



Department of
Environmental
Conservation

Creating a Natural Resources Inventory

January 14, 2016
Climate Smart Communities Webinar

Laura Heady
Conservation and Land Use Coordinator
&
Ingrid Haeckel
Conservation and Land Use Specialist
Hudson River Estuary Program and Cornell University



Photos by Laura Heady



Hudson River Estuary Program

Working to achieve six key benefits:

- vital estuary ecosystem
- clean water
- resilient communities
- conservation of fish, wildlife, and habitats
- preservation of river's natural scenery
- enhanced opportunities for education, access, recreation, and inspiration

<http://www.dec.ny.gov/lands/4920.html>



Today's Presentation

- What's at stake?
- Natural resources inventories (NRIs): The process and examples
- Guidebook: *Creating a Natural Resources Inventory**
- Putting the Inventory to Work

Photo by Laura Heady



What's at stake if we don't plan proactively to conserve important natural resources?



**natural
resources**

water quality and quantity
flood control
temperature moderation
carbon storage
clean air
human health
recreation and education
scenery
fisheries and forest products
natural pollinators



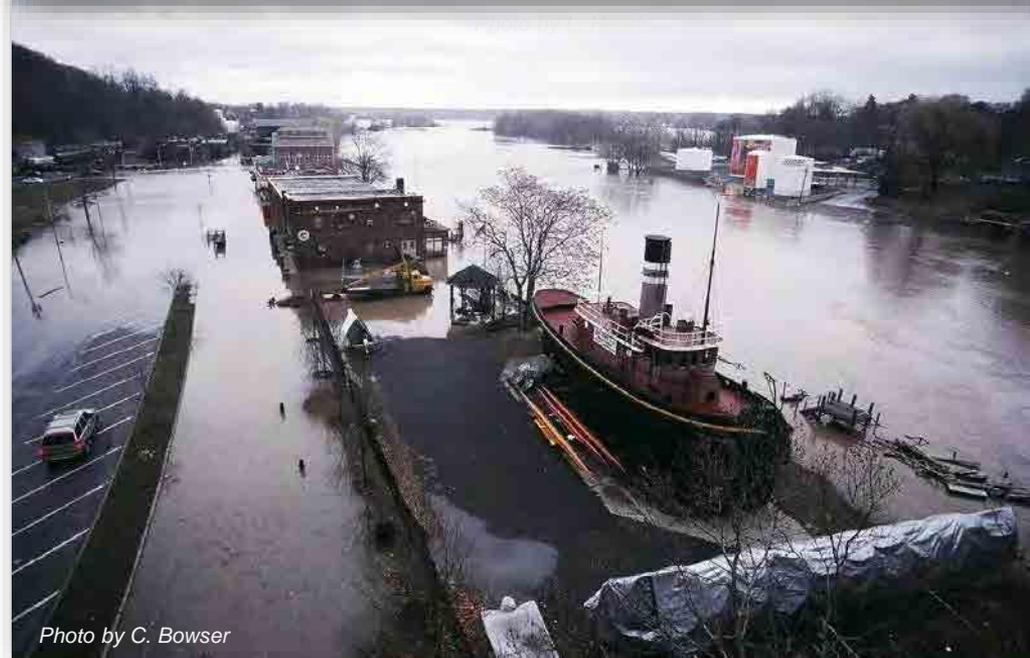
→ **“ecosystem
services”**

What's at stake?

Climate Change Resilience

Conservation of natural resources like forests, wetlands, and floodplains can help communities build resiliency to:

- increasing temperatures,
- sea level rise, and
- variability in precipitation.



Climate Change Resilience: *Examples*



An acre of trees absorbs the same amount of CO₂ in one year as the amount produced by a car driven 26,000 miles.

(North Carolina State Cooperative Extension)

An acre of wetland can store 1-1.5 million gallons of floodwater.

(United States EPA)

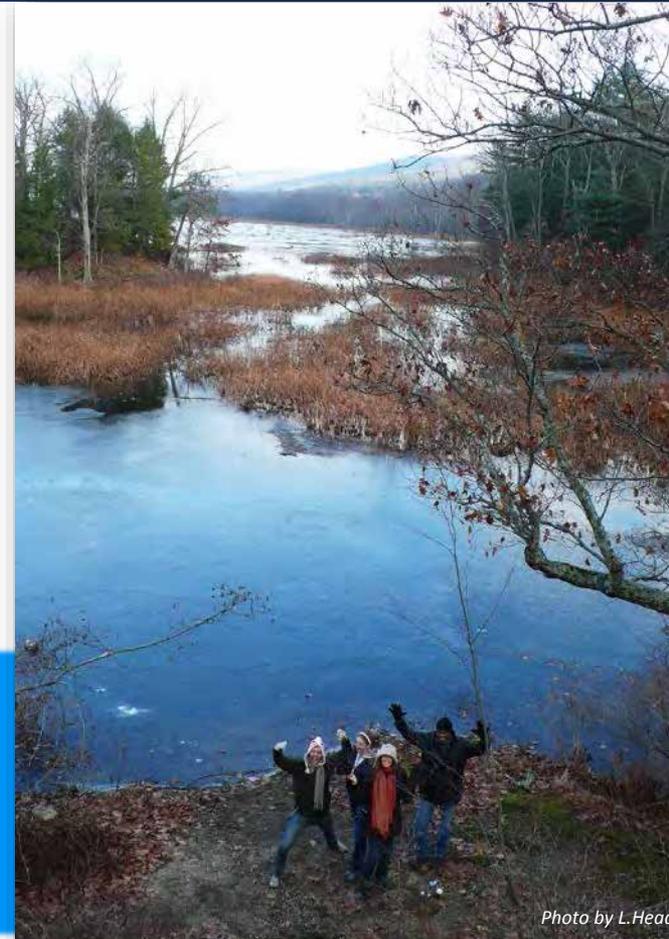


Photo by L. Heady

Photo by L. Heady

Economic Benefits of Open Space:



OFFICE OF THE STATE COMPTROLLER

Thomas P. DiNapoli, State Comptroller

Economic Benefits of Open Space Preservation

March 2010

“In many instances, it is less expensive for a community to maintain open space that naturally maintains water quality, reduces runoff, or controls flooding than to use tax dollars for costly engineered infrastructure projects such as water filtration plants and storm sewers.”



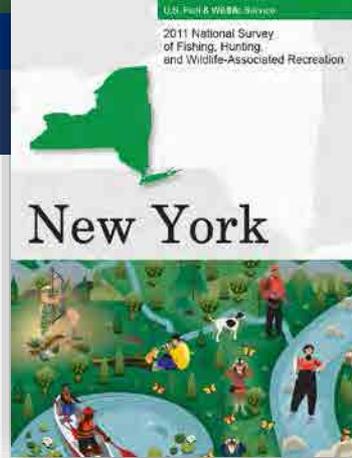
**Department of
Environmental
Conservation**

What's at stake?

Economic Benefits of Recreation:

In 2011, residents and nonresidents spent \$9.2 billion on wildlife-related recreation (hunting, fishing, and wildlife-watching) in New York.

(USFWS 2014)



Wildlife-Related Recreation Expenditures in New York (Total: \$9.2 billion)



What's at stake?



Photos by L. Heady

“The future is literally in our hands to mold as we like.
But we cannot wait until tomorrow. Tomorrow is now.”

-Eleanor Roosevelt



Department of
Environmental
Conservation

Recommended Conservation and Planning Approach

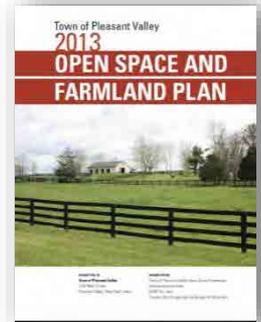
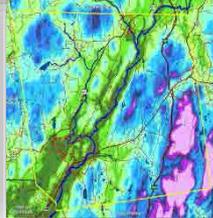
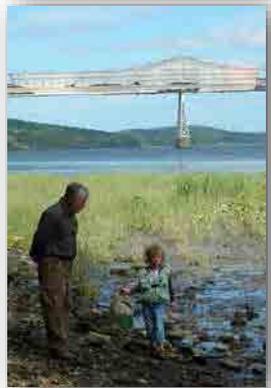
identify what you have



prioritize



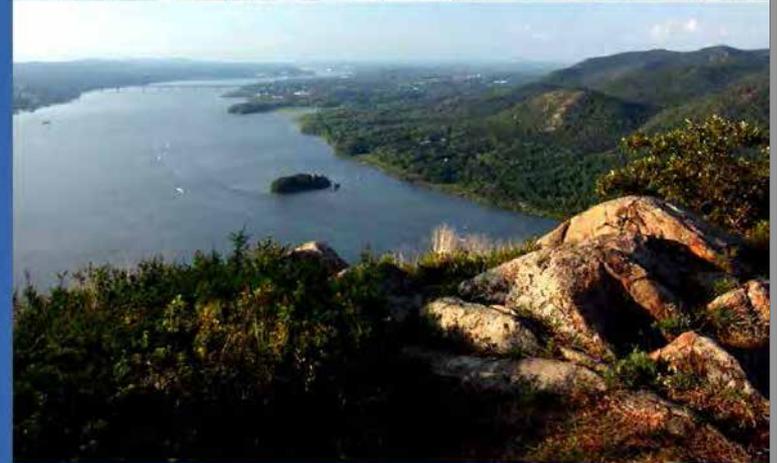
plan, protect, manage



identify what
you have

Creating a Natural Resources Inventory

A Guide for Communities in the Hudson River Estuary Watershed



Cornell University



Hudson River Estuary Program
A Program of the New York State
Department of Environmental Conservation

identify what
you have

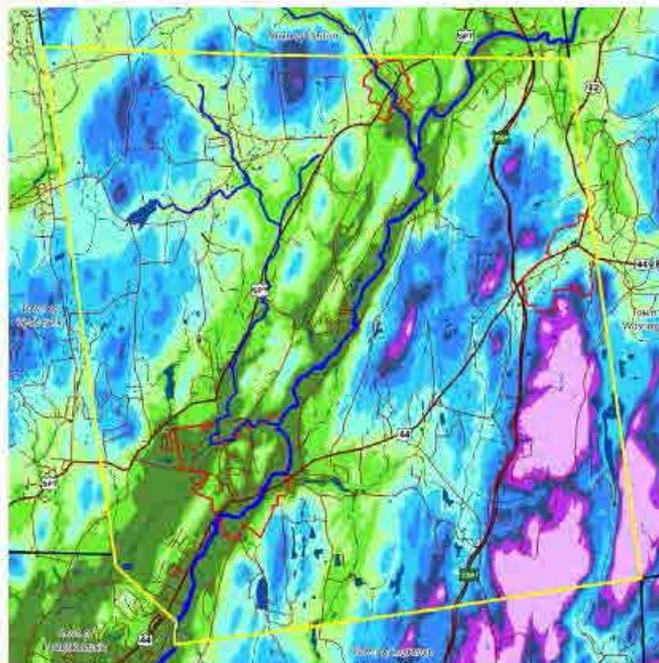
What is a Natural Resources Inventory (NRI)?

- a compilation and description of natural resources within a particular area (municipality, watershed, region)
- primary focus is naturally-occurring resources, but cultural resources are often included

APPENDIX I: EXAMPLES OF MAPS FROM A MUNICIPAL NRI

The Town of Pleasant Valley in Dutchess County, NY completed an Open Space and Farmland Plan in 2013. The purpose of the plan is to assess the town with protection of significant open space and farmland resources by providing information on the importance of those resources, offering a guide on voluntary land protection and financing options, and providing short-term and long-term recommendations that will contribute to the protection of the environmental and economic health of the community. The plan includes a townwide inventory of existing natural and cultural resources, and identifies six significant resource areas. The entire plan can be viewed on the town's website at <http://www.pleasantvalley.ny.gov/assessments/open-space-and-farmland-plan-2013>. The following selection of maps comes from the natural and cultural resources chapter and is used with permission from Taconic Site Design & Landscape Architecture and AGRF.

TOPOGRAPHY



Who develops an NRI in NY? *CACs and EMCs*

CACs (Article 12-F, General Municipal Law)

“...shall keep an inventory and map...of all open areas within the municipality...” and “...all open marsh lands, swamps and all other wet lands in a like manner...”

EMCs (Article 47, Environmental Conservation Law)

“...shall develop and maintain an inventory of natural resources within the county...shall include wetlands and open spaces...”

Anyone on a CAC?

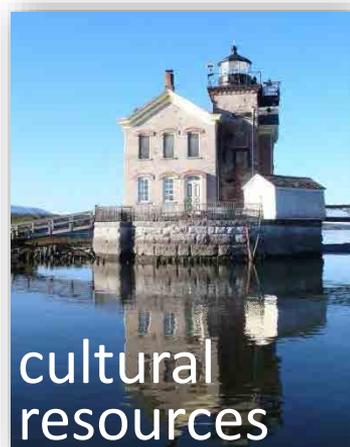
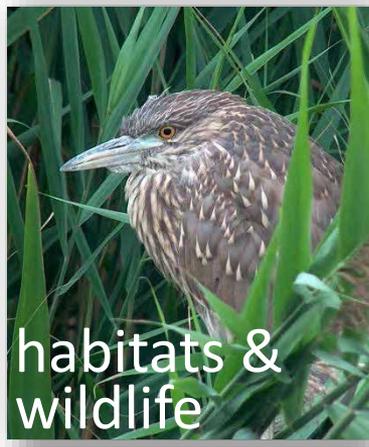
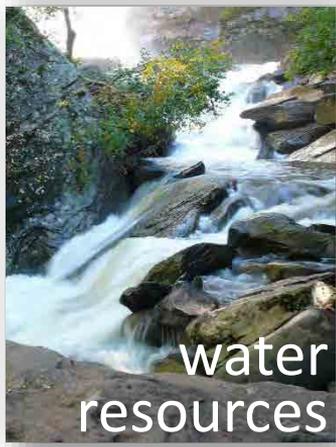
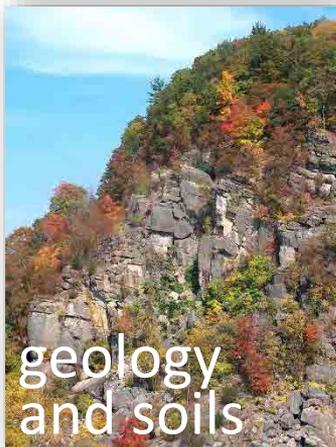


Photo by Laura Heady



Department of
Environmental
Conservation

What is included in an NRI?



Photos by Laura Heady



What is included in an NRI?

➤ *What does your community want?*

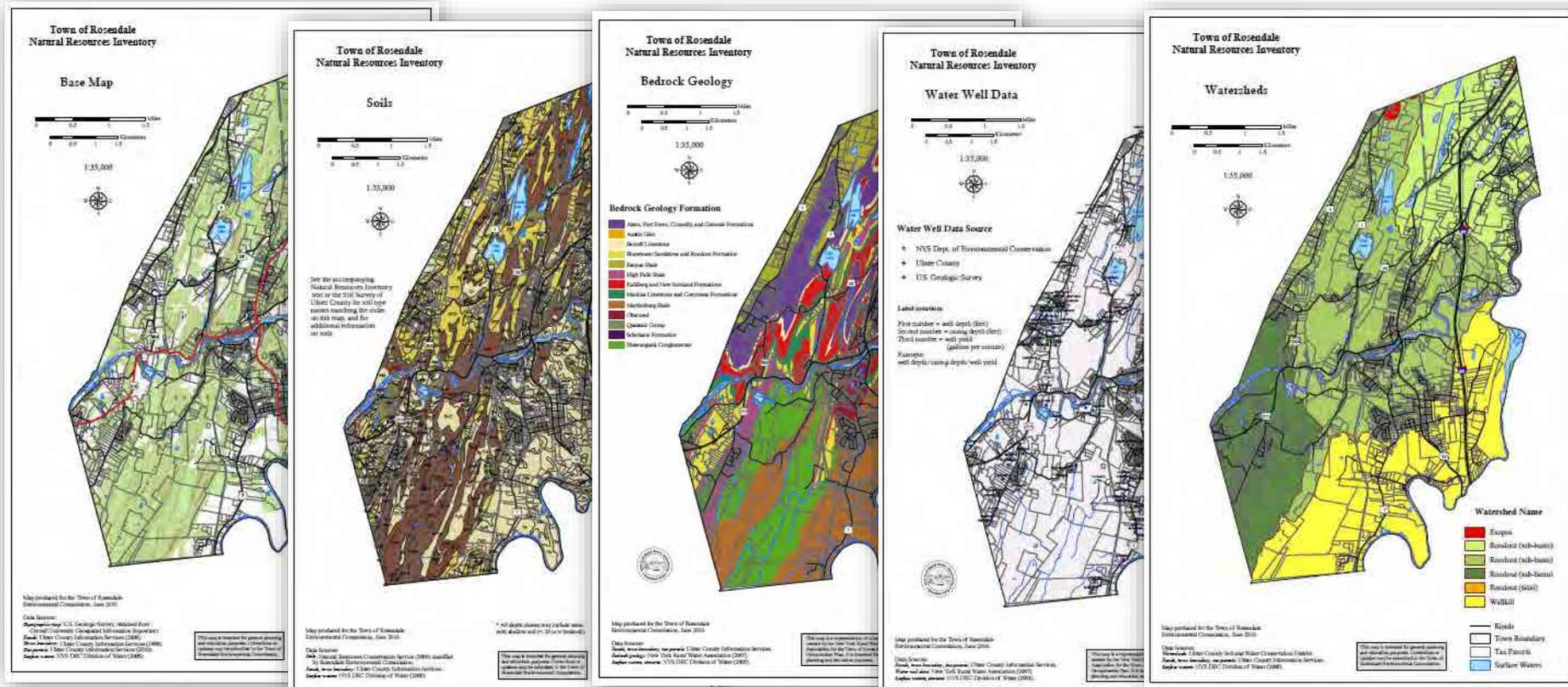
Two approaches:

- “Basic” NRI – uses publicly available data
- “Detailed” NRI – basic data + new analysis or study



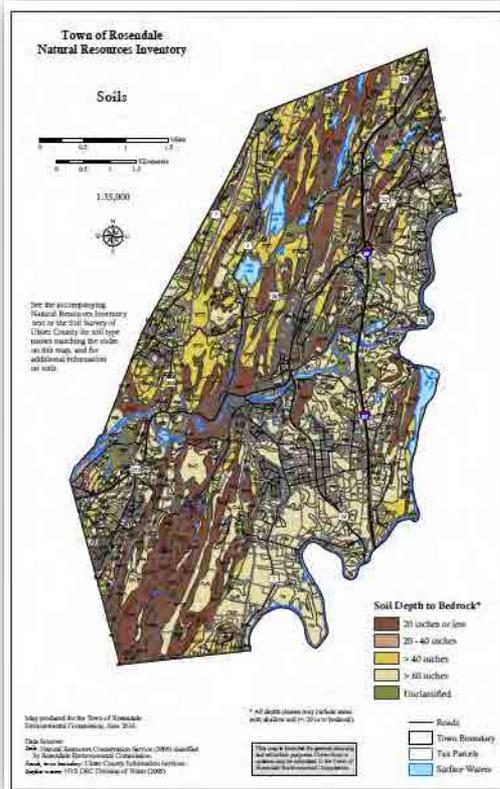
What is included in an NRI?

1) maps



What is included in an NRI?

- 1) maps
- 2) data and sources



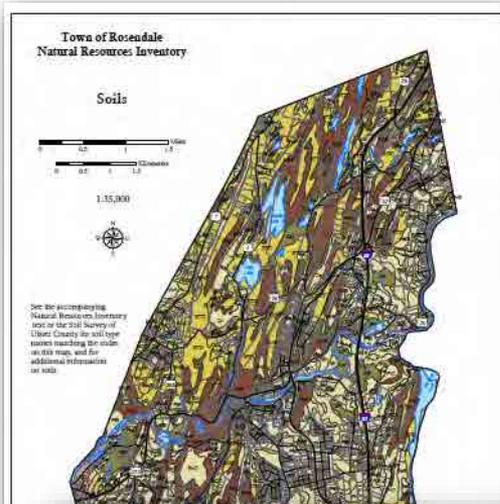
Soils Descriptions⁸:

Label on Map	Name	Reaction*	Depth (inches)	Drainage**
CnB	Chenango gravelly silt loam	sc, nc	>60	sx-w
HgB	Hoosic gravelly loam	nc	>60	x-w
HgC	Hoosic gravelly loam	nc	>60	x-w
HgD	Hoosic gravelly loam	nc	>60	x-w
HSF	Hoosic soils	nc	>60	x-w
	Underlain			

⁸ The source for these descriptions is the *Soil Survey Manual*, U.S. Department of Agriculture, Natural Resources Conservation Service (updated 1993), at <http://soils.usda.gov/technical/manual>.

What is included in an NRI?

- 1) maps
- 2) data and sources
- 3) report (goals, methods, resource descriptions, findings, recommendations)



Soils Descriptions¹:

Label on Map	Name	Reaction ^{**}	Depth (inches)	Drainage ^{**}
CnB	Chemango gravelly silt loam	ac, nc	>60	SN-W
HgB	Housic gravelly loam	nc	>60	SN-W
HgC	Housic gravelly loam	nc	>60	SN-W
HgD	Housic gravelly loam	nc	>60	SN-W
HNF	Housic soils	nc	>60	SN-W
HNE	Hudson and Scholarre soils	c	>60	HW
SaB	Scholarre silt loam	c	>60	HW-W
SaC	Scholarre silt loam	c	>60	HW-W
ARD	Arnot- Lordstown- Rock outcrop complex	nc	<=20/20-40	HW-SN-W
ARF	Arnot-Opoga- Rock outcrop complex	nc	<=20/20-40	HW-SN-W-S
CVA	Churchville silt loam	c	>60	sp
LOC	Lordstown- Arnot-Rock outcrop complex	nc	20-40/20-20	W/HW-S

Soils and Topography

Soils

Soil underlies and shapes the biodiversity of a region. Such soil characteristics as pH (acidity and alkalinity), drainage, soil texture, depth to bedrock, and slope inform the types of habitat likely to occur in a particular area, with distinctive natural communities becoming established on calcareous (alkaline) soils, acidic soils, clayey soils, sandy soils, and shallow soils, among other soil types.

Soil characteristics also influence human uses of the land: soils range in suitability for food production, their proneness to flooding and inundation, vulnerability to soil erosion and soil instability, and efficiency at filtering pollutants and wastes. What we grow, where we build, and how we maintain the quality of our environment depend directly on the nature of our soils.

What is included in an NRI?

1) maps

2) data and sources

Table 6. Floodplain Acreage by Municipality. Dutchess County Department of Planning. January 1985

Municipality	Approximate Floodplain Acreage	Approximate percentage in Wappinger Watershed	Percentage of Municipality
Clinton	1,227	85%	4.9
Fishkill	1,862	10	10.9
Hyde Park	1,440	0	6.1
LaGrange	4,779	50	19.2
Milan	345	65	1.5
Pine Plains	955	60	4.8
Pleasant Valley	3,930	95	18.5
Poughkeepsie	2,260	65	12.1
Stanford	977	100	3.0
Wappinger	3,563	60	21.0
Washington	393	60	1.1
Village of Millbrook	121	100	10.3
Village of Wappingers Falls	110	100	14.1

Natural Resource Management Plan for the Wappinger Creek Watershed

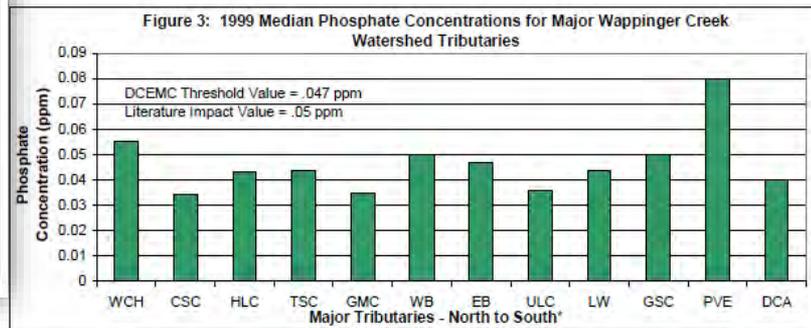
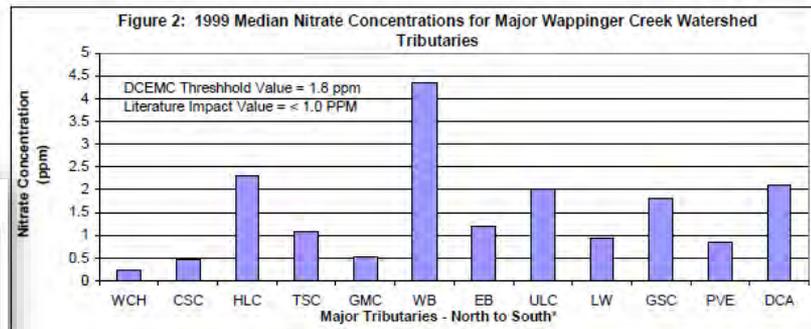
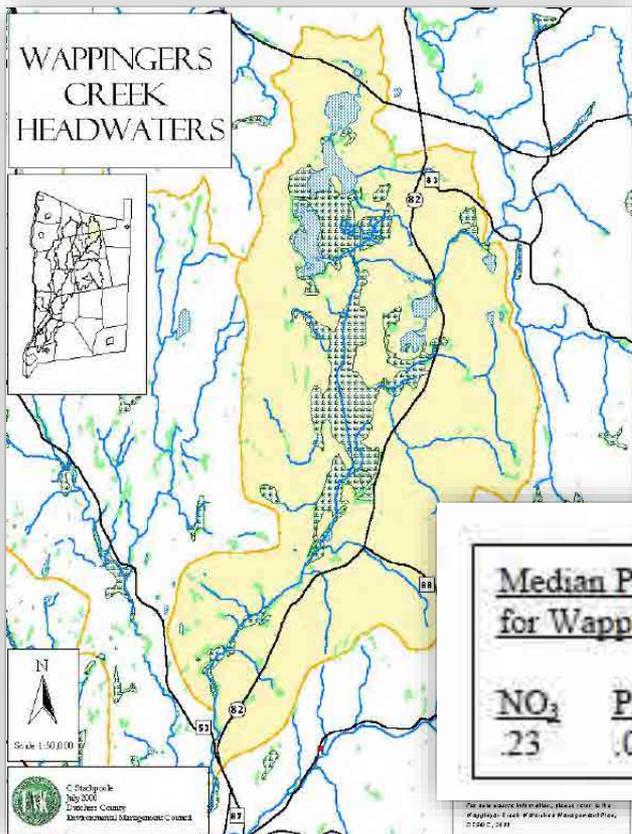


Figure 4: 1999 Median Suspended Material Concentrations for Major Wappinger Creek Watershed Tributaries

What is included in an NRI?



- 1) maps
- 2) data and sources
- 3) report (goals, methods, resource descriptions, findings, recommendations)

Subwatershed Impact Summaries

Wappinger Creek Headwaters

The Wappinger Creek Headwaters subwatershed encompasses 9,430 acres in the northern portion of the Wappinger Creek watershed (Map 10^o). Contained within the Towns of Pine Plains and Stanford, the subwatershed comprises 7% of the Wappinger Creek watershed. Subwatershed land use consists of 38% agriculture (the second-highest amount of agricultural land use of all the subwatersheds), 40% forested, 8% residential,

Why inventory natural resources?

NRIs provide an opportunity to educate and raise awareness about your community's natural assets.

- educates landowners
- prepares developers
- contributes to community vision



Photo by G. Goff

Why inventory natural resources?

NRIs provide a valuable reference for planning, designing, and reviewing. They help decision-makers to:



- know what questions to ask
- provide consistency in reviews
- consider the context of a project, i.e., the “big picture”

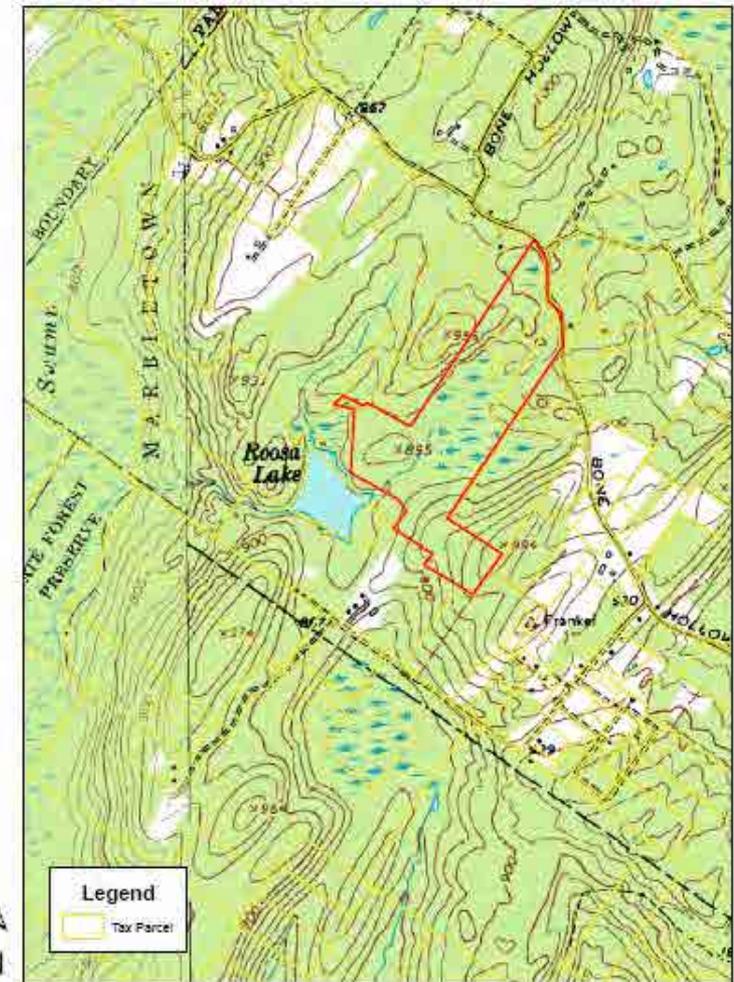




Map produced by Laura Heady
NYSDEC Hudson River Estuary Program

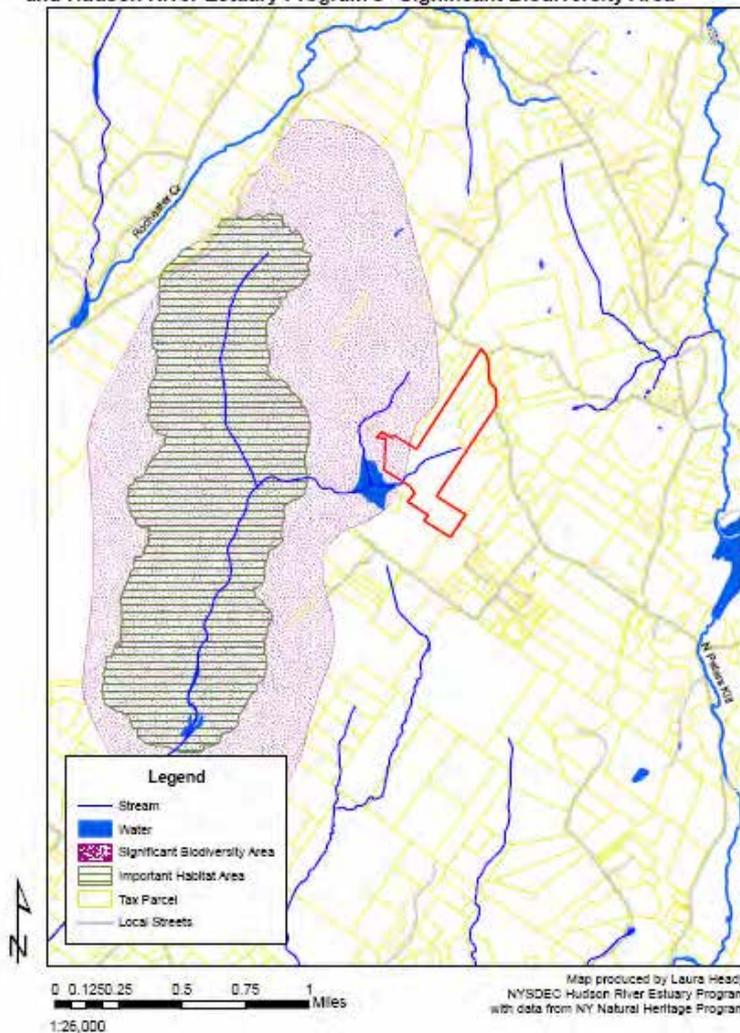
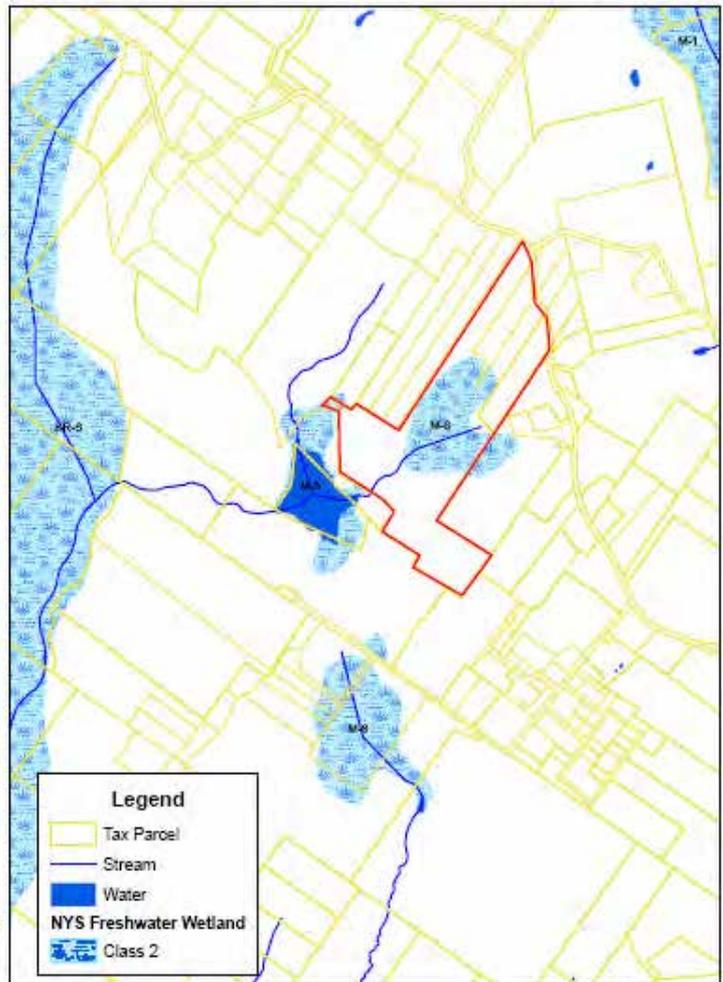
1:14,000

Parcel boundaries over USGS 7.5 Minute Topographic Map



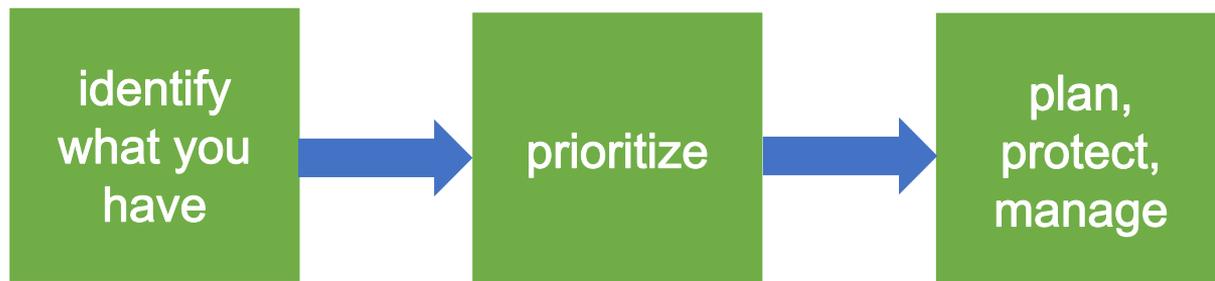
Map produced by Laura Heady
NYSDEC Hudson River Estuary Program

1:14,000



Bottom Line: Why inventory natural resources?

In order for your community to “insure” or plan for what’s most important, it needs to know what it has and where it is, its priorities, and sources of risk.



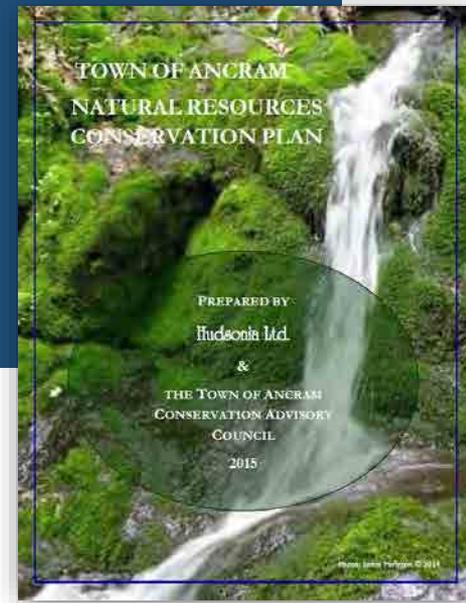
Examples of Inventory Projects (cont'd)

Town of Ancram Natural Resources Conservation Plan

Done by: CAC and Hudsonia Ltd.

\$\$\$: Funding from Hudson River Valley Greenway, Hudson River Bank and Trust Foundation, and the Town

- Used existing data + habitat mapping completed by volunteers.



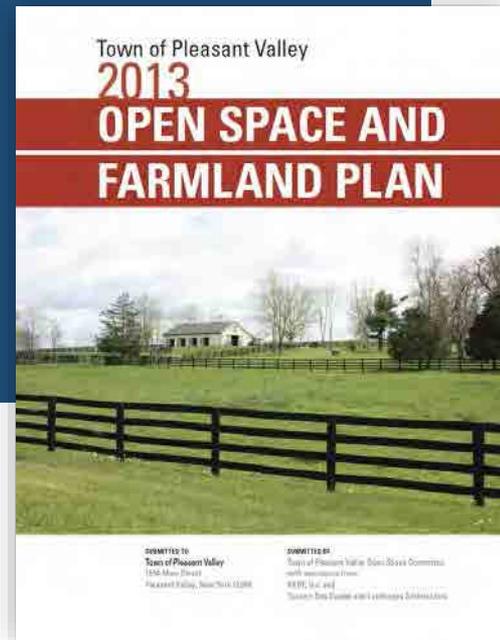
Examples of Inventory Projects (cont'd)

Town of Pleasant Valley Open Space and Farmland Plan

Done by: Open Space Committee,
Taconic Site Design and AKRF

\$\$\$: Funding from Hudson River Estuary Grant

- Used existing data to inventory natural resources and identifies and describes priority areas.



Technical and Funding Assistance



**Hudson River
Estuary Program**

A Program of the New York State Department of Environmental Conservation

The Guidebook at a Glance

- Outlines an approach to developing an inventory
- Recommends resources to inventory
- Suggests available data to include and where to find help
- Considers ways to analyze the results
- Presents ideas and examples for putting the inventory to work

www.dec.ny.gov/lands/100925.html

Creating a Natural Resources Inventory

A Guide for Communities in the Hudson River Estuary Watershed



Cornell University



Hudson River Estuary Program
A Program of the New York State
Department of Environmental Conservation

Who is the guidebook especially designed for?

Boards, commissions, and groups that are:

- involved in environmental review and conservation planning
- starting or updating an NRI, comp plan, open space plan, or watershed characterization
- taking the next steps with a completed inventory



Photo by David Burns



Photo by Laura Heady

What's in the guide?

Ch. 1: Introduction (why/what)

Ch. 2: Getting Started (process)

Ch. 3: Mapping Options (online tools and GIS)

Ch. 4: What to Include (inventory components)

Ch. 5: Analyze the Information (what does it all mean?)

Ch. 6: Putting the Inventory to Work (next steps)

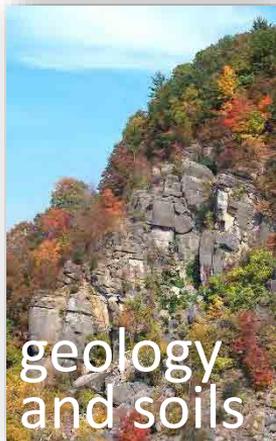
plus appendices....



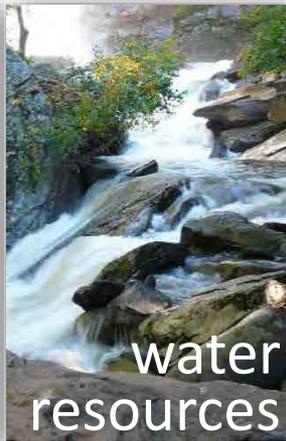
Contents

Preface and Acknowledgments	iii
Chapter 1: Introduction	1
Why inventory natural resources?	1
What is a natural resources inventory (NRI)?	1
About this guide	2
Chapter 2: Getting Started	5
Establish a work group	5
Determine goals and scope of project	6
Define the study area	7
Review existing natural resources documents	8
Develop a draft inventory outline	8
Develop a budget and scope of work	8
Publicize the inventory and solicit public input	8
Where to find help	8
Chapter 3: Mapping Options: Using Online Tools and Geographic Information Systems (GIS)	9
What is a geographic information system?	9
Online mapping tools	10
Where can you obtain GIS data, maps, and assistance?	11
What map scale should be used?	12
What do you do if the information you need isn't available digitally?	12
How recent are the GIS data?	12
Chapter 4: What to Include in the NRI	13
Inventory Format	14
Inventory Components:	16
Base Map	16
Geology and Soils	16
Bedrock and Surficial Geology	16
Soils	18
Slopes	19
Water Resources:	19
Groundwater and Aquifers	19
Watersheds	21
Streams and Waterbodies	22
Floodplains	23
Wetlands	24
Water Quality: Standards and Assessments	26
Water Quality: Potential and Known Sources of Contamination	28
Habitats and Wildlife	28
Significant Biodiversity Areas of the Hudson River Estuary Corridor	28
Hudson River Coastal and Shoreline Habitat	29
Stream and Riparian Habitat	30
Wetland Habitat	32
Forests	33
Grasslands and Cnublands	34
Rare Plant and Animal Species and Significant Natural Communities	36
Undeveloped Habitat Blocks	39
Climate: Conditions and Projections	40
Cultural Resources:	41
Historic Resources	41
Scenic Resources	43
Recreation Resources	44
Land Use	45
Zoning and Tax Maps	45
Land Use and Land Cover	46
Farmland	47
Conservation and Public Lands	49

Resources to include in an NRI:



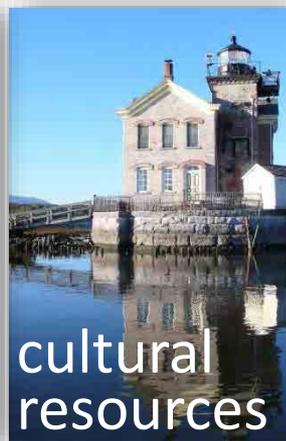
geology and soils



water resources



habitats & wildlife



cultural resources



climate conditions



land use

Table 2: Suggested Inventory Components and Recommended Data: The following list primarily includes widely available national and New York State data sets. Additional regional data sets may exist and in many cases, county agencies like planning departments have more localized data and should be consulted at the start of the inventory project. In all cases, local data should be included where available and appropriate.

Inventory Component	Recommended Data to Include	Page
Base Map	• Municipal boundaries, transportation and utility networks, topography, aerial imagery, regional watershed boundaries, streams and waterbodies, landmarks	16
Geology and Soils		
Bedrock and Surficial Geology	• Bedrock and surficial geology features and table with geologic unit attributes	16
Soils	• Soil survey units and table with attributes	18
Slopes	• Percent slope calculated from a digital elevation model	18
Water Resources		
Groundwater and Aquifers	• Unconsolidated aquifers	18
Watersheds	• National Hydrography Dataset 10-digit HUC or other regional watershed boundaries • 12-digit HUC subwatershed boundaries • Smaller watersheds of interest to the NRI effort	21
Streams and Waterbodies	• National Hydrography Dataset streams and waterbodies	22
Floodplains	• FEMA Floodway and 100-year and 500-year Floodplains	23
Wetlands	• National Wetlands Inventory data • DEC Freshwater Wetlands data • Hydric soils from county soil survey	24
Water Quality: Assessment and Standards	• DEC Water Quality Classifications • DEC Waterbody Inventory/Priority Waterbodies List • Water quality monitoring data	26
Water Quality: Potential and Known Contamination Sites	• SPDES permit lists • Hazardous waste sites	28
Habitats and Wildlife		
Significant Biodiversity Areas	• Hudson Valley Significant Biodiversity Areas	26
Hudson River Coastal and Shoreline Habitat	• Documented submerged aquatic vegetation • Tidal wetlands • Significant Coastal Fish and Wildlife Habitats • Hudson River shoreline habitat type • Significant natural communities	25
Stream and Riparian Habitat	• See Streams and Waterbodies section, above • Significant natural communities • Migratory fish runs • DEC trout and trout spawning streams • Known aquatic barriers to resident and migratory fish movement (e.g., dams, culverts)	30
Wetland Habitat	• See Wetlands section, above • Significant natural communities	32
Forests	• Large forest patches • Matrix forests and linkage zones • Significant natural communities	33
Grasslands and Shrublands	• NYS Breeding Bird Atlas and NYS Amphibian and Reptile Atlas data • Significant natural communities	34
Rare Plant and Animal Species and Significant Natural Communities	• Rare plant and animal species and significant natural communities • Areas of known importance for rare species and significant ecosystems • NYS Breeding Bird Atlas and NYS Amphibian and Reptile Atlas data	36
Unfragmented Habitat Blocks	• There are currently no region-wide publicly available data sets. See Chapter 4 for existing methodologies.	39
Climate		
Climate Conditions and Projections	• State's Hudson's low level rise projections for the Hudson River estuary • Table with current average climate conditions and projections of future climate conditions	30
Cultural Resources		
Historic Resources	• National Register and NYS historic districts and individually-designated historic sites • National Heritage Corridor/Area and NYS Heritage Areas	41
Scenic Resources	• Scenic Areas of Statewide Significance • Scenic bylaws	43
Recreation Resources	• Outdoor recreation destinations and amenities • Public trails and fishing sites • Conservation and public lands	44
Land Use		
Zoning and Tax Maps	• Municipal zoning and tax maps • Rural property tax records	
Land Use and Land Cover	• National Land Cover or Coastal Change Analysis Program	
Farmland	• Prime farmland soils and farm soils of statewide importance • Agricultural districts	
Conservation and Public Lands	• Conserved or publicly-owned lands under federal, state, or local ownership • Conservation assessments	

Each resource description includes:

- background
- what to include (readily available data)
- detailed inventory studies (to gather new, local data)
- where to find help

Where to find help

See [Appendix A](#) for organization contact information, [Appendix B](#) for publications and web resources, and [Appendix C](#) for sources of GIS data.

United States Geological Survey

HUC watershed delineations, StreamStats tool for local watershed delineation

DEC Hudson River Estuary Program

Technical and mapping assistance

Hudson River Watershed Alliance

Watershed Atlas maps, information on local watershed groups, watershed plans, and intermunicipal agreements

Local watershed association

Maps, watershed assessments and plans

County agencies (such as planning department, soil & water conservation district, or Cornell Cooperative Extension)

Maps, watershed plans

Streams and Waterbodies

Background

Streams, reservoirs, lakes, and ponds and their adjacent riparian (streamside) habitats provide critical benefits to communities, including clean water, flood management, and recreational opportunities like fishing and kayaking. The health of the Hudson River estuary is closely linked to the health of its tributaries and their watersheds.

There are various classification systems for surface water systems based on a range of physical conditions, habitat values, and human uses, including hydrology, flow, average depth, surface area, temperature, habitat structure, water quality, sensitivity to pollutants, and recreational uses, among other attributes. A basic NRI may simply document known streams and waterbodies, while detailed inventory studies can research characteristics relevant to local water resource concerns and interest.

Perennial streams flow continuously throughout years with normal precipitation, but some may dry up during droughts. *Intermittent streams* only flow seasonally or after rain. They can easily be overlooked when dry, but have great impact on the water quality and quantity of larger downstream waters and warrant attention. Stream barriers, such as dams and poorly designed and installed culverts, can have serious effects on stream habitat, local flooding, and water quality. Bridges, open-bottom culverts and similar structures that completely span a waterway and associated riparian area and floodplain usually have the least impact on streams. Stream habitat values are discussed further in the [Stream and Riparian Habitat](#) section.

Poorly planned development in a watershed can dramatically increase the amount of stormwater runoff, chemicals, sediment, and other contaminants entering streams and waterbodies, threatening water quality, degrading habitat value, and increasing flood risk. Precipitation has become more variable and extreme with climate change

in the Northeast, exacerbating these threats. Annual rainfall occurring in heavy downpour events increased 74% between the periods of 1950-1979 and 1980-2009, and most areas of the Hudson Valley have been impacted by serious flooding in recent years (Rosenzweig et al. 2011). Thorough documentation of streams and waterbodies in an NRI can help communities to plan for and mitigate future flood risk as precipitation trends continue. See the [Floodplains](#) section for more information on flooding considerations and [Appendix F](#) for information on precipitation projections in the Hudson Valley. See the [Water Quality](#) and [Land Use](#) sections for further discussion of watershed connections to surface water pollution, water quality assessment, and monitoring studies.

Poorly planned development in a watershed can dramatically increase the amount of stormwater runoff, chemicals, sediment, and other contaminants entering streams and waterbodies, threatening water quality, degrading habitat value, and increasing flood risk.

What to include

Streams and waterbodies can be mapped and described using the USGS National Hydrography Dataset or more detailed local data sources, where available. (Some municipal and county agencies have developed finer-scale stream maps, for example.) This information may be displayed together with watershed boundaries, which provide logical units for evaluating surface water resources (see [Watersheds](#) section). The National Hydrography Dataset can be viewed online using the USGS Hydrography Viewer and GIS data can be obtained from the USGS website. It may be helpful to combine features such as floodplains, riparian wetlands and forests, waterbodies, and subwatersheds in a single map in the NRI.



Flowing culverts prevent fish from traveling upstream. © M. Adamson



Detailed inventory studies

Intermittent streams and small waterbodies are not captured on USGS and statewide stream maps. These important resources can be identified and delineated through airphoto interpretation, map analysis, local knowledge, and site visits to create more accurate maps. See [Appendix E](#), Biodiversity Assessment, for details.

The *New York State Inventory of Dams* and the USGS National Hydrography Dataset document a small fraction of dam locations. Many dams, especially small ones, are missing from these data sets. Culvert data sets do not exist on any standard, county, or statewide scale in New York. The DEC Hudson River Estuary Program is collecting information on dams and culverts in the Hudson Valley. Field surveys can fill in missing dam and culvert information.

Where to find help

See [Appendix A](#) for organization contact information, [Appendix B](#) for publications and web resources, and [Appendix C](#) for sources of GIS data.

United States Geological Survey

National Hydrography Dataset, Hydrography Viewer

DEC Hudson River Estuary Program

Technical and mapping assistance, aquatic barrier information

Hudson River Watershed Alliance

Watershed Atlas maps

Local watershed association

Maps, watershed plans

County agencies (such as planning department or soil & water conservation district)

Maps

Floodplains

Background

Floodplains are low-lying areas adjacent to streams and other waterbodies that become inundated during heavy precipitation or snowmelt. By slowing and stirring floodwaters, floodplains reduce downstream flood damage and serve as a safety zone between human settlement and the damaging impacts of floods. Naturally vegetated floodplains help prevent erosion, recharge groundwater, and

can serve as travel corridors for plants and animals that support the in-stream food web. In natural states, they provide space for change course. Floodplains are also where land-use change can occur.

Floodplains have traditional uses. In the US Department of Homeland Security's National Flood Hazard Mitigation Plan, floodplains are identified as areas with a high potential for damage. It is important to understand their statistical flooding in order to make the best data and technical mapping. Due to many variables, including the variable nature of floods, the variable intensity of local weather, and the variable intensity of local flood-prone areas, floodplain maps, and floodplain maps, and floodplains over time as more information is gathered.



Naturally vegetated floodplains help prevent erosion, recharge groundwater, and

Example: Wetlands

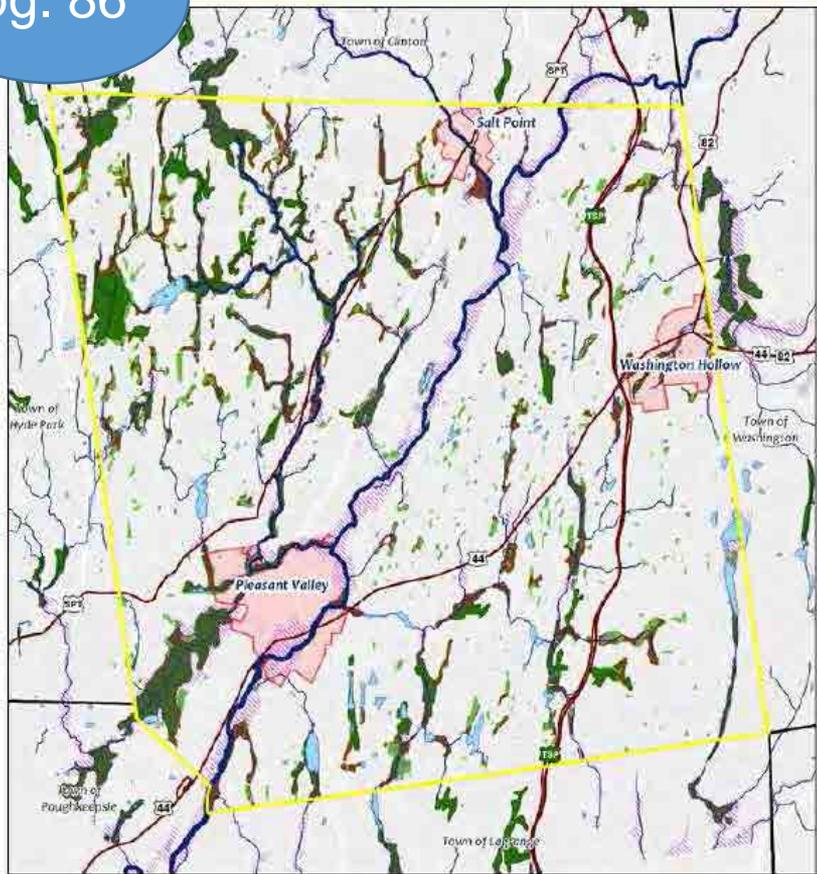
Background: defining features, multiple values, relation to other surface water, mapping issues

What to include: National Wetland Inventory, NYS Freshwater Wetlands, soils drainage data (poorly and somewhat poorly drained classes)

Detailed inventory studies: wetland inventory and evaluation methods, wetland buffer delineation

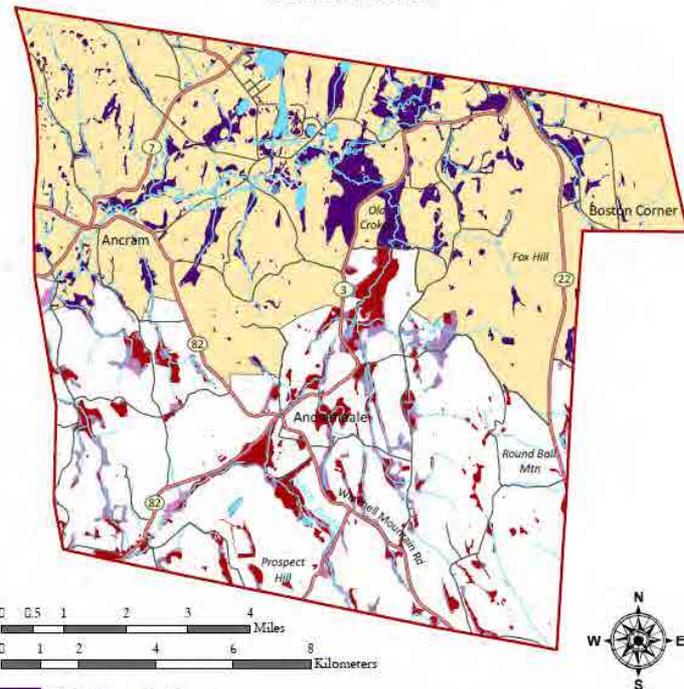
Where to find help: DEC Freshwater Wetlands Program, DEC Hudson River Estuary Program, county soil and water conservation districts





Town of Pleasant Valley surface hydrology

Detailed Wetlands



- Wetland mapped by Ancram Biodiversity Assessment Team
- Area mapped by Ancram Biodiversity Assessment Team
- NWI wetland
- Hydric soils
- Somewhat poorly drained soils

Ecologically significant wetlands mapped by Ancram Biodiversity Assessment team and digitized by Hudsonia. This project is ongoing for up-to-date map content. Ancram CAC, National Wetlands Inventory (NWI) data acquired in 2012 from the US Fish and Wildlife Service website. Soils data acquired from Natural Resources Conservation Service website. Categorized as hydric (very poorly drained and poorly drained) and somewhat poorly drained by Nava Tabak (Scenic Hudson) in 2012. Map created by Hudsonia Ltd, Annandale, NY.

Town of Ancram detailed wetlands

Example: Forests

Background: interior forest habitat, forest corridors, fragmentation of forests, pests and invasive species

What to include: large forests (>200 ac), matrix forest blocks and linkage zones, significant communities

Detailed inventory studies: biodiversity assessment (habitat mapping), managed forest land, street tree inventory

Where to find help: Hudson River Estuary Program, New York Natural Heritage Program, DEC Forest Stewardship Program

Inventory

Large-scale inventories, large forest tracts are ecologically diverse, and functionally quite heterogeneous. In general, large forests contain greater numbers of rare, threatened, and imperiled species. The heterogeneity of large tracts of unmanaged forest may result in a greater number of species than any smaller tract, even a patchwork of smaller tracts, with the same or larger total area. Large tracts generally have reduced edge effects, are more resistant to species loss, and are the only type of forest that can support a wide range of species. Large tracts also provide a natural laboratory for studying ecological processes and the effects of natural disturbance.

Management of large tracts of forest

What to include

Large tracts of forest are ecologically diverse and functionally quite heterogeneous. In general, large forests contain greater numbers of rare, threatened, and imperiled species. The heterogeneity of large tracts of unmanaged forest may result in a greater number of species than any smaller tract, even a patchwork of smaller tracts, with the same or larger total area. Large tracts generally have reduced edge effects, are more resistant to species loss, and are the only type of forest that can support a wide range of species. Large tracts also provide a natural laboratory for studying ecological processes and the effects of natural disturbance.

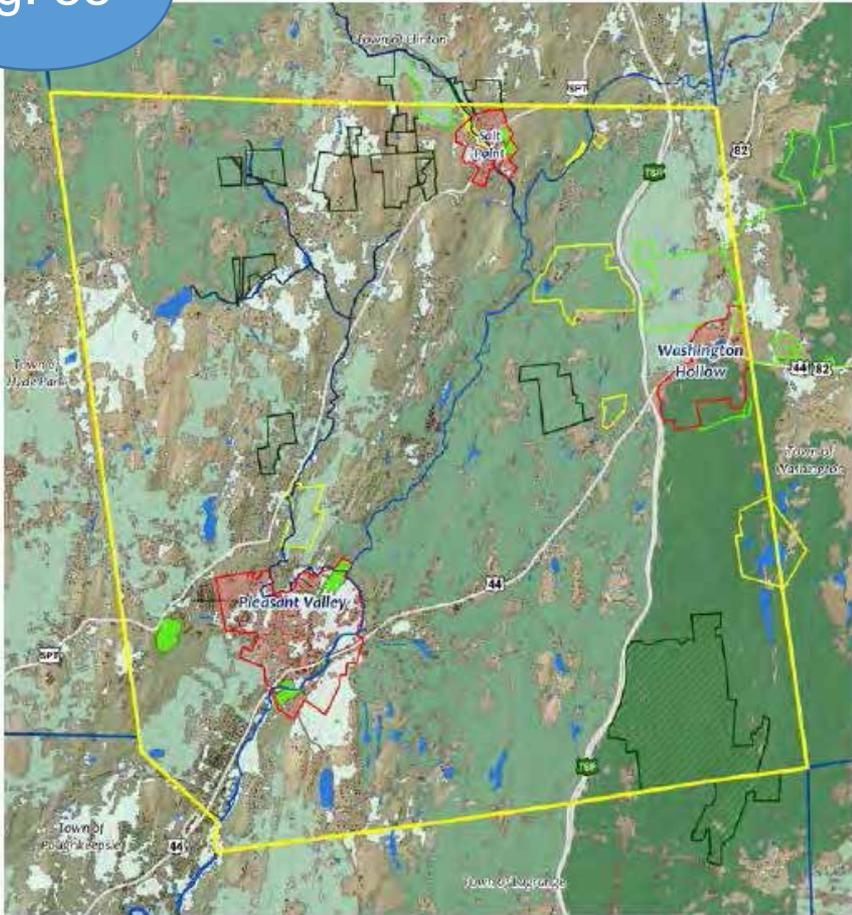
Detailed inventory studies

Detailed inventory studies are critical to understanding the biodiversity of a forest tract. They provide a baseline for monitoring changes in species diversity and abundance over time. Detailed inventories should include a comprehensive list of all species found in the forest, including rare and threatened species. They should also include information on the distribution and abundance of each species, and on the ecological and cultural values of the forest.

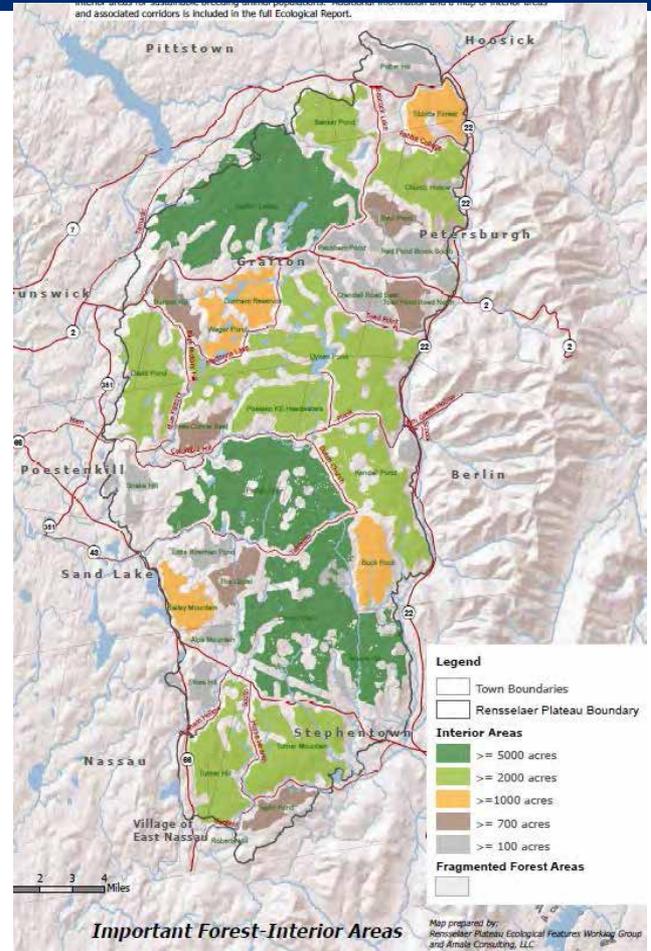
Where to find help

For more information on forest inventory and management, contact the New York State Department of Environmental Conservation (DEC) Forest Stewardship Program. The program provides technical assistance and funding for forest management projects. For more information, visit the DEC Forest Stewardship Program website at <http://www.dec.ny.gov/forests/>.



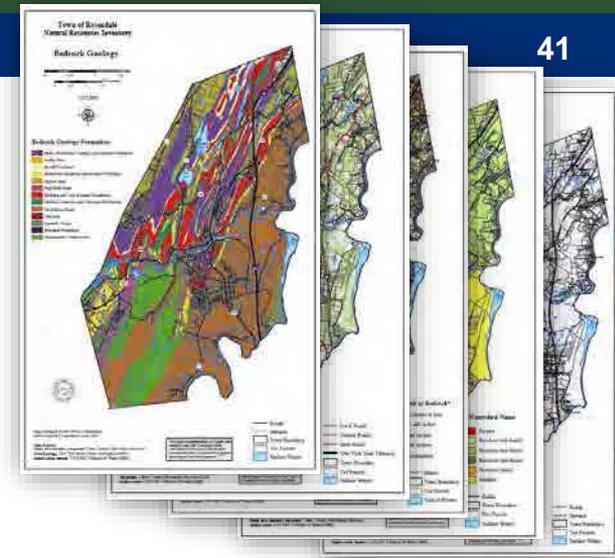
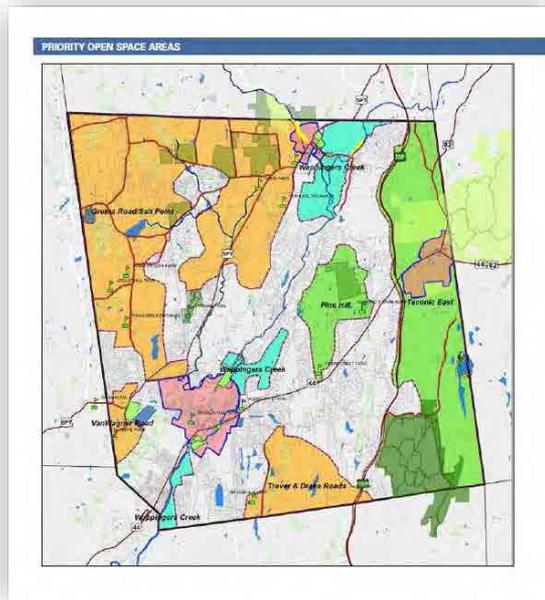
Town of Pleasant Valley woodlands



Rensselaer Plateau interior forest

Your NRI is complete. What's next?

Analyze the information:



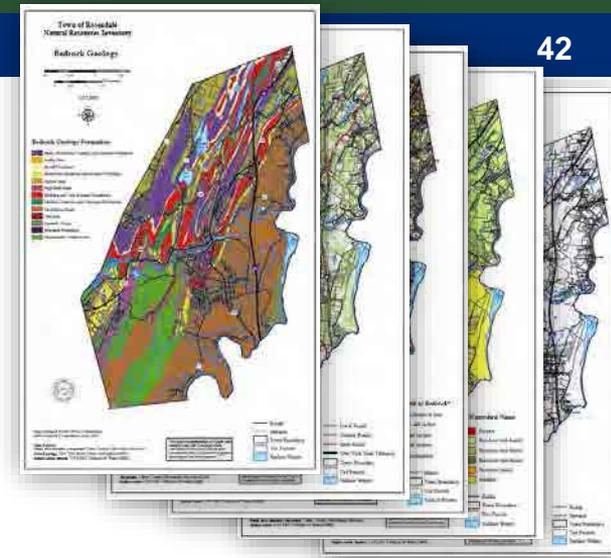
- Which resources have the greatest value to the community? Why?
- What are the threats?
- Are there resources that have importance to adjacent communities or the region?

Your NRI is complete. What's next?

Putting the Inventory to Work:

- public education
- comprehensive planning
- open space planning and implementation, watershed plans
- critical environmental areas
- zoning and subdivision regulations
- development review

- A completed NRI can receive up to 5 points through the Climate Smart Communities Certification Program (Action 6.17)



Climate Smart Communities Program certification actions informed by NRIs:

6.19: Preserve natural areas through zoning or other regulations

7.10: Create or update a watershed assessment to identify flooding and water quality priorities

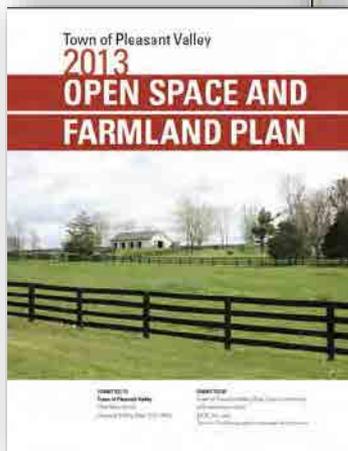
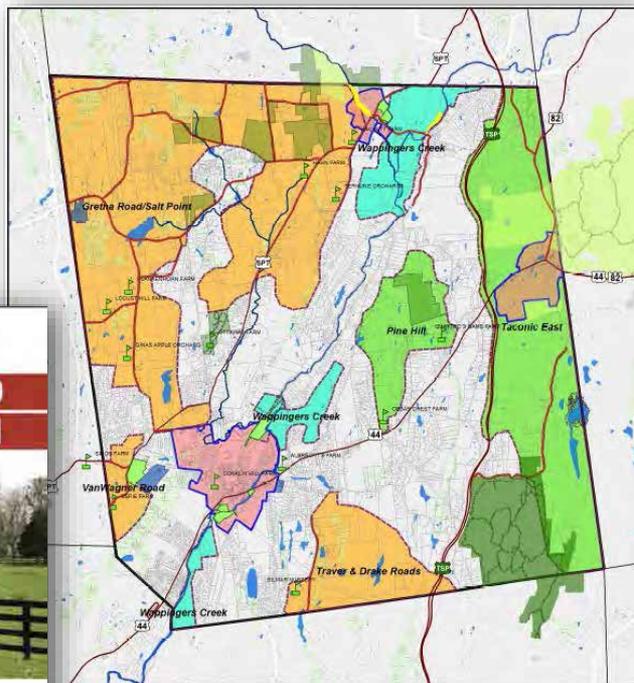
7.12: Conserve, revegetate, reconnect floodplains and riparian buffers

7.13: Conserve natural areas for species migration and ecosystem resilience

7.17: Conserve wetlands and forests to manage stormwater, recharge groundwater, and mitigate flooding



Identify high priority natural areas in your comprehensive plan or an open space plan



Town of Pleasant Valley Open Space and Farmland Plan

- Critical habitat areas
- Large forests
- Wetland complexes
- Drinking water protection
- Working farmland or forests
- Scenic resources

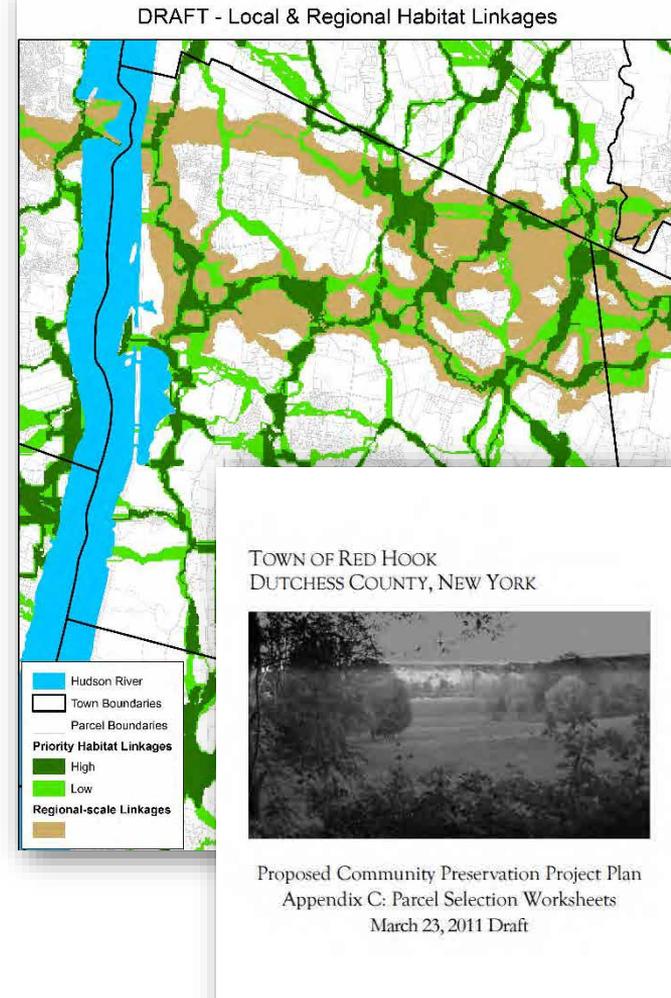


Example from the Town of Red Hook: Community Preservation Fund

Real estate transfer tax toward open space preservation; must first be approved by NYS legislature.

Parcels ranked for protection by:

- Agriculture and water resources
 - Ecological features
 - Scenic vistas, trails, and greenways
 - Historical values
- Update will consider habitat connectivity



Adopt a Site Resource Assessment Checklist

to streamline conservation analyses of proposed sites

Example from the Town of Rhinebeck:

- stream and waterbody buffers?
- significant habitats or wildlife corridors?
- active farmland?
- scenic and historic resources?
- climate resilience values
- sea level rise, storm surge, or flood vulnerability?

Town of Rhinebeck Site Resource Analysis Assessment

Name of subdivision: _____

Address: _____

	Yes	No	Not Sure
Are there streams, wetlands, waterbodies or watercourses that require protective buffer areas?			
Is there active farmland on the parcel(s)?			
Will the active farmland be preserved?			
Is there active farmland contiguous to or within 500 feet of the subject parcel(s)?			
Is this an Agricultural Exempt parcel(s)?			
Are there ridgelines that the Town deems to be kept clear of development?			
Could development alter the visual character from offsite areas dramatically?			
Could development alter visualized viewage points within the property?			
Have visual mitigation measures been discussed?			
Are there high quality trees and significant groups of trees that should be preserved?			
Is there the potential for significant wildlife habitats or wildlife migration areas?			
Do any of these significant natural areas extend into existing properties?			
Have mitigation measures been discussed?			
Are there stone walls and rock outcrops on the site?			
Is the parcel adjacent to a public recreational area?			
Are there possibilities for walkways, bikeways or trail connections?			
Are there special cultural, archaeological and/or historic features that should be preserved?			
Is the parcel adjacent to or within a National, State or locally designated Historic Site or District?			
Is the parcel adjacent to or within an officially designated Scenic District or Scenic Road?			
Is the parcel adjacent to or within an officially designated Critical Environmental Area (CEA)?			
Is the parcel within the Local Watershed Revitalization Area?			
Can the development be connected to a community water supply system?			
Can the development be connected to a community sewage disposal system?			
Will affordable housing be addressed by the subdivision?			

Priority resources that should be preserved on the site:

App. H



Department of
Environmental
Conservation

Identify and prioritize areas for stormwater management at the start of the design process

NYS Stormwater Management Design Manual guidelines:

- Preserve existing natural areas
- Minimize impervious surfaces
- Use green infrastructure practices to reduce additional runoff



Example from the City of Newburgh: Green Infrastructure Opportunity Mapping

The city's current NRI effort plans to highlight and analyze impervious areas for their potential contributions to green infrastructure functions, including:

- existing streets, medians, and sidewalks
- hard-packed underutilized and vacant lots
- surface parking



This information will be incorporated to project reviews following the CAC's Green Infrastructure Policy.



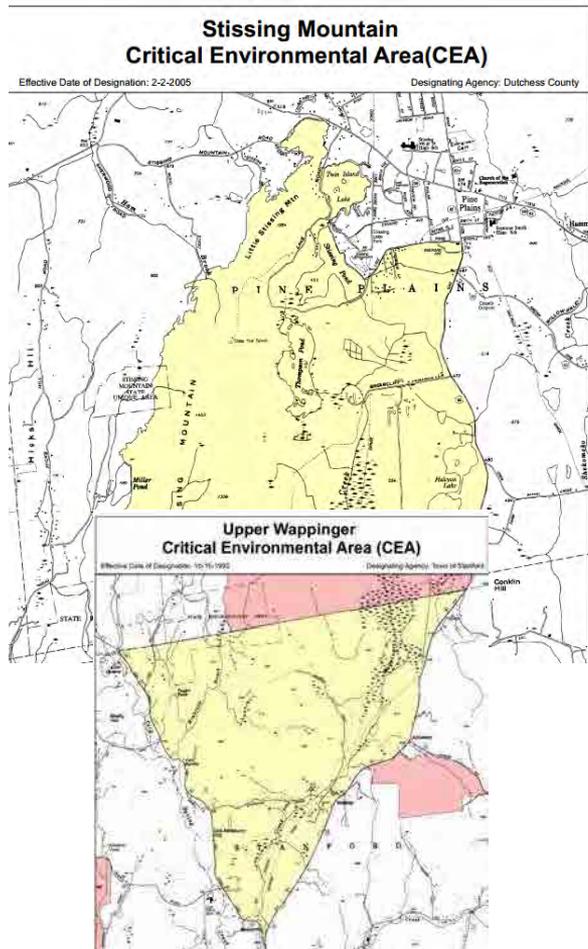
Designate Critical Environmental Areas

- A specific area designated by a state or local agency through SEQR as having **exceptional or unique environmental or cultural characteristics**. Examples:
 - Aquifer or reservoir protection
 - High quality stream corridor
 - Rare plant or animal habitat
 - Ridgelines or steep slopes

- Brings attention to high priority resources during SEQR

<http://www.dec.ny.gov/permits/45500.html>





Example from Dutchess County: Stissing Mountain CEAs

- Mountain area – steep slopes
- Headwater forests and wetlands
- Exceptional wildlife habitat



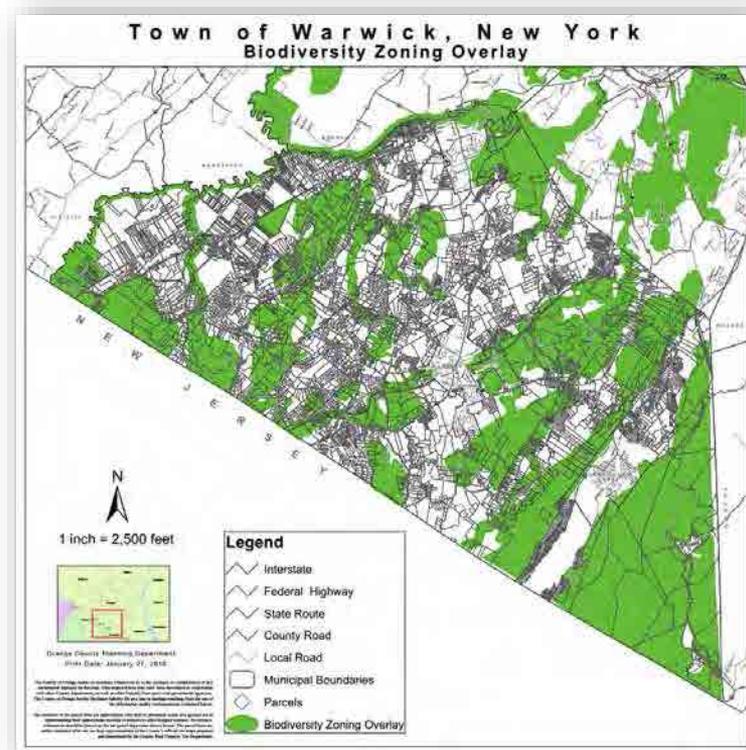
Photo: Nature Conservancy

Use zoning to conserve priority natural areas

Overlay zoning

➤ Applies a new set of standards and incentives within existing zoning districts to better achieve natural resource protection goals (does not replace existing zoning districts)

- Steep slopes
- Floodplains
- Wetlands
- Aquifers
- Significant habitats



Town of Warwick Biodiversity Overlay Zone

Example from the Town of Coxsackie: Natural Resource Protection Standards



Photo by Greene Land Trust

Applies to all land containing natural resource constraints, including:

- Steep slopes
- Watercourses
- Wetlands
- Wildlife habitat



Example from the Town of Coxsackie: Natural Resource Protection Standards

Wetland and watercourse protection:

- Protects all NWI wetlands and 50-ft buffer
- Requires field delineations of all wetlands
- Protects variable-width buffers on streams based on USGS maps; 25-ft buffer on all other streams
- Specifies allowable uses/management of buffer areas (e.g., no lawns)



Photo by Ingrid Haeckel

Adopt a Wetland and Watercourse Ordinance

Example: Town of Woodstock

- Protects **all streams and wetlands**, including **small streams**, and **small, isolated wetlands** in the municipality
- Protects adjacent buffer areas of variable width (30-100 ft) based on drainage area or wetland size
- Wetland inspector and planning board refer to townwide habitat map



Photo by S. Cuppett



Appendices

TABLE OF CONTENTS

Appendix A: Agencies and Organizations	62
Federal Agencies and Programs	62
New York State Agencies and Programs	62
Statewide and Regional Nonprofit Organizations	63
County Agencies, Programs, and Land Trusts	63
Appendix B: Publications and Web Resources for Further Reading and Research	66
Geology and Soils	66
Water Resources	66
Habitat and Wildlife	67
Climate Conditions and Projections	67
Cultural Resources	67
Land Use	68
Appendix C: Recommended GIS Data Sources	69
Appendix D: Information About Commonly Used Maps	70
USGS Topographic Maps	70
NRCS County Soil Survey Maps	71
National Wetlands Inventory Maps	71
Aerial Photographs	72
Appendix E: Biodiversity Assessment Overview	74
Appendix F: Hudson Valley Climate Resilience	76
Climate Hazards in New York State	76
Climate Risks	77
Building Resilience through Adaptation	78
Appendix G: Model Local Law to Adopt the NRI	79
Appendix H: Sample Checklist for Assessing Site Resources During Subdivision Review	82
Appendix I: Examples of Maps from a Municipal NRI	84
Appendix J: Examples of Inventory Projects	98
Town of Rosendale Natural Resources Inventory	98
Town of Bernie Inventories of Forests, Wildlife, and Wetlands	98
Town of Shawangunk Open Space Inventory and Analysis	99
Town of Ancram Natural Resources Conservation Plan	100
New Paltz Open Space Plan	100
Shawangunk Mountains Regional Open Space Plan	101
Wappinger Creek Natural Resource Management Plan	102
Dutchess County Natural Resources Inventory	102

What else is in the guide?

App. A: Agencies & Organizations

App. B: Publications & Web Resources

App. C: Recommended GIS Data Sources

App. D: Information about Commonly Used Maps

App. E: Biodiversity Assessment Overview

Creating a Natural Resources Inventory

A Guide for Communities in the Hudson River Estuary Watershed



Appendices

TABLE OF CONTENTS

Appendix A: Agencies and Organizations	62
Federal Agencies and Programs	62
New York State Agencies and Programs	62
Statewide and Regional Nonprofit Organizations	63
County Agencies, Programs, and Land Trusts	63
Appendix B: Publications and Web Resources for Further Reading and Research	66
Geology and Soils	66
Water Resources	66
Habitat and Wildlife	67
Climate Conditions and Projections	67
Cultural Resources	67
Land Use	68
Appendix C: Recommended GIS Data Sources	69
Appendix D: Information About Commonly Used Maps	70
USGS Topographic Maps	70
NRCS County Soil Survey Maps	71
National Wetlands Inventory Maps	71
Aerial Photographs	72
Appendix E: Biodiversity Assessment Overview	74
Appendix F: Hudson Valley Climate Resilience	76
Climate Hazards in New York State	76
Climate Risks	77
Building Resilience through Adaptation	78
Appendix G: Model Local Law to Adopt the NRI	79
Appendix H: Sample Checklist for Assessing Site Resources During Subdivision Review	82
Appendix I: Examples of Maps from a Municipal NRI	84
Appendix J: Examples of Inventory Projects	98
Town of Rosendale Natural Resources Inventory	98
Town of Bernie Inventories of Forests, Wildlife, and Wetlands	98
Town of Shawangunk Open Space Inventory and Analysis	99
Town of Ancram Natural Resources Conservation Plan	100
New Paltz Open Space Plan	100
Shawangunk Mountains Regional Open Space Plan	101
Wappinger Creek Natural Resource Management Plan	102
Dutchess County Natural Resources Inventory	102

What else is in the guide?

App. F: Hudson Valley Climate Resilience

App. G: Model Local Law to Adopt the NRI

App. H: Sample Checklist for Assessing Site Resources During Subdivision Review

App. I: Examples of Maps from a Municipal NRI

App. J: Examples of Inventory Projects

Creating a Natural Resources Inventory

A Guide for Communities in the Hudson River Estuary Watershed



- PDF version available to view or download at: www.dec.ny.gov/lands/100925.html
- Limited number of print copies available
- Technical assistance available for Estuary watershed communities
- Estuary Grant funding



Cornell University



Hudson River Estuary Program
A Program of the New York State
Department of Environmental Conservation

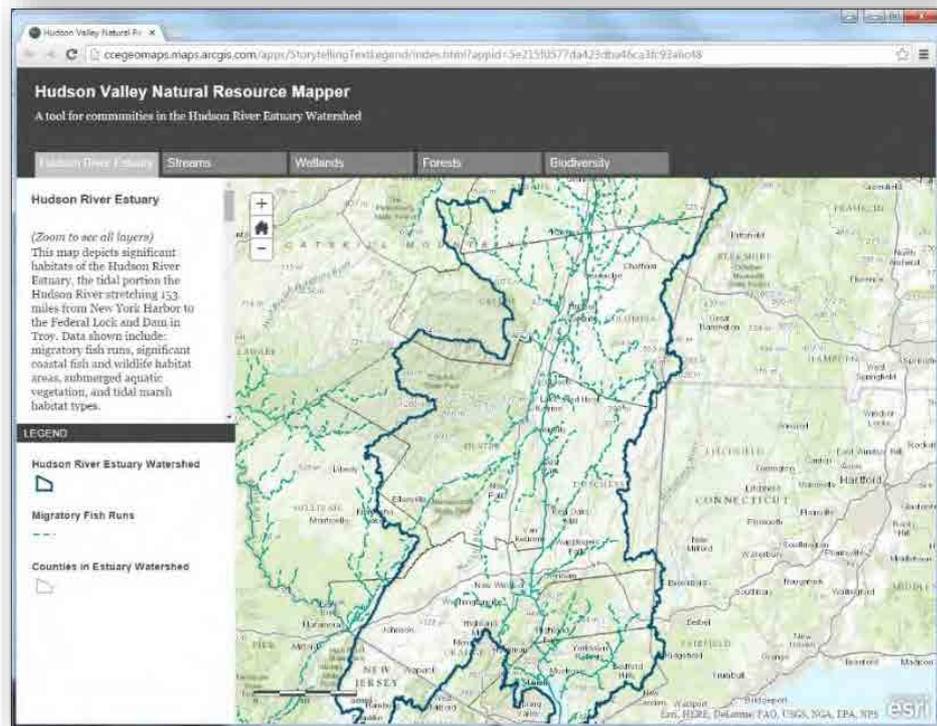


Department of
Environmental
Conservation

Hudson Valley Natural Resource Mapper

Interactive web map

- Estuary
- Streams & Watersheds
- Wetlands
- Large Forests
- Biodiversity



www.hudson.dnr.cals.cornell.edu/mapper



NEW YORK
STATE OF
OPPORTUNITY
**Department of
Environmental
Conservation**

For more information:

Laura Heady

Conservation & Land Use Coordinator

laura.heady@dec.ny.gov

Ingrid Haeckel

Conservation & Land Use Specialist

ingrid.haeckel@dec.ny.gov

Hudson River Estuary Program
and Cornell University

Thank you!



Photo by Laura Heady

Connect with us:

Facebook:

www.facebook.com/NYSDEC

Twitter: twitter.com/NYSDEC

Flickr: www.flickr.com/photos/nysdec



Cornell University



Department of
Environmental
Conservation