EPA’s Healthy Watersheds Program Promotes Planning for Green Infrastructure at the Landscape Scale – A Case Study of New York

Webcast sponsored by EPA’s Watershed Academy

Tuesday, January 14, 2014
1:00pm – 3:00pm Eastern

Instructors:
Karen Engel, Green Infrastructure Coordinator, New York State Department of Environmental Conservation
Karen Firehock, Executive Director, Green Infrastructure Center, Inc.
Amanda LaValle, Coordinator, Ulster County Department of the Environment

Webcast Logistics

• **To Ask a Question** – Type your question in the “Questions” tool box on the right side of your screen and click “Send.”

• **To report any technical issues** (such as audio problems) – Type your issue in the “Questions” tool box on the right side of your screen and click “Send” and we will respond by posting an answer in the “Questions” box.
Overview of Today’s Webcast

• New York State’s green infrastructure plan
  – Why green infrastructure and how to initiate the plan writing process
• Introduction to a landscape scale approach toward green infrastructure planning
  – Benefits of green infrastructure
  – Green infrastructure planning as a tool for land use conservation decisions
• Case Study: Green infrastructure planning in Ulster County, New York
  – Steps in green infrastructure planning
  – Green infrastructure mapping

Healthy Watersheds Program
www.epa.gov/healthywatersheds

Owen McDonough, PhD - ORISE Fellow
mcdonough.owen@epa.gov
EPA’s Healthy Watersheds Program

Historically, a large focus was placed on restoring impaired waters, yet there was growing recognition that increased emphasis on protecting healthy waters was needed.

HWP Overarching Goals

• Maintain existing healthy watersheds and increase their numbers over time
• Raise the visibility and importance of protecting high quality waters
Benefits of Healthy Watersheds

- clean water
- flood control
- erosion control
- fisheries
- timber
- increased property value
- recreation & tourism
- habitat & biodiversity
- carbon sequestration
- nutrient cycling
- lower restoration & compliance costs
- increased quality of life

Going Green with Green Infrastructure

- **Green infrastructure** is the interconnected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas that support native species, clean water and contribute to community health and quality of life.

- Strategic green infrastructure planning is a critical step toward healthy watershed protection. . .and the provision of many other benefits!
Green Infrastructure in New York State

Karen Engel
Green Infrastructure Coordinator
NYS Department of Environmental Conservation

Diverse New York

New York's Ecoregions

NYS Department of Environmental Conservation
What we do up here affects you down there…

Local Governments
The New York State Department of Environmental Conservation
We always knew trees were pretty, but they also:

- Improve air quality
- Improve water quality
- Reduce stormwater run-off
- Reduce soil erosion
- Reduce noise
- Store carbon
- Reduce energy costs
- Reduce crime
- Increase property values
- Provide wildlife habitat

... and more ... and now we can prove it!

GI Projects Funded by the USFS

Low Impact Development Rapid Assessment (LIDRA)

- Stream characterization
- Urbanized watershed
- Urban development
- Hydrologic model

www.lidrad.org
For some, GI is all about water…

Green Infrastructure techniques use soils and vegetation to infiltrate, evapotranspire, and/or recycle runoff, creating an effective stormwater management system.

…but natural systems impact more than water…

Vegetation and natural systems also help filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon while also providing communities with aesthetic and natural resource benefits.
What **is** Green Infrastructure?

**It’s a Fan!**

**It’s a Spear!**

**It’s a Snake!**

**It’s a Wall!**

**It’s a Rope!**

**It’s a Tree!**

...and size matters...

**L A N D S C A P E** scale **to** site scale
A large-scale plan can help to ensure the most beneficial arrangement of small-scale pieces.

Beneficial arrangement

Non-beneficial arrangement
DEC & GI: Ready, set, go…but…

- Differing perceptions of what GI is
- DEC Division (program) ‘silos’
- Neither funded nor mandated
- Lack of staff with time and expertise
- Lack of empirical data
- ‘Threat’ to established programs
- Municipal “Home Rule” can make Statewide planning effort an exercise in ‘herding cats’
- Misplaced fear of Eminent Domain can raise “You can’t take my property!” suspicions
- Coordination with other State agencies
- Political will may be focused elsewhere

Opportunities for Synergy?

- NYS DEC’s Division of Lands and Forests: NYS Open Space Conservation Plan
- NYS DEC’s Office of Climate Change: Climate Smart Communities Program
- NYS Energy Research & Development Authority (NYSERDA):
  - Cleaner Greener Communities Program at www.nyserda.ny.gov
  - The Land Use Toolkit at www.nyslandusetoolkit.us
- ICLEI-Local Governments for Sustainability: Sustainability Planning Toolkit
  - (formerly the International Council for Local Environmental Initiatives) at www.icleiusa.org/sustainabilitytoolkit
Hurricane Sandy 2012 - A disaster … and an opportunity that may depend on you

The DOS Communities and Waterfronts Division has been reorganized to the Office of Planning and Development to:

- Reflect its current work and responsibilities in NYS planning and development initiatives.
- Increase resiliency and sustainable growth of communities by advancing progressive land-use solutions, community-based development and building standards and codes.
- Support the Regional Economic Development Councils, local government planning and development, Superstorm Sandy recovery, and the mitigation of future natural disasters.
- Work with the Governor’s Office on the New York Rising Community Reconstruction program.

The Office will consist of 4 divisions:

- **Planning**
  "... undertakes planning resulting in catalytic public and private projects that stimulate community revitalization – as identified and prioritized by NY Rising Community Reconstruction Program (NYRCP), Regional Economic Development Council (REDC), Local Waterfront Revitalization Program (LWRP) or Brownfield Opportunity Area (BOA) plans."

- **Development**
  "... implement development projects resulting from Brownfield Opportunity Area (BOA), Local Waterfront Revitalization Program (LWRP), NY Rising Community Reconstruction Program (NYRCP), Regional Economic Development Council (REDC), and other Office initiatives, and partners with local governments, community-based organizations, neighborhood associations, business leaders, investors, and academia to generate good ideas, align programs, and marshal resources to achieve sustainable growth."

- **Technical Assistance**
  "... harnesses technologies that can be paired with program development, training, and technical services. It will also provide electronic access to the Department’s assets, help steer staff development, and shape new initiatives and programs to expand assistance to communities."

- **Building Standards and Codes**

NY DOS Office of Planning and Development at  [www.dos.ny.gov/opd](http://www.dos.ny.gov/opd)

---

So, county planning folks…

…the EPA Healthy Watersheds Initiative supported the Green Infrastructure Center in a pilot project in Ulster County to develop a methodology that you can use to:

- Inventory your green assets and connections,
- Identify opportunities for protection and/or restoration,
- Plan a coordinated strategy to channel development and redevelopment to the most appropriate locations.
Green Infrastructure is earth’s life-support system

How can I help?
Karen Engel
NYS DEC
625 Broadway
Albany, NY 12233
(518) 402-9517
kmengel@gw.dec.state.ny.us

Green Infrastructure is our life-support system
Questions?

Karen Engel
NYS DEC
625 Broadway
Albany, NY 12233
(518) 402-9517
kmengel@gw.dec.state.ny.us

What Is Green Infrastructure Planning and Why Is It a Key Tool?

by Karen Firehock
Executive Director
The Green Infrastructure Center
www.gicinc.org
This project was featured in a new guide!

The GIC is a nonprofit organization. We conducted a pilot test case with Ulster County to create a methodology featured in the New York chapter of the GIC’s planning guide.

The GIC used land cover and environmental monitoring data to determine the highest value blocks of intact habitat.

To obtain a guide visit www.gicinc.org
Infrastructure: What’s in a name?

Infrastructure (n): the substructure or underlying foundation...on which the continuance and growth of a community or state depends.

What is Green Infrastructure?

A planimetric map shows a neighborhood’s gray infrastructure including buildings and roads (left). Classified high-resolution satellite imagery adds a green infrastructure data layer (trees and other vegetation) (right). Source: American Forests
Term Origin ...

Florida coined the term “Green Infrastructure.” in a 1994 report to the governor on land conservation strategies. It was intended to reflect the notion that natural systems are important components of our “infrastructure.”

Natural Assets are Green Infrastructure

Green infrastructure includes all landscape elements that support our existence.
Natural Assets Include Land Suited for Farms or Forestry

Soils suited for forestry or agriculture provide an ecosystem service.

Their locations are variable and should be considered in land planning.

And, while total acreage is important, the quality and intactness of these forests also matters. Forest fragmentation remains one of the greatest threats to America’s forests.

Natural Assets Also Support Cultural Assets

Natural assets support the landscape context for historic and recreation features.
What Is Green Infrastructure Planning?

“Strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations”

It’s about connecting the landscape!

How to Calculate Interior Habitat

Take the average tree height for Arkansas @ 100 feet and multiply by 3 to get edge. Subtract that to learn what remains and whether there is enough area to constitute a core. If smaller, it may still be a key “patch” or “site.”

Interior = Total Area – 3(h)
Who prefers interior forest cores?

Birds, e.g. cerulean warbler, Scarlet tanager

Mammals, e.g. black bear, bobcat, n. flying squirrel

Amphibians, e.g. spotted salamander

Dividing a large core into two smaller cores = less interior habitat
Core Shape Matters

In nature, cores are not usually round. Fingers of green help animals move into and out of cores.

When Direct Corridors Are Lost, Some Species Can Still Hop Across.
When Cores Are Lost, Species May Decline

If cores or patches are too far apart, or if a core is lost, species may become isolated and decline over time.

More Edge = More Impact Zones
What kinds of forests will we have? More fragmented, less natives, more invasives...

Type of Edge Matters Too!

The hard edge (top) is not as conducive to supporting species’ diversity as the bottom soft (more gradual) edge.
Who can use the corridors? (300 meters is ideal...)

Corridors May Not Be Uniform.

The ideal is 100 meters of safe space in the middle and 100 meters of edge.

minimum width = 300 meters wide
Impacts of over-development

Traffic congestion
Poor Water quality
Reduced Air quality
Loss of critical habitat
Loss of forests and habitat

While you viewed this slide, America lost another 3 acres of open space.

Traditional Development
Clustering = setting buildings closer together to conserve green space

Within a subdivision, clustering can add to open spaces and provide an amenity for wildlife and recreation. But, which land is protected and how it is connected are critical.

The problem of clusters that don’t look beyond parcel boundaries
Green Infrastructure Planning Applications

- Zoning Tools and Comp Plans
- Park and open space planning
- I.D. lands for PDR or TDR programs
- New ordinance development
- Species protection
- Heritage tourism and viewsheds
- Ag and Forestall Districts
- Easements
- Transportation plans: roads/trails
- Land management

Mapping Green Infrastructure Provides Benefits

- Conserving working lands, such as farms and forests, that contribute to the economy.
- Protecting and preserving water quality and supply.
- Providing cost-effective stormwater management and hazard mitigation.
- Preserving biodiversity and wildlife habitat.
- Improving public health, quality of life and recreation networks.
Green Assets = Real Estate $$$

$ Having a park within 1,500 feet of a home increased its sale price between $845 - $2,262

$ The larger the park, the more significant the property value increase.

So, parks = better tax base = $!

$ Large natural forest areas have a greater positive impact on nearby property prices than smaller urban parks or developed parks such as playgrounds, skate parks or golf courses.

So, bigger intact forests/natural areas = more $!

---

Trees and Water

Estimates for the amount of water a typical street tree can intercept in its crown, range from 760 gallons/tree/year to 4000 gallons/tree/year depending on species.

Key Message: Trees = better stormwater management
Trees Save Water Treatment Costs

Forest cover protects surface water sources and aquifer recharge zones and reduces the cost of drinking water treatment. American Water Works Association found a 10% increase in forest cover reduced chemical and treatment costs for drinking water by 20%. (Ernst et al. 2004)

**Key Message:** Trees = cheaper water treatment

---

Trees: for Health

- Access to fitness opportunities. (addresses obesity, nature deficit disorders)
- Clean air – trees absorb pollutants, VOCs, filter runoff, cool the city. (combat asthma)
- Well being and mental health - people heal faster when they can see or access green. (hospitals need this for patients, reduces absenteeism of workers)
- Less crime occurs near trees. (issue especially for downtowns and public housing areas)
- Employees will exercise if they can access green where they work and on the way to work. (addresses employee health)

**Key Message:** Trees = healthy safer communities!
Green Infrastructure Planning Applications

- Zoning Tools and Comp Plans
- Park and open space planning
- I.D. lands for PDR or TDR programs
- New ordinance development
- Species protection
- Heritage tourism and viewsheds
- Ag and Forestall Districts
- Easements
- Transportation plans: roads/trails
- Land management

Meet or Avoid Regulations

**TMDLs:** Identify areas that may be subject to impairment and protect them to prevent future TMDL's. Use your natural assets maps to indentify areas to restore to mitigate the pollution loadings. Choose practices that will affect runoff such as retain or restore forested stream buffers etc.

**Stormwater Programs:** Prevent new stormwater problems and erosion by identifying sensitive landscapes, steep slopes as well as natural assets to retain on site.
Species Protection in New York

- Eastern Tiger Salamander
- Bog turtles
- Bald Eagle
- Indiana Bat
- Northern Monkshood

Tourism Planning
GREEN INFRASTRUCTURE

Viewshed Protection

Site level planning to protect water quality

- Sites designed to protect and enhance buffer for waterways.
- Multiple opportunities for water infiltration.
- Improvements to increase habitats for people, animals, fish.
Six Steps for Green Infrastructure Planning

1) **Set Your Goals** – What does your community/organization value?

2) **Review Data** – What do we know or need to know, to map identified values?

3) **Map Your Community’s Ecological and Cultural Assets** – Based on the goals established in Step One and data from Step Two.

4) **Risk Assessment** – What assets are most at risk and what could be lost if no action is taken?

5) **Rank Your Assets and Determine Opportunities** – Based on those assets and risks you have identified, which ones should be restored or improved?

6) **Implement Opportunities** – Include natural asset maps in both daily and long-range planning (park planning, comp plans, zoning, tourism and economic development, seeking easements etc).

To map large habitat cores we use land cover and overlay fragmenting elements - What breaks up habitat?
Add land cover from satellite imagery

What areas are intact forest?
Cores May Need to Be Updated

If a core is developed, the fragmented landscape may no longer constitute a core.

Questions?

For more information on how to start a green infrastructure plan in your community or to order a planning guide please visit:

www.gicinc.org
Creating the Maps
by Amanda LaValle
Coordinator
Ulster County Department of the Environment

+ Size and shape
+ Rare, threatened and endangered species
+ Water quality, aquatic biodiversity
+ Water abundance

= Habitat Core Ranking for Intact Landscape
What makes these cores so special?

- 12,758 acres in size
- 258 acres of interior wetlands
- 27 Element Occurrences
- 12 KM of DEC Class A streams
- 9,880 acres in protection (77%)
- 11,543 acres of significant natural communities (EO)

Themed Maps: overlay key landscape features to see relationships and other natural assets

- Watersheds
- Water Quality Rankings

= Watersheds with High Quality Waters
Themed Maps
+ Local Reservoirs
+ Aquifers known or likely to be highly productive, but not yet used extensively.
= Drinking Water

Intact Forests = possibility for sustainable timber or wildlife management

Small parcels fragment forest into many owners
Large parcels create contiguous forest blocks

We use local parcel data to determine current and future intactness.
Timber Asset = Contiguous Large Forested Parcels (>50 acres). A wildlife asset = > 100 acres
Which parcels may support forestry?

Themed Maps
+ Forested Land
+ Land > 50 acres by owner
  - Protected reserve lands
  - Slopes > 15 %

= Sustainable Forestry Potential

Themed Maps
+ Prime (best) agricultural soils
+ Agricultural Districts
- Forested lands

= Agricultural Lands
**Themed Maps**

- Scenic/land based tourism (wineries, apples, maple sugar)
- Scenic routes
- National Register properties that are landscape dependent
- Hudson River Viewshed

= **Cultural Resources Supported by the Landscape**

---

**Themed Maps**

- Top fishing areas
- Trout waters
- State hunting lands and hunt clubs

= **Hunting and Fishing**

Note: also have REConnect features (hiking, birding, boating) in on-line viewer over this map but can not show in a static map.
4) **Risk Assessment**
   – What assets are most at risk?

Waters deemed impaired by state and EPA

5) **Rank Your Assets and Determine Opportunities** – Based on those assets and risks you have identified, which ones should be restored or improved?
6) **Implement Opportunities** – Include natural asset maps in both daily and long-range planning (park planning, comp plans, updates to open space plans, greenway plans, zoning, tourism and economic development, seeking easements etc).

The County will use these maps in open space and greenway planning. Towns can use them to connect resources to larger landscape and visa versa.
Smaller scales …

- Trees and woodlots
- Habitat patches
- Streams and wetlands
- Trails and smaller parks

Local site plans can be connected to the County plan and visa versa …

---

We Can Link to Regions

*Sites change focus, but still need to connect to larger scales.*

*MAY also include restoration.*
Regional Context- Forested Lands

Figure 1.2 Regional Overview, 2010

Regional Context- Ag Lands

Figure 7.1 Agricultural Land Cover
How can town level data inform the potential reconnection/improvement of cores?

How can County level cores inform town level efforts?
- How has development impacted our cores?
- How does infill protect our cores?
- How can town level data inform the potential reconnection/improvement of cores?
- How can County level cores inform town level efforts?
Green Infrastructure Mapping in Ulster County is an opportunity to

- Link the County to the Region... and beyond
- Build on existing data and efforts at the municipal and area scale
- Inform and further efforts at the municipal and region scale

Green Infrastructure...Next Steps

- Get the information out...make cores data publically and easily accessible via web
- Use cores data in public decision making (adopt cores data as amendment to UC Open Space Plan)
- Continue to refine and improve the data set
Overall Summary Points

- Need to think at multiple scales (up and down in scales and connections)
- Realize that a GI plan can help you keep a landscape healthy now and in the future (instead of paying a lot to clean it up later!)
- Think of systems and nested landscape elements
- Need to realize the multiple benefits provided
- Consider building a green infrastructure model in your state too! Contact us to learn how!

Speaker Contact Information

Karen Engel
Green Infrastructure Coordinator
NYS Department of Environmental Conservation
Office of Environmental Justice
625 Broadway, 14th Floor, Albany, NY 12233
518-402-9517
kmengel@gw.dec.state.ny.us

Karen Firehock
Executive Director, Green Infrastructure Center Inc.
P.O. Box 317, Charlottesville, VA 22902
434-244-0322
firehock@gicinc.org, www.gicinc.org

Amanda LaValle
Coordinator, Ulster County Department of the Environment
17 Pearl Street, PO Box 1800, Kingston, NY 12402
845-338-7455
alav@co.ulster.ny.us, www.co.ulster.ny.us/environment,
www.co.ulster.ny.us/recreation, www.sustainableulster.org
Next Watershed Academy Webcast

Using Cover Crops to Improve Water Quality
March 2014

Information will be posted at
www.epa.gov/watershedwebcasts

Participation Certificate

If you would like to obtain participation certificates type the link below into your web browser:


You can type each of the attendees names into the PDF and print the certificates.