Catalyzing Green Infrastructure Opportunities on Private Property

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Motivation

Why do cities need to manage stormwater?

- Nearly 10 trillion gallons per year of polluted runoff fouls our rivers, oceans, and lakes. Clean Water Act (1972) mandates that cities meet specified pollution reduction targets

What are cities doing to meet water quality goals?

- Many are incorporating green approaches into traditional stormwater management. Green infrastructure (GI) mimics natural hydrologic processes to capture, infiltrate, and evapo-transpire rainwater at or near the site where it falls.

- Green strategies are attractive because they provide a range of public benefits that traditional "gray" solutions lack– help meet water quality goals as well as bolster urban climate resiliency.

Where are cities building green infrastructure?

- Public property and publicly controlled rights-of-way is default for most cities. However, many low-cost green infrastructure opportunities exist on private property.

A closer look at gray infrastructure

A closer look at a green approach

Green stormwater strategies manage stormwater and also provide a range of public benefits

- air quality
- temperatures
- property values
- reduced localized flood risk

Natural drainage system cells and plantings in Seattle. Photo credit: Seattle Public Utilities.

Philadelphia's green infrastructure plan

Philadelphia's Long Term Control Plan commits to "greening" approx. 10,000 acres within the City's combined sewershed by 2036*, reducing stormwater pollution by 85%. Three key sources of greened acres:

1) **Retrofits on public land/public right-of-way (ROW)**

2) **Private property retrofits <u>required</u> by on-site capture standards for new and re-development**

3) **<u>Voluntary</u> private property retrofits obtained through incentives: Area-based stormwater fees in addition to direct subsidies to property owners**

*To "green" an acre in Philadelphia means to manage first inch of stormwater from an acre of impervious area– but what it means to "green" a given impervious area will vary by city and depend on regulatory requirements

Impervious-area based stormwater fees

- Philadelphia uses an impervious-area (IA) based stormwater fee for commercial property owners.
  - 80% discount for property owners who install GI.
- However, fee discount alone insufficient to encourage GI retrofits on private parcels.
  - A project would need to cost less than ~$ 0.40/sf for a property owner to break even (in terms avoided stormwater fees) within 4 years.

GI practice	Retrofit cost ranges ($/ft^2) *
Downspout disconnections	$0.33-0.38
Vegetated Swales	$0.64- 2.13
Infiltration Trenches	$1.38-$1.58
Rainwater Harvest/Reuse	$1.28- 5.33
Rain gardens	$3.88-4.43
Porous Pavement	$4.88-5.58
Green Roof	$30.70-63.97

**Costs estimated in 2012 dollars. Cost ranges represent Philadelphia capital cost estimates. Costs estimates do not include O&M. Costs vary greatly by city and on a case-by case basis. As such, these ranges are most useful as points of comparison across practice types.*

Source for data on this and the following slide: Valderrama, Levine, et al., Creating Clean Water Cash Flows (NRDC, TNC, & Encourage Capital, 2013)

Green infrastructure grants to private landowners can stimulate voluntary retrofits at scale

Green Infrastructure practices	Off-site Mitigation	Aggregation	$0.50/ft² Subsidy	$1.00/ft² Subsidy	$3.00/ft² Subsidy	$3.50/ft² Subsidy
Downspout Disconnection	■	■	■	■	■	■
Swales		■	■	■	■	■
Infiltration Trenches			■	■	■	■
Rainwater Harvest & Reuse			■	■	■	■
Rain Gardens					■	■
Reducing Impervious (Hard) Surfaces					■	■
Flow-Through Planters					■	■
Porous Pavements						
Green Roofs						
New Potential Greened Acres	658	215	2,532	2,252	1,015	344
Total Potential Greened Acres	658	873	3,405	5,656	6,671	7,015
Progress to 9,564 Greened Acres Goal	7%	9%	36%	59%	70%	73%

A subsidy rate of **$3.50/ft²** (~$150k/acre) is likely to stimulate private property retrofits as well as provide attractive project economics for the city relative to cost of retrofits in the public ROW, where cost estimates at the time were **$5.74/ft²** (~$250k/acre).

Summary of our findings

- Area-based stormwater fees and discounts are most effective when used in combination with subsidies or grants that cover bulk of costs to “green” private property
- Impervious-area based stormwater fees and discounts are useful as partial motivation for private landowners to retrofit; fee discounts have important role in “pay for performance” contract to ensure long-term maintenance once GI is built.
- Projects need to be economically attractive to private property owners
- Appropriately-targeted policies and programs can pay off…
  - Of the total ~10,000 acres that Philadelphia has committed to “green” over 25 years, Philadelphia projects that it will meet roughly 2/3 of its acreage requirement from private property retrofits (1/3 voluntary and 1/3 regulated sites).

Photo courtesy of the Philadelphia Water Department


NRDC

Appendices

Conclusions

- Likely that in many cities, a hybrid gray/green approach to runoff management that utilizes both private and public land is most cost-effective
- Programs and policies targeting private property owners can play an important role in helping cities take advantage of the cheapest stormwater capture:
  - ✓ On-site capture requirements for new and re-development
  - ✓ Impervious-area based stormwater fees are important. Although discount alone is unlikely to motivate voluntary retrofits, fees can be adjusted to motivate owners to *maintain* GI
  - ✓ Direct subsidies (i.e., grant program) are required to achieve voluntary GI retrofits on private property

Market challenges and opportunities

- ✓ Over 1500 stormwater utilities nationwide, each with own set of water quality mandates and resilience challenges
  - ➢ In aggregate, the costs for U.S. cities to maintain and expand storm/sewer infrastructure projected to go into high hundreds of billions over next 20 years.
  - ➢ Impervious-area based fees are in the mainstream and increasingly common, as are programs targeting private landowner retrofits
- ✓ In order to operate on a large scale, grant programs meant to stimulate private property retrofits must provide direct financial benefit to property owners (could be through reduced stormwater fee, quantified property value improvement, etc.)
  - ➢ Opportunity to better quantify “co-benefits” of GI and identify downstream beneficiaries of GI investments (e.g., healthcare providers)
- ✓ Traditional design/engineering firms accustomed to “request for proposals” model rather than grant programs. Existing large players struggle to compete in municipal grant program structure
  - ➢ Potential opportunity for new entrant to invest heavily in customer acquisition and present turnkey solution to a city
- ✓ Cities struggle with tax, budgetary, and accounting issues relating to large-scale investment in “green” assets on private land

Urban stormwater management: regulatory background

- Federal Water Pollution Control Act – also known as the Clean Water Act – was adopted in 1972 and mandates that cities meet specified pollution reduction targets
- CWA Section 303(c) requires states to adopt water quality standards that protect the public health or welfare, enhance the quality of water, and serve the purposes of the CWA. Presumption that all waterbodies should be "fishable and swimmable."
- The heart of the Clean Water Act is Section 301, which makes it unlawful for any person to discharge any pollutant from any point source without a permit.
  - ✓ Municipal stormwater management systems fall under the definition of "point sources."
- States and federal government work together to enforce CWA:
  - ✓ The federal government sets national standards and is ultimately responsible for ensuring achievements of these requirements, but states can receive authorization from EPA to implement the program under EPA oversight.

Philadelphia's grant programs: key points

- Philadelphia's grant programs cover the upfront costs of stormwater management opportunities on private land. These grants cover nearly all the costs of typical GI retrofits—between $100,000 to $150,000 per acre of impervious area managed.

- Long-term maintenance: Applicants agree to install GI and to maintain the GI practice on behalf of the City for a 45-year period in exchange for the grant dollars. The stormwater fee discount will remain in effect so long as the owner maintains the GI.

- Grant programs must be easy and financially attractive for owners:

  - ✓ Allowing either owners or third parties to submit GARP applications on behalf of owners

  - ✓ Max. potential fee savings amount was designed to more than cover the cost of the maintenance to enable some cash savings for owners.

Sample of recommendations NRDC made for New York City's new GI grant program

- ✓ Provide a direct financial benefit to property owners—beyond reimbursing the direct costs for green infrastructure. Enhanced property values, reducing local flooding, etc.
- ✓ Design the program to be as transparent, simple and flexible as possible for property owners. If necessary, engage a third-party to administer the new program
- ✓ Bring community-based organizations into the program as important partners to help the program succeed and help achieve citywide environmental and social goals
- ✓ Look to affordable housing as an opportunity for green infrastructure to support both clean water goals and broader OneNYC goals.
- ✓ Stormwater and GI-enabling policies should be mainstreamed throughout all relevant city agencies, programs, and policies.