Using Green Infrastructure to Manage Combined Sewer Overflows and Flooding

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Presentation Outline

- Hudson River Estuary Program
- Combined sewer overflows
- Impact of stormwater
- Green infrastructure
- Municipal programs and economic benefits
Hudson River Estuary Program

Core Mission

- Ensure *clean water*
- Protect and restore fish, wildlife, and their *habitats*
- Provide water recreation and river *access*
- Adapt to *climate change*
- Conserve world-famous *scenery*
Importance of Watershed Thinking

The land and water that drain to a common outlet

From NEMO
What is a Combined Sewer System?

Riverkeeper, 2011
What is a Separated Sewer System?

Riverkeeper, 2011
CSOs on the Hudson

- Albany Pool - Albany, Rensselaer, Troy, East Greenbush, Bethlehem, & Watervliet
- Hudson
- Catskill
- Kingston
- Poughkeepsie
- Newburgh
- Yonkers
Overflowing Sewage

- Wet weather leads to overflows
- Degrades water quality
- Impacts public health, water recreation

Sanitary sewer overflows in Poughkeepsie
Stormwater Carries Pollutants

- **Water quality** problems
  - Sediment
  - Nutrients
  - Road salt
  - Oil/grease
  - Trash

- **Water quantity** problems
  - Flooding
  - Erosion
What is Green Infrastructure?

- Different approach to stormwater - natural and engineered systems that mimic nature

- Manage runoff by maintaining or restoring natural hydrology
  - allow stormwater to *infiltrate* and be used by plants
Gray vs. Green Infrastructure
Green Infrastructure

- Regional and local scales
- Includes “low impact development” projects
- Provides multiple benefits
  - Slows the flow of runoff
  - Keeps it out of the storm sewer system
  - Removes pollutants
Green Infrastructure Requirements

- August 2010 - Updated New York State Stormwater Design Manual
- Chapter 5 – Green Infrastructure
- New development – reduce runoff using green infrastructure first
NYS Stormwater Design Manual

1. Planning
   A. Preserving natural areas → Avoid stormwater
   B. Reducing impervious surface cover → Reduce stormwater

2. Green infrastructure practices → Manage stormwater
Green Infrastructure Planning

• Preserve natural areas – reduce disturbance, conservation design
• Reduce impervious cover
Green Infrastructure Practices

• Natural features and engineered practices that infiltrate runoff on-site
  – Treat stormwater closer to where the rain falls

• Examples on HREP website:
  http://www.dec.ny.gov/lands/58930.html
Rain Gardens & Bioretention Areas

• Shallow depression of soil and plants, filters runoff and slows its flow

Ulster County Dept. of the Environment, Kingston

Vassar College, Poughkeepsie
Green Roofs

- Layers of soil and vegetation on rooftops that capture runoff

Rensselaer County Master Gardeners shed, Wynantskill

Marist College, Poughkeepsie
Porous Pavement

- Paved surfaces that allow stormwater to infiltrate

Sojourner Truth Ulster Landing County Park, Saugerties

NYS Parks, Recreation & Historic Preservation, Staatsburg
Rain Barrels or Cisterns

- Capture and store rooftop runoff to re-use for watering plants and other uses

Children's Garden at Boyce Park, Wingdale

Greenburgh Nature Center, Westchester
Stream Buffer Restoration

- Vegetation along streams improves stream health, filters/slows polluted runoff, many other benefits

Wallkill River, Gardiner

Whaley Lake Stream, Beekman
Other Green Infrastructure Practices

- Disconnecting rooftop runoff
- Stormwater planters
- Vegetated swales
- Tree planting/street trees
- Stream daylighting
Benefits of Green Infrastructure

- Manage stormwater (quality and quantity)
- Recharge groundwater
- Reduce CSOs, reduce wastewater treatment costs
- Cool urban areas – energy savings
- Provide wildlife habitat
- Improve air quality
- Improve human health
- Increase land values
- Beautify neighborhoods
Implementing Green Infrastructure

- Homeowners, watershed groups, neighborhoods, regional planners, businesses, and
- **Municipalities**
  - Planning
  - Codes/ordinances to encourage, incentivize, or require
  - Demonstration sites

SUNY Orange, Middletown
Green Infrastructure to Mitigate CSOs

- New York City
- Philadelphia, PA
- Syracuse, NY
- Portland, OR
- Seattle, WA
- Milwaukee, WI
- Kansas City, MO

* Cities highlighted in NRDC’s Rooftops to Rivers II
Green Infrastructure Saves Money

• New York City (over 20 years)
  – Overall cost:
    Green - $5.3 billion
    Gray - $6.8 billion
  – Per gallon of CSO reduced:
    Green - ~$0.45
    Gray - ~$0.62

• Philadelphia (over 40 years)
  – Green - $2,846.4 million in benefits
  – Gray - $122.0 million in benefits
What can you do?

- Plan for GI
- Incorporate into CSO Long Term Control Plans
- Review codes/ordinances – Better Site Design Worksheet
- Visit local GI practices
- Submit projects for website
- Build demo projects
- Restore stream buffers with Trees for Tribs
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