Green Infrastructure: Show me the money

LISA MERRIFIELD

COMMUNITY AND ECONOMIC DEVELOPMENT SPECIALIST

LMORRISN@ILLINOIS.EDU

@LISAMERRI

@ILEXTCED

Objectives

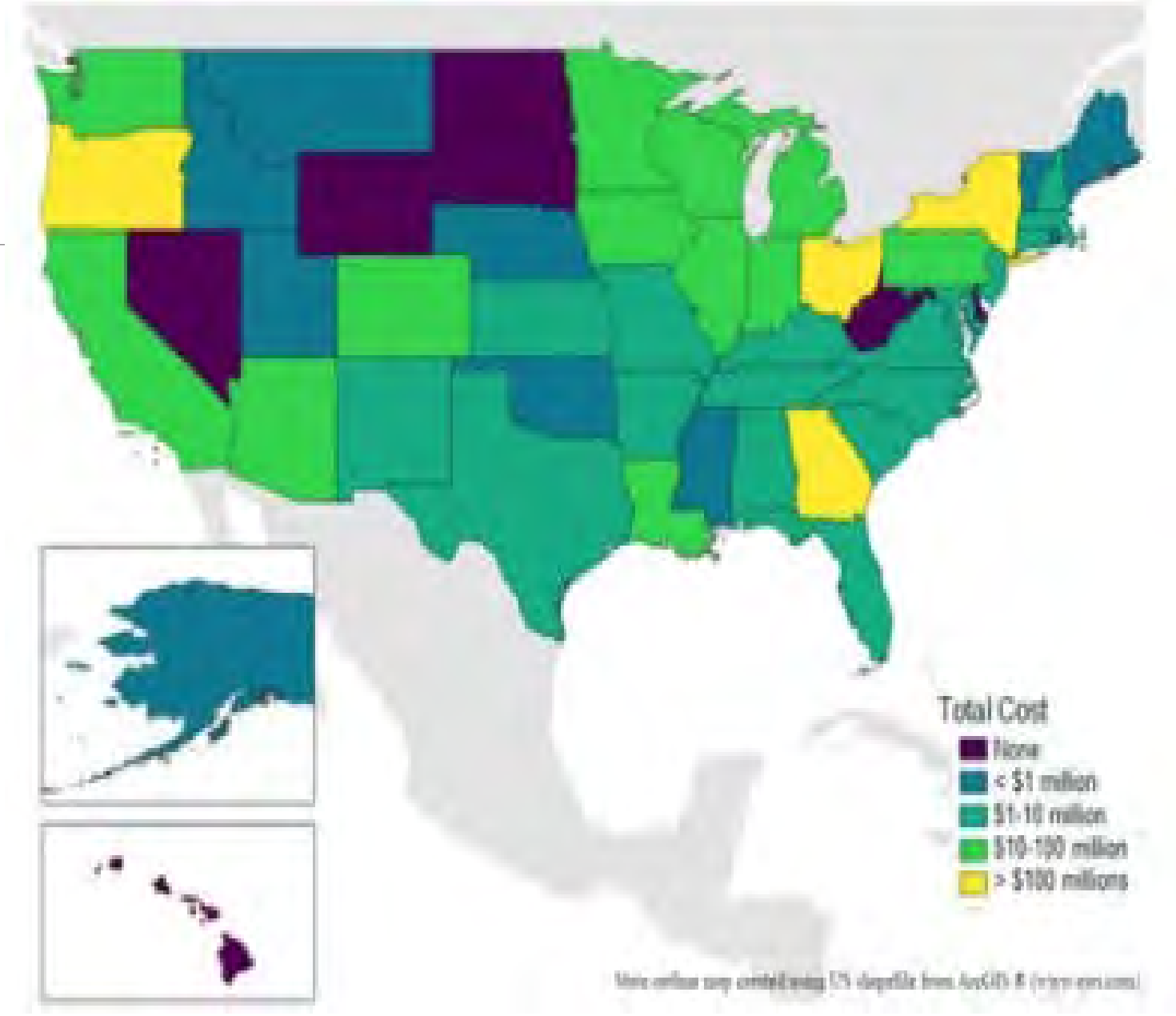
- Overview of green infrastructure around the country
- Economic impacts of green infrastructure
- Equity considerations
- Finding funding for green infrastructure

Dollars spent

Practices used:

- 55% bioswales
- 50% rain gardens
- 45% bioretention ponds
- 44% porous pavement

Most projects used an average of three practices.



Zimmerman, R.; Brenner, R.; Llopis Abella, J. Green Infrastructure Financing as an Imperative to Achieve Green Goals. *Climate* **2019**, *7*, 39.

Why?

- 1972 Water Quality Act: regulates discharge of pollutants into water
- National Pollutant Discharge Elimination System: Requires cities, towns, and counties over 50,000 to obtain state permits to discharge into waters
- Municipal Separate Storm Sewer System Permits/Combined Sewer Overflow Permits: Many states incorporate GSI guidelines
- **Sustainability goals (community level)**
- **Increasing severe storm events**

Economic valuation

- Reduction in stormwater runoff
  - Reduced water treatment needs
  - Reduced grey infrastructure needs
  - Improved water quality
  - Reduced flooding
- Reduction in energy used
  - Cooling buildings
  - Reducing energy needs for water treatment
- Air quality improvements
  - Reduced nitrogen dioxide (NO2), ozone (O3), sulfur dioxide (SO2) and some particulate matter
  - Related health benefits
  - Indirect energy reduction

Annual Rainfall Interception in Gallons from 1 tree, 40-year average, Midwest Region

	Small tree: Crabapple (22 ft tall, 21 ft spread)	**Medium tree: Red Oak** (40 ft tall, 27 ft spread)	**Large tree: Hackberry** (47 ft tall, 37 ft spread)
Rainfall Interception	292 gallons	1,129 gallons	2,162 gallons

Source: McPherson, E. et al. (2006).

- **NO_2 = $3.34/lb**
- **O_3 = $3.34/lb**
- **SO_2 = $2.06/lb**
- **PM-10 = $2.84/lb**

US Forest Service

Calculating economic benefits

Hypothetical green roof program

Benefit	Annual Benefit ($) per 5,000 SF green roof (Example Demonstration 1)	Annual Benefit ($) from scaled green roof program (= annual benefit per roof * 240 converted roofs)
Reduces Stormwater Runoff	$6.53	$6.53 * 240 = $1,567.20
Reduces Energy Use	$107.60 + $444.75= $552.35	$552.35 * 240 = $132,564.00
Improves Air Quality *Note: The figures used here only account for the benefits of reduced NO_2. Similar steps should be performed for the other criteria pollutants, when possible.*	$100.83	$100.83 * 240 = $24,199.20
Reduces Atmospheric CO_2	$49.04	$49.04 * 240 = $11,769.60
Total Annual Benefit (∑ Annual Benefits)	**$708.75**	**$708.75 * 240 = $170,100.00**

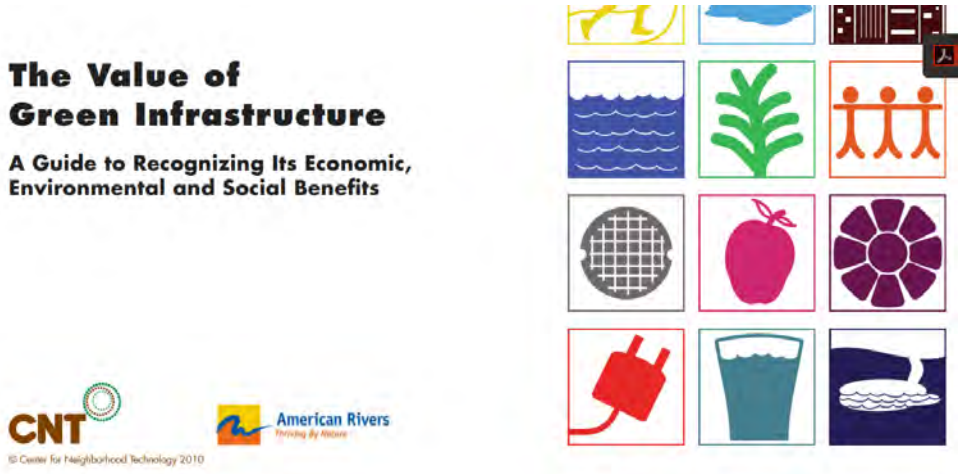
https://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf

Tax Revenue

- Well designed landscaping boost rental rates by 7%.
- Retail customers are willing to pay 8-12% more when shopping in a place with a mature tree canopy.
- Proximity to green infrastructure increases property value ~2-26.6%.
- Flood mitigation increases property value by 2-8%.

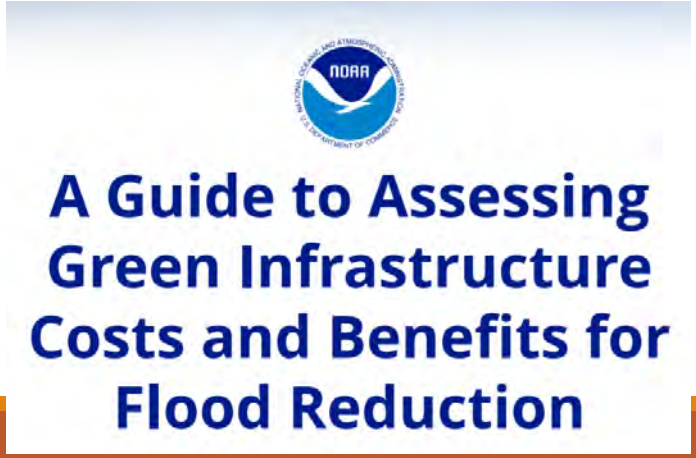
https://www.nrdc.org/sites/default/files/commercial-value-green-infrastructure-report.pdf

Calculating economic benefits



CLASIC Vision

The CLASIC tool is a user-informed screening tool which utilizes a lifecycle cost framework to support stormwater infrastructure decisions on extent and combinations of green, hybrid green-gray and gray infrastructure practices.



CENTER FOR THE ECONOMICS OF SUSTAINABILITY

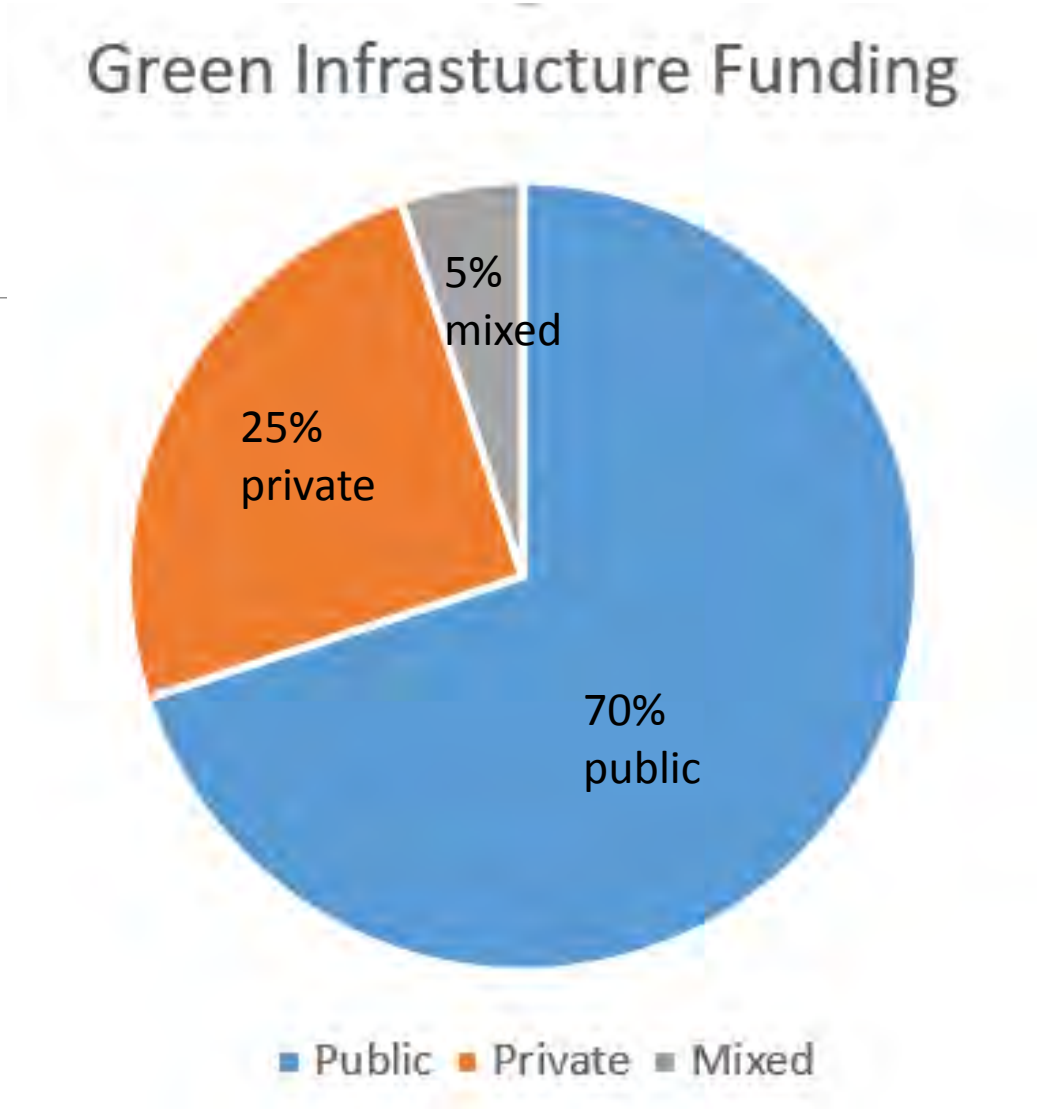
Equity and Social Justice

- Atlanta's Beltline project
  - Will connect 45 Atlanta neighborhoods
  - Will convert a 22-mile rail road track with of trails, parks, and eventually a streetcar.
  - Property value increase of between 17.9% and 26.6% within a ½ mile of the beltway.
  - Disproportionally affected minority and low income neighborhoods, despite efforts to maintain affordable housing.
  - (Immergluck 2018)
- General Guidelines
  - Function and location matter
    - Transportation corridors
    - Proximity to downtown or business districts
  - Park size seems less connected to increases in prices.
  - (Rigolon, 2019)

https://beltline.org/about/the-atlanta-beltline-project/atlanta-beltline-overview/

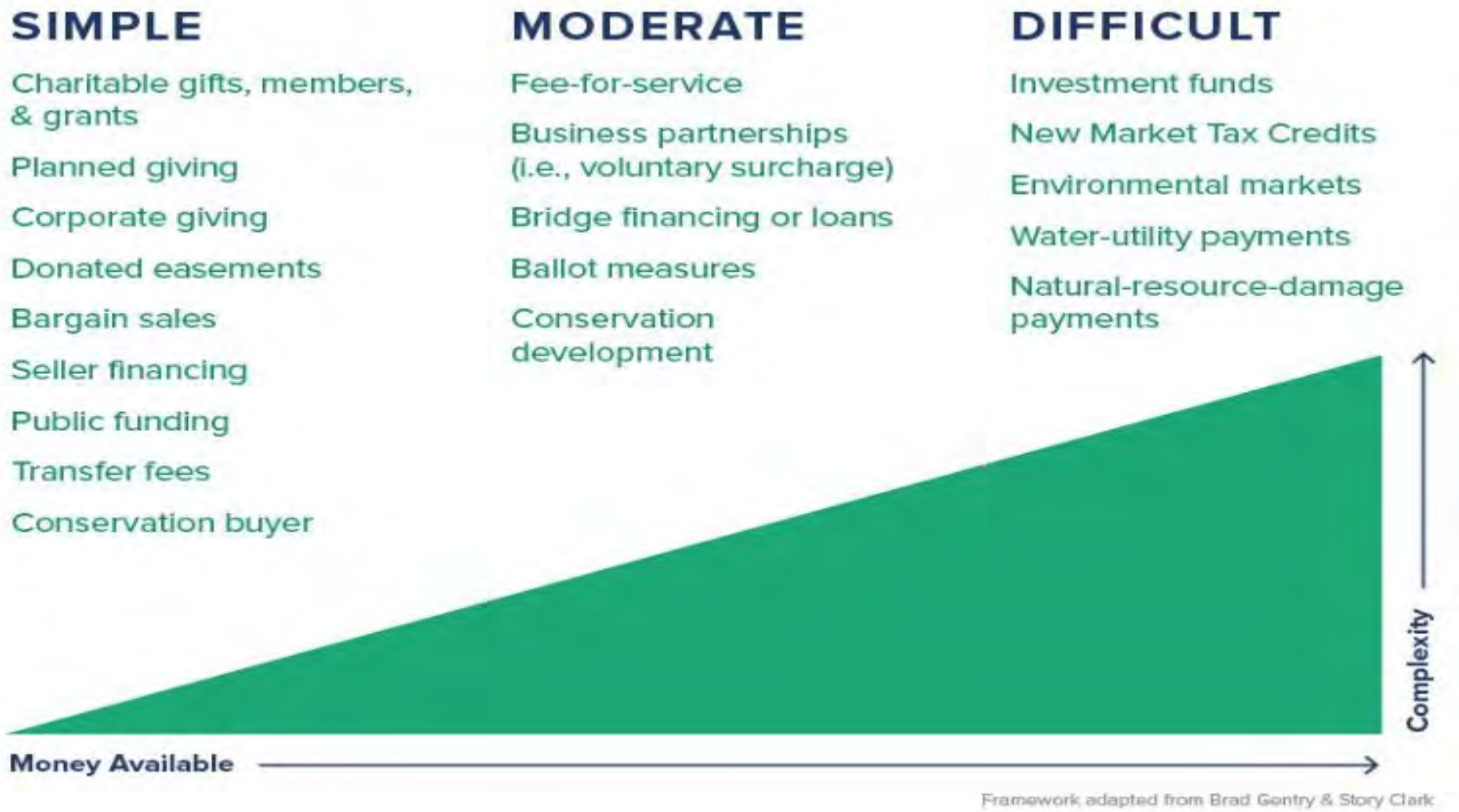
Funding Overview

- 80% of projects used only one funding source
- 66% used grant sources
- 51% used only grants



(Zimmerman, 2019)

How do you pay for it?



https://www.conservationfinancenetwork.org/2017/11/27/launching-the-conservation-finance-network-toolkit

Impact Bonds

- Return depends on results of the project.
  - 3.55% return
  - After 6 years, if returning 6.52M gallons of stormwater capacity, investors get a performance pay out.

- First public sector impact bond
  - Established with grant funds from the Rockefeller Foundation

https://www.conservationfinancenetwork.org/2019/06/24/atlanta-environmental-impact-bond-breaks-into-public-market

Impact Investing

"Impact investments are investments made with the intention to generate positive, measurable social and environmental impact alongside a financial return," according to Global Impact Investing Network (GLIIN).

- Market is growing at 18%/year
- $12.0 trillion or more of professionally managed investments is currently invested in socially responsible investment strategies.

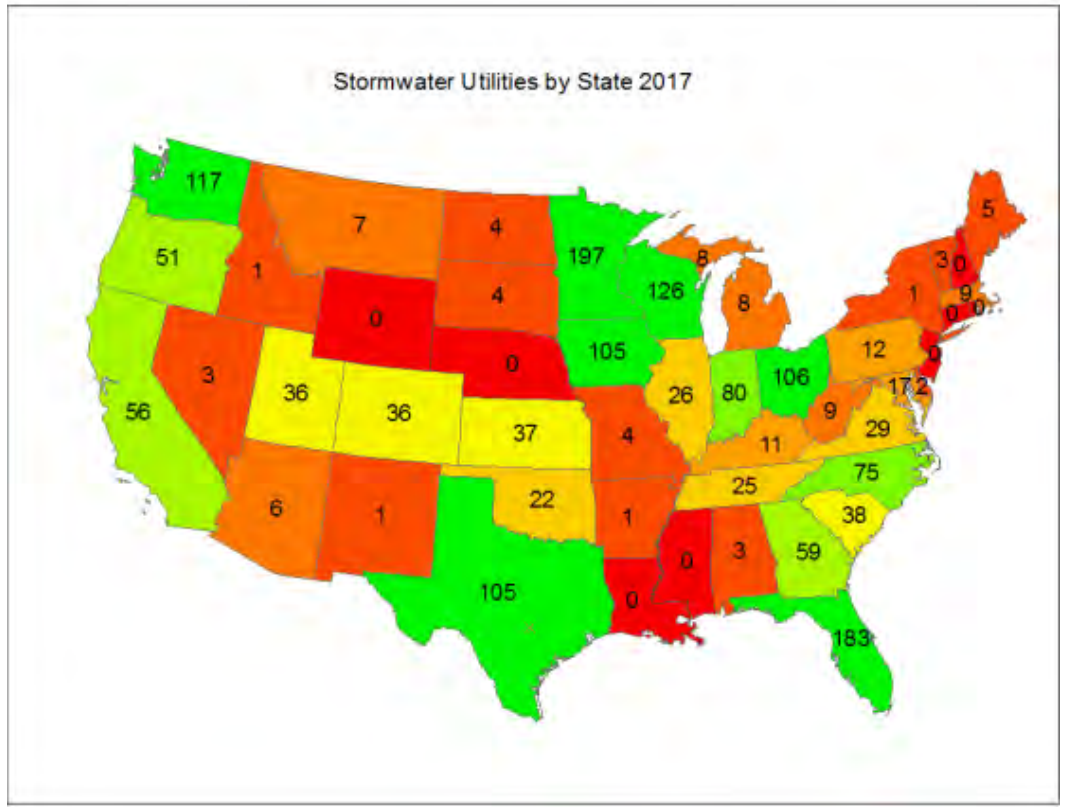
- What does it mean for communities?
  - Community Development Financial Institutions seek community projects.
  - Community foundations leverage donations to support socially responsible.

Ag-Urban Partnerships/Water Quality Permit Trading

Improved water quality/pollutant load relief at treatment plant downstream

$ for ag practices that improve water quality upstream

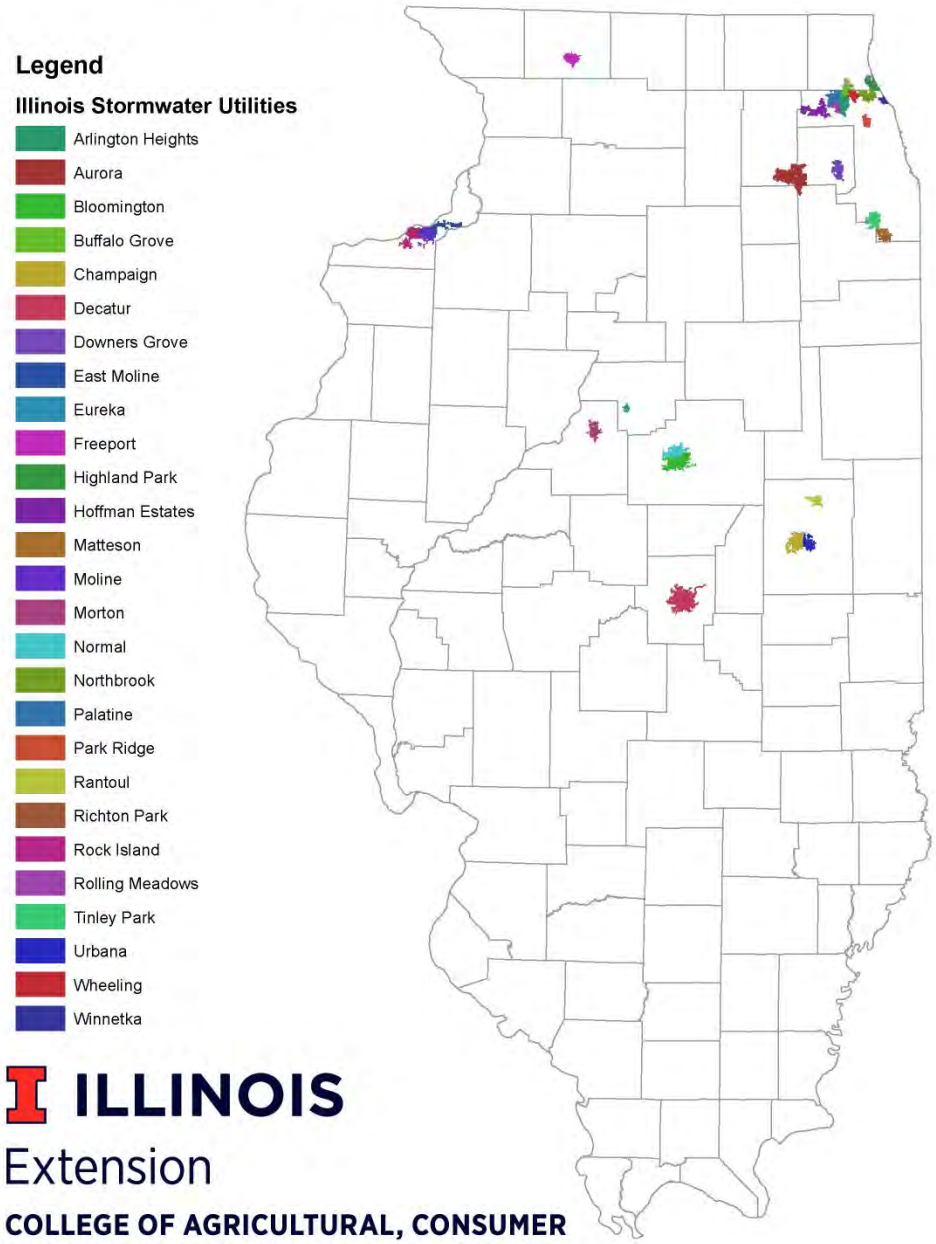
Stormwater Utility Fees



https://www.wku.edu/seas/documents/swusurvey2017b.pdf

- 1639 programs 40 states and DC
  - 6 states have over 100
- Smallest community: Creek Village, FL (pop 88)
- Average fee: $5.18/single family household
  - Fees range from $0-$69.25/month
  - Most set fees based on impervious area

Illinois Stormwater Utilities



ILLINOIS Extension

COLLEGE OF AGRICULTURAL, CONSUMER & ENVIRONMENTAL SCIENCES

Sources for Green Infrastructure Funding

- NLRS Urban Stormwater Working Group Resource Repository
  https://www.illinoisfloods.org/publications-resources
- USEPA's Water Finance Clearinghouse
  https://www.epa.gov/waterfinancecenter/water-finance-clearinghouse
- Conservation Finance Network
  https://www.conservationfinancenetwork.org
- Illinois EPA
  - 319 grants
  - Revolving loan funds
  - Illinois Green Infrastructure Grants?

Thank you!

Lisa Merrifield
Community and Economic Development Specialist
University of Illinois Extension
lmorrisn@Illinois.edu
@LisaMerri
@ILextCED