



New York State Water  
Resources Institute

# Addressing barriers to green infrastructure in the Hudson River Estuary watershed

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NYS Department of Environmental Conservation



# Presentation Outline

- Hudson River Estuary Program
- Green infrastructure
- Identifying barriers
  - Technical
  - Regulatory
  - Financial
  - Community
- Addressing barriers

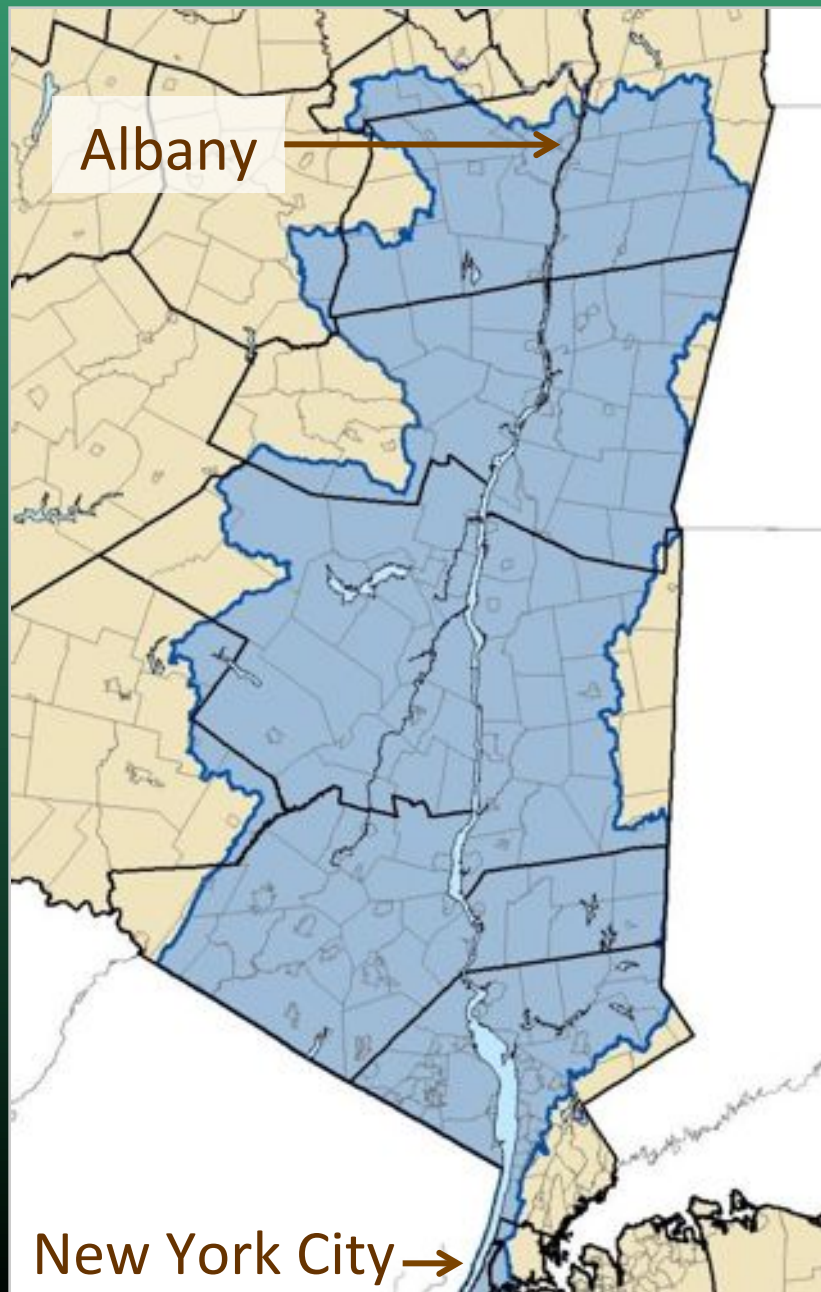


# Hudson River Estuary Program

## 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*





# Hudson River Estuary Program Area

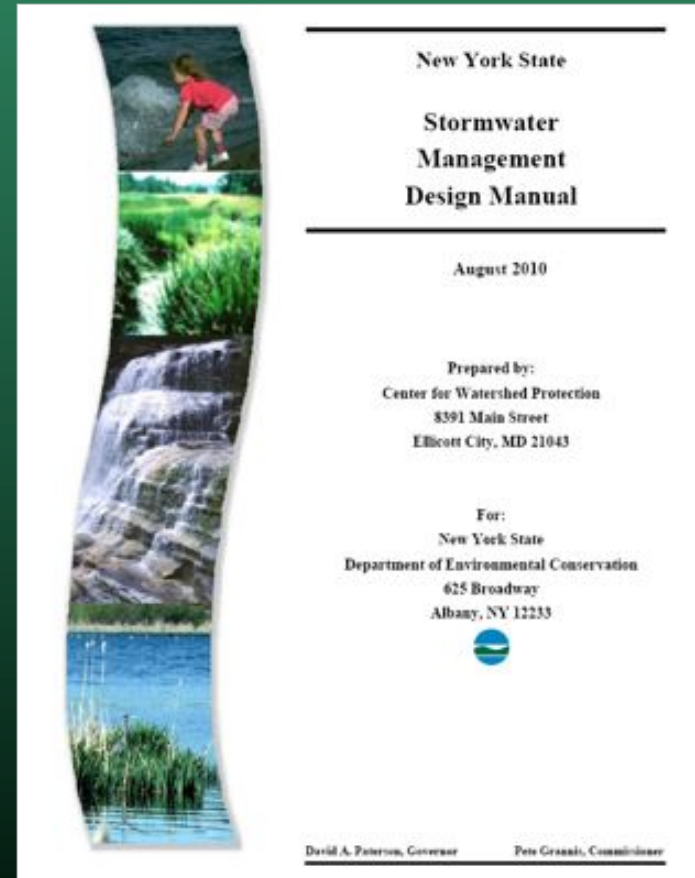
# Green Infrastructure

- Network of natural and engineered systems that mimic natural processes to provide ecosystem services
- Manage runoff by maintaining or restoring natural hydrology
  - allow stormwater to *infiltrate* and be used by plants



# Updated Guidance from NYS

- August 2010 - Updated New York State Stormwater Management Design Manual
- Chapter 5 – Green Infrastructure
- New development required to incorporate/consider green infrastructure

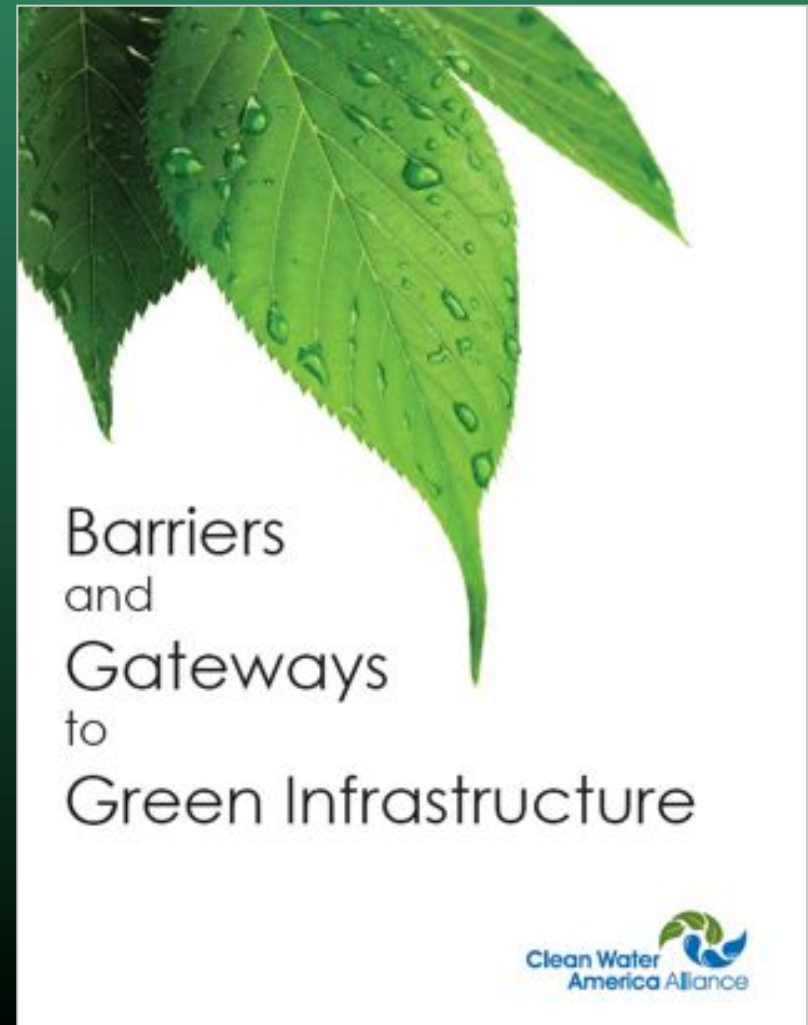


<http://www.dec.ny.gov/chemical/29072.html>



# Barriers and Gateways to GI

- Published by Clean Water America Alliance in September 2011
- Information based on national survey
- Over 200 entities responded, from a variety of sectors
- <http://www.cleanwateramericaalliance.org>



# Types of Barriers

- Technical and physical barriers
  - Lack of technical knowledge/expertise
  - Lack of design standards
  - Lack of data/knowledge of green infrastructure
- Legal and regulatory barriers
  - Local rules can be lacking, conflicting, or restrictive
  - State or federal rules can be complicating or conflicting



# Types of Barriers

- Financial barriers
  - Perceived high cost
  - Lack of funding
  - Upfront and maintenance costs
- Community and institutional barriers
  - Insufficient/inaccessible information for political leaders, developers, landscapers, and the public
  - Lack of cooperation
  - Community values that under-appreciate GI

# What are barriers in the Hudson River Estuary watershed?

- Personal communication
- Informal survey at the end of a GI bus tour
- Working on more comprehensive survey to send out, based on “Barriers and Gateways” survey



# Technical Barriers

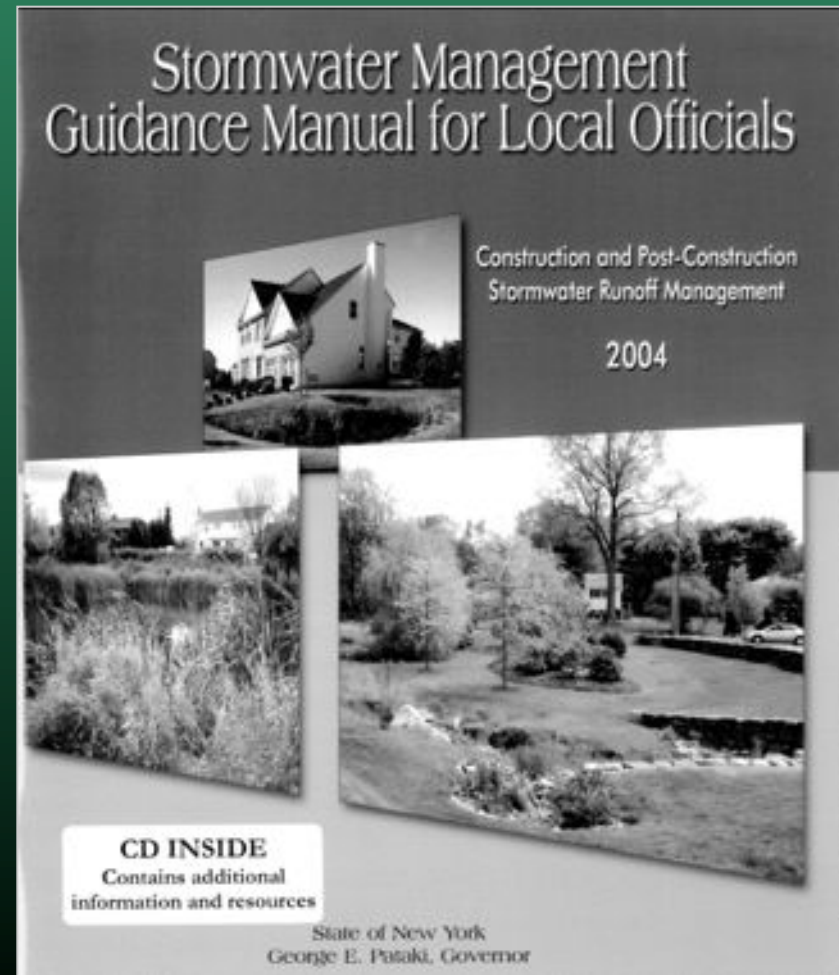


- Barriers:
  - “Education of contractors”
  - “Lack of knowledge by other boards”
  - “It’s just hard to get builders to do anything outside of what they have always done”
  - “Need more expertise on plants”
- Lack of technical knowledge or expertise

## Technical Barriers:

# Green Infrastructure Guidance

- NYS Stormwater Management Design Manual – guidance for designing green infrastructure
- May need to create or update guidance materials for local officials



## Technical Barriers:

# Hudson Valley Native Plant Lists

### Hudson River Estuary Native Plants for Intensive Green Roofs

Plant	Tolerance	Propagation	Growth
	<ul style="list-style-type: none"> <li>• Light</li> <li>• Moisture</li> <li>○ Soil preference</li> </ul>		<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>○</li> </ul>
SHRUBS			
 Northern bush honeysuckle <i>Diervilla lonicera</i>	<ul style="list-style-type: none"> <li>• Sun to partial shade</li> <li>• Dry</li> <li>○ Rocky, slightly acidic</li> </ul>	Seed, softwood and hardwood cuttings	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>○</li> </ul>
 Wintergreen <i>Gaultheria procumbens</i>	<ul style="list-style-type: none"> <li>• Sun to shade</li> <li>• Dry to moist</li> <li>○ Acidic; organic or sandy</li> </ul>	Seed, division	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>○</li> </ul>
 Black huckleberry <i>Gaylussacia baccata</i>	<ul style="list-style-type: none"> <li>• Sun to shade</li> <li>• Dry to wet</li> <li>○ Acidic</li> </ul>	Seed, softwood cutting (treated)	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>○</li> </ul>
 Dwarf juniper <i>Juniperus communis</i> , v. <i>depressa</i>	<ul style="list-style-type: none"> <li>• Sun</li> <li>• Dry to excessively drained</li> <li>○ Sandy or rocky</li> </ul>	Seed, cuttings	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>○</li> </ul>
 Fragrant sumac <i>Rhus aromatica</i>	<ul style="list-style-type: none"> <li>• Sun to partial shade</li> <li>• Dry to moist; well drained</li> <li>○ Acidic to limestone</li> </ul>	Seed; division; hardwood, softwood and root cuttings	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>○</li> </ul>
 Carolina Rose <i>Rosa carolina</i>	<ul style="list-style-type: none"> <li>• Sun</li> <li>• Dry</li> <li>○ Acidic to limestone</li> </ul>	Seed; division; hardwood, softwood and root cuttings	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>○</li> </ul>
 Northern dewberry <i>Rubus flagellaris</i>	<ul style="list-style-type: none"> <li>• Sun to shade</li> <li>• Moist to dry</li> <li>○ Various</li> </ul>	Seed	<ul style="list-style-type: none"> <li>• Up to 4 ft</li> <li>• Fast</li> <li>○ 12 in</li> </ul>

### Hudson Valley Native Plants for Green Infrastructure, Including Rain Gardens, Stormwater Planters, Vegetated Swales, and Bioretention Areas

Plant Common Name Scientific Name	Bloom Season March April May June July August Sep. Oct. Nov. Dec.	Light Sun Partial sun Partial shade Shade	Soil Type Gravel Sand Silt Loam Clay	Max Height
TREES				
Red Cedar <i>Juniperus virginiana</i>				45 ft
Black Gum <i>Nyssa sylvatica</i>				60 ft
Red Maple <i>Acer rubrum</i>				60 ft
SHRUBS				
Highbush Blueberry <i>Vaccinium corymbosum</i>				10 ft
Black Chokeberry <i>Photinia melanocarpa</i>				8 ft
Bayberry <i>Myrica pensylvanica</i>				8 ft
Maleberry <i>Lyonia ligustrina</i>				13 ft
Arrowwood <i>Viburnum dentatum</i>				10 ft
Red Chokeberry <i>Photinia erubescens</i>				10 ft

Currently DRAFTS



## Technical Barriers:

# Hudson Estuary Trees for Tribs

- Stream buffer restoration
- Free native trees and shrubs to plant along tributaries to the Hudson River
- Watershed groups, land trusts, municipalities, schools, non-profits, landowners, and more



## Technical Barriers:

# Hudson Estuary Trees for Tribes

- Plantings in the spring and fall
- We provide plant material and technical assistance:
  - Planting plan
  - Plant selection
  - Site prep

<http://www.dec.ny.gov/lands/43668.html>





## Technical Barriers:

# Hudson Estuary Trees for Tribes

- 60,000 feet of stream buffers replanted
- 22,000 native trees and shrubs
- 2,900 volunteers
- 180 sites



# Regulatory Barriers



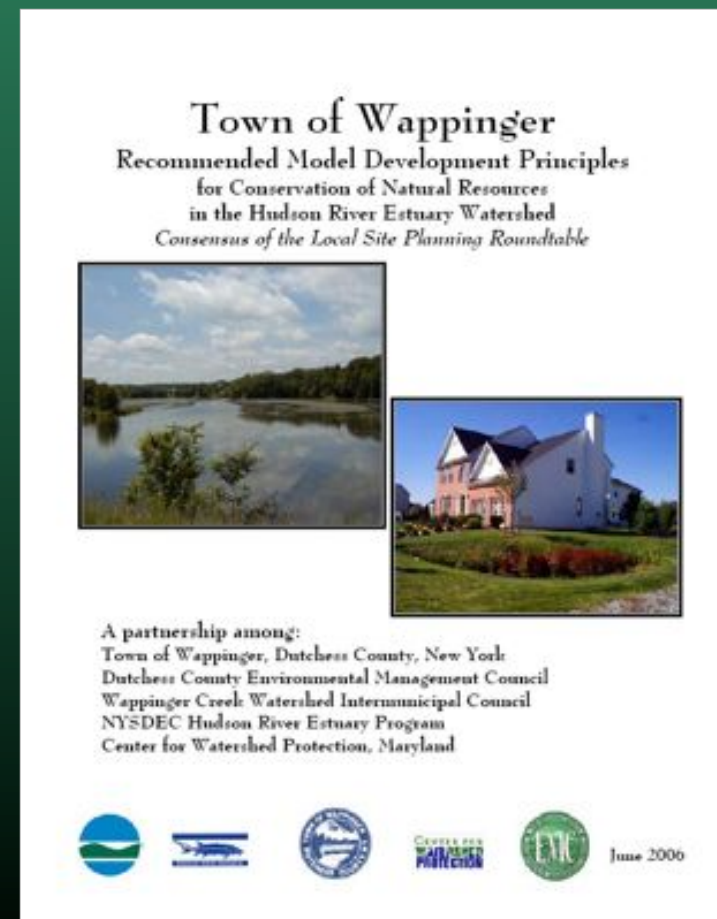
- Barriers:
  - “Road widths, set-backs are too large”
  - “Local regulation issues”
- Codes, ordinances, or regulations, especially at the local level

## Regulatory Barriers:

# Better Site Design Roundtables

- NYS Code and Ordinance Worksheet (based on Center for Watershed Protection)
- Identify legal barriers and opportunities to revise
- Case studies and recommendations
  - Wappinger and Clinton

<http://www.dec.ny.gov/lands/42053.html>



# Financial Barriers



- Barriers:
  - “People-hours”
  - “Initial cost and cost of maintenance”
  - “Education of benefits and economic breakdowns”
  - “Costs!”
- Lack of funding for implementation, maintenance



## Financial Barriers:

# Small Grants for Watershed Partners

- Rain gardens and stormwater planter - Groundwork Hudson Valley
- Better Site Design Roundtable using COW – Wallkill River Task Force and Saw Mill River Coalition



## Financial Barriers:

# Small Grants for Watershed Partners

- Rain barrel workshop - Cornell Cooperative Extension Dutchess County
- Green infrastructure video on local projects – Lower Hudson Coalition of Conservation Districts



# Community Barriers




- Barriers:
  - “Inertia and unfamiliarity”
  - “Lack of knowledge and interest”
  - “Habits” & “Ignorance”
  - “Getting everyone on board”
  - “Public and private entities are still not ‘sold’ on the GI approach”
- Not understanding if or how green infrastructure practices work
- Lack of appreciation



## Community Barriers:

# Green Infrastructure Examples Website

<http://www.dec.ny.gov/lands/58930.html>

**DEPARTMENT OF  
ENVIRONMENTAL CONSERVATION**

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### Vassar College Rain Garden

#### Description


This rain garden is an example of green infrastructure in an institutional setting. The runoff from the maintenance building is directed to the rain garden where is infiltrated into the ground.

#### Site Location

- **Site Address:** Hooker Ave. Poughkeepsie, NY 12601
- **Town:** Poughkeepsie
- **County:** Dutchess
- **Land Use of Site:** College Campus
- **Can Site be visited?:** Check with College
- **Location on Site:** North of first building on the right after entering the athletic complex from Hooker Avenue

#### Practice Information Details

- **Intent of Design:** Treat parking lot runoff through infiltration and biological uptake
- **Stormwater Management Capacity:** 152 Cubic Feet
- **Year of Installation:** 2007
- **Plant Material Used:** Unknown
- **Annual Operational and Maintenance:** Weeding and replacement of any dead vegetation.
- **Required Zoning Change or Special Permit:** None



Page Applies To:



Hudson River

Related Links:

- [Better Site Design Program for the Hudson River Estuary](#)
- [NYSDEC Construction Stormwater Toolbox](#)
- [NYSDEC Stormwater Public Review Documents](#)
- [Offsite Links:](#)
- [Low Impact Development Center](#)
- [Beacon Institute for Rivers and Estuaries](#)
- [NEMO National Low Impact Development Atlas](#)
- [PDF Help:](#)

## Community Barriers:

# Green Infrastructure Examples

- Over 50 projects, engineered and natural features

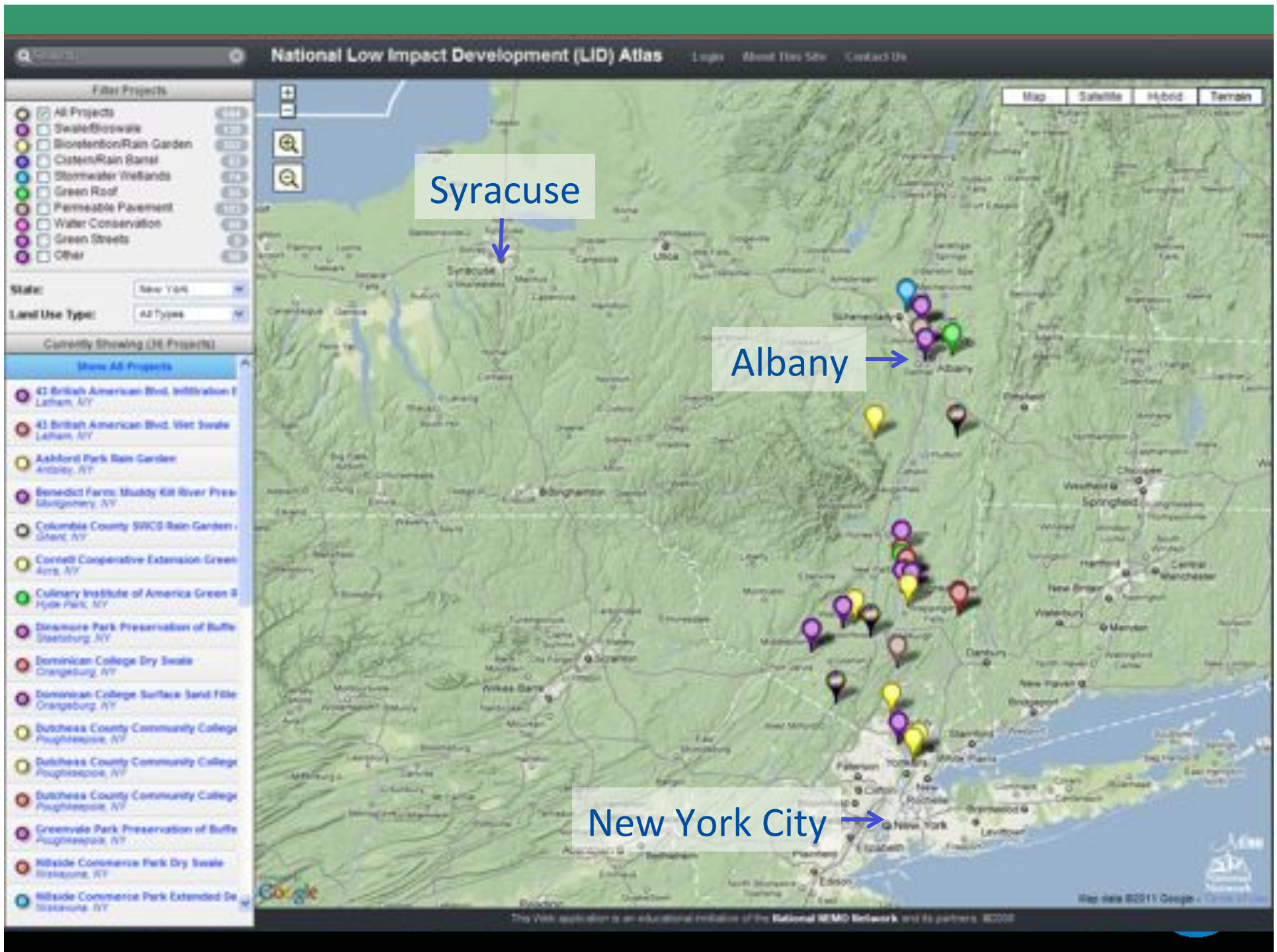


Rensselaer County Master  
Gardeners shed, Wynantskill



Village Hall, Greenwood Lake





## Community Barriers:

# Green Infrastructure Bus Tours

- Demonstration projects in Dutchess County
- Explain how they work, show that GI is viable option
- Information for municipal audience
- Tour also included
  - costs/benefits
  - local ordinances
  - maintenance





## Community Barriers:

# Green Infrastructure Bus Tours



## Community Barriers:

# Trainings on Green Infrastructure

- Presentations for municipalities
- HREP Biodiversity Program covers larger-scale GI
- Planning a roundtable for GI implementers
  - Challenges and future opportunities for regional coordination
- Survey to continue to identify training needs





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