1342(p)
[4] 33 U.S.C. Section 1362 (14)
[5] National Research Council, Urban Stormwater Management in the United States, National Academies Press (Washington, D.C. 2009), p. 1
[6] National Research Council, Urban Stormwater Management in the United States, National Academies Press (Washington, D.C. 2009), p. 25

words, selecting the optimal mix of green and gray solutions is an asset management decision in the circumstances of a given utility's service objectives.[7]

Given the decentralized or distributed nature of GI practices, and their use of vegetation, trees and other nonstructural techniques, they present many challenges in terms of ongoing operation and maintenance (O&M) and financing over time. They are also more labor-intensive than traditional engineered approaches, a definite benefit for many communities but, again, not without challenges.

B. What is Green Infrastructure Used For?

GI is used to reduce costs of stormwater control and, increasingly, remediating combined sewer overflows (CSOs) while generating multiple environmental and social benefits. In the parlance of sustainability theory, it addresses the triple bottom line in the area of wet weather, water-quality challenges. Besides reducing costs and water pollution, GI, deployed at scale, can create habitat, mitigate urban heat island effects, enhance human health and productivity, reduce energy consumption, recharge groundwater, and generally contribute to city beautification and improvement of the quality of life.

Two examples from Pennsylvania illustrate the dual attraction of GI in terms of cost savings and multiple benefits. The City of Lancaster is developing an integrated GI plan both to reduce CSO, stormwater and nutrient runoff. An EPA case study suggests that the city's plan will provide approximately $2.8 million in energy, air quality, and climate-related benefits annually.[8] The plan will also reduce capital costs by $120 million and pumping and treating costs by $661,000 per year. Moreover, these benefits exceed the costs of GI in the study area, which ranged from $51.6 million to $94.5 million, depending on the mode of implementation.

Philadelphia's Green Cities, Clean Waters program is designed to both avoid massive gray infrastructure costs of traditional CSO remediation, e.g., massive tanks and tunnels, while improving water resources and revitalizing the city's quality of life. Over 25 years the Philadelphia Water Department will invest approximately $2.4 billion in the largest green infrastructure initiative in the nation.[9] This intensive effort is modest, in terms of costs, compared to the $6 billion Philadelphia would have spent going the traditional route.

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[7] "Mixing Grey & Green," by G. Tracy Mehan III, Water & Wastes Digest, January 2015, p. 16 available at www.wwdmag.com

[8] U.S. Environmental Protection Agency, "The Economic Benefits of Green Infrastructure. A Case Study of Lancaster, PA," February 2014, EPA 800-R-14-007 accessed at http://water.epa.gov/infrastructure/greeninfrastructure/upload/CNT-Lancaster-Report-508.pdf April 18, 2015

[9] "Philadelphia's One-Water Approach Starts with Source Water Protection," by Elizabeth Couillard, Molly D. Hesson, Kelly Anderson, Chris Crockett, and Mary Ellen McCarty, Journal AWWA 107:4, April 2015, pp. 67-68.

On the benefits side, a 2009 triple bottom line study of the water department's GI program examined several categories of benefits, including:

- Recreation
- Increased community aesthetics, reflected in higher property values
- Heat stress reduction
- Water quality and aquatic ecosystem improvements
- Wetland creation and enhancement
- Poverty reduction from local green jobs
- Energy savings and carbon footprint reduction
- Air quality improvement
- Construction and maintenance related disruption[10]

While economists will argue about the precise quantification of the benefits, it is clear that the traditional "tunnel option" did not yield much benefit in most categories.

C. Types of Green Infrastructure

Examples of GI include bioretention, wetlands, rain gardens, green roofs and walls, permeable pavement, rain barrels, downspout disconnection, vegetated swales, and urban tree planting.[11]

Onondaga County, New York, is pursuing an aggressive GI program as part of its CSO reduction plan. As of 2014 it had implemented 150 GI projects and is projected to spend $80 million, which will account for almost one-third of its CSO reductions. This amounts to a savings to the county of $20 million compared to using traditional stormwater and CSO techniques.[12]

Onondaga County and the City of Syracuse utilize almost every variety of GI practice, from downspout disconnection to green streets with permeable pavement, bio-swales, and infiltration trenches. They also utilize rainwater harvesting at the War Memorial arena where captured rainwater is treated and used to make ice for the professional hockey team. A one-hectare constructed wetland is the first of its kind in the Northeast to treat CSO discharges.

A spectacular example of a green roof can be at found Ford Motor Company's River Rouge Center in Dearborn, Michigan.[13] 450,000 square feet of assembly plant roofing are covered with sedum and other succulent plants and can hold an inch of rainfall. According to a former Ford official who oversaw the project, Ford invested $15 million in the GI project versus $50

[10] A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds. Final Report, Stratus Consulting, Inc., August 24, 2009.
[11] See Schlaman et al., p. 10.
[12] "Save the Rain program models green-grey approach to reducing CSOs," by Kristina Twigg, World Water: Stormwater Management, Spring 2014, pp. 15-16.
[13] "Ford Motor Company's River Rouge Plant," http://www.greenroofs.com/projects/pview.php?id=12

million in capital costs for a traditional engineered approach before even counting ongoing O&M.[14]

Urban forestry and sophisticated tree planting are an important part of GI programs across the country. However, environmental and financial returns depend on sound design and installation to ensure long-term survival in the harsh urban environment.[15] Toronto, Ontario, sets minimum soil volumes for street trees of 30 cubic meters per tree and aims to increase its overall tree canopy from 17 percent to 40 percent.

As important as individual GI practices or techniques are, scale and ongoing O&M are crucial to achieving environmental goals. Thus, a centralized management and financing system must be in place to sustain what is, of necessity, a decentralized and distributed system.

D. Benefits of Green Infrastructure

As noted in the foregoing sections, GI offers a cost-effective means of addressing urban wet weather issues, including stormwater runoff and combined sewer overflows, while generating many co-benefits in terms of social and environmental benefits. With proper management and financing, relating to design, installation, and O&M, it can effectively meet sustainability's triple bottom line for communities across the country.

II. The Need for Green Infrastructure Operations and Maintenance Financing

A. Overview of Maintenance Requirements

All stormwater management systems, whether gray or green, require maintenance. Appropriate O&M ensure that green infrastructure will function properly and provide water quality and environmental benefits, protect public safety, meet legal standards, and protect communities' financial investment. If properly constructed and maintained, GI is capable of significant flow volume reductions during storm events. In addition, GI projects can also cost less to construct than gray stormwater practices. GI can reduce traditional maintenance costs. The successful financing of green stormwater infrastructure O&M is steadily gaining importance as the environmental, social, and economic benefits of these projects are increasingly recognized.

Ensuring that GI projects are planned and designed with maintenance in mind can maximize environmental benefits and reduce costs over time. There are a number of important O&M factors to consider before project implementation. These include type of maintenance,

[14] Email from Tim O'Brien to G. Tracy Mehan III, EFAB member, January 31, 2015.
[15] "Repairing urban forests to help manage stormwater," Peter MacDonagh, World Water: Stormwater Management, Summer 2014, pp. 20-21.

frequency of maintenance, cost of replacement (e.g., plants, shrubs, porous pavement), and sufficient funds to cover O&M, including cost of replacement components.

Successful GI O&M programs typically include an accountability mechanism such as an O&M plan or manual, documentation and tracking systems, training and education, partnerships, assuring compliance, and dedicated funding. Below are brief summaries of maintenance requirements for the most common GI practices.

Porous Pavements: General maintenance for porous pavement includes cleaning sediments, trash, and other debris out of inlets and clean-outs, at least twice a year. Most porous pavements require annual vacuuming or power washing. Adjacent landscaping and planting beds need to be maintained to prevent migrating into porous pavement areas and clogging or silting. Inspections for clogged areas, cracks, and broken areas should occur at least once a year.

Infiltration Practices: General maintenance includes inspecting and cleaning catch basins/inlets at least twice per year, maintaining overlying vegetation, and re-vegetating bare spots as needed. Prohibiting vehicular access on subsurface infiltration areas unless they are designed to allow vehicles prevents compaction that reduces infiltration.

Rain Gardens: General maintenance includes mulching, trimming, pruning, weeding, and removing litter. The party responsible for maintenance must inspect for erosion, sediment buildup, and vegetation health; clean inlets, outlets, overflow risers; manage damage by pests, if any; and ensure water is draining within 72 hours.

Green Roofs: The first 12 to 15 months after construction is the establishment phase during which fertilization, irrigation, and weeding are necessary. Some contractors provide a warranty after construction to care for vegetation and replace any dead or diseased plants. Beyond the establishment phase, extensive green roofs may only require irrigation during drought conditions. They require inspection to check for leaks, blocked drains, dead vegetation, or debris.

B. Overview of the Financing Problem

GI O&M expenses have a number of characteristics that make the funding of these expenditures particularly challenging. In particular:

- They have unique challenges relative to grey infrastructure with regard to planning and budgeting.
- They often lack dedicated revenue sources.
- They increasingly require the involvement of both public and private entities.
- They commonly have diverse and widely distributed costs and benefits across a watershed, crossing municipal and private boundaries.

One of the biggest challenges in funding GI O&M expenses is the establishment of a dedicated and growing revenue source, such as general fund property taxes, utility district property tax assessments, stormwater utility or other user fees, or endowment income to cover these costs over time. In a recent EPA report that evaluated 22 GI projects, more than 40 percent did not have a dedicated source of revenue to cover O&M expenses.[16] A number of funding mechanisms available to municipalities, nonprofits, and private entities for GI O&M expenses are presented later in this report.

In addition, municipalities looking to implement GI projects are constrained under the tax code regarding the types of funds other than revenues that they can use for O&M expenses. Many GI funding sources – like tax-exempt general obligation and revenue bonds and Clean Water State Revolving Fund loans – provide funding for capital expenditures but cannot be used for ongoing O&M expenses.

O&M expenses are considered working capital expenditures under general federal income tax principles and cannot properly be capitalized. There are significant limitations under the tax code on the use of long-term tax-exempt debt for working capital expenditures. Typically, such working capital financing has to be funded on a taxable basis unless the municipality can demonstrate that it is in financial distress and that it does not expect to have any available amounts for five years after issuance of the bonds for bond redemption. Beginning in year six, it is required to use any excess available amounts to either (1) redeem the working capital bonds, (2) yield restrict investments allocable to these excess available amounts, or (3) invest the excess amounts in non-Alternate Minimum Tax tax-exempt bonds. For most municipalities, however, tax-exempt working capital financing is not available.

Another funding consideration is the ongoing renewal and replacement of GI projects. A threshold question is whether or not green plantings are considered capital expenditures. This will be a function of the GI project owner's policies and procedures as well as tax considerations. Policies and procedures vary from project owner to project owner. For example, New York City does not include tree pruning or the cost of planting new or replacement trees as an eligible capital project, unless done in connection with a betterment to an existing park or playground, a comprehensive streetscape improvement program, or if part of a comprehensive tree planting and replacement program.[17]

From a tax perspective, general federal income tax principles define a capital expenditure to include any cost of a type that is properly charged to a capital account. Costs incurred to acquire, construct, or improve land, buildings, and equipment are generally included as capital

[16] The Importance of Operation and Maintenance for the Long-Term Success of Green Infrastructure, A Review of Green Infrastructure O&M Practices in ARRA Clean Water State Revolving Fund Projects, http://water.epa.gov/grants_funding/cwsrf/upload/Green-Infrastructure-OM-Report.pdf, US EPA Office of Water, March 2013, p. 9.

[17] The City of New York Office of the Comptroller, Internal Control and Accountability Directives: Directive 10-Charges to the Capital Projects Fund, May 31, 2011.

expenditures. The question for tax counsel will be whether the green plantings can be deemed to be improvements to the land. If they are, a second question is the assumed useful life of these assets. The term of any tax-exempt debt issued to fund these assets would need to take into account their useful life. The same would be true of any significant additions or replacements of GI plantings.

C. Who is Responsible?

1. Public vs. Private Property: Deciding Who is Responsible for the O&M Costs

While it would seem as if the responsibility for operating and maintaining GI installations would be relatively clear – if you install it, you must maintain it – in reality, it is up to the local government to clearly define who is responsible when GI is installed. If GI improvements are installed on public property to satisfy a local government's Municipal Separate Storm Sewer System permit (MS4), then it is the responsibility of the local government to operate and maintain the improvements, including documenting and tracking all O&M activities.

If a private landowner installs improvements voluntarily, it is that landowner's responsibility to operate and maintain the installation. Yet, in many circumstances the delineation of responsibility is not so easily defined, and the outcome can be dependent on the requirements of the state or other jurisdiction in which a GI project is implemented. For example, when public funding supports implementation of a project on private property or when installations installed by a developer are then left to one or a number of private property owners to maintain over time, the responsibility of maintenance can become quite uncertain.

There are many complexities and nuances at the local level about the responsibility for O&M for GI practices. Greater investigation in the following areas would enable a better understanding of the models that appropriately and successfully allocate responsibility for GI O&M:

- **Clear comprehensive municipal O&M plan and/or municipal stormwater management ordinance**: Stormwater infrastructure, gray or green, is like any other infrastructure component. It must be planned for, budgeted for, and maintained over time in order to function as intended. As with the asset management approach applied to any other form of infrastructure, developing an O&M plan can help ensure that both gray and green infrastructure practices function properly over time.

  Without an O&M plan in place for stormwater practices, projects may become neglected and inadequate maintenance will lead to the installation failing to function as intended. A local ordinance can frame out the process for operating and maintaining these practices and define the responsible party based on where projects are implemented – private land, public land, and hybrid models. In The Importance of

Operation and Maintenance for the Long-Term Success of Green Infrastructure, an EPA Office of Water report, the necessary elements of an O&M plan are defined as:

- Identification of the party(ies) responsible for maintenance
- Maintenance schedules
- Inspection requirements
- Frequency of inspections
- Easements of covenants for maintenance
- Identification of a funding source[18]

- **Education and outreach to party(ies) responsible**: Even when the party responsible for GI O&M is clearly identified in a plan, ordinance, or maintenance agreement, oftentimes the responsible party remains unaware of its obligation to operate and maintain a practice. In Staying Green: Strategies to Improve Operations and Maintenance of Green Infrastructure in the Chesapeake Bay Watershed, authored by American Rivers, lack of awareness and poor public perception of green infrastructure were identified as a barrier to effective maintenance.[19] Since, in the case of MS4 permitted communities, the municipality is typically the permit holder and thus responsible for keeping track of all green and gray stormwater management practices being implemented, American Rivers recommends voluntary homeowner incentive programs, workshops, tours, and other events to educate and engage the public.[20]

- Perhaps the most difficult cases arise when a GI project is installed by a developer in a new or growing community, and the maintenance is passed on to either one or a group of property owners (through a homeowner's association (HOA), property management entity, etc.). A lack of proper communication or education, often amplified by property transfer, can result in the neglect and failure of O&M activities. Because this can occur frequently, it often becomes the responsibility of the municipality or local government to inspect and enforce GI O&M requirements to ensure that those responsible for maintenance understand their role.

- **Training for party(ies) responsible**: GI practices/installations function differently than gray infrastructure, and there can be a steep learning curve to understanding the O&M procedures of these installations. In addition, the O&M procedures often differ by type of installation as well as site specificity. While a number of guidance documents are

[18] The Importance of Operation and Maintenance for the Long-Term Success of Green Infrastructure, A Review of Green Infrastructure O&M Practices in ARRA Clean Water State Revolving Fund Projects, https://www.epa.gov/sites/production/files/2015-04/documents/green_infrastructure-om_report.pdf, US EPA Office of Water, March 2013, p. 9.

[19] Staying Green: Strategies to Improve Operations and Maintenance of Green Infrastructure in the Chesapeake By Watershed, http://www.americanrivers.org/conservation-resource/operations-maintenance- green-infrastructure/, American Rivers, p. 2.

[20] Ibid., p. 2.

available, they tend to be site-specific, and there is fairly limited data on standard O&M procedures for GI best management practices. American Rivers recommends developing maintenance standards for GI.[21]

- Public works staff responsible for the maintenance of gray infrastructure will need additional specific training to properly operate and maintain GI practices. The EPA report previously cited states that "training courses or workshops for municipal employees and contractors responsible for green infrastructure O&M are a necessary component of a well-developed maintenance program. Training targeted to the activities employees are expected to perform provides practical instruction on the proper care and maintenance of green infrastructure projects. Training can also provide information on the environmental benefits and important water quality impact that green infrastructure can have when properly maintained."[22] American Rivers suggests tapping into existing capacity within the local government, particularly when green infrastructure benefits naturally overlap with other community priorities, such as parks, and public health and safety, to aid in green best management practices O&M, either through training or being brought on as a responsible party.[23]

- In cases of private landowners and/or other private entities as the responsible party (ies) for O&M, the municipality or government should provide public education efforts, outreach campaigns, and training programs to ensure proper O&M on private best management practices.[24]

2. Implementation Approaches

a. **Public Projects**: For projects on public property there are a number of ways to ensure proper O&M takes place:
    - *In-house personnel*: The agency or municipality that owns the infrastructure re-tools, re-trains, or hires new appropriate public employees.
    - *Shared service agreements*: These occur when public GI owned by a primary public body are constructed on public property owned by second public body. Often, maintenance can be integrated in an existing property maintenance regime, usually by the secondary public body, or its contractor. Appropriate training, inspection, and oversight may be needed.
    - *Private contracts*: These contracts, typically to landscape maintenance firms, help defray the cost and reduce pressure on existing staff. However, inspection

[21] Ibid., p. 2.
[22] US EPA Office of Water, pp. 18-19.
[23] American Rivers, p. 8.
[24] US EPA Office of Water, p. 19.

and oversight, as well as damage and replacement costs need to be considered in contracting.

b. **Private Projects**: Depending on how the project was paid for, or how ownership is defined, maintenance can vary from regular inspection and enforcement to no maintenance. Ideally, a public or other regulatory body would inspect privately owned GI installations.
    - *On staff personnel*: Depending on project size and staff size, there may be capacity to conduct maintenance in-house, but training is likely necessary.
    - *Private contracts*: These contracts, typically to landscape maintenance firms, help defray costs and reduce pressures on existing staff. However, inspection and oversight, and damage and replacement costs need to be considered in contracting.

c. **Tracking Maintenance Costs and Activities**: An asset management system helps keep track of costs, needs, priorities, schedules, and inspections records. Whether it is a spreadsheet or a software tool, depending on the number of GI installations to manage, an asset management tool is a helpful way to ensure that O&M take place efficiently. Items to track in an asset management system would include:
    - In-house personnel hours and rates
    - Shared service direct costs
    - Private contracts direct costs

    Database records for such systems would include, but not be limited to:
    - Annual inspections
    - Maintenance records

III. Green Infrastructure O&M Funding/Financing Mechanisms

A. Overview

There are a wide variety of potential ways to address GI O&M costs. Each funding/financing mechanism has pros and cons and is most useful in specific circumstances. Individual communities must ask themselves a number of questions to determine their circumstances and goals, to select the most appropriate strategies. Examples of such questions include:

- Are there many GI projects that need to be monitored and maintained, or just a few?
- Are the GI projects voluntary or mandatory?
- Are they on public or private land?

- What other goals (such as job training and the hiring of disadvantaged groups) does the community have that could or must be addressed in conjunction with the GI O&M?
- Is the political support and will, as well as the enabling environment, amenable to different strategies—especially related to taxes, fees, cutting-edge strategies, and potential partnerships?
- What capacity exists within the community or nearby to monitor and maintain the GI?
- What capacity needs to be created?
- What partnerships (public, private, and/or nonprofit) might be formed to ensure success?
- What are the community's goals in establishing the GI O&M program?

Thirteen mechanisms to finance GI O&M are described in this section and summarized in the **Funding/Financing Matrix on page 6**. Some of the mechanisms presented are more tested than others. Many are based on mechanisms already in use for other environmental areas with similar characteristics but which have not been adapted yet to GI O&M financing. The mechanisms are not mutually exclusive and communities may seek to combine multiple mechanisms to address goals, needs, and circumstances. Brief information on a number of innovative GI O&M programs that are being financed by a combinations of multiple mechanisms are presented throughout this section.

B. Mechanisms

1. Stormwater Utilities/Fees

More than 1,400 U.S. municipalities charge some form of dedicated user fee for providing stormwater management services to property owners.[25] While many of these communities use the funding stream from stormwater utility fees for flood control and traditional stormwater management with gray infrastructure, many also use it to support GI O&M.

In this discussion, "stormwater fee" and "stormwater utility" are used interchangeably, both referring to when a user fee is assessed by a governmental entity specifically for stormwater management. Many do not include a separate, semi-independent agency similar to a water or electric utility but are housed within another local government agency.

Most stormwater utilities assess fees based on some measure of a property's contribution of stormwater to the public system, such as the amount of impervious surface or the amount and type of development. Some local governments, however, issue a flat fee or mix stormwater fees with other environmental services, such as air quality mitigation or

[25] Roberts-Lahti, MicKenzie. Stormwater Utilities: A Funding Solution for New Jersey's Stormwater Problems. New Jersey Future, September 2014. http://www.njfuture.org/wp-content/uploads/2014/09/New-Jersey- Future-Stormwater-Utilities-Report.pdf

wastewater service. A 2014 survey of stormwater utilities documented average stormwater fees ranging from $0.24 to $26.58 per month for a single-family residence.[26]

Example

It is not always necessary for enabling legislation to be present at the state level for a local stormwater utility to enact a fee. New York State is one of about two-dozen states that do not have enabling legislation for communities to develop, and directly charge for, stormwater utilities.

The City of Ithaca, New York, enacted a fee beginning January 1, 2015. Being in a home rule state, New York communities may not need to wait for the state to enable them to act. Before the Ithaca stormwater fee was established in 2014, stormwater O&M were funded by property taxes. Property taxes in Ithaca are based on property value, which does not reflect how much stormwater is generated by a property. Further, when stormwater is funded out of taxes, tax-exempt property owners do not contribute toward the cost required to handle stormwater flowing off of their properties.

In 2013, Ithaca Mayor Svante Myrick established a task force to examine whether a funding mechanism other than property taxes would be appropriate for the city's stormwater expenses. In particular, Myrick was interested in a new funding mechanism that improved incentives for reducing stormwater runoff from each property; shared the cost burden of stormwater services and infrastructure in proportion to each property's contribution to the need for it; included tax-exempt property owners; and was dedicated to current and future maintenance and regulatory obligations.

The stormwater user fee meets all of these goals. The fee also encourages property owners to reduce the amount of impervious surface area on their properties, which reduces the amount of stormwater runoff. Finally, because the user fees are placed into a separate account, the fee provides a dedicated funding source for these costs that is not affected by the overall economy. This is an important consideration, since through the general fund budget process, stormwater funding needs are in competition with other service areas, such as police, fire, parks and libraries. In this competition, stormwater funding needs are often relegated to a lower priority. The implementation of a user fee results in a recurring, dedicated funding source for both traditional and GI ongoing and one-time needs.

Utilization Considerations

The majority of stormwater fees are considered to be a user charge, which generally meet the following criteria:

- Fees assessed for stormwater management are used only for that purpose.

[26] Black & Veatch. 2014 Stormwater Utility Survey. http://bv.com/docs/default-source/management- consulting-brochures/2014-stormwater-utility-survey

- Fees charged are reasonably comparable with the cost of providing the service and proportional to the property's impact on the stormwater system.
- Citizens have the option to opt out of the program or reduce their fees in some way.[27]

While it does not appear that enabling state legislation is always needed to implement stormwater fees, many stormwater utility programs have been legally challenged, often based on the criteria listed above and the question of whether a stormwater fee is a true user fee or a tax. Many, but not all, of those programs challenged have withstood the legal test. However, a close consideration of legal issues should be an essential part of the due diligence phase for any community considering stormwater fees. For an excellent discussion of the legal issues involved with stormwater fees, see the publication Guidance for Municipal Stormwater Funding, produced by the National Association of Flood and Stormwater Management Agencies.[28]

Additional considerations regarding the fee vs. tax challenge include:

- Whether the charge is imposed for a regulatory purpose or simply for revenue generation.
- Whether the charge is paid in exchange for benefits not received by the general public.
- Whether the charge is voluntary or required.
- Whether the charge is a fair approximation of the costs incurred by the agency or utility to provide the benefit.[29]

The Water Environment Federation publication, *User-Fee-Funded Stormwater Programs*, contains numerous case studies discussing the challenges surrounding the development and implementation of stormwater user fees, including a consideration of the legal, political, public acceptance, and technical challenges faced by communities.

Advantages

- Stormwater utilities provide a stable, dedicated source of revenue for stormwater management, which may include GI O&M.
- Programs that include fee credits can offer a strong incentive for implementing and maintaining GI on private property (see Section 3).
- Fees create a funding pool in which GI O&M is a much higher priority than it is in, by contrast, a municipal general fund based on property or sales taxes.
- To the degree that rates are linked to the cost of providing the service and are based on the relative impact of each property on the stormwater system, stormwater fees are an equitable way to allocate costs.

[27] Black & Veatch. 2014 Stormwater Utility Survey.

[28] National Association of Flood and Stormwater Management Agencies. Guidance for Municipal Stormwater Funding. 2006. https://www.epa.gov/sites/production/files/2015-10/documents/guidance-manual-version- 2x-2_0.pdf

[29] Water Environment Federation Special Publication. User-Fee-Funded Stormwater Programs. Second Edition. 2013.

- Stormwater utilities that were created to exclusively address issues like flood control or regulatory compliance may find it is possible to expand or modify programs to incorporate GI over time to reflect the changing community priorities and industry practices.

Disadvantages

- For local governments seeking to institute a stormwater utility, significant political issues may exist relating to:
    - The lack of public awareness of the need for funding stormwater management (and thus a lack of public support).
    - The perception that the proposed stormwater user fees are actually a tax.

- Instituting a stormwater utility requires navigating a complex set of legal, technical, social, and financial issues that may be difficult to address in many communities but often more so in smaller and/or poorer communities. These issues may include, but are not limited to:
    - Public understanding and acceptance, e.g., the view that the user fee is nothing more than a "rain tax."
    - Affordability concerns.
    - Availability and accuracy of property-related information, e.g., lot size and impervious area.
    - Billing requirements, including the reconciliation of utility account holders and property owners.

- Even within a dedicated funding source for stormwater management, GI O&M must compete with other priorities, such as regulatory compliance, flood control, and capital investment needs. The majority of stormwater utility managers consider their revenues to be inadequate to even meet the most urgent needs, or at best, adequate to meet only the most urgent needs.[30]

2. Watershed Improvement Districts

To date, watershed improvement districts have not been established specifically for public GI improvements. However, municipalities around the country have established special purpose districts as political subdivisions to provide various water-related services to residential, commercial, and/or industrial customers. Such districts have been established to provide public utility services, such as water, sewer, or drainage as well as other services such for roads, parks, conservation, or hospitals.

[30] 2014 Stormwater Utility Survey. Black & Veatch. http://bv.com/docs/default-source/management- consulting-brochures/2014-stormwater-utility-survey

Watershed improvement districts have been established in states such as Florida (utility assessment districts), Arizona (community facilities districts), Texas (municipal utility districts), and California (Mello-Roos Districts). These special purpose districts can impose an ad valorem or non-ad valorem property tax assessment, a specific user fee, or a combination of the two on all properties in the district on an ongoing basis to fund O&M expenses, capital expenditures, and/or district-related debt service.

A watershed improvement district can be set up by a municipality or group of municipalities to manage any publicly owned GI projects located within the watershed. The district would be authorized to finance municipally owned GI projects and/or fund ongoing O&M expenditures for these projects. Property owners located within the watershed would be assessed an ad valorem or non-ad valorem tax levy on their property tax bill or user fee on their utility bill, which would be remitted to the watershed improvement district to cover O&M expenditures and any capital or debt service expenditures for GI projects. The district would be able to enter into contracts with design and construction companies to design and construct these projects and maintenance companies (e.g., landscapers) to maintain these projects. It could also hire professionals to construct and/or maintain these projects without outside contractors.

Examples

The City of Cape Coral, Florida, established several special assessment districts during periods of rapid growth to fund water, sewer, and irrigation projects for single-family residential, multifamily residential, and commercial customers in these districts. The city has used these districts to facilitate the funding of infrastructure in rapidly growing sections without burdening existing ratepayers in older sections. Non-ad valorem taxes are assessed on the property tax bills of each property in the district based upon equivalent lot size with a total maximum assessment rate established per lot for a period of 20 years. Property owners have the option to make annual payments or prepay the total assessment. In the event of a payment default, there is a lien on the assessed property that is on parity with any other non-ad valorem assessments. These revenues are collected to cover the debt service on the special assessment bonds issued to fund the infrastructure projects plus one percent and the collection costs of the assessments. For each district, the city enacted a capital improvement ordinance that established a procedure for the imposition and levying of special assessments to finance its improvements. No state legislation was required to establish the districts or levy the special assessments. Bonds issued to fund district capital improvements are secured by district special assessments as well as a subordinate claim on the revenues of the city's water, wastewater, and irrigation utility system. These utility system revenues are collected from all utility customers and are also used for system-wide O&M expenses (including expenses related to district improvements).[31]

[31] "City of Cape Coral Case Study." NBS. Web. http://www.nbsgov.com/case-study/city-of-cape-coral 32 Urban Drainage and Flood Control District. Sustainability on a Large Scale. April, 2010. http://www2.apwa.net/Documents/Advocacy/UDFCD%20Sustainability%20Project.pdf

The Denver Urban Drainage and Flood Control District (udfcd.org) was established in 1969 by the Colorado General Assembly to assist local governments in the Denver metropolitan area with multi-jurisdictional drainage and flood control problems. The district covers an area of 1,608 square miles and includes Denver, parts of six surrounding counties, and all or parts of 33 incorporated cities and towns. The district population is approximately 2.7 million people. The district is governed by a 23-member board of directors that includes 21 locally elected officials appointed to the board and two professional engineers selected by the other members to serve on the board. The district operates with a relatively small staff of 23 full-time employees and eight part-time college interns and relies upon private consultants and contractors. This staff manages all project funds, oversees work done by the consulting engineers, and coordinates local government planning, design, construction and floodplain management. The district is funded by four different property tax mill levies that are designated for four programs (master planning; design, construction and maintenance; floodplain management; and information services and flood warning). The total mill levy authorized by the state cannot exceed one mill. The largest levy (0.8 mill) is for design, construction, and maintenance. All design and construction projects implemented by the board are selected based upon criteria, including (1) the proposed improvements must be requested by local governments; (2) the proposed improvements must be master- planned; (3) district funds must be matched by local governments; and (4) local governments must agree to own completed facilities and must accept primary responsibility for their maintenance. All design and construction work is contracted to the private sector. Flood management projects selected provide multiple purposes, including use for parks, open space, trail corridors, wildlife habitat, and water quality management. Maintenance funds are used to assist local governments in the Denver area with the maintenance and preservation of drainage ways. Local governments are not required to match these funds. Maintenance funds are prioritized first toward district-owned facilities and district-funded projects, then to projects funded by others, and finally to unimproved urban and rural drainage ways. Money is allocated to each of the seven counties based upon their contribution of tax revenues to the maintenance fund.[32]

Utilization Considerations

Districts have been established in many states for many purposes with or without state enabling legislation. Local legislation is often required to establish the districts as well as the type of special assessments and billing and collections procedures. The legislation may also specify the governance structure for the district (if separate from the city or utility) and processes for district member input. A new stand-alone operating district will need to hire management and staff and develop procedures to procure outside vendors (including design, construction, and maintenance companies). The district will need to establish procedures to set initial and ongoing assessment levels as well as for billing and collections. For example,

[32] Urban Drainage and Flood Control District. Sustainability on a Large Scale. April, 2010. http://www2.apwa.net/Documents/Advocacy/UDFCD%20Sustainability%20Project.pdf

the basis for the assessment charge could be an ad valorem property tax, non-ad valorem property tax, or user fee. It could depend upon the size of the property or assessed valuation, the type of land use or the amount of impervious area (in the case of a user fee), and it could provide for an offset for any private property GI. Depending on the governance structure or contractual relationships, billing and collections could be done by the district, municipality (with a line item on the municipal property tax bill), or a utility (with a line item on the utility bill). If the district boundaries cross multiple municipal jurisdictions, the governance, district member input, assessment, billing, and collections procedures may be more complex.

Advantages

- Special purpose districts provide a stable, dedicated source of revenue for O&M expenses and capital expenditures.
- The fees are assessed on property owners or utility customers in the district who directly benefit from the GI projects.
- District property owners who install GI on their properties can receive an offset against district assessments due to reduced stormwater runoff.
- Revenues held by the district are applied to GI expenditures without any other competing uses of the funds.

Disadvantages

- Smaller and/or poorer special purpose districts may not have the tax or revenue base needed for GI O&M and capital spending.
- Where there is a lack of public awareness of the need for and benefits of GI, or the perception that proposed district assessments are a tax rather than a user fee, there may be political opposition to special purpose districts.

Resources

- http://www2.apwa.net/Documents/Advocacy/UDFCD%20Sustainability%20Project.pdf
- http://udfcd.org/resources
- http://www.eastmark.com/wp-content/uploads/2014/02/EM-CFD-Brochure-Final-100313.pdf

3. Fee Credits or Discounts for Maintaining GI O&M on Private Property

Communities that have implemented stormwater utilities or stormwater management fees may incentivize the installation of GI practices on private property through stormwater fee discounts and credits. Reductions in stormwater fees or credits are provided to property owners for reducing impervious surfaces, retaining and/or detaining stormwater on-site, or installing specified GI practices.

These incentives can apply to the GI O&M if they provide a means for ensuring or encouraging proper practices. The following methods are commonly used:

- Requiring access for periodic inspection by the responsible agency.
- Limiting fee discounts or credits to a certain time period, making renewal contingent on providing proof of maintenance (via inspection, photo documentation, etc.).

Examples

Via its Clean River Rewards program, the City of Portland, Oregon, provides stormwater utility fee discounts of up to 35 percent to residential properties based on the amount of stormwater that is retained on-site and to commercial/industrial/multi-family properties based on reductions in pollution, flow rates, and disposal control of stormwater. When an application for a discount is filed, the property owner must grant the city permission to conduct inspections of the property with proper notice. If improper maintenance is found to affect the functionality of on-site stormwater systems, the utility can discontinue discounts until the property owner remedies the situation.[33]

The City of Northampton, Massachusetts, provides stormwater fee credits of up to 50 percent for property owners who install and maintain stormwater best management practices such as rain gardens. The credit offered for residential rain gardens and permeable pavement expires after three years, and renewal applications must include proof that the facility is being maintained and functioning properly. The program does not specify what constitutes proof. The city also requires that property owners receiving credits allow for on-site inspection at any time with proper notice.[34]

Utilization Considerations

To use incentives, a community must have a stormwater fee in place. Depending on state and local regulations, stormwater fees and credits/incentives may be subject to a ratemaking process that links the fee and credit program with the public stormwater management services provided (see section on stormwater utilities/fees on page 15). Since credits reduce the revenue available to the public entity for stormwater management, consideration should be given to the portion of fees associated with the management of stormwater runoff from private versus public property, and the baseline revenue requirements for the managing entity. For instance, Portland gives credits of up to 35 percent of the stormwater fee because it has found that 35 percent of stormwater management costs relate to runoff from private property. Similar to requirements for installing and maintaining GI on private property, credits and incentives require significant investments in inspection, enforcement, and education to be effective.

Advantages

- O&M funding is provided by the private sector.

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[33] *ENB – 4.16 Clean River Rewards Stormwater Discount Program*. June 2012. Portland Policy Documents]. Portland, Oregon. https://www.portlandoregon.gov/bes/41976

[34] City of Northampton. Credit and Incentive Policy for Stormwater and Flood Control Utility. 2015. http://www.northamptonma.gov/documentcenter/view/4776

- GI is implemented on private property, which can significantly increase the impact of a GI program led by the public sector.
- These voluntary mechanisms may avoid possible issues associated with mandatory requirements, such as privacy and private property rights.
- They provide a mechanism for implementing GI on property that is already developed (as opposed to requirements, which are typically placed on new development only).

Disadvantages

- They reduce the revenue available to the managing public entity for stormwater management.
- Private maintenance may be of inconsistent quality or quantity, with inspection or requiring proof of maintenance being governments' primary methods of assurance.
- Public resources must be made available for inspection, and also likely for outreach, education, and training for ordinances to be effective.

Resources

- *Managing Wet Weather with Green Infrastructure Municipal Handbook: Incentive Mechanisms*
  This EPA publication provides a review of incentive mechanisms, including several examples from communities across the country.
  https://www.epa.gov/sites/production/files/2015-10/documents/gi_munichandbook_incentives_0.pdf
- *Staying Green: Strategies to Improve Operations and Maintenance of Green Infrastructure in the Chesapeake Bay Watershed*
  This report by American Rivers provides a discussion of GI maintenance incentives and provides examples.
  http://www.americanrivers.org/conservation-resource/operations-maintenance-green-infrastructure/

4. Ordinances on Private Property

To meet the environmental goals of GI programs, local governments may require the implementation and maintenance of privately owned and maintained GI practices on private property. To the degree that this maintenance is funded by the landowners themselves, these funds can augment, offset, or replace public expenditures.

Local governments have required the construction and maintenance of stormwater infrastructure on private property for decades. Examples include retention and detention basins and infrastructure for stormwater conveyance into the larger municipal system. These requirements are commonly instituted through ordinances that regulate site development and that require developers to enter O&M agreements with the local government and/or incorporate them in conditions, covenants, and restrictions. Enforcement is usually achieved

through requirements to provide site access for periodic inspection, and/or documentation of green infrastructure performance/condition by the private entity.

A number of communities are greening these requirements to include green infrastructure principles and practices, such as requiring full retention of frequent storms on-site, and the use of surface-level, vegetated stormwater features. The most comprehensive of these requirements are found in low-impact development ordinances.

Example

The City of Los Angeles instituted a low-impact development ordinance in 2012 that mandates the use of GI features to retain, filter, and infiltrate stormwater on-site on the majority of private projects (as well as city projects). During the plan submittal process, each project subject to the ordinance must submit a covenant and agreement, signed by the property owner, that indicates the owner's responsibility and commitment to maintain the GI features over the long term. The covenant and agreement is submitted with an O&M plan that includes types and frequency of maintenance that will be performed, training procedures for staff, and other details. The owner must agree to keep a maintenance log on- site and provide access to the city for inspection of the facilities for the life of the project. These documents are bound to the property and become the responsibility of the new owner if the property is sold.[35]

Utilization Considerations

Private property owners in essence become partners in maintaining a community's GI. Most local leaders would agree that this is desirable; however, serious consideration should be given to how prepared governments are to inspect and enforce maintenance agreements with potentially thousands of new partners. GI maintenance may also present technical challenges that are not familiar to the vast majority of property owners. Significant and ongoing investments may need to be made in education and training that are not needed with government-maintained infrastructure.

Advantages

- O&M funding is provided by the private sector.
- GI is implemented on private property, which can significantly increase the impact of a GI program led by the public sector.
- Some existing development can be captured by ordinances if they include requirements of significant redevelopment projects.

Disadvantages

- Does not address GI implementation and maintenance on developed property (for the most part), which constitutes the vast majority of land in most communities.

[35] City of Los Angeles Department of Public Works, City of Los Angeles, and Watershed Protection Division. Development Best Practices Handbook. 4th ed. 2011. http://www.lastormwater.org/wp-content/files_mf/lidhandbookfinal62212.pdf

- Private maintenance may be of inconsistent quality or quantity, with inspection being governments' primary method of assurance.
- Public resources must be made available for inspection, and are also likely for outreach, education, and training for ordinances to be effective.

Resources

- *Stormwater Control Operation & Maintenance*
  EPA maintains this website, which includes a model stormwater ordinance and several sample GI O&M agreement
  http://water.epa.gov/polwaste/nps/stormwater.cfm

5. Conservation Land Trusts

Land trusts, also called land conservancies or conservation land trusts, have been in existence since 1891. There are more than 1,500 land trusts operating in every state. Conservation trusts are established to preserve sensitive natural areas, farm and ranch lands, water sources, and cultural resources. Land trusts can be large, such as The Nature Conservancy, or smaller organizations that operate on a state, county, or community level. Often, conservation trusts preserve lands adjacent to existing protected areas; however, land with other natural or cultural values is also a candidate for protection. It is up to each trust to determine, according to its mission, what type of land to protect. A conservation land trust could readily be used to protect land used for GI.

As nonprofits, land trusts rely on donations, grants, and public land acquisition programs for operating expenses and for acquiring land and easements. Donors often provide monetary support in the form of a grant or an endowment to fund the ongoing O&M of the conservation land. The structure of an endowment is discussed in the ecosystem services section of this report on page 30. Some land trusts also receive funds from government programs to acquire, protect, and manage land. Land trusts use a variety of strategies to provide conservation protection. These include:

- *Acquisition*: Outright acquisition of the land by the trust at the market price allows the trust to control the land in perpetuity for conservation purposes.
- *Donation of Land*: Donation of land to a land trust allows the taxpayer to deduct the value of the land from taxable income. Gifts to a public charity allow the taxpayer to deduct the fair market value of the land. Gifts to a private foundation allow the taxpayer to deduct the cost basis of the land.
- *Purchase of Conservation Easement*: In some cases, the land will remain in private hands, but the trust will buy a conservation easement on it to prevent development.
- *Donation of Land or Easement*: It is not uncommon for conservation-minded landowners to donate an easement on their land or the land itself. Conservation easements allow private landowners to permanently retire development rights to all or

part of their property to protect significant natural resources. Easements maintain the land under private ownership. This keeps the land on local property tax rolls, thus providing income to the local government. Future owners are also bound by the terms of the conservation easement. Each conservation easement is crafted to meet the needs of the landowner while not jeopardizing the conservation values of the land. The land trust is responsible for monitoring the land to ensure that the easement's terms are followed.

- *Bargain Sale*: A landowner sells a property interest to an organization for less than the market price. The amount of value between the market price and the actual sale price is considered a donation to the organization. The donation is deductible at fair market value for gifts to public charities, and at cost basis for gifts to private foundations. Charitable tax incentives such as these can be critical incentives for conservation easements.

In the case of GI O&M, existing or new conservation land trusts could purchase and/or accept donations for land or easements to be used for GI. These trusts would maintain or monitor the condition of the GI over time, depending on terms of the easement. GI mandated by regulation might require the owner of the easement to maintain it with private funds, whereas a voluntary GI easement might require the trust to maintain the land, possibly using the property tax revenue collected on the easement property. Trusts that own land or easements outright would be responsible for infrastructure O&M. In this situation, the donor of the land or easement could include O&M funds with the donation and receive a charitable tax credit.

Utilization Considerations

This existing tool has not, to our knowledge, been used yet with a formal GI program. However, it merits consideration as a way to bring both monitoring and maintenance expertise and charitable tax credits to the GI O&M toolkit. Since many land trusts struggle to meet the O&M costs of the lands they own and manage, the source of O&M funds should be established upfront if used for GI.

Advantages

Land trusts can be excellent partners for local governments in maintaining GI. Land trusts can and do monitor the O&M of conservation easements that remain in private hands and maintain GI on lands held by the trust or on voluntary easements. Trusts must comply with local regulations related to GI.

Disadvantages

Disadvantages are few, although government entities would be required to coordinate with the land trusts within their jurisdiction concerning the development (if needed) or enforcement of relevant municipal regulations.

6. Property Assessed Green Infrastructure (PAGI) Programs

These are a proposed mechanism similar to property assessed clean energy or PACE program.

Like a watershed improvement district, this PAGI funding mechanism would be a district established for improvements owned by private property owners, and all participation by owners in the district would be voluntary. While this mechanism has not yet been used for GI, it has been used by communities to fund solar energy systems for residential homeowners and commercial establishments.

A utility or municipality could establish a district, which would assist private property owners interested in making GI improvements to their properties with the district's involvement. By definition, any property owners that self-fund GI capital as well as O&M expenditures would not be in the district. The district could be involved in funding participants' GI improvements with district debt and/or the district could be involved in managing the O&M of the improvements. District participants would benefit from economies of scale cost savings, and the utility or municipality would benefit by ensuring that GI benefits are achieved upfront and maintained over time.

There are several possible governance models for such a district. One model would be for the district to be a public agency established by a utility or municipality. It would have professional governmental administration to ensure ongoing billing and collections, any operator and debt service payments, and environmental compliance. However, a non- binding advisory board could be established by the district with participating private property owner representation. In this case, there could be a separate district charge on utility bills or property tax bills.

Another model could involve the management of the district by a nonprofit environmental organization or business improvement district with district advisory board representation by relevant utility, municipality, participating private property owners, and other stakeholders. The nonprofit organization or business improvement district would handle billing, collections, and operator payments. The utility or municipality would have oversight responsibility to help ensure ongoing environmental compliance. Property owners could be billed by the district for any capital and/or O&M expenses related to improvements. For certain utilities, any district assessments could be offset by reduced property owner stormwater impervious area charges.

A utility or municipally established district could issue taxable bonds on behalf of the district to fund capital improvements for property owners that elect to borrow for improvements in the district. Property owners could enter into contracts with district-approved construction contractors to make improvements. The district would enter into maintenance agreements with the property owners specifying required O&M activities, their frequency, and inspection and reporting requirements. The district could also contract with maintenance companies to maintain the improvements and fund the ongoing O&M expenses with an added assessment (which would be recognized under the property owners' maintenance agreements). Subject to statutory authority and any prior lien pledges to other creditors, unpaid capital and O&M

assessments could potentially be enforced by the utility or municipality on behalf of the district with service shutoff or tax liens on the property, respectively.

To the extent that property owners finance and construct their GI improvements, they still could join the district to take advantage of the economies of scale by using the district's maintenance company. The district assessment in this case on the utility or property tax bill would only be for contracted ongoing O&M expenses as well as any district administrative costs. The district would contract with the maintenance company to do the work according to certain performance standards. There would be annual inspections of the properties by the district (or municipality or utility) to confirm compliance with the contract.

Examples

The City of Berkeley, California, was the first community in the country to establish a property assessed clean energy (PACE) program for solar installations. In November 2007, the Berkeley City Council created a sustainable energy financing district into which property owners who wanted to install solar systems could annex themselves. The Berkeley program requires the property owner to hire a city-approved solar installer who determines the best solar installation for the property. The city pays the contractor for the system and installation, less any applicable state and federal rebates, and adds an assessment to the property owner's tax bill to pay for allocable debt service and administrative fees pursuant to a loan agreement. Energy savings from the solar installations help cover the assessment costs. The 20-year amortizing loan to the property owner attaches to the property, so if the property is sold, the new owner assumes the loan and any assessment payments due on it. The district is authorized to issue bonds whose proceeds finance the upfront costs of photovoltaic solar systems.

Since this program was implemented, 31 states and the District of Columbia have passed legislation supporting PACE financing. Commercial PACE financing has been the primary focus of lenders around the country. Residential PACE financing went into a hiatus in 2010 when the Federal Housing Finance Agency (FHFA) directed Fannie Mae and Freddie Mac to stop underwriting mortgages for homeowners in the program because PACE loans take priority over home mortgages if a property owner defaults or moves. Residential PACE was recently restarted in California. To alleviate FHFA concerns, the state set up a loan loss reserve fund to backstop defaults, set minimum credit requirements for participating homeowners, and is collecting and evaluating data on PACE loan performance. In addition, the Federal Housing Administration (FHA) has now provided guidance under which it will approve mortgages on properties that include PACE assessments. The FHA will approve purchase and refinance mortgage applications in states that treat PACE obligations as special assessments similar to property taxes.

Utilization Considerations

Like PACE, it is expected that PAGI may require state enabling legislation to establish these types of districts, including their governance structures. Local legislation may also be needed

to establish the type of district assessments as well as the billing and collections procedures (particularly if they are on municipal or utility bills). Depending on the governance structure or contractual relationships, billing and collections could be done by the district, by a municipality (with a line item on the municipal property tax bill) or by a utility (with a line item on the utility bill). If the district boundaries cross municipal jurisdictions, governance, member input, assessment, billing, and collections procedures may be considerably more complex.

PAGI projects, as well as O&M requirements, will vary considerably, based on the type of property involved compared to PACE projects. Solar residential projects tend to be more homogeneous. PAGI project diversity and O&M needs increase a district's operating complexity.

Advantages

- Special-purpose districts provide a stable, dedicated source of revenue for O&M and capital expenditures.
- Fees are assessed on property owners or utility customers in the district who directly benefit from the GI projects.
- Revenues held by the district are applied to GI expenditures without any other competing uses of the funds.
- Economies of scale for GI O&M can help lower the cost to the property owners participating in the program.

Disadvantages

- As a voluntary mechanism, limited property owner interest could result in lower economies of scale funding benefits of contracted GI O&M or capital spending.
- It will most likely require state legislation to enable the establishment of PAGI districts.
- PAGI project O&M activities may vary considerably from property to property, increasing the complexity of implementing district-wide activities.

Resources

- http://www.greentechmedia.com/articles/read/Why-Residential-PACE-Is-Growing
- http://www.nrel.gov/docs/fy10osti/47097.pdf
- http://www.pacenow.org/resources/all-programs/
- http://www.ci.berkeley.ca.us/berkeleyfirst/
- https://en.wikipedia.org/wiki/PACE_financing

7. Water Funds

Water funds are a mechanism for aggregating dedicated funds and then distributing them according to a water quality/watershed objective. The use of a fund for financing or paying for a service is not a new concept. However, its application to water quality restoration and conservation activities is relatively new. Best known for success in Latin American under The Nature Conservancy's guidance, water funds have been a mechanism for:

- collective and innovative decision-making among water-related sectors;
- diversification of private and public funding streams and/or donors;
- sustaining a balance of natural and built infrastructure;
- allocating resources and watershed benefits more equitably.[36]

To date, the primary sources of capitalization for water funds are user fees from drinking water enterprise programs. Additional funds may come from state, local, or federal grants and philanthropic contributions. Tax-supported funds will become more common when the water fund concept expands to other water issues such as stormwater management.

Water funds provide a means of overcoming institutional barriers that impede or prevent pooling and transfer of resources among private and public entities. In a review of 22 GI projects, EPA found that 36 percent had shared private-public involvement.[37] The private sector managed 23 percent of the projects, with municipal entities responsible for the remaining 41 percent. With initiatives focused on increasing private sector engagement, economic theory suggests that significant efficiency gains could be realized through pooling and sharing resources to undertake GI O&M activities across a region. Since they can be organized to serve a watershed or region, typically under the management of a nonprofit organization specializing in water restoration and protection, water funds offer one mechanism to capitalize on this efficiency potential.

Examples

The use of water funds is relatively limited in the United States. The Nature Conservancy established the Rio Grande Fund serving central and northern New Mexico to focus on forest management needs, centering the fund's activities on the control of large fires and the maintenance of waterway health. The fund is capitalized by a combination of federal, state, and county monies and charitable contributions from foundations and business. The Pinchot Institute established a voluntary fund in 2011 focused on the Upper Delaware River Basin. The fund has a private endowment, the U.S. Endowment for Forestry and Communities, Inc.

While not dedicated to water activities, similar models have been developed – most frequently by enterprise funds and utilities – to manage discrete restoration or conservation initiatives. Enterprise fund projects are operated as self-sustaining, fee-driven programs, functioning outside public financing and budgeting systems. Alternatively, as in the case of the Rio Grande Fund, public and private entities may come together to capitalize funds established by nonprofit institutions.

The primary purpose of existing water-related funds has been to support watershed restoration and protection. To date, the assumption has been that such watershed investments need to occur outside the traditional infrastructure financing system set in place

[36] Natural Capital Project. Water Funds in Latin America: Prioritizing Investments in Watershed Services. Accessed 4/19/15 at http://www.naturalcapitalproject.org/pubs/WaterFunds_Brochure.pdf
[37] Ibid.

by the local water system due to the need for technical expertise in watershed restoration project management. The concept of a water fund is, therefore, also well suited to addressing the challenges involved in meeting the capital, O&M, and other needs associated with GI.

Utilization Considerations

Efficiency and Cost-effectiveness: A key consideration in establishing a water fund is efficiency and cost-effectiveness. Water purveyors will set up funds if and when it can be demonstrated that investments in watershed restoration and protection outweigh investments in treatment technology. The same is true for other water resource issues such as stormwater management. Urban communities will consider supporting water funds when the investments, often outside their jurisdiction, can be demonstrated to be the most cost effective and economically beneficial approach to address local stormwater management needs.

Geographic Scope: The water fund should be sized to serve the appropriate geographic area. In many cases, a fund would need to operate throughout a watershed or other region to maximize environmental and operational benefits.

Expertise: Whether intended for watershed restoration and protection or stormwater management, the entity charged with administering a water fund needs to have personnel with the appropriate technical, financial, and project expertise. Strong governance, financial controls, and good asset management practices are needed as well.

Business Plan: If it is to become self-supporting over time, the water fund needs a viable business model and plan.

Advantages

- Flexible organization
- Economies of scale
- Ability to leverage resources from a variety of financing sources, including federal, state, and local government and philanthropic sources.

Disadvantages

- Financial benefits may be difficult to document.
- Political viability can be challenging when operations involve multiple jurisdictions.
- Concept is new to the GI space.

8. Ecosystem Service Payments

Ecosystem service payments can be used to finance GI O&M over the long term. These payments can be used to capitalize an endowment fund in which the corpus is preserved and the interest applied for future O&M expenses. Ecosystem service payment programs monetize the benefits derived from ecosystems, including carbon sequestration, water quality maintenance, and the preservation of wildlife habitats and biodiversity. Ecosystem service payment programs can be structured in a number of ways:

- *Public Payment Programs*: Under public payment programs, federal, state, or local governments pay private landowners for conserving or enhancing ecosystems. The U.S. Department of Agriculture's Conservation Reserve Program, established in 1985, makes annual rental payments to farmers to remove environmentally sensitive land from agricultural production and to plant species that will improve environmental quality. Contracts are 10 to 15 years in length and have been used to improve water quality, prevent soil erosion, and reduce loss of wildlife habitat. Additional public payment programs are managed by the Department of Agriculture, the Department of the Interior, and state governments.[38] Where applicable, state and local governments may want to work with eligible landowners to encourage participation in public payment programs to finance GI O&M.
- Voluntary Transactions: Voluntary transactions include the sale of carbon offset credits, the purchase of hunting leases by private individuals, the payment of entrance fees for wildlife viewing and hunting, and the purchase of conservation easements. (See section 5 on Conservation Land Trusts for a more detailed examination of the use of conservation easements.) Voluntary transactions are typically executed between private parties and/or nongovernmental organizations.[39] Local and state governments could also levy entrance fees for wildlife viewing and hunting on public land; these fees could be applied to meeting the O&M costs of associated GI.
- Compliance-Driven Transactions: Compliance-driven transactions are markets and payment mechanisms established in response to government regulation, including mitigation banking, conservation banking, and carbon offset markets set up under regional cap-and-trade programs.[40] Compliance-driven transaction structures provide government entities with clear-cut mechanisms to finance GI O&M costs. An example can be found in mitigation banking. Mitigation banks are created to offset adverse impacts to nearby wetlands, streams, and or wildlife habitats, as required by Section 404 of the Clean Water Act. Mitigation bank activities are governed by 2008 regulations issued jointly by the U.S. Army Corps of Engineers and the Environmental Protection Agency.

Example

U.S. Army Corps of Engineers Mitigation Banking Program: The most prominent U.S. mitigation banking program is run by the Army Corps of Engineers. Developers of projects that the Corps of Engineers determines to adversely impact a sensitive ecosystem are required to purchase credits at a nearby mitigation bank to offset their impact. Established in 1992 with 46 mitigation banks, the Corps' mitigation banking program has grown rapidly. A 2005 Corps inventory estimated the number of banks at 450, of which 59 (13.1 percent) had sold out of

[38] D. Evan Mercer, David Cooley, Katherine Hamilton, Taking Stock: Payments for Forest Ecosystem Services in the United States, Forest Trends Ecosystem Marketplace, February 2011, pp. 3, 5, 41-45.
[39] D. Evan Mercer, David Cooley, Katherine Hamilton, Taking Stock: Payments for Forest Ecosystem Services in the United States, Forest Trends Ecosystem Marketplace, February 2011, p. 3.
[40] Ibid., p. 3.

credits, with 198 banks in the proposal stage.[41] By December 2014, the number of approved mitigation banking sites had grown to 1,428, encompassing 870 square miles of protected land, and 303 bank proposals were under consideration by the Corps. Mitigation banks, implemented in most states, are most prevalent in the Corps' South Atlantic and Mississippi Delta regions.[42]

Corps mitigation banking programs have four components:[43] 1.) the bank site or physical acreage to be restored, established, enhanced, or preserved; 2.) the bank instrument or the formal agreement between the bank owners and regulators establishing liability, performance standards, management and monitoring requirements, and the terms of bank credit approval; 3.) the interagency review team (chaired by the Corps) of federal, state, local and/or tribal authorities that provide regulatory review, approval, and oversight of the bank; and 4.) the service or geographic area in which permitted impacts can be compensated for at the bank.

Most Corps mitigation banks are commercial mitigation banks, which sell credits to project developers throughout a service area. These commercial programs represented 80 percent of protected land area as of December 2014. Eighty-eight percent of commercial mitigation banks are sponsored and managed by private, for-profit organizations. The remainder are sponsored and managed by state and/or local governments, by private nonprofit organizations, or through joint public-private initiatives.[44] Twenty percent of land area in the Corps mitigation banking program is protected under programs run by single-user banks, which sell credits to a sole company or government agency. Most single-user banks sell credits to mitigate the impact of road and highway projects.[45]

The number and pricing of credits issued to a mitigation bank is negotiated between the bank's sponsor and the interagency review team regulators responsible for bank oversight. The number and pricing of credits are typically linked to the quantity and quality of ecosystem resources that can be restored, established, enhanced, or preserved through the mitigation banking program. Potential credits are identified through a site design program and quantified on the basis of affected acreage or other reliable measure. Credits are released to project developers as performance-based mitigation activities are completed.[46]

Considerations in Utilizing Ecosystem Service Payments:

An appropriate and reliable revenue stream must be identified:

- Revenues must be set aside sufficient to fund all or part of the GI O&M program.

[41] U.S. Environmental Protection Agency, Status of Mitigation Banking.
[42] Forrest Vanderbilt, Steven Martin, David Olson, The Mitigation Rule Retrospective: A Review of the 2008 Regulations Governing Compensatory Mitigation for Losses of Aquatic Resources, Institute for Water Resources, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, October 2015, p. 59.
[43] U.S. Environmental Protection Agency, What is a Mitigation Bank?
[44] Vanderbilt, Martin, Olson, p. 64
[45] Ibid., p. 65.
[46] Washington State Department of Ecology, U.S. Army Corps of Engineers, Credit Guide for Wetland Mitigation Banks, February 2013, pp.2-9.

- Compliance-based systems, which link payments to site restoration, establishment, enhancement or preservation activities, must develop quantifiable, performance-based measures to guide program operation.
- If using a compliance-based system, the program sponsor needs the technical expertise to design and manage the program in partnership with regulators.

Advantages of Utilizing Ecosystem Service Payments:

- Public payment programs may enable private landowners to undertake GI O&M activities, by identifying government financing.
- Voluntary transaction programs may identify additional streams of fee revenues for GI O&M.
- Compliance-based payment systems establish revenue streams linked to the fulfillment of environmental objectives, including O&M.

Disadvantages of Utilizing Ecosystem Service Payments

- Local governments may find it difficult to identify and capture reliable payment streams.
- Program effectiveness may require reliable forecasts of O&M costs.
- Significant technical expertise may be required to design and manage the program, especially if quantifiable performance metrics are required.

9. Endowments (used in conjunction with ecosystem service payments or other dedicated revenue stream)

Endowments are used in combination with ecosystem service payments to set up a fund in an amount sufficient to finance future GI O&M requirements. To succeed, the payment stream backing the endowment must be large enough to ensure O&M payments in future years.

In running its mitigation banking program, the Corps often requires that a portion of credit sales (either by an amount per credit or as a percentage of gross sales) be made to an endowment to pay for future O&M costs. The establishment of an endowment for long-term maintenance of a mitigation site is an appropriate function of a mitigation banking program. The endowment can be managed by the mitigation bank, if provided for in the bank's initial agreement with the Corps, or can be turned over to an organization charged with permanent site maintenance after completion of the mitigation program.[47]

Frequently, endowments are set up in an interest-bearing account with protections against running down the corpus. The following table demonstrates how endowments generally work. The base case assumes that 20 percent of gross revenues from credit sales is placed in an endowment for a 10-year period, earning 5 percent annual interest. The endowment is drawn down in $30,000 increments over the subsequent 90 years to fund O&M expenses.

[47] Wetland Mitigation Banking Guidebook for Oregon, First Version, October 2000, pages 4-2, 4-7.

Figure 1: Base Case

% Gross Revenue Reserved	20%
Assumed Nominal Interest Rate	5%

Project Yeara	TOTAL	0	1	2	3	4	5	6	7	8	9	10	20	30	40	50	60	70	80	90	100
Cash Flow without Endowment																					
Gross Credit Revenues			$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Costs			($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Total Net Cash Flow	**$230,000**	**($200,00)**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**
IRR	***33%***																				
Cash Flow with Endowment																					
Gross Credit Revenues			$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Costs			($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Contribution to Endowment			($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0
Contribution by Endowment			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Total Net Cash Flow	**$500,000**	**($200,00)**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
IRR	***21%***																				
Endowment																					
Beginning Balance			$0	$20,000	$41,000	$63,050	$86,203	$110,513	$136,038	$162,840	$190,982	$220,531	$251,558	$234,136	$215,843	$196,635	$176,466	$155,290	$133,054	$109,707	$85,192
Interest	$129,452		$0	$1,000	$2,050	$3,153	$4,310	$5,526	$6,802	$8,142	$9,549	$11,027	$12,578	$11,707	$10,792	$9,832	$8,823	$7,764	$6,653	$5,485	$4,260
Contributions	$200,00		$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Withdrawals	($270,000)		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Ending Balance			$20,000	$41,000	$63,050	$86,203	$110,513	$136,038	$162,840	$190,982	$220,531	$251,558	$234,136	$215,843	$196,635	$176,466	$155,290	$133,054	$109,707	$85,192	$59,452

The critical variables are (1) the total amount or level of credit sales versus the expected O&M costs; (2) the expected interest rate of the endowment; and (3) amount of corpus preserved.

Lowering the contribution amount will negatively impact the amount available for future O&M costs. In Figure 2 below, only 10 percent of gross revenues are put in the endowment, versus 20 percent in the base case. As a result, interest earned on the corpus is not enough to support expected O&M costs (see the negative value in the highlighted cell in the bottom right).

Figure 2: Lowering the Contribution

% Gross Revenue Reserved	10%
Assumed Nominal Interest Rate	5%

Project Year	TOTAL	0	1	2	3	4	5	6	7	8	9	10	20	30	40	50	60	70	80	90	100
Cash Flow without Endowment																					
Gross Credit Revenues			$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Costs			($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Total Net Cash Flow	**$230,000**	**($200,00)**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**
IRR	***33%***																				
Cash Flow with Endowment																					
Gross Credit Revenues			$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Costs			($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Contribution to Endowment			($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	($10,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0
Contribution by Endowment			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Total Net Cash Flow	**$600,000**	**($200,00)**	**$60,000**	**$60,000**	**$60,000**	**$60,000**	**$60,000**	**$60,000**	**$60,000**	**$60,000**	**$60,000**	**$60,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
IRR	***21%***																				
Endowment																					
Beginning Balance			$0	$10,000	$20,500	$31,525	$43,101	$55,256	$68,109	$81,420	$95,491	$110,266	$125,779	$102,068	$77,171	$51,030	$23,581	($5,240)	($35,502)	($62,277)	($100,641)
Interest	$34,327		$0	$500	$1,025	$1,576	$2,155	$2,763	$3,401	$4,071	$4,775	$5,513	$6,289	$5,103	$3,859	$2,551	$1,179	($262)	($1,775)	($3,364)	($5,032)
Contributions	$100,00		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Withdrawals	($270,000)		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Ending Balance			$10,000	$20,500	$31,525	$43,101	$55,256	$68,019	$81,420	$95,491	$110,266	$125,779	$102,068	$77,171	$51,030	$23,581	($5,240)	($35,502)	($67,277)	($100,641)	($135,673)

If interest rates are higher than expected, then too much corpus is reserved and capital, which could go toward other improvement projects, is not efficiently allocated. In Figure 3 below, see how the corpus is oversized versus expected O&M costs (see the positive value in the highlighted cell in the bottom right). Alternatively, if interest rates are lower than expected over the life of the endowment, interest earned would be inadequate to pay for expected O&M costs.

Figure 3: Actual Interest Rate Exceeds Projected Interest Rate

% Gross Revenue Reserved	20%
Assumed Nominal Interest Rate	7%

Project Year	TOTAL	0	1	2	3	4	5	6	7	8	9	10	20	30	40	50	60	70	80	90	100
Cash Flow without Endowment																					
Gross Credit Revenues			$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Costs			($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Total Net Cash Flow	**$230,000**	**($200,00)**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**$70,000**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**	**($30,000)**
IRR	***33%***																				
Cash Flow with Endowment																					
Gross Credit Revenues			$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Costs			($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Contribution to Endowment			($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	($20,000)	$0	$0	$0	$0	$0	$0	$0	$0	$0
Contribution by Endowment			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Total Net Cash Flow	**$500,000**	**($200,00)**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
IRR	***21%***																				
Endowment																					
Beginning Balance			$0	$20,000	$41,400	$64,298	$88,799	$115,051	$143,066	$173,080	$205,196	$239,560	$276,329	$265,672	$254,269	$242,068	$229,013	$215,043	$200,097	$184,103	$166,991
Interest	$129,452		$0	$1,400	$2,898	$4,501	$6,216	$8,051	$10,015	$12,116	$14,364	$16,769	$19,343	$18,597	$17,799	$16,945	$16,031	$15,053	$14,007	$12,887	$11,689
Contributions	$200,00		$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Withdrawals	($270,000)		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)	($30,000)
Ending Balance			$20,000	$41,400	$64,298	$88,799	$115,015	$143,066	$173,080	$205,196	$239,560	$276,329	$265,672	$254,269	$242,068	$229,013	$215,043	$200,097	$184,103	$166,991	$148,680

In sum, it is important that the corpus is appropriately sized. For the corpus to be adequate, the expected O&M costs must be less than the interest earned during the period under consideration. While there is a sacrifice in the internal rate of return associated with a stream of public revenues, endowments can allow for the long-term sustainability of GI projects.

Considerations in Using Endowments

- An appropriate and reliable revenue base or revenue stream must be established to capitalize the endowment.
- Sound forecasting of future contributions, O&M expenditures, and interest rates is required.
- An investment program must be set up to lock in the desired yield over the life of the endowment.

Advantages in Using Endowments

- Service payments are related to environmentally beneficial outcomes, such as the establishment of a GI infrastructure system.
- Funds for GI O&M payments are set aside in advance.
- Interest income helps to pay future maintenance costs. If the corpus is large enough relative to expenses, long-term O&M might be financed entirely from interest income.

Disadvantages in Using Endowments

- The forecasting of service payment revenues, O&M expenses, and/or interest rates may not prove sufficiently accurate to deliver the needed level of O&M payments.
- Endowment funds are purpose-restricted; the build-up of excess capital in the endowment might result in inefficient capital allocation over time.

10. Philanthropic and Federal Grants Philanthropic Grants

Philanthropic grants can supply additional financial and programmatic support for the operation and maintenance of GI. Key resources for identifying appropriate organizations are:

- *Foundation Center*: The Foundation Center maintains databases for identifying appropriate philanthropic organizations and grants. The Foundation Center's databases can be used online for a monthly fee ($49.99 as of mid-2015), or without charge at a Foundation Center regional office in Atlanta, Cleveland, New York, San Francisco, or Washington, D.C.

- *Funding Information Network*: The Funding Information Network is a network of libraries, community foundations, and other nonprofit resource centers that can be found across the country and around the world. Network partners provide a suite of tools and resources consisting of Foundation Center databases, publications, and a variety of supplementary materials and services in areas useful to grant seekers.

- *Guidestar*: Guidestar maintains an online directory of charities and nonprofit organizations, organized by subject matter. Areas covered include organizations dedicated to environmental and public benefit causes.

- *National Directory of Nonprofit Organizations*: The National Directory of Nonprofit Organizations, maintained by the Gale Group, is an online searchable database that identifies nonprofit organizations. The database can be searched by keyword, location, and other criteria. Several nonprofit and philanthropic ventures in the directory relevant to GI are identified below for illustrative purposes.

- *ACTrees*: A national nonprofit organization dedicated to building the capacity of its members to plant, sustain, and advocate for trees in America's communities. Working

with grassroots member organizations and network partners in the United States and Canada, ACTrees engages volunteers to take action to improve the environment where more than 90 percent of people live and work: in cities, towns, and metropolitan areas. Together local ACTrees member organizations have planted and cared for more than 15 million trees in cities with the help from more than 5 million volunteers. ACTrees offers grants, awards, and other funding opportunities as benefits of membership. The programs of ACTrees can be combined with municipal efforts to develop, replant, and extend areas dedicated to GI.

- *Arbor Day Foundation*: The Arbor Day Foundation is a national conservation and education organization dedicated to encouraging tree planting in communities throughout the United States. The Foundation's Strategic Tree Planting Initiative is a project funded by the U.S. Forest Service Urban and Community Forestry program and administered in partnership with the Forest Service, the National Association of State Foresters, and state forestry agencies. The initiative is designed to stimulate public participation and awareness to support strategic tree planting by participating utilities. The intent is to grow utility company investment and community involvement in strategic tree planting for carbon sequestration and energy conservation. Eligible grantees include municipalities, state agencies, and IRS-designated charitable or education organizations. Grants can be used to spread the word about trees available through the Energy-Saving Trees program, support the distribution of trees in the community, and provide participating homeowners with information on proper tree care. Grantees must be located in the service area of a participating utility.

- *SAGE* (Stormwater Alternatives through Green Enhancement): This is a donation-funded program to install and maintain GI in the Chesapeake Bay watershed. Started in Lynchburg, Virginia, in 1990 by a landscape architect, SAGE took a 10-mile stretch of a dreary four-lane expressway and turned it into a green oasis using business donations to pay for installation and maintenance gardens on the right-of-ways with tasteful sponsorship signs located in the fauna and flora of the beautifully designed gardens. Maintenance costs are set aside as part of donations to ensure appropriate upkeep. The program was approved by the Virginia State Highway Administration and recently copied in Hampton, Virginia, to become part of its stormwater program. Funding for the Hampton SAGE program comes from local businesses and special interest groups wishing to invest in the aesthetic improvements of local streets and roads and improve stormwater quality. The program is being modeled in Baltimore.

Federal Grants

A broad spectrum of federal grants can be used to support local programs to operate, maintain, and expand or improve GI. Grantee eligibility varies by program but typically includes

government entities, native tribes, and nonprofit organizations that develop and administer programs of community benefit.

Local governments and their partners should also consider other grant sources, including state and foundation grants, to support GI. Many states provide grant funding to local governments with money derived from EPA's Clean Water Act Section 319 program, which supports a wide variety of activities to control nonpoint source pollution, including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. Tribal governments and territories are also eligible for Section 319 support.

The Catalog of Domestic Federal Assistance and Grants.gov are the key databases for local governments that wish to identify and apply for federal grants. Users can search both databases on the basis of relevant search functions and keywords.

- The Catalog of Domestic Federal Assistance organizes results by agency and program, and covers all forms of federal financial assistance, including grants.
- Grants.gov permits users to identify, apply for, and track the progress of grant applications online.

A summary of key federal grants that can be used to support GI O&M appears in the following Federal Grant Program Table. A select number of the many federal grants that might be used to support GI infrastructure O&M programs are described in the Appendix. This number can be expanded with further research.

Table 1: Federal Grant Programs

Grant Program	Agency	Public	Private	Non Profit	Tribal	Grant/Loan	Green Infrastructure	Stormwater	Drinking Water Improvements	Sewer Improvements	Outreach	Short Term O&M	Long Term O&M	Job Training	Public	Website
Community Development Block Grants*	US Department of Housing and Urban Development	x				Grant	x	x	x	x						http://portal.hud.gov/hud-portal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs
Clean Water Act 319(h) Grants*	US EPA	x				Grant	x	x				x				https://www.epa.gov/polluted-runoff-non-point-source-pollution/319-grant-program-states-and-territories
Environmental Workforce Development and Job Training	US EPA	x		x		Grant								x		https://www.epa.gov/brownfields#fy15rfp
American Apprenticeship Initiative	US Department of Labor	x	x	x		Grant								x		http://www.dol.gov/featured/apprenticeship/grants
Training to Work 3 - Adult Reentry Grants	US Department of Labor			x		Grant								x		https://doleta.gov/grants/
Americorp Grants	Corporation for National and Community Service	x		x		Grant								x		http://www.nationalservice.gov/build-your-capacity/grants/funding-opportunities
Water and Waste Disposal Loan and Grant Program	USDA Rural Development	x		x	x	Grant/ Loan		x	x	x		x				http://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program
Rural Community Development Initiative	USDA Rural Development	x		x	x	Grant					x			x		http://www.rd.usda.gov/programs-services/rural-community-development-initiative-grants
Water and Waste Disposal Training and Technical Assistance Grants	USDA Rural Development			x		Grant			x	x						http://www.rd.usda.gov/programs-services/water-waste-disposal-technical-assistance-training-grants
Transportation Investment Generating Economic Recovery	US Department of Transportation	x				Grant	x									https://www.transportation.gov/tiger
Clean Water State Revolving Fund	US EPA	x	x	x	x	Grant/ Loan	x	x		x	x	x				https://www.epa.gov/cwsrf
Drinking Water State Revolving Fund	US EPA	x	x	x	x	Grant/ Loan	x		x		x	x				https://www.epa.gov/drinkingwatersrf

Utilization Considerations

Winning and managing grants requires significant planning and expertise. Local governments and partner organizations applying for grants will typically require a dedicated employee or specialized contractor to prepare the grant application or, for larger communities and their partners, a larger team. Local governments and their partners will be expected to document need, anticipated program results, and outcomes associated with the grant. Grantees will also be expected to demonstrate their capabilities to manage the grant during the award term. Each granting agency or organization has specific guidelines and criteria that must be met during the application process. One final important point to note is that the failure to meet such guidelines and criteria is likely to be a factor in application rejection, regardless of the inherent worth of the proposal.

Advantages

- Federal and other grants supplement local revenues and do not require repayment.
- Grants can often be used to leverage additional grant funding or financing, including federal, state, and foundation grants. Private and nonprofit partners may also be able to obtain loan financing to supplement the capital raised from grants.
- The pursuit of grants may encourage local governments to develop beneficial partnerships with foundations, nonprofit organizations, and the business community in the creation of effective GI initiatives.

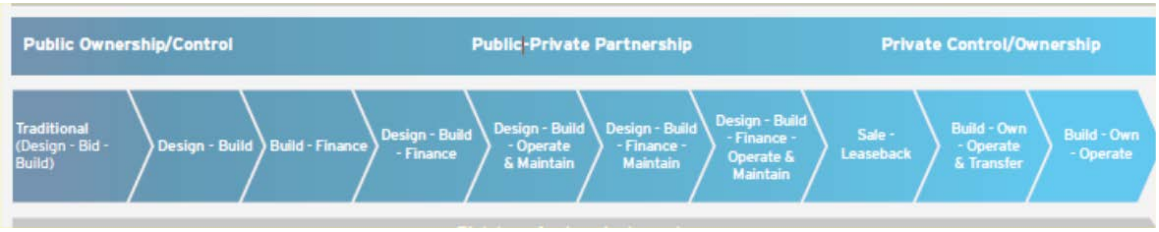
Disadvantages

- A major drawback for many applicants can be the time and dedication needed to complete a grant application. It can easily take more than 30 days if done properly.
- Because the grant process can be extremely competitive, there is never a guarantee of an applicant winning an award. This leads to considerable uncertainty for the potential grant recipient.
- A single grant may be inadequate amount to fully support the desired program, requiring the applicant to locate additional sources of funding or financing. In some cases, applicants must demonstrate their ability to secure matching funds or, on a contingent basis, loan financing to win an award.

11. Private Equity Capital: Public-Private Partnerships (P3s) and Community-Based Public-Private Partnerships (CBP3s)

Public-private partnerships, also known as PPPs or P3s and referred to as P3 in this paper, are business relationships in which a government entity enters into a long-term contract (typically with private enterprise) to deliver a public facility or service. As shown in Figure 4, such arrangements can be organized through a variety of transaction structures and arrayed on a spectrum from complete public ownership and control (at the left) to complete private ownership and control (at the right).

Figure 4: Public-Private Delivery Model Spectrum



Design-Build-Finance-Maintain (DBFM) and *Design-Build-Finance-Operate-Maintain (DBFOM)* P3 models could be especially useful for designing, developing, financing, and maintaining required GI and, if needed, operating a GI program to provide ongoing services to private property owners on behalf of local government. Under these models, a private contractor or consortium of contractors would supply the financing and would earn its long- term return from contract payments from the local government. This approach bundles design, development, maintenance, and, if desired, other operating activities in a single contract, thereby integrating project delivery with long-term financing. The theory behind P3s is that integrated long-term project delivery and financing will enhance value-added service delivery and create economies that minimize some costs to the public sector.

P3 contracts, including DBFM and DBFOM agreements, are typically vetted using value for money (VfM) financial models. These are discounted cash flow analyses that compare the long-term expense associated with a typical design-bid-build contracting model combined with traditional operating and maintenance agreements (the public sector comparator) with a hypothetical P3 contract for the same services (the shadow bid). If the shadow bid results in lower overall expense than the public sector comparator, the municipality may elect to bid out the project as a P3. Eventual bids can also be required to conform to the parameters of the VfM model to allow for standardized comparisons between bids. State enabling legislation is required for local governments to undertake P3 projects. As of December 2014, 33 states, the District of Columbia, and Puerto Rico had adopted P3 enabling legislation.[48]

Community-based public-private partnerships (CBP3s), a proposed variant of the traditional P3 model, have been advocated by EPA Region 3 to support the development, operation, and maintenance of green infrastructure programs in the Chesapeake Bay region. EPA notes that CBP3s differ from traditional P3s by better aligning local government and private sector interests through the execution of relational contracts, designed to:

- Offer higher levels of municipal control in P3 decision making and, in some instances, fund disbursements.

[48] U.S. Department of Transportation, Federal Highway Administration, Office of Innovative Program Delivery, State P3 Enabling Legislation, http://www.fhwa.dot.gov/ipd/p3/state_legislation/

- Provide for shared accountability and adaptive management over time, while holding the private partner responsible for program execution.
- Returning residual cash flows (net cash flows after all expenses and fees) to the local jurisdiction or to a reserve fund. (By contrast, residual cash flows are returned to the private sector partner under traditional P3s.).
- Focus on project opportunities to provide for local economic growth and improved quality of life in urban and underserved communities.[49]

Examples

The CBP3 model has its roots in the privatization of U.S. military housing. Most Americans may not realize it, but most military housing in this country today is privately financed, constructed, and maintained using a fraction of public monies to leverage adequate capital and O&M investments.[50] Facing an aging, substandard inventory – at one point more than 50 percent of military housing was rated substandard.[51] With a $20 billion cost of revamping its housing system for a volunteer army with more dependents than ever before, the Pentagon utilized new authorities granted to it in the Military Housing Privatization Initiative of 1996. The Residential Communities Initiative worked on 88,000 homes and took advantage of a 10-to-1 leverage of public investment.

A key element of the Residential Communities Initiative is the use of long-term, low-risk incoming revenues, such as military housing stipends, to attract equity investment and obtain debt financing at favorable interest rates from the private investment community. Moreover, economies of scale in project delivery allowed for more innovative construction practices. This drove down overall costs. Costs were 20 percent lower than previous government projects, and the Residential Communities Initiative cleared up a $7 billion housing maintenance backlog.[52]

Due to recent legal mandates for the cleanup of Chesapeake Bay, Prince George's County, Maryland, needs to retrofit 15,000 impervious acres at a cost of $1.2 billion. The county is developing a pilot CBP3 program, the Clean Water Partnership, in service of this objective, as recently promoted by Region 3 of EPA.[53] The county seeks to meet regulatory mandates,

[49] U.S. Environmental Protection Agency, Region 3, Community-Based Public-Private Partnerships, April 21, 2015.
[50] Privatizing Military Family Housing. A History of the U.S. Army's Residential Communities Initiative, 1995- 2010 (Government Printing Office, Washington D.C.), 2012, by Matthew C. Godfrey and Paul Sadin with Dawn Vogel, Joshua Pollarine, and Nicolai Kryloff, p. 293.
[51] "Solving a National Crisis. Assessing the effectiveness of the P3 model for storm water management ", by Greg Cannito, Water & Wastes Digest, April 2015, p. 16.
[52] "Public-Private Partnerships: Lessons From Military Housing," by Mahlon (Sandy) Apgar, IV, Real Estate Issues, Vol. 36, No. 2, 2011, p. 63. EPA Region 3 has invited RCI partners from the Army, the contractor, and the investor to make presentations, at least twice, to meetings of stormwater managers given the relevance of the program.
[53] Ibid. See also Community Based Public-Private Partnerships (CBP3s) and Alternative Market-Based Tools for Integrated Green Stormwater Infrastructure. A Guide for Local Governments prepared by U.S. Environmental Protection Agency Region 3, Water Protection Division, April 2015 which can be accessed at https://www.epa.gov/sites/production/files/2015- 12/documents/gi_cb_p3_guide_epa_r3_final_042115_508.pdf

reduce costs, and create local economic benefits. It is dedicating the revenue stream created by local stormwater management fees to capitalize $100 million in private investment for an initial pilot program that retrofit 2,000 acres over a three-year period, as well as fund long-term maintenance over the life of a 30-year agreement to design, finance, build, operate, and maintain a massive stormwater retrofit program. Improvements to be installed in the county include bios-wales, rain gardens, green roofs, rain barrels, and permeable pavements. The program is also intended to drive economic development in the county by using locally based, small and minority businesses for 30 percent to 40 percent of the project. Some 5,000 entry-level green jobs are projected to be created. According to Larry Coffman of the county's Department of the Environment, "Early indications were a P3 program could drive down costs by as much as 40 percent, thus saving the county over $400 million over the life of the retrofit program."[54]

The prime contractor for the Prince George's County program is Corvias Solutions, which will oversee the design, development, and maintenance of diverse stormwater improvements. Corvias' fees are performance-based and are linked to the achievement of time, budget, procurement, and local business development goals. Potential fees are capped and based on project budgets; half of the fees Corvias is eligible for represent incentive fees for exceeding performance targets. Greg Cannito, managing director of Corvias Solutions, describes some aspects of the cost-savings involved with this CBP3 pilot:

> "Unlike traditional procurement, where each of the thousands of individual stormwater projects must go through a time-consuming and fragmented design, bid and build process, this approach aggregates the stormwater projects into an integrated program that streamlines the planning, engineering, design, construction, and maintenance activities to improve both affordability and speed of implementation."

In addition, Prince George's County's CBP3 allows for implementation of full life cycle asset management and maintenance to ensure resilient facilities; private partner accountability for success while retaining the county's oversight and governance; and performance-based fees. The promise of the community-based public-private partnership model is that a community can implement a stormwater fee or secure another dedicated funding stream and enter into a partnership that allows the leveraging of private funds at ratios many multiples of the income stream. Leveraging additional private financing allows the community to raise sufficient capital to scale up the initial installation of GI and LID practices while assuring long-term O&M. That, at least, is the vision of CBP3.

Utilization Considerations

- Local governments typically need state enabling legislation to use P3s and CBP3s, including the authority to enter into development and service contracts. If local

[54] EPA, p. 72.

government wants to use a CBP3 model that lets it share in ownership, administration, or policy making, then local government officials must have the authority to serve as officers or directors of private entities.

- Government entities must develop the technical capacity to plan, develop, and implement appropriate procurement practices; evaluate the feasibility of proposals; and negotiate and monitor P3 contracts. If such capacity is not available in-house, then third-party expertise must be engaged.
- The decision to use a P3 contract instead of a typical design-build contract is typically evaluated through a complex financial analysis, such as a value for money (VfM) model. VfM or similar models must also be used to cross-compare competing bids. If the analytic capacity to conduct and/or review such models is not available in-house, then third-party expertise must be engaged.

Advantages

- The use of P3s and CBP3s integrates project capital financing with long-term O&M support, offering a one-stop solution for developing and operating infrastructure projects.
- The use of P3s and CBP3s encourages the creation of integrated, least-cost solutions to deliver, operate, and manage public infrastructure.
- P3s and CBP3s may accelerate project delivery by better integrating project planning, design, construction, and operating decisions.
- P3s and CBP3s may attract additional private capital financing that otherwise might not be available and provide for greater flexibility in the use of financing structures.

Disadvantages

- While P3s provide long-term capital, governments must raise the revenues to pay P3 contract obligations.
- Local governments frequently lack the expertise to evaluate P3/CBP3 costs and benefits, successfully negotiate the P3 contract, and monitor and manage successful contract implementation.
- Initial transaction and ongoing monitoring costs may be high, especially if local governments lack the required analytic and management capacity.
- Best practices surrounding the use of P3s and CBP3s are still evolving, leading to the possibility that contracts will not deliver the anticipated results and savings.

Resources

- *P3 Financing for Water Projects: U.S. Environmental Protection Agency, Water Infrastructure Finance and Innovation Act*

  This site contains initial information on EPA's implementation of the Water Infrastructure Finance and Innovation Act, intended to encourage the use of P3 financing for water projects.

  http://water.epa.gov/grants_funding/cwsrf/wifia.cfm

- *U.S. Environmental Protection Agency, Water Infrastructure and Resiliency Finance Center*
  This site announces the 2015 formation of EPA's Water Infrastructure and Resiliency Finance Center, established to offer technical assistance to local governments in the use of traditional and innovative water finance vehicles, including P3s.
  http://water.epa.gov/infrastructure/waterfinancecenter.cfm

Global Use of P3s

- Alastair Adair, et. al., *The Global Infrastructure Challenge*
  The Role of PPP in a New Financial and Economic Paradigm, RICS Research, Royal Institution of Chartered Surveyors, October 2013. This is a review of P3 markets in the countries of Australia, Canada, India, the United Kingdom, and the United States.
  http://www.rics.org/us/knowledge/research/research-reports/the-global-infrastructure-challenge/

State P3 Enabling Legislation

- U.S. Department of Transportation, Federal Highway Administration, Office of Innovative Program Delivery, State P3 Enabling Legislation
  This site Includes status material on state P3 enabling legislation as of December 2, 2014.
  http://www.fhwa.dot.gov/ipd/p3/state_legislation/

Community-Based P3 Resources

- U.S. Department of Defense, Military Housing Privatization Initiative (MHPI)-101, September 2006
  This site provides comprehensive information on the DOD housing initiative.
  http://www.acq.osd.mil/housing/mhpi.htm
- U.S. Environmental Protection Agency, Region 3, Community-Based Public-Private Partnerships, April 21, 2015.

Prince George's County Program:

- Prince George's County, MD Urban Retrofit Public Private Partnership Model
  http://www.mde.state.md.us/programs/Marylander/outreach/Documents/PG%20County_Urban%20Retrofit%20P3%20Model.pdf

12. Social Ventures

Social ventures or enterprises are businesses that generate both a social and an economic return. In cities across the country, GI is being used as the catalyst for creating for new social enterprises. Many of these enterprises are founded to provide job training and employment in GI installation and O&M. Others are founded to sustainably harvest and/or produce a product such as lumber or biomass fuels from the GI itself. Social enterprises allow for an additional level of social and/or economic benefits to be derived from GI. In addition to the

water quality benefits of GI, jobs for the unemployed, a remediated brownfield site, or a new source of sustainable fuel are created. In addition to the potential cost savings from GI installation, private ownership of these projects helps to overcome some of the political hurdles associated with implementing a new way of addressing stormwater problems. Further, job training funds or revenues generated from land remediation or harvested products can help to defray the cost of installing and operating and maintaining the GI.

Examples

In their April 2013 publication "Staying Green and Growing Jobs," Green For All and American Rivers identified Verde in Portland, Oregon, and Generation Water in Los Angeles as examples of social enterprises that hire and train targeted populations to perform landscape-related work. In the Chicago area, a new social enterprise, High Bridge, is training and providing transitional employment in GI installation and maintenance for residents in the low-income communities where the GI is being planted.

Fresh Coast Capital is a social enterprise that will provide GI by planting hybrid poplar trees on brownfield sites. The trees remediate the sites in less than 10 years via phytoremediation (a process by which trees break down pollution in the soil) and produce marketable wood products in four to eight years for the well-established wood pulp, timber, and biomass markets. This strategy will reduce remediation costs by 80 to 90 percent. While the majority of Fresh Coast's investment return is obtained from the sale of the property after remediation, these sites do not have to be sold. The income derived from the sale of wood products is substantial and may support the costs of installation as well as the O&M of GI on the site.

Fresh Coast Capital, formed by students at the Kellogg School at Northwestern University, won the Morgan Stanley International Sustainable Investment Challenge in 2014 as the best idea to create market rate returns and scalable social impacts. Fresh Coast Capital is capitalizing its first fund—the Fresh Coast Forest Fund—to plant and remediate 5000 acres of brownfields. As of 2015, a pilot project is underway in Gary, Indiana, to test the Fresh Coast Capital model in an urban setting.

Utilization Considerations

Social enterprises are appropriate in situations where a capable entrepreneur is available to launch the venture and the community is interested in achieving multiple goals from its green infrastructure investments. For employment and training related enterprises, source(s) of job training funds may be needed to cover the social costs of job training. A clear pipeline of projects is also important to ensure the continuation of the enterprises. This strategy is most appropriate in large urban areas with many GI projects and where there is a significant history of partnership between the public and private/nonprofit sectors. For environmental remediation or product sales-focused ventures, larger sites are needed. Fresh Coast is targeting brownfield sites of 40 acres or more without buildings on them.

Advantages

By establishing new businesses, social enterprises open the realm of public and private business financing tools and incentives to GI installation and O&M. They also can enable communities to meet multiple social and environmental needs by blending job training and placement with stormwater management objectives. If well operated, these enterprises typically develop efficient and cost-effective O&M protocols, while generating new employment and tax revenue.

Disadvantages

Social enterprises require skilled management and sufficient capitalization. Many lack either or both of these necessities. In addition, many social enterprises attempt to solve deeply entrenched social problems that have been resistant to improvement. As a result, many social enterprises, like other small businesses, have a high risk and a high probability of failure.

Resources

- http://www.americanrivers.org/wp-content/uploads/2016/05/staying-green-and-growing-jobs.pdf
- www.millenniumreserve.org/Priorities/high-bridge
- Video on Fresh Coast: http://video.cnbc.com/gallery/?video=3000270133

13. Credit Enhancements (used in conjunction with other financing approaches)

Credit enhancements can be used to attract private capital to GI transactions and reduce the financing costs of GI O&M by reducing credit risk. Organizations engaged in financing GI should investigate the potential use of credit enhancements when developing financing programs. Additional policy development is needed to bring the use of credit enhancements to fruition for GI projects, including O&M. A number of credit enhancement strategies are discussed below for illustrative purposes.

New Markets Tax Credits: New markets tax credits (NMTCs) give a federal tax incentive to investors who make an equity investment via community development entities located in low-income rural communities or urban neighborhoods. Community development entities provide equity capital to eligible businesses and the NMTC investor receives a federal tax credit equal to 39 percent of the investment, taken over a seven-year period (5 percent annually for the first three years and 6 percent in years four through seven). If the investment is redeemed before the seven-year term, all tax credits awarded in connection with the investment will be recaptured with interest.

New markets tax credits could be used to provide equity capital to a GI installation and maintenance enterprise connected to a large urban GI portfolio. The business, which can be operated by a for-profit or nonprofit entity, would have to be located in an eligible low- income community, and its activities would have to be conducted primarily in low-income areas. The new market tax credit is a credit enhancement because the equity component of the loan relies on federal tax credits for repayment—not the income stream of the business. The equity

provided by new markets tax credits allows project debt to be raised on more favorable terms than would otherwise be available. While the new markets tax credit lapsed at the end of 2014, the U.S. Senate has passed bipartisan legislation to extend it through December 2016.

Clean Water SRF Loan Guarantees: Federally sponsored Clean Water State Revolving Funds provide financial assistance for clean water programs throughout the United States. From 1990 through mid-2012, these funds have financed nearly $89 billion in clean water projects. Clean Water State Revolving Funds frequently enjoy triple-A credit ratings. EPA's Environmental Finance Advisory Board (EFAB) has previously recommended that state revolving funds with strong credit leverage their financing capacity by guaranteeing loans to finance GI. The loan guarantees would enable the financing of GI projects at lower interest rates. Such guarantees could help finance public-private partnerships, water fund programs, and other initiatives intended to install, operate, and maintain green infrastructure. EFAB has estimated that the use of loan guarantees by Clean Water State Revolving Funds could leverage $6 billion to $28 billion of additional financing for GI O&M.

Examples

The state of Connecticut has established the Green Connecticut Loan Guaranty Fund to provide first loss guarantees (guarantees of repayment for initial losses up to a specified limit) to private lenders who finance energy conservation loans for individuals, small businesses and nonprofit entities. The fund was initially financed with $5 million in general obligation debt issued by the state. The fund is administered by the Connecticut Green Bank. Similar funds could be set up by other jurisdictions to guarantee GI O&M programs.

The International Institute for Sustainable Development has identified a variety of credit supports used in multinational development lending that are suitable for leveraging capital for GI projects. These credit supports are typically provided by public entities or multilateral development banks to bring private capital to the table. In addition to first loss guarantees, credit supports utilized include:

- *Partial credit guarantees*: These guarantees absorb part or all of debt service default risk regardless of the cause.
- *Contingent loans*: Contingent loans are activated when previously negotiated conditions trigger the need for additional debt capital for the project. The contingent loan provides debt financing to ensure against risk that a private lender does not want to assume.
- *Viability gap funding*: Viability gap funding can be provided in the form of capital grants, subordinated loans, and/or interest subsidies to address weaknesses in the proposed project.
- *A/B loans*: Multilateral development banks, acting as the lead lender, lender of record, and loan administrator, often engage in A/B loans, wherein they issue an A tranche of debt and a secondary lender or consortium issues a B tranche. The arrangement spreads risk and allows the lead lender to obtain preferred creditor status for the debt.

Federal agencies and state green banks would be the most appropriate U.S. entities to create and implement such credit supports. Bipartisan legislation, the Partnership to Build America Act, has been introduced in the U.S. House of Representatives to create a $50 billion U.S. infrastructure bank that would utilize credit supports.

Utilization Considerations

Existing credit enhancement mechanisms such as New Market Tax Credits and loan guarantee funds are applicable to the business enterprises that would be responsible for implementing the O&M activities. Enhancements can reduce the risk and costs for these enterprises. Credit enhancement programs often have strict access requirements that should be considered carefully before expending effort to obtain them.

Advantages

The business risks and costs for business enterprises entering or expanding into GI O&M can be reduced with credit enhancements. These benefits can be passed on to the community.

Disadvantages

New credit enhancement vehicles are likely to take significant time and effort to establish, if an existing one is not available.

14. Environmental Insurance Settlements/Judgments

GI developed as part of an environmental remediation program might be financed pursuant to an insurance settlement or judgment related to the contamination of the site. Depending on insurance coverage terms, expenditures eligible for financing might include cleanup, redevelopment, program operation, and site maintenance.

Frequently overlooked sources of insurance proceeds are historic policies once held by the property owners responsible for the environmental damage. The premise of looking to a historic insurance policy to finance the remediation of a polluted site is that the policy insures against damages incurred during the coverage period, no matter when the damage is discovered.[55] Thus, judgments and settlements can be collected by policyholders against old policies that were in force when the contamination occurred. Historic insurance coverages that can be relevant to an environmental damage or injury claim include:

- Comprehensive general liability insurance (especially policies issued before 1970, which do not contain partial polluter exclusion language)
- Umbrella insurance (especially policies issued before 1970, which are not subject to partial polluter exclusion language)
- Excess liability insurance (especially policies issued before 1970, which are not subject to partial polluter exclusion language)
- Environmental impairment liability insurance (sold since 1981)

[55] Anderson Kill & Olick, P.C., A Guide to Insurance Coverage for Environmental Liability Claims, p.20.

- Ship scrapping or water quality insurance syndicate insurance (insures against pollution caused by maritime activities)
- Personal injury liability insurance
- First-Party property insurance
- Product liability insurance
- Automobile insurance[56]

Jurisdictions differ in their definition of the trigger date of an event or occurrence giving rise to an environmental damage or injury claim. Most courts adopt a continuous trigger standard, under which the date of an insured event or occurrence extends from the date(s) the environmental contamination begins through to the date(s) on which the damage or injury is discovered. Alternative trigger date definitions adopted by the courts have included (1) the date(s) on which environmental contamination took place; (2) the date(s) on which the resultant damage or injury was discovered; or (3) the date(s) on which remediation was ordered by a regulator or court.[57]

Even claims involving insolvent insurance companies can result in payment to the policyholder. In some cases, umbrella or excess liability coverages go into force if a primary liability insurer is no longer solvent. Most states have guaranty funds to settle claims against insolvent insurers.[58]

Example

The Hunsucker Goodstein law firm successfully pursued a historic insurance claim that led to an environmental liability settlement that allowed the remediation of a contaminated site in Evansville, Indiana, as a municipal greenway. The site, which now houses the Mead Johnson Trailhead and the Shirley James Gateway Plaza, is a central component of the Pigeon Creek Gateway Passage, a 42-mile jogging, walking and biking trail being developed in Evansville and Vanderburgh counties.[59]

The historic insurance litigation that resulted in the Evansville remediation began when the City of Evansville sought to acquire for greenway use a former scrap yard run by General Waste Products from the 1950s to 1998. Testing of the site revealed extensive contamination, including high levels of lead and polychlorinated biphenyls (PCBs), requiring remediation by General Waste.[60]

Although General Waste Products had closed its business and had no assets, Hunsucker Goodstein located historic insurance policies for the site and negotiated a settlement with the

[56] Ibid., p.17.
[57] Ibid., pp. 12, 49.
[58] Ibid., p. 23.
[59] Michael D. Goodstein and Stacey H. Myers, Hunsucker Goodstein PC, "Funding Remediation of Environmentally Impaired Properties," in *Environment and Climate Change Law*, International Comparative Legal Guides, 2013, pp.19-20; and City of Evansville, Indiana, Pigeon Creek Gateway Passage
[60] Goodstein and Myers, pp. 15-20.

insurance carrier. The settlement established the Evansville Greenway and Remediation Trust, paid for previous investigation and legal costs, and extended a $3.5 million loan used for immediate site investigation and remediation.

On behalf of the trust, Hunsucker Goodstein also negotiated a $4.375 million settlement against parties who had sent equipment containing PCBs and other contaminants to the scrap yard for disposal and metal recycling. Settlement proceeds were used for additional investigation and remediation activities.[61] Michael D. Goodstein of Hunsucker Goodstein notes that, in appropriate cases, historic insurance proceeds may be used for program O&M expenses associated with environmental remediation and that the proceeds of the settlements for the Evansville greenway were applied to O&M expenses, as well as to capital costs.[62]

Utilization Considerations

The filing of a historic insurance claim in an environmental damage or injury case requires the hiring of specialized legal counsel and investigators. Notice must be filed promptly with the insurer/s (in some states within 10 days) when a policyholder becomes aware of a claim against it for environmental damages or liability. Notice should be provided to every insurer that issued coverage at any point in time that might relate to the claim.[63] While historic insurance cases typically take years to resolve at considerable expense, most cases result in a settlement. Of the cases taken to trial, policyholders frequently prevail,[64] although the outcome of any case depends on the specific fact pattern, the quality of the evidence advanced and legal representation provided, and prevailing statutes and case law.

Advantages

- Historic insurance cases can discover and unlock financial resources that might not otherwise be considered to finance environmental remediation, including GI O&M activities.
- Historic insurance cases taken on a contingent fee basis may result in a relatively modest financial outlay by the policyholder, although the policyholder may be responsible for non-attorney expenses, such as filing fees and deposition costs. (Under a contingent fee arrangement, the attorney agrees to accept a fixed percentage – often

[61] Ibid., pp. 15-20.
[62] Correspondence with Michael D. Goodstein, April 9, 2015.
[63] Anderson Kill & Olick, pp. 13-15.
[64] Anderson Kill & Olick, pp. 26-28. Estimates given by Anderson Kill & Olick are that more than 97 percent of all cases settle (p. 28), and that policyholders win 85 to 90 percent of the cases that go to trial (p. 27). Policyholders should not rely on these statistics, however, in that the outcome of any specific case depends on its fact pattern and the applicable case law and statutes.

one-third – of the amount recovered for the client. If the case is unsuccessful, no legal fees are due.)[65]

Disadvantages

- Historic insurance claims are applicable to only a subset (of unknown size) of GI programs. The use of historic insurance is not a generally applicable solution to GI financing needs, including O&M costs.
- Advancing a historic insurance case can disrupt the daily business of the policyholder due to the volume and detail of records and information requests.[66]
- Historic insurance cases are expensive[67] and may be financially untenable, unless a contingent fee arrangement is available.
- Historic insurance cases are lengthy, typically extending for years.[68]

Resources

- Anderson Kill & Olick, P.C., A Guide to Insurance Coverage for Environmental Liability Claims
- Michael D. Goodstein and Stacey H. Myers, Hunsucker Goodstein PC, "Funding Remediation of Environmentally Impaired Properties," in *Environment and Climate Change Law*, International Comparative Legal Guides, 2013, pp. 15-20.

IV. Supports to O&M Financing

A. Operations and Maintenance (O&M) Training

It's one thing to fund ongoing O&M of a particular green infrastructure installation, it is another to ensure that the peoples you hire are trained in O&M and understand the project. How one integrates that training matters, especially if you contract those services out. Where training happens also matters: on the job by a private company or public agency/utility; courses offered through programs at a community college; a master gardeners program; or landscape architecture program. Agencies that contract the work out can write requirements in for training in green infrastructure O&M or the demonstration of knowledge required to maintain the project in the request for qualifications or proposals. In states where certification programs exist, this documentation is easier to reference.

- *Webinars*: Webinars provide ample opportunities for training; many are free and others offered at a low cost. Webinars offer opportunity for Q&A, materials (downloads), etc.

[65] American Bar Association, "When You Need A Lawyer, Legal Fees and Expenses: What Are Contingent Fees?" http://www.americanbar.org/groups/public_education/resources/law_issues_for_consumers/lawyerfees_contingent.html.
[66] Anderson Kill & Olick, p.27.
[67] Ibid., p.27.
[68] Ibid., p. 27.

- *Conferences/Workshops*: Training through conferences and workshops can be found on national, regional, state, district, and city/county levels. Some may be at no cost if they are grant-funded.
- *Certification/Accreditation/Continuing Education*

Examples of training sources:

- *North Carolina State Stormwater Best Management Practice Inspection and Maintenance Certification Workshops*: The course is short, two days, and targets people in the field, not just engineers and landscape architects. Fees range from $215 for professionals to $160 for nonprofit or public attendees. The workshops include a recertification/update option for $75. A suggestion for programs such as these would be to reduce fees for private companies that intentionally seek to attract and retain employees from targeted unemployed or underemployed areas of a community. http://www.bae.ncsu.edu/topic/bmp-im/
- *Green Certifications*: Firms will often pay for staff to become Leadership in Energy and Environmental Design (LEED)-certified in a variety of areas, including LEED Green Associate and LEED AP O+M designation. There are pros and cons to these programs, but agencies can include the certification as a requirement or preferred qualification in their requests for proposals and requests for quotations.
- *Organization Memberships*: Organizations with a clean water mission often offer training and publications with best management practices on their websites. Membership perks might include free training or access to webinars, conferences, workshops, and publications.
- *Workforce Development*: In its Staying Green and Growing Jobs report, American Rivers provides examples of how some communities have successfully linked workforce training, education, and economic development with green infrastructure jobs. http://www.americanrivers.org/wp-content/uploads/2016/05/staying-green-and-growing-jobs.pdf

  The communities and organizations featured are:
  - Verde, Portland, Oregon: http://www.verdenw.org/
  - Ready, Howard County, Maryland: http://livegreenhoward.com/ready-for- action/ https://www.youtube.com/watch?v=WyPanChbupA
  - Bronx Environmental Stewardship Academy: http://www.ssbx.org/best- academy/
  - Seattle Conservation Corps: http://www.seattle.gov/parks/scc/
  - Green Corps, Cleveland Botanical Gardens: http://www.cbgarden.org/support/green-corps.aspx
  - Onondaga Earth Corps, Syracuse New York: http://www.onondagaearthcorps.org/

- *Government Agencies*:
    - The EPA Brownfields Program provides the opportunity for funding for O&M job training for GI through its FY15 Environmental Workforce Development and Job Training Grants: "Includes environmental workforce development and job training programs focused on hazardous and solid waste management, assessment, and cleanup associated activities, chemical safety, emergency response, integrated pest management, and waste and stormwater management. These grants are provided to organizations to develop environmental programs that recruit, train, and place, unemployed and under-employed, including low-income and minority, residents historically affected by hazardous and solid waste sites and facilities with the skills needed to secure full-time, sustainable employment in the environmental field and in the assessment and cleanup work taking place in their communities." https://www.epa.gov/sites/production/files/2015-11/documents/16_-01.pdf
    - NOAA offers grants that can be used to train and educate community members to become environmental stewards: http://www.oesd.noaa.gov/grants/elg.html#page=about, http://www.oesd.noaa.gov/grants/docs/MWEE-National.pdf, and http://www.oesd.noaa.gov/grants/.
    - Other federal funding sources include Department of Housing and Urban Development Community Development Block Grant program; Department of Agriculture; Economic Development Administration; Department of Interior's Rivers, Trails and Conservation Assistance Program: http://www.nps.gov/orgs/rtca/index.htm.
    - States offer educational materials and programs, such as Illinois: http://www.epa.illinois.gov/topics/water-quality/surface-water/green-infrastructure/index);
    - Local governments/agencies such as Louisville and Jefferson County Metropolitan Sewer District offer education and programs: http://www.msdlouky.org/aboutmsd/rainbarrels.htm)

B. Cost Reduction Strategies

There are many strategies to consider to reduce the cost of GI O&M such as:

- Bulk purchasing
- Choosing and installing plants correctly
- Leveraging job training or targeted hiring funding
- Contracting with lower-cost entities

C. Enabling Legislation

Examples of legislation or regulations that enable practices to support and sustain GI O&M financing include:

- Urban Runoff Drainage Plan, Santa Monica, California: http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Urban_Runoff/UR_Worksheet.pdf
- Standard Urban Stormwater Mitigation Plans
- Urban Runoff Reduction Fee: http://www.eli.org/research-report/lieu-fee-mitigation-model-instrument-language-and-resources
- Off-site Mitigation: http://www.eli.org/land-biodiversity/wetland-and-stream-mitigation-handbook-land-trusts
- Virginia Off-Site Mitigation Location Guidelines: http://www.deq.virginia.gov/Portals/0/DEQ/Water/WetlandsStreams/VA_Offsite_Mit_Guidelines.pdf
- Maryland: http://www.mde.state.md.us/programs/Water/WetlandsandWaterways/Regulations/Pages/programs/waterprograms/wetlands_waterways/regulations/mitigation.aspx
- Watershed Protection Fee (stormwater utility fund)/state-required fund Howard County, Maryland: https://www.howardcountymd.gov/Departments/Public-Works/Bureau-Of-Environmental-Services/Stormwater-Management/Watershed-Management/Protection-Fee

D. Partnerships

Partnerships to support the O&M of GI investments have developed over time to compensate for the limitations in financing. The report referenced below highlights 22 green infrastructure projects funded under the American Recovery and Reinvestment Act and highlights how O&M issues were addressed. There are several good examples of partnerships between local governments and other entities such as utilities in this document. https://www.epa.gov/sites/production/files/2015-04/documents/green_infrastructure-om_report.pdf

Nonprofits and Universities: Example - Sonoran Institute & University of Arizona's "Conserve to Enhance" (C2E) "…Since 2011, sixty pilot participants saved over 2 million gallons of water and donated $2,000 to the restoration of Tucson's Atturbury Wash. Additional private funds contributed via a "donation checkbox" for C2E on the Tucson Water utility bill brought in over $30,000 for local wash restoration and will allow the completion of three projects to enhance neighborhood washes over the coming year. If brought to scale (just 5% of Tucson Water

customers), donations would bring in half a million dollars per year to restore local waterways." http://conserve2enhance.org/

Government Agencies: US Fish and Wildlife; USDA; US Army Corps of Engineers; USEPA, as well as State and Local governments.

Private Entities: Local governments who have access to funds for installation can garner private entities (homeowners) to provide the maintenance of certain kinds of GI on a voluntary basis. Burnsville, MN serves as a clear example of the importance of community engagement and education in projects that rely on private parties for O&M.
http://www.werf.org/liveablecommunities/studies_burns_mn.htm

Transportation: Developing partnerships with state and federal departments of transportation are key to GI projects connected to state and federal roadways. The Green Highways Partnership is an example of an effort to bring green infrastructure to highway construction projects but does not articulate how O&M financing can be established. Localities attempting to install GI in their complete street designs or even minor tree planting efforts face pushback from state transportation departments due to a variety of issues including lack of clarity for funding O&M for the projects.
http://www.greenhighwayspartnership.org/index.php

E. Regulatory Frameworks (e.g. trading mechanisms)

Municipal and Regional Stormwater Management Plans: Finding loopholes in plans; using a Code and Ordinance worksheet; Real Estate Transfer regulations, Zoning and Watershed District Overlays, Concurrency Requirements, Impact Fees, Incentive Zoning.
http://louisville.edu/landuse/Chapter_12_Regulatory_Tools.pdf

The Milwaukee Metropolitan Sewer District (MMSD): a regional agency serving 28 municipalities uses easements on private property or property held by municipalities to give the agency stake in ownership and the ability to thus use capital funds rather than O&M funds that are historically lower since they are based on use rather than property taxes. This works within the regulatory framework that limits how they can use capital funds. Funds based on usage are bound to go down as more water is conserved and large utilities need to rethink financing structures based solely on use. So the GI O&M is written into agreements with the municipalities that they fund as easement agreements that give them the ownership stake mentioned and into maintenance requirement language of the contract; failure to comply makes the partner ineligible for future district funding. The Milwaukee example also highlights the importance of capacity to insure compliance with any new regulatory structure. MMSD is looking at new sensors that help them monitor GI functioning remotely, and shared data entry mechanisms that support real-time data management in the field, not perfect but moving in the right direction. http://www.mmsd.com/

Residential Site Improvement Standards: Zoning ordinances, development codes and design standards, subdivision ordinances, erosion and sediment control ordinances, stormwater management ordinances, parks and open space plans and ordinances.
http://louisville.edu/cepm/projects/sustainable-community-capacity-building/promoting-green-infrastructure-strategies-case-studies-resources

National Complete Streets Coalition: http://www.smartgrowthamerica.org/complete-streets

Appendix

Selected Federal Grants with Green Infrastructure (GI) Operations and Maintenance (O&M) Funding Potential

Community Development

U.S. Department of Housing and Community Development, Community Development Block Grants: HUD's Community Development Block Grant (CDBG) program, established in 1974, is flexible funding that provides communities with resources to address a wide range of community development needs. Larger cities (populations of 50,000 or more) and urban counties (counties with populations of at least 200,000) receive annual funds according to a federal formula. States award federal CDBG allocations to smaller jurisdictions, defined as cities with populations below 50,000 and counties with populations below 200,000. The CDBG program provides annual grants on a formula basis to 1,209 general units of states and local government.

Stormwater management is a permitted purpose of funds awarded. Funds cannot be used for O&M but can be used for the acquisition, construction, reconstruction, rehabilitation, and installation of public facilities and improvements that can be incorporated in a GI, such as trees, parks and playgrounds. CBDG money can also be used for the acquisition and sale of real property, including land. Eligible land acquisition and sale activities include the land purchase price and supporting soft costs, such as legal, survey, appraisal, recordation, and transfer tax expenses. Eligible property sales are those that support national CDBG program objectives.

Workforce Development Opportunities

U.S. Environmental Protection Agency, Environmental Workforce Development and Job Training Grants: These grants can be used to train unemployed, underemployed, or disadvantaged workers for jobs related to wastewater management, including GI design, installation, and O&M. Funds may be used for worker recruitment, training, and placement. Grants are targeted to communities affected by historic disinvestment, health disparities, and environmental contamination. Permissible grantees include local and regional governments; redevelopment agencies; native tribes and consortia outside Alaska; and certain Alaskan native corporations. The fiscal 2015 program budget is $3.4 million, expected to support approximately 17 grants of up to $200,000 each for a three-year period. Grants are typically awarded annually; due to funding shortfalls, however, grants are sometimes awarded on a two-year cycle.

An example for using GI for workforce development or job training opportunities for under employed or disadvantaged workers can be found in Rhode Island, which has one of the highest unemployment rates in the country, still hovering around 6.5 percent. Limited employment opportunities exist for its 18- to 30-year-old population. The Rhode Island Nursery

and Landscape Association (RINLA) has found a way to help young adults and veterans and overcome the problem of lack of operation and maintenance for green infrastructure projects. RINLA's 600-plus members – who represent a diversity of small farms and businesses related to supporting Rhode Island's horticulture, agriculture, and landscape community – have organized to respond to the growing needs resulting from a poor economic environment and an increasing problem associated with green infrastructure.

A recent Department of Housing and Urban Development grant of $2.4 million was given to RINLA and partners from Harvard University, the University of Rhode Island, the Community College of Rhode Island, and a veterans organization called Operation Stand Down, as well as the White House Office of Social Innovation and Civic Participation. The grant will allow RINLA to start a job-training program for adult youth and veterans on ways to implement and manage operations and maintenance of GI projects, specifically in South Kingstown and Newport, Rhode Island. This program will utilize GI experts from RINLA to train a new generation on how to retrofit and redesign community green infrastructure that will allow communities to better weather storms, improve the choices of plant material based on local climate change conditions, and install and maintain plantings properly.

U.S. Department of Labor, American Apprenticeship Initiative: This initiative provides grants to public-private consortia to support apprenticeship training in high-growth industries, particularly those that typically recruit workers under HB-1 non-immigrant visas. The use of green technology and energy-efficiency training within the construction arena can be elements of innovation used to support submission of an application. Information technology jobs related to the operation of a GI program would be eligible for support under the American Apprenticeship Initiative. Grants are also intended to provide training and work experience in high-growth industries to low-skilled populations. Training for entry into professions related to the operation and maintenance of GI might qualify for funding. $100 million in American Apprenticeship grants was to be funded in 2015.

U.S. Department of Labor, Training to Work 3 - Adult Reentry Grants: This program (T2W3) provides job training and employment services to inmates of correctional facilities who participate in work release programs. Grant applicants must be located in high-poverty, high-crime areas. Grants may be used for vocational training and the payment of wages for on- the-job training and work experience activities; participants in the program can also be placed in unpaid work experience roles. T2W3 grants are administered by nonprofit organizations in cooperation with employers. Local governments and GI contractors wishing to train employees with T2W3 funds would be required to partner with a nonprofit grant applicant to receive funding. $27 million in T2W3 funding was available in 2015 to support 20 grants in amounts up to $1,360,000. The cost per participant funded by the grant must be $8,000 or less, although grantees are encouraged to leverage additional funds from other organizations.

AmeriCorps and Corporation for National and Community Service Grants: These agencies have partnered with the Department of Justice to present a green incentivized grant opportunity. The Grants.gov website says:

"This funding opportunity is a program jointly sponsored by the Department of Justice Office of Juvenile Justice and Delinquency Prevention (OJJDP) and the Corporation for National and Community Service (CNCS) to create a Youth Opportunity AmeriCorps. The program is consistent with the missions of OJJDP and CNCS, and within the objectives of the My Brother's Keeper initiative. CNCS defines Opportunity Youth as economically disadvantaged individuals age 16-24 who are disconnected from school or work at least six months prior to service. CNCS defines 'disconnected from school or work' as unemployed, underemployed, and not in school for at least six months prior to service. This program will target Opportunity Youth that have been adjudicated in the juvenile justice system. The program will provide disconnected youth with the opportunity to participate in a national service program and provide them with meaningful mentoring while they are serving. Disconnected youth is defined as individuals at least 17 but under 25 years old who have been adjudicated in the juvenile justice system, convicted in the criminal justice system, or have been identified as at risk of incarceration. Grant funding and member slots will be awarded to successful applicants to enroll disconnected youth to serve as AmeriCorps members. Recipients will also need to enroll additional members to provide mentoring and coaching to the disconnected youth members throughout their service. Programs should target recruitment of two distinct types of AmeriCorps members: 1.) disconnected youth who will be engaged in full-time or less than full-time direct service to address a compelling community need. 2.) Individuals who will have mentoring experience and/or applicable life experience to serve as mentors for disconnected youth. In addition to providing direct service that addresses the community need, these AmeriCorps members will provide direct service as coaches and mentors to guide and to support the successful participation of the Disconnected Youth members in the program and position them for success after their service ends. The program may enroll individuals over age 25 in this capacity, and members may be full-time or less than full-time. Program objectives will include:

- Engaging AmeriCorps members in an evidence-based or evidence-informed approach to provide a service intervention that will result in intended solutions to community problems.
- Matching Disconnected Youth AmeriCorps members with the one-on-one mentoring and support services needed to establish a self-sustaining, law-abiding life and successfully reintegrate into the community.
- Developing and implementing comprehensive and collaborative member development strategies that address the challenges posed by offender reentry, recidivism reduction, and youth at risk of incarceration.
- Stabilizing communities by reducing recidivism and reintegrating offenders into the community. Proposed programs should:

- Establish and maintain a mentoring relationship between the experienced member(s) and the Disconnected Youth AmeriCorps members.
- Be cognizant of and collaborate with other entities that also provide reentry or reentry-related activities. This includes engagement with probation and parole offices for partnerships, collaboration, and sharing of data and information if the members are court involved."

Departments of Labor and Education Release Workforce Innovation and Opportunity Act (WIOA) Draft Regulations for Public Comment: On July 22, 2014, President Obama signed the Workforce Innovation and Opportunity Act (WIOA), the first legislative reform of the public workforce system in more than 15 years. Draft regulations to implement WIOA are available on the Federal Register website. The regulations come in five "Notices of Proposed Rulemaking," which address different aspects of the law.

Opportunity with National Science Foundation and a Cooperative Activity with Department of Energy Programs for Education and Human Resource Development (Request for Supplement):
https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5632&org=NSF&sel_org=XCUT&from=fund

The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide

Rural Assistance

U.S. Department of Agriculture Rural Community Development Initiative: This program provides matching grants of $50,000 to $250,000 to facilitate the provision of technical assistance to nonprofit housing and community development organizations, low-income rural communities or native tribes. The grant amount must be matched by the grantee. The grantee must provide the recipient with technical assistance or training that will allow the recipient to provide new functions or expand existing functions related to housing, community development, community facilities, or economic development, including sustainable development activities. Subjects on which technical assistance can be offered include, but are not limited to, organizational management; accessing alternative sources of financing; developing training programs; and procuring up to $10,000 in computer equipment, software, and printers to support program execution. Grant funds must be expended within three years of the award.

U.S. Department of Agriculture Water & Waste Disposal Loan and Grant Program. While USDA's water and waste assistance program primarily provides long-term, low-interest loans for rural areas, project grants are provided as funds permit. Project monies can be used for rural stormwater management, including startup operations and maintenance; and the purchase or rental of equipment to operate, maintain extend or protect facilities; and the

enlargement, extension, or improvement of existing facilities. Eligible applicants include most local and state jurisdictions, private nonprofit organizations, and native tribes.

U.S. Department of Agriculture, Water and Waste Disposal Training and Technical Assistance Grants: Nonprofit organizations may apply for training and technical assistance reimbursement grants related to the sourcing, collection, storage, treatment, distribution, and disposal of water and waste in rural areas. Program support includes technical assistance and training to improve system management, operations, and maintenance. Grantees apply for funding on a national, regional, or local basis and provide support to rural towns and areas and on tribal lands.

Transportation

U.S. Department of Transportation, Transportation Investment Generating Economic Recovery (TIGER) Grants: TIGER grants, awarded competitively, provide discretionary funding for up to 20 percent of the planning and/or capital expenditures for significant transportation projects, including highways, bridges, public transit, pedestrian/bicycle projects, passenger freight systems, ports, and multi-modal uses. A key ranking criterion is environmental sustainability, and GI development can be included in funded projects. TIGER grants provide an opportunity for local governments to plan, construct, or expand GI programs in the context of surface transportation or broader development projects with a surface transportation component. Eligible grantees include state and local governments, tribes, regional and multi-jurisdictional authorities, and planning organizations. Grantees must procure at least 80 percent of project financing from non-TIGER sources, including the private sector. From 2009 to 2014, the TIGER grant program provided $4.1 billion to 342 projects in all 50 states, the District of Columbia, and Puerto Rico. $500 million in funding for TIGER grants was announced for award in 2015.