

Promoting Green Infrastructure: Strategies, Case Studies, and Resources

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Funding and Finance Strategies

Stormwater fee/ utility

“A stormwater utility or fee is a dedicated and separate fund created to pay for stormwater management, planning, and outreach activities within a specified area. A fee can be collected on a separate bill, added to a water collection bill, or added to the property tax bill. Usually an ordinance is passed by the council or commission for approval.”¹

Benefits of a stormwater fee:

- It is a dedicated source of funding for a community’s stormwater management program.
- It is generally considered equitable or fair, in that users pay for the stormwater services they receive, especially if the fee structure is based on variables like amount of impervious surface, property size, and land use type.
- Discounts or offsets can be provided to low-income residents, further ensuring the fee’s equitable
- Tax-exempt properties like universities, hospitals, and places of worship are required to pay the fee, helping ensure that these (often large) institutions help cover the cost of providing services to them.
- If a credit or reduction is offered, the fee can become an incentive for green infrastructure stormwater management on private property. See next section.
- It is easier for the municipality to institute than other forms of funding. “In many communities, new taxes require a vote of approval by the public, while a fee is a charge that municipalities have the authority to leverage for the services they provide.”²

Considerations for structuring a stormwater fee, so that it achieves desired objectives without causing harmful unintended consequences:

- Set rates so that the fee provides adequate revenue to achieve stormwater goals. If the fee is unreasonably high, it will not be supported. If it is too low to cover needs, promised benefits will not materialize and support will erode.
- Start with a thoughtful outreach campaign that generates enthusiasm for the community’s stormwater vision. No one wants new fees or taxes, but if residents appreciate the benefits they will receive, they are more likely to support the fee.
- Be sure that the greatest costs are directed toward those who create the most runoff, i.e. commercial and industrial facilities with large areas of impervious cover, rather than residential and other properties with low impervious cover.³
- Ensure the fee does not harm low-income residents, as in Detroit, where an increase in stormwater fees caused some low-income residents to be unable to pay their water bill and have their water turned off. Sliding fee scales, bill discounts, crisis vouchers, and zero interest loans for qualified customers are options to consider.⁴

Case study: Philadelphia, PA

“Like many large cities, Philadelphia has witnessed a significant increase in stormwater management costs over the past several years. In an effort to comply with state and federal regulations, the city has incurred substantial capital expenditures and operating costs to maintain its aging stormwater infrastructure. In addition, the city will need to invest hundreds of millions of dollars over the next decade to reduce the frequency of combined sewer overflows.

“To help offset these tremendous costs, the Philadelphia Water Department recently decided to revise its stormwater fees. For years, the Water Department recovered the costs of operating and maintaining stormwater infrastructure through a service charge collected from metered customers. Under this system, properties with larger water meters - such as commercial and industrial facilities - paid a higher service charge. While this fee structure may seem reasonable, it has one major drawback in that non-metered properties such as parking lots and utility right-of-ways have not had to pay a stormwater fee.

“The Water Department convened a Citizens Advisory Council to make recommendations for improving the city’s stormwater fee. This group of stakeholders recognized that impervious cover is the primary factor in determining the amount of runoff a property will generate. As a result, 80 percent of the city’s new stormwater fee is based upon a property’s impervious area, with the remaining 20

¹ University of Maryland Environmental Finance Center website. Accessed 5/17/12: <http://www.efc.umd.edu/SFOUfinoptions.html>

² US Environmental Protection Agency. 2009. Managing Wet Weather With Green Infrastructure Municipal Handbook: Funding Options, p. 2. Accessed 5/16/12: http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

³ US Environmental Protection Agency. 2009. Managing Wet Weather With Green Infrastructure Municipal Handbook: Funding Options, p. 2. Accessed 5/16/12: http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

⁴ Ibid.

percent based upon the property's gross area. In this way, stormwater fees will reach non-metered customers such as rail lines, parking lots and utility right-of-ways that account for significant impervious space (and stormwater runoff) within the city.

"Philadelphia offers a stormwater fee discount for customers who reduce impervious cover using green infrastructure practices, including rain gardens, infiltration trenches, porous pavements, vegetated swales, and green roofs. If a property is retrofitted with any of these features, the Water-Department will re-calculate that property's stormwater fee based on the 80/20 impervious/gross area formula.

"The Water Department is planning to implement this new fee among its large-meter non-residential customer base over a four year period beginning in FY 2009. However, for residential and other small-meter customers, the City recognized that a detailed analysis of each of the City's 450,000 residential properties would be administratively complex and have chosen not to implement this level of detail for an impervious-based billing program at this time. As a result, all residential properties have been combined and treated as a single land parcel with the total costs of the 80/20 calculation divided equally among all households. Under this new fee system, stormwater costs will be spread out and shared over a larger customer base, and calculations show that the majority of customers will see a reduction or otherwise minor impact on the stormwater component of their water and sewer bills. For those customers that experience a noticeable increase in their fees, the Water Department will provide site-design recommendations that will decrease the amount of impervious area on their properties and thus decrease their stormwater fees."⁵

Additional case studies

- Takoma Park, MD: <http://www.takomaparkmd.gov/publicworks/stormwater.html>
- Rockville, MD: <http://www.rockvillemd.gov/residents/swm/>
- Portland, OR, Toledo, OH, and Lenexa, KS:
http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

Resources

- New England Environmental Finance Center. 2005. *Stormwater Utility Fees: Considerations and Options for Interlocal Stormwater Working Group*. <http://efc.muskie.usm.maine.edu/docs/StormwaterUtilityFeeReport.pdf>
Provides guidance to decision makers on the development and implementation of a stormwater utility. Includes a detailed discussion of 11 important considerations for establishing a stormwater utility, including start-up strategy, user fee structure, organizational structure, and fee basis and data collection, as well as various options for each category.
- Environmental Finance Center, University of North Carolina. 2010. Stormwater Utility Dashboard. <http://www.efc.unc.edu/tools/NCStormwaterDashboard.html>
Allows users to compare residential and non-residential stormwater fees charged in 2010 by all of the NC stormwater utilities. Comparisons are made across subgroups of utilities with similar characteristics, such as location, EPA phase, rate structure, and customer income levels.
- Florida Stormwater Association. 2003. *Establishing a Stormwater Utility In Florida*. <http://www.florida-stormwater.org/content.asp?contentid=53>
Developed to assist communities that are considering the development and implementation of a stormwater utility as a means of providing supplemental or alternative funding for their stormwater management program. The manual is written for citizens, elected officials, and city or county administrators and staff who want to understand the issues, benefits and community investment associated with stormwater utilities.
- US Environmental Protection Agency. 2009. *Managing Wet Weather With Green Infrastructure Municipal Handbook: Funding Options*. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf
Includes considerations for setting up a stormwater fee or utility.
- Black and Veatch. 2007. *Stormwater Utility Survey*. http://www.bv.com/Downloads/Resources/ems_brochures/rsrc_2007StormwaterUtilitySurvey.pdf

Municipal infrastructure bonds

Municipal debt has a long and storied history dating back to Renaissance Italy when city-states borrowed from wealthy families to finance infrastructure.⁶ In the U.S. the first carefully recorded use of municipal bonds took place in New York city in 1812 to allow the

⁵ Ibid.

⁶ Temel, Judy. *The Fundamentals of Municipal Bonds*. (New York: John Wiley and Son, 2001), 55.

city to build a canal.⁷ These instruments are widely used, with local debt per person averaging \$2,704 per person. Municipalities can finance green infrastructure projects by contracting debt. “General obligation bonds are a method of financing debt that traditionally carries low interest rates because the County/City pledges its full faith and credit to the repayment of the bonds. Bonds are usually voted on by the public at large and then put into a Capital Improvement Program.”⁸ General obligation bonds backed by the full faith and credit of the state or local government are termed unlimited tax bonds.⁹ Limited tax bonds are used when the issuers constitution or statutes limit the issuer’s taxing power.¹⁰

Another option is a revenue bond. Revenue bonds are sold for revenue generating projects such as water treatment facilities.¹¹ These bonds generally carry a higher interest rate because they are not as secure as a general obligation bond since they are not backed by government taxing power.¹² When a government pledges its taxing power for additional security the bond is considered double-barreled.¹³ One potential advantage of revenue bonds is that often there a voter referendum is not required for issuance.¹⁴

The first step in the bond issuing process is a Capital Improvement Plan (CIP).¹⁵ A CIP will take into account capital and operational needs with attention to current needs and policy considerations.¹⁶ These considerations are used to create a 5-10 year CIP.¹⁷

Political requirements for plans will differ depending on local laws. Sometimes voter approval is required. In some municipalities enabling legislation must be passed to create a new authority to issue bonds.¹⁸ The next step is to assemble a financing team of professionals including a legal advisor, financial advisor, and an underwriter.¹⁹ This team will then work within the bounds of state laws to determine remaining details of the bond sale and to create the documents required.²⁰

| Case study: Raleigh, NC

<http://www.raleighnc.gov/arts/content/PRecDesignDevelop/Articles/ParksandGreenwayFunding.html>

Raleigh, credited with one of the first comprehensive greenway systems in the country.²¹ With a population of 276,093 the city has 8,990 acres of park land, totaling nearly 10 percent of the city’s land area. Raleigh pays for its comprehensive greenway systems, one of the earliest in the nation, with bonds approved by voters every few years since 1981.²² This initiative is part of the city’s Capital Improvement Program (CIP) which is updated every five years.²³

The Raleigh City Council approves potential projects proposed by the Parks and Recreation Department that are then put on a ballot for voter approval.²⁴ The city is authorized under North Carolina law to issue bonds valued at up to two thirds of the amount by which the municipality reduced its outstanding general obligation indebtedness in the previous year.²⁵ Funding earned through this process, along with minimal municipal funding, grants and donations provides funding for this large green infrastructure project.²⁶

Development review and impact fees

⁷ Ibid.

⁸ University of Maryland Environmental Finance Center website. Accessed 5/17/12: <http://www.efc.umd.edu/SFOUfioptions.html>

⁹ Ibid.

¹⁰ Ibid.

¹¹ Ibid.

¹² [Temel, 58.](#)

¹³ [Ibid.](#)

¹⁴ Temel, 58

¹⁵ [Temel, 62.](#)

¹⁶ [Ibid.](#)

¹⁷ [Ibid.](#)

¹⁸ [Ibid.](#)

¹⁹ Temel, 63.

²⁰ Temel, 63-64.

²¹ Merriam, Dee. *Urban Green Infrastructure: A Study of Implementation Strategies*. Jan. 31, 2011. Accessed 6/7/2012:

http://smartech.gatech.edu/jspui/bitstream/1853/38253/1/DeeMerriam_Urban%20Green%20Infrastructure.pdf, 31

²² Ibid.

²³ City of Raleigh, *Funding for Parks and Greenways*. May 15, 2012. Accessed June 7, 2012:

<http://www.raleighnc.gov/arts/content/PRecDesignDevelop/Articles/ParksandGreenwayFunding.html>.

²⁴ Ibid.

²⁵ Ibid.

²⁶ Ibid.

Fees tied to new development are based on the impact it has on public infrastructure such as roads, schools, and utilities. Called impact fees or plan review and permitting fees, these fees represent “an alternative to providing the needed public improvements rather than letting the improvements lag behind or putting the burden upon taxpayers by increasing taxes. The purpose of these charges is to shift a pro rate share of public capital improvement costs to the developments that create the need for those improvements.”²⁷

Special assessment fees can be used to discourage development in environmentally sensitive areas or other land integral to the community’s green infrastructure plan. In addition, “some communities are charging private properties a “fee-in-lieu” of on-site water quality treatment, wherein developers no longer implement on-site water quality treatment practices but instead pay into a fund that the municipalities can use to finance green infrastructure projects in priority areas.”²⁸

Case study: Lenexa, KS

“In 2004, the Lenexa City Council adopted the Systems Development Charge to require new development to pay a one-time fee at the time of building permit as a means for recovering costs for capital improvement activities within the Rain to Recreation program so that growth pays for growth. Although all public projects incorporate water quality treatment and protection into all new city facilities, the focus of this fee is to systemically address water quantity needs through construction of regional retention facilities and necessary capital improvements to streamways, many of which are protected by the City’s stream setback ordinance.

“Some other cities refer to this as a ‘fee in lieu’ of requiring developers to construction detention areas on new development sites (and in this case detention of the 100 year (1% storm) event), and instead directs the money towards projects that have wider public benefit beyond just water quality treatment. Because new developments are contributing to the problems of water quantity, Lenexa has required that they pay into the pool of funds used to build new projects, including the construction of regional watershed management, multi-use lakes, wetlands and stream restorations.”²⁹

Dedicated taxes and fees

Another way municipalities can finance green infrastructure projects is through the addition of a stormwater tax. Requiring approval by City or Council Council or by voters via referendum, stormwater taxes are often added to and collected along with the property tax bill. “The tax is usually a general fund collection but can then be redistributed into a special stormwater fund. This money is not necessarily dedicated, however, and may be reallocated to other pressing community needs.”³⁰ Advantages of a tax include that it is relatively easy to administer and that it may be tax deductible.

Other dedicated fees include real estate taxes and capital cost recovery fees... NEED MORE HERE.

Case study: Lenexa, KS

“Lenexa taxpayers voted for a ballot in 2000 to add a 1/8 of a cent sales tax levy to support building stormwater facilities that repair existing infrastructure problems and protect against future flooding events. The sales tax passed by a 78% margin. It generated \$7.2 million between 2000 and 2005 and sunsets in 2010. The sales tax levy supports a frontloaded capital improvement program.”³¹

Loans and grants

“Loans and grants are not considered stable or long-term solutions or fixes. They can be useful, however, as seed funding or as funding for pilot projects. Depending on loan and grant funding to support a stormwater program is not highly recommended as the funds are not sustainable, are subject to change from year to year, and are often competitively won.”

²⁷ Ibid.

²⁸ US Environmental Protection Agency. 2009. Managing Wet Weather With Green Infrastructure Municipal Handbook: Funding Options, p. 10. Accessed 5/22/12: http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

²⁹ US Environmental Protection Agency. 2009. Managing Wet Weather With Green Infrastructure Municipal Handbook: Funding Options, p. 10. Accessed 5/22/12: http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

³⁰ University of Maryland Environmental Finance Center website. Accessed 5/17/12: <http://www.efc.umd.edu/SFOUfinoptions.html>

³¹ US Environmental Protection Agency. 2009. Managing Wet Weather With Green Infrastructure Municipal Handbook: Funding Options, p. 9. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

A variety of federal and state loan programs are available to pay for green infrastructure, including Community Development Block Grants administered by the US Department of Housing and Urban Development as well as funding under Section 319 of the Clean Water Act (see Funding and Finance Resources at the end of this section for more resources). One of the largest and most readily available sources is the US Environmental Protection Agency Clean Water State Revolving Fund (CWSRF).

NEED TO PARAPHRASE / SHORTEN:

“The CWSRF is a powerful financing program that provides funding for wastewater treatment, stormwater management, nonpoint source abatement and estuary protection projects. Today, all 50 states and Puerto Rico operate successful CWSRF programs that have provided over \$63 billion in financial assistance since 1988, with funding generally provided in the form of low interest loans. In 2007 alone, \$5.3 billion was provided to fund a wide variety of projects that protect or improve national water quality. At present, only a small percentage of the CWSRF has been used for green infrastructure projects; however a growing number of states are beginning to implement green stormwater technologies with CWSRF loans.

“The working framework of the CWSRF is relatively simple. Each year, funds to establish or capitalize the CWSRF program are provided to states through EPA grants. In addition, states add matching funds which are then loaned to a wide variety of water quality improvement projects. Although there is no federal requirement to do so, these loans are usually paid off over 20 years or the useful life of the project - which ever is less - with repayment commencing within one year of project completion. To complete the cycle, loan payments, interest and new capitalization grants are reincorporated into the fund and used for new projects. This is the basis of the revolving funding program.” (EPA Handbook 11)

“Under current regulations, the CWSRF can fund only the “capital costs” of a water quality improvement project. However, the CWSRF’s definition of capital costs is very broad. In addition to traditional infrastructure expenditures on pipes, pumps and treatment plants, capital costs also include things like land conservation, tree plantings, equipment purchases, environmental cleanups and even the development and initial delivery of environmental education programs. One of the few things the CWSRF cannot fund is the operation and maintenance costs of a project, such as periodic cleaning of pervious pavement. Some examples of green infrastructure projects that are eligible for CWSRF include: land conservation, reforestation, tree boxes, cisterns & rain barrels, downspout disconnections, wetland restoration, parks & greenways, rain gardens & bioinfiltration practices, permeable pavements, green roofs.” (EPA Handbook 12-13)

Case study: Ohio Clean Water SRF Program

“The Ohio CWSRF program recently provided over \$1.1 million in low interest loans to Hidden Creek, Ltd., a residential development company, to fund the installation of a variety of green infrastructure practices that protect the Big Darby Creek watershed – one of the highest-quality aquatic ecosystems in the United States. Home to 25 rare or endangered species, this watershed encompasses 557 square miles in central Ohio and has been recognized as one of The Nature Conservancy’s “Last Great Places” in the western hemisphere.

“When a large tract of highly sensitive agricultural land within this watershed was put up for sale, Hidden Creek Ltd. bought the property and designed a housing project to demonstrate that development can be both environmentally sensitive and financially profitable. With the help of CWSRF funds, a comprehensive set of actions were taken to limit the amount of runoff generated from the development project, including the construction of vegetated swales for stormwater treatment, restoration of wooded stream buffers, and the establishment of emergent wetland habitat. In addition, 230 acres of the riparian stream corridor within the development have been protected via a conservation easement held by the Natural Resources Conservation Service. A program has also been developed to educate homeowners and housing contractors about watershed protection and related deed restrictions attached to each property. Hidden Creek, Ltd. received a national wetland award for land stewardship and development from the Environmental Law Institute for their watershed protection efforts, and has repaid the CWSRF loans with revenues from the sale of the housing lots.” (EPA Handbook 13-14)

Resources

- Clean Water State Revolving Fund. 2008. *Green Infrastructure Approaches for Managing Wet Weather with Clean Water State Revolving Funds*. http://www.epa.gov/owm/cwfinance/cwsrf/green_if.pdf
Fact sheet identifying several ways in which states, communities, and individuals can use the Clean Water State Revolving Fund (CWSRF) to finance green infrastructure projects.
- Massachusetts Department of Environmental Protection State Revolving Fund program information. <http://www.mass.gov/dep/water/wastewater/wastewat.htm>

Private donations and sponsorships

Private funds may be available to fund green infrastructure projects, especially demonstration or pilot projects in public places. Corporate sponsorships will be most effective if the business received publicity through signage, media attention, or other outreach. Nonprofit organizations concerned with water quality or habitat may be helpful in recruiting donations from their members. NEED MORE HERE.

Case study: Portland, ME

Private donations from individuals and businesses supported the installation of a demonstration rain garden along the tidal Back Cove in Portland, Maine. A 3.5 mile recreational trail lining the Cove is heavily used by walkers, joggers, and cyclists, making the highly visible location idea for a demonstration project. Donations were collected by a local nonprofit and the project was managed by the Cumberland County Soil and Water Conservation District, with volunteers providing much of the labor needed for construction and maintenance. The project's popularity led to the installation of a second rain garden adjacent to the trail's parking area, which was designed and funded by Stantec, a national engineering firm with local offices. Signage at the rain gardens provides educational opportunities as well as visibility for corporate sponsors (learn more: <http://www.pressherald.com/life/homeandgarden/rain-garden-gives-city-a-green-way-to-stop-flow-of-pollution-2010-07-04.html>).

Case study: Lynchburg, VA

Lynchburg Virginia's new corporate sponsorship program is funding the installation of demonstration rain gardens in prominent public places throughout the City. Each garden is funded by a local business, which is credited on nearby signage. MORE HERE?

Resources

Title	Link	Date	Author	Type	Description
Federal Funding Resources	http://water.epa.gov/infrastructure/greeninfrastructure/gi_funding.cfm	Ongoing	US Environmental Protection Agency	Website	Lists potential federal funding sources for green infrastructure projects.
Stormwater Financing Workshops	http://www.efc.umd.edu/swlidfinancing.html	2009 and 2007	Environmental Finance Center, University of Maryland	Workshop presentations	University of Maryland Environmental Finance Center hosted three workshops on financing stormwater management programs. Presentations are available for download.
Stormwater Financing Options	http://www.efc.umd.edu/SFOUfinoptions.html	Ongoing	Environmental Finance Center, University of Maryland	Website	Overviews stormwater financing options, including utilities, fees, taxes, bonds, loans, grants, and unconventional funding structures. Provides case studies for each.
Stormwater Financing Presentations	http://www.efc.unc.edu/projects/stormwater.htm	2008 - 2010	Environmental Finance Center, University of North Carolina	Workshop presentations	University of North Carolina Environmental Finance Center hosts workshops and trainings on how to plan and fund stormwater programs and watershed protection efforts. Downloadable presentation slides provide an overview of funding and financing options, including fees, mitigation banks, nutrient trading, and state revolving funds.
Financing Alternatives Comparison Tool	http://water.epa.gov/grants_funding/cwsrf/fact.cfm	Ongoing	US Environmental Protection Agency	Online tool	A financial analysis tool that helps identify the most cost-effective method to fund a wastewater or drinking water management project. This tool produces a comprehensive analysis that compares various financing options for these projects by incorporating financing, regulatory, and other important costs.
Municipal Handbook: Funding Options	http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_municipalhandbook_funding.pdf	2009	US Environmental Protection Agency	Handbook	Describes strategies and provides case study examples of how local governments are generating reliable funding for green infrastructure.

Regulatory Strategies

Zoning and subdivision regulations

Audit and amend codes!

“Typically there are many places in your codes and ordinances that directly or indirectly deal with stormwater and green infrastructure. Doing a systematic review or audit of your codes and ordinances can be one way to plan and prioritize updating of your local ordinances”³²

“In some cases, staff in a local environmental department may be interested in promoting green infrastructure, but existing requirements in comprehensive plans, zoning codes, and building standards may be silent on, ambiguous towards, or even in conflict with the principles of green infrastructure. Zoning density standards, storm sewer connection requirements, and minimum parking and road widths are just a few of the requirements that can limit opportunities for green infrastructure. The following steps can help municipalities remove some of these obstacles from local codes and ordinances.

- Conduct an audit of local codes and ordinances: Several audit tools are available to help municipal leaders identify the barriers to green infrastructure in local codes and ordinances and collaboratively develop solutions. These audit tools include the Center for Watershed Protection’s Better Site Design Codes and Ordinances Worksheet and the EPA’s Water Quality Scorecard. EPA’s recent webcast on Updating Local Codes to Cultivate Green Infrastructure also includes many tips on identifying provisions that do not support green infrastructure.
- Amend local codes and ordinance: By integrating the principles of green infrastructure into stated goals and adding language that provides flexibility for green infrastructure, municipal leaders can craft codes that facilitate green infrastructure approaches. EPA’s webcast on Updating Local Codes to Cultivate Green Infrastructure provides many examples of amendments to statements of purpose or intent, as well as to curb and landscaping requirements. As a rule of thumb, “anything with the words ‘roof,’ ‘curb,’ ‘edge,’ or ‘tree’ needs to be audited.” ³³

Types of ordinances to review when doing an audit:

- Zoning ordinances
- Development codes
- Subdivision ordinances: communities can allow for flexible subdivision designs via planned development provisions, as well as provisions for conservation development (which can specify requirements for percentage open space)
- Erosion and sediment control ordinances
- Stormwater management ordinances
- Parks and open space planning³⁴

Things to look for:

- Dimensional standards: lot size, frontage, height, coverage, yards, parking
- Building codes and public works standards: drains, roads, sewers
- Landscaping, buffers, trees, and tree canopy (landscaping and planting requirements)
- Site plan review
- Maintenance requirements found in subdivision, site plan, CC&Rs, stormwater ordinance, utility, enforcement (??)
- Stormwater drainage and detention
- Soil erosion and sediment control
- Floodplain management
- Stream and wetland protection
- Natural area protection and management
- Landscaping standards

³² US Environmental Protection Agency, Region 5. 2011. Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management webinar. http://water.epa.gov/infrastructure/greeninfrastructure/gi_training.cfm

³³ US Environmental Protection Agency. 2012. Green Infrastructure Website: How Can I Overcome the Barriers to Green Infrastructure? http://water.epa.gov/infrastructure/greeninfrastructure/gi_barrier.cfm

³⁴ US Environmental Protection Agency, Region 5. 2011. Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management webinar. http://water.epa.gov/infrastructure/greeninfrastructure/gi_training.cfm

- Street and parking requirements (impervious area reduction)
- Conservation design (look in zoning and subdivision codes)³⁵

Integrate GI into the whole planning and permitting process:

- Comp plan (goal setting, how we describe “ideal” spaces, whether we connect spaces to hydrology) -- Any feature of the natural environment that provides ecological services to the community is a fit topic for a green infrastructure element. The community must have a full picture of the value and utility of its natural resources.
- Zoning codes
- Development/ plan review: who reviews what?
- Negotiation among departments
- Enforcement: what gets enforced?
- Site management³⁶

WHO needs to be educated:

- Planning and zoning staff who write the plan and regulations, negotiate with applicants, and write staff reports
- Consulting engineers who prepare plans
- City Engineer, Fire Chief, Public Works who review plans
- Appointed boards who ultimately approve applications³⁷

Conducting a code audit – first steps

- Goal: reduce total impervious cover (per parcel, per project), put formal stormwater controls in place, implement surface water setbacks
- Zoning strategies: require compact development and reduced parking, allow conservation development, implement erosion and sediment control, SWPP/ stormwater ordinances, flood hazard mitigation, stream/ wetland setbacks.³⁸

Conducting a code audit – more advanced

- Goals (LID principles): disconnection, permeability, landscape for ecological function, tree canopy restoration, open space area management, assigning responsibility
- Coding cousins: zoning (dimensions, uses, procedures), design districts, public works standards, stormwater design manuals/ regs/ ordinances, tree ordinances, municipal (what??), building codes (“Updating local codes” webcast)
- Make sure the following can be approved (by right!): sidewalk/ parking lot bioretention areas, permeable pavements and surfaces, planter boxes, rain barrels, rainwater harvesting, multi-use stormwater treatment systems/ restoration areas, xeriscaping/ landscape changes, green streets, green walls & roofs

Conducting a code audit – even more advanced

- Zoning drives location of SW facilities on a site
 - Regulator confidence in maintenance affects types of facilities allowed
 - Soil assumptions in SW regs affect design options, sizing
 - WQv determines sizes for storage & basins, affect use of LID
- LOOK AGAIN at the code + reg formulas, so that better outcomes can happen!

Case study: Cleveland Heights OH³⁹

In 2010, Cleveland Heights Department of Planning and Development hired a consultant to review the City’s zoning code and other regulations to remove barriers and encourage ecological practices in land development and building construction. The review process included two main phases, the first designed to engage the public and the second to develop an easily understood and administered document. Overall objectives of the sustainability audit included decreasing water consumption, reducing impervious surfaces, increasing tree and vegetation coverage, increasing biodiversity, reducing landfill dumping and encouraging energy efficiency and clean modes of transportation.

³⁵ US Environmental Protection Agency, Region 5. 2011. Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management webinar. http://water.epa.gov/infrastructure/greeninfrastructure/gi_training.cfm

³⁶ Ibid.

³⁷ Ibid.

³⁸ Ibid.

³⁹ Ibid.

Consultants and city staff reviewed general zoning provisions as well as specific provisions for large-scale developments, residential districts, commercial districts, accessory structures and uses, principal uses, parking standards, and landscape and water conservation. The final report made the following recommendations:

- Large-scale development process: expand planned development to include sustainable benefits: energy efficient buildings, conservation easements, innovative water management, public infrastructure improvements (complete streets, bike lanes), public open spaces, public plazas, public art, accessible / ADA compliant units, proper solar orientation
- Residential districts: changes to lot coverage, impervious surface, parking requirements, and yard additions (?)
- Commercial districts: encourage pedestrian-oriented, compact design, transparency along street frontages, bike access and storage, connections to surrounding areas, high quality, sustainable building materials, proper landscaping
- Accessory structures and uses: allow structures and uses that encourage alternative energy production (solar, thermal, wind), water and energy efficiency (rain barrels, cisterns, clotheslines, rain gardens), and local food production (greenhouses, chicken coops, etc)
- Parking standards: adjust parking demand formulas, include *maximum* number of parking spaces rather than minimum, allow land banked parking, update shared parking flexibility, reduction in parking for car-sharing programs, allow car sharing in parking lots and structures, allow compact spaces, allow parking for charging of electric vehicles, allow semi-pervious material for paving, require parking lots over a certain size to use semi-pervious materials for a percentage of the parking lot, where parking lot exceeds minimum and meets maximum pave excess with semi-pervious materials, landscape standards, encourage retention basins, require bike parking in new lots, design & siting requirements for bike parking, flexibility allowing racks in the public right-of-way where space is available
- Landscape and water conservation: minimum installation sizes for all plant types, allow for naturalized lawns, native landscapes and gardens, species diversity requirement, require native plant species, establish recommended and prohibited plant lists

More information: http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_webinar_part4.pdf

Read the Sustainability Audit: http://www.clevelandheights.com/citydept_dev_sustainabledevelopmentpractices.asp

Case study: Seattle WA's Green Factor⁴⁰

- Simple points-based landscape requirement with easy-to-use calculator
- Incentives built into point system: larger plants, permeable paving, green roofs, vegetated walls, layering of vegetation in public right-of-way, food cultivation, native and drought-tolerant plants, rainwater harvesting
- One of a very few zoning approaches that can be copied easily across jurisdictions
- http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_webinar_part5.pdf

Design guidelines

Design guidelines for GI stormwater management facilities that would work in the NE, especially green streets, green roofs, and green parking lots

Develop design guidance: To remove all trace of ambiguity towards the use of green infrastructure, municipalities can supplement language providing flexibility for green infrastructure with design guidelines demonstrating acceptable green infrastructure designs. Design guidance can also introduce engineers and public works staff who are unfamiliar with green infrastructure to these techniques

Two approaches:

- 1) Adopting guidance: LID design manuals. Provides flexibility, but makes clear statement of the intent to use LID; often a 'kinder, gentler' way to introduce these techniques, especially to engineers / Departments of Public Works; usually still allow some discretion or wiggle room to use conventional techniques
- 2) Adopting standards: Alternative or Green Street Standards. Makes it crystal clear what's allowable, takes uncertainty out, can be as inflexible as the originals, especially if design standards, products, or regulations change

Resources

Find some good design manuals from NE (EPA GI website)

⁴⁰ US Environmental Protection Agency, Region 5. 2011. Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management webinar. http://water.epa.gov/infrastructure/greeninfrastructure/gi_training.cfm

Municipal / Department of Public Works policy statement

Green standards for street replacement/ repaving?

Resources

Title	Link	Date	Author	Type	Description
Green Infrastructure Case Studies	http://www.epa.gov/owow/NPS/lid/gi_case_studies_2010.pdf	2010	US Environmental Protection Agency	Case studies	Examines the policies adopted by 12 local governments that have successfully promoted green infrastructure, as well as the policy drivers and policy outcomes. A menu of policy options is presented and barriers and lessons learned are summarized.
Water Quality Scorecard	http://www.epa.gov/smartgrowth/pdf/2009_1208_wq_scorecard.pdf	2009	US Environmental Protection Agency	Online tool	A program evaluation tool that local governments can use to collaboratively identify the barriers to green infrastructure in local codes and ordinances. The scorecard guides municipal staff through 230 policies, codes, and incentives that could be adapted to promote sustainable stormwater management. The scorecard also provides extensive references and case studies.
Managing Wet Weather with Green Infrastructure Municipal Handbook	http://water.epa.gov/infrastructure/greeninfrastructure/gi_policy.cfm	2008	US Environmental Protection Agency	Handbook	Provides local governments with a step-by-step guide to growing green infrastructure in their communities. Chapters address funding options, retrofit policies, green streets, rainwater harvesting, and incentive mechanisms. Each chapter provides a discussion of available programs and policies and several case studies.
Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management	http://water.epa.gov/infrastructure/greeninfrastructure/gi_training.cfm	2011	US Environmental Protection Agency, Region 5	Webcast	Describes the interaction of zoning and building codes with water quality; presents several examples of code audits conducted in Illinois, Ohio, and Minnesota; and highlights the top 10 obstacles to green infrastructure in local codes and ordinances.
Top Ten Green Infrastructure Issues in Plans and Codes	http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_webinar_part5.pdf	2011	Tetra Tech	Webcast slides	Part of the webcast listed above "Using Local Codes to Cultivate Green Infrastructure." Identifies common code barriers in local codes and ordinances, and offers solutions.
Revising Local Plans, Codes, and Ordinances	http://cfpub2.epa.gov/npdes/courseinfo.cfm?program_id=0&outr each_id=409&schedule_id=1045	2009	US Environmental Protection Agency	Webcast	One of six two-hour webcasts on green infrastructure offered by EPA in the spring and summer of 2009. Presented by Abby Hall of US EPA, Chris Kloss of the Low Impact Development Center, and Bill Davis of Progressive Design and Planning.
Conservation Design Resource Manual	http://www.chicagowilderness.org/sustainable/conservationdesign/Manual/Conservation_Design_Resource_Manual.pdf		NIPC and Chicago Wilderness	Design manual	
Code and Ordinance Worksheet	http://www.cwp.org/documents/cat_view/77-better-site-design-publications.html		Center for Watershed Protection	Worksheet	
Low Impact Development Strategies and Tools for NPDES Phase II Communities	http://www.lowimpactdevelopment.org/lidphase2/	Ongoing		Website	Contains various resources to assist stormwater Phase II communities integrate low impact development (LID) strategies into their compliance programs.

Incentive Strategies

Stormwater fee discounts

An effective way to encourage stormwater management on private property is to reduce stormwater fees in exchange for desired green infrastructure practices, such as reducing impervious cover or installing rain barrels, rain gardens, or trees. “Fee discounts and credits provide an opportunity for property owners to reduce the cost of their stormwater fees by using green infrastructure techniques that limit impervious cover and reduce the amount of runoff generated. The public system clearly benefits when property owners manage stormwater runoff on site. If less water enters the sewer system, less money needs to be spent on treatment, maintenance, and operation expenditures. Further, discounts and credits support the fee-for-service system because property owners can reduce the amount they pay by reducing the service they receive.”⁴¹

Case study: Portland, OR’s Clean River Rewards program

“Clean River Rewards is the most recently updated version of the stormwater discount program. Launched in 2006, it provides discounts to property owners based on the extent and effectiveness of on-site stormwater management practices that control flow rate, pollution and disposal. Because the on site portion of the stormwater bill is only 35%, this is the maximum discount received for full on site management. Different forms and requirements apply to two ratepayer categories, either single-family homes or commercial, industrial, and multi-family homes. The process for registering is very simple and straightforward, can be done entirely online and requires only the property owner’s signature for certification.

“Single-family homes are given a stormwater discount based on roof runoff management. Property owners are given a checklist to choose what type of on-site management qualifies them for the discount. For example, different percentage discounts are given for disconnecting downspouts and depending on the type of practice collecting runoff, such as a drywell, swale or rain barrel. Partial credit is also given for ecoroofs, four or more trees over 15 feet tall and for properties with less than 1,000 square feet of imperviousness. To date, over 35,000 residential participants have registered for Clean River Rewards.”⁴²

Case study: Reading, MA’s Stormwater Enterprise Fund Fee Abatement

“The City allows single and two-family residential properties to abate up to 50% of the total fee if they install and maintain infiltration systems or other means to reduce runoff. Commercial/industrial/multi-family properties are allowed this abatement if they install and maintain “state-of-the-art” stormwater treatment and infiltration systems. Typical devices that qualify are drywells, infiltration chambers, detention ponds. Drinking water filtration systems and rain barrels do not qualify. The stormwater abatement continues as long as the impervious surface does not change.”⁴³

Case study: Toledo, OH’s stormwater fee discount program

“Toledo, OH instituted a stormwater fee discount program as a way for non-residential property owners to reduce their stormwater service fee. The credit program was developed based on research and evaluation of 15 other communities with existing Stormwater Utilities. The program identifies several different practices that property owners can install to reduce stormwater runoff and pollution and establishes different discount percentages for each practice. For example, a property owner can receive a 10% discount for brownfield reuse, and a 30% discount for installing a forested buffer or swale. The current guidelines of the program are as follows:

- Credits are available only for non-residential property owners who pay a stormwater fee.
- The maximum credit receivable is 50%.
- Credit is awarded only for fully constructed and functional practices.
- The credit is applicable only to the impervious area that is controlled by the practice.”⁴⁴

Additional case studies

- Orem, UT. Storm Water Quality Credit Manual. <http://www.orem.org/PDF/PW/Credit.pdf>

⁴¹ US Environmental Protection Agency. 2009. Managing Wet Weather With Green Infrastructure Municipal Handbook: Funding Options, p. 3. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

⁴² Ibid, p. 7.

⁴³ US Environmental Protection Agency. 2009. Managing Wet Weather With Green Infrastructure Municipal Handbook: Incentive Mechanisms, p. 10. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_incentives.pdf

⁴⁴ US Environmental Protection Agency. 2009. Managing Wet Weather With Green Infrastructure Municipal Handbook: Funding Options, p. 8-9. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_munichandbook_funding.pdf

- Charlotte, NC. DRAFT Charlotte-Mecklenburg Stormwater Credit Manual. <http://charmeck.org/stormwater/FeesandBilling/Documents/Fee%20Credit%20Manual%20Draft%20Jan%202026.pdf> Charlotte will enact a stormwater credit program beginning July 1, 2012. The program focuses on reducing peak flow, surface runoff and pollution runoff. Charlotte's credit application instruction manual provides technical details and examples for calculating storm water credits (sections 5 & 6).

Resources

See stormwater utility resources in Funding and Finance Strategies section.

Zoning and permitting incentives

Various incentives can be integrated into the framework of existing development codes and regulations. Often making the permitting process easier and/ or cheaper, such incentives encourage private developers to implement green infrastructure practices in new or redevelopment projects. Some common types of incentives include:

- Density bonuses/ zoning upgrades
- Increases in floor area ratios
- Reduced parking requirements
- Reduced stormwater requirements
- Expedited permitting
- Waived fees (consultant code review fees, application fees)
- Free consulting from in-house design experts or other staff, to help navigate the permit process

Incentives can be offered for a wide range of desired practices. Some examples include:

- Green buildings and developments (as defined by the US Green Building Council or a state or local program)
- Installing green roofs, rain gardens, rain harvesting devices (barrels, cisterns), or permeable pavement
- Vegetated stream buffers
- Removing impervious cover or disconnecting impervious areas from stormwater control system via infiltration systems

Case studies

- "Chicago's Green Permit Program reviews permits much faster, even in as few as 30 days, for projects that meet certain LEED (Leadership in Energy and Environmental Design) criteria that include better stormwater management practices."⁴⁵ In addition, "participants that display a particularly high level of green strategy can possibly have consultant code review fees waived."⁴⁶
- Portland OR's "Floor Area Ratio (FAR) Bonus increases a building's allowable area in exchange for adding an ecoroof/greenroof. Portland has seen over \$225 million in additional private development through this program, and more than 120 ecoroofs have been built in the center city district."⁴⁷
- Knox County TN's Water Quality Volume Credits program "allows for a reduction in the water quality treatment volume (WQv). The credit system directly translates into cost savings to the developer by reducing the size of structural stormwater control and conveyance facilities. If a developer incorporates one or more of the credited practices in the design of the site, the requirement for capture and treatment of the WQv will be reduced. Site designers are encouraged to utilize as many credits as they can on a site. Greater reductions in stormwater storage volumes can be achieved when many credits are combined (e.g., disconnecting rooftops and protecting natural conservation areas)."⁴⁸

Tax abatements and credits

What types of abatements are being used and how are they structured? In MA we now have a land tax credit for donations of land or conservation restrictions

Municipalities may consider offering tax-based incentives to private property owners who implement specific practices, particularly in targeted areas... NEED MORE HERE

⁴⁵ US Environmental Protection Agency. 2009. Managing Wet Weather With Green Infrastructure Municipal Handbook: Incentive Mechanisms, p. 4.

http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_municipalhandbook_incentives.pdf

⁴⁶ Ibid, p. 20

⁴⁷ Ibid, p. 4

⁴⁸ Ibid, p. 22

Case study: Philadelphia's Green Roofs Tax Credit

Business owners may receive a credit for a green roof covering at least fifty percent (50%) of the building's rooftop or seventy-five percent (75%) of eligible roof top space. They may claim a tax credit of twenty-five percent (25%) of all costs actually incurred to construct the green roof, provided that total tax credits for a green roof do not exceed \$100,000. The tax credit is applied against the applicant's total business privilege tax liability for the Tax Year during which the applicant certifies completion of the green roof, provided that any unused credits may be carried forward until fully used. (EPA 20-21)

Case study: New York's Green Roof Tax Abatement

Building owners in New York City can apply for a one-time tax credit of up to \$100,000 for the installation of a green roof. The green roof must be on at least 50% of available rooftop space. The credit would be equal to \$4.50 per square foot of roof area that is planted with vegetation. It is a state program for New York City residents only and is administered by the city. The program sunsets in 2013 unless extended by the state legislature. The program will begin accepting applications on January 1, 2009.

Rebates and grants

NEED TO PARAPHRASE / SHORTEN:

"Grant programs can be used to disburse money directly to individual homeowners, other property owners and community groups for stormwater-related projects and can help a city or county add green infrastructure projects to the landscape. Grants can be used to encourage both site-specific green infrastructure practices such as rain gardens, street retrofits, green roofs, and cisterns, as well as neighborhood and municipal scale projects such as wetland construction or stream restoration projects. Santa Monica provides \$160,000 per year in Landscape Grants to develop sites with native landscaping that reduce water consumption and absorb runoff. Chicago's Green Roof Grant program has helped this former industrial city add over 2.5 million square feet of green roofs across the City. The program grants \$5000 awards to residential and small commercial buildings that meet criteria based on location, visibility and environmental benefit. Green infrastructure grant programs provide awards and savings to developers and properties that take extra steps to add greener stormwater management practices to both new and existing sites." (EPA 4)

"Communities offer rebates and installation financing to provide incentives for property owners to install green infrastructure practices on their property. These rebates and financing opportunities are often targeted to specific areas with the greatest need for green infrastructure, most often combined sewer areas. However, these programs may also be developed to achieve a range of water quality goals and implement community livability initiatives. For example, subsidies might be provided in neighborhoods with a high percentage of imperviousness or limited access to public green space.

"Rebates and financing tools are also commonly used to encourage the use of specific practices based on priority environmental and community goals such as cisterns for water conservation, rain gardens to improve groundwater recharge, and green roofs to mitigate urban heat island effects.

"Rebates and installation financing are also an effective means of educating the public about the benefits of green infrastructure and how it can be applied to a variety of property types and settings." (EPA 4-5)

Case studies – CHOSE AMONG THESE!

King County WA offers watershed stewardship grants "up to \$10,000 to schools, churches, businesses and other community organizations for projects that protect and enhance watershed health at the local level. Groups can use grant money for supplies, materials, equipment, room rentals, feasibility studies or technical assistance. Past projects include education and monitoring, ecoroofs, stormwater features, restoration, and naturescaping."

Portland OR's Willamette Stormwater Control Program "provides technical and financial assistance for a limited number of pilot projects that control stormwater runoff. [It has] funded 15 demonstration projects to retrofit existing sites in targeted areas. Up to \$30,000 was available for design and construction for projects that were part of an existing development, located in the city's combined sewer target area, and removed runoff from at least 10,000 ft² of paved or roof area."

King County WA's Impervious Surface Cost Share and Credit Program: "As an incentive to reduce impervious surface, the county is making funds available for sharing the costs of converting impervious surface to (1) native-vegetated landscape, (2) compost-amended lawn or (3) grassed, modular-grid pavement. To qualify, a plot plan, technical information and description must be submitted to county engineers who will work with the customer to develop the plan. 50% of costs up to \$20K will be reimbursed after the job is complete and inspected. Reducing impervious surface could potentially place the property into a lower rate category, reducing the surface water fee." (EPA 24-25)

Cincinnati OH's Mt. Airy Rain Catchers (rebate/ installation financing): "Reverse auction to encourage the installation of rain barrels and rain gardens. Bids were received from qualified residents which outlined what rain catcher projects they agreed to have installed and the incentive payment they requested to do so. The bids were selected based upon the project(s) they agreed to install, their scoring within an Environment Benefit Index and the amount of the incentive payment requested. The selected project(s) were installed for free and the residents were paid the bid amount as a one-time incentive payment. The first round of the reverse auction in 2007 resulted in 50 rain gardens and 100 rain barrels installed at 67 of the approximately 350 residential properties in the watershed. In 2008, the auction was repeated and an additional 35 rain gardens and 74 rain barrels were installed." (EPA 30)

Resources

Title	Link	Date	Author	Type	Description
Municipal Handbook: Incentive Mechanisms	http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_municipal_handbook_incentives.pdf	2009	US Environmental Protection Agency	Handbook	Green infrastructure on private property can significantly reduce the public cost of stormwater management. This chapter of EPA's green infrastructure municipal handbook describes a number of incentives that municipalities can offer to promote the implementation of green infrastructure on private properties and reduce their stormwater management costs.
The Value of Green Infrastructure: A Guide to Recognizing its Economic, Environmental, and Social Benefits	http://www.cnt.org/repository/gi-values-guide.pdf	2010	Center for Neighborhood Technology and American Rivers	Report	Cumulatively assesses the multiple benefits of low-impact development (LID) and green infrastructure (GI) as a municipal or private investment. Since methods and tools for assessing benefits have been lacking, municipalities more easily can assess gray infrastructure cost-benefits and favor those solutions. This guide provides simplified ways to assess the full benefits of LID and GI to aid decision-makers in evaluating options for water management.
Green Infrastructure Case Studies: Municipal Policies for Managing Stormwater with Green Infrastructure	http://www.epa.gov/owow/NPS/lid/gi_case_studies_2010.pdf	2010	US Environmental Protection Agency	Case studies	Examines the policies adopted by 12 local governments that have successfully promoted green infrastructure, as well as the policy drivers and policy outcomes. A menu of policy options is presented and barriers and lessons learned are summarized.