Using Natural Resource Inventories as a Springboard for Adaptation Planning

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CaRDI Community Development Institute
Flood Risk and Community Resiliency

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Hudson River Estuary Program

Photo by Laura Heady
Hudson River Estuary Program takes a watershed approach to achieve six key benefits:

- vital estuary ecosystem
- clean water
- resilient communities
- fish, wildlife, and habitats
- natural scenery
- education, access, recreation, and inspiration
What does resiliency look like in the estuary watershed?

- Adequate, connected habitat to sustain fish and wildlife.
- Sustainable shorelines on the Hudson estuary.
- Intact, functioning floodplains; wetlands; forests.
- Decision-makers and communities with capacity to make informed, natural resource-based planning decisions.
The Estuary Program’s Conservation and Land Use team works with decisionmakers and local leaders to encourage natural resource-based planning.
Research & Policy Brief Series

Conservation and Land Use: Engaging Municipal Officials in Improving Natural Resource-Based Planning

by Karen Strong, Laura Heady, Sharna Atkins, Richard Steinman, and Caroline Tsiu

What is the issue?

New York State’s 2025 Hudson River Estuary water quality goals set ambitious targets for reducing nutrient loading to the river. For the watershed as a whole, this translates to 11,500 metric tons of nitrogen and 1,000 metric tons of phosphorus from non-point sources. Municipalities have an important role to play in achieving these goals.

Many municipalities have established nutrient management plans to help meet these goals. The Stormwater Management Information System (SMIS) database contains over 260 nutrient management plans from municipalities across the state. However, the plans lack a common framework for organizing the data and presenting information in a way that is accessible and actionable for municipalities.

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Upgrading Municipal Procedures, Plans, and Policies

The long-term goal of the Conservation and Land Use Program is to increase the number and quality of land use plans, policies, and programs that support biodiversity and resilience at the local level. To do this, we have developed a series of materials that provide guidance on how to incorporate biodiversity and resilience into land use planning and policymaking.

Research Methods

In January 2018, a team from Cornell University’s Human Dimensions of Conservation and Land Use Program conducted a web survey with 947 land use decision makers who participated in the Conservation and Land Use Program from 2001 to 2017. The survey had a 6% response rate (n=57) and respondents were from a total of 49 municipalities. Questions focused on:

1. How do you communicate the intent of your land use planning?
2. How do you engage stakeholders in your land use planning?
3. What are the primary reasons for engaging in land use planning?

Participants in the program represented a wide range of municipal size and background, including conservation advisories, planners, developers, and environmental organizations.

Outcomes of Program Participation

Research & Policy Brief Series

Conservation and Land Use Planning: Linking Municipal Capacity and Biodiversity Outcomes

by Sharna Atkins, Richard Steinman, Laura Heady, Karen Strong, Caroline Tsiu

What is the issue?

Recent work in conservation planning has demonstrated the importance of linking conservation planning to land use planning. However, few studies have examined the effectiveness of linking conservation planning to land use planning at the municipal level. The purpose of this study is to explore the links between conservation planning and land use planning in New York State.

A program participant says:

“By using a design conservation plan, we have much more easily satisfied our planning board as a planning person on the plan for a new or major existing property improvements.”

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Outcomes of Program Participation

For more info: HDRU surveyed participants in 2013 and evaluated our program outcomes.
**Estuary watershed:**

- 260 municipalities
- 80% private property

= complex decision-making landscape
identify what you have → prioritize → plan, protect, manage
Local legislatures may create a conservation advisory council (CAC) to advise in the development, management and protection of its natural resources. This legislation directs CACs to create an open areas inventory and map.

*Article 12-F Section 239-x of the State of New York General Municipal Law*
Creating a Natural Resources Inventory
A Guide for Communities in the Hudson River Estuary Watershed

"identify what you have"

Photos by Laura Heady
APPENDIX F: HUDSON VALLEY CLIMATE RESILIENCE

New York's changing climate presents new challenges and opportunities for communities. It is vital for local decision-makers to understand their communities' vulnerability to changing climate conditions and consider how natural resources can be an important asset in planning for resilience, managing climate risks, and recovering quickly from extreme weather events.

The New York State Energy Research and Development Authority (NYSERDA) has been studying, documenting, and modeling the impacts of climate change in New York State for several years. This appendix presents climate trends and projections for the East Hudson and Middle-New York River Valleys from NYSERDA's Resilience Project "Climate Change in New York State: Adaptation and Mitigation" by Christell H. Miszak et al., 2011, as well as opportunities from the New York State Climate Smart Communities program for putting a natural resource inventory to action for building climate resilience. A summary of projections for the West Hudson Valley, New York City, and Long Island can be obtained at www.nysrda.ny.gov/energy/climate_resilience.

Climate Resiliency in New York Metro Area

There are significant climate hazards expected to affect New York State and the country in the 21st century: increasing temperatures, rising sea levels, and changing precipitation patterns.

- Increasing Temperatures: Average annual temperatures have been steadily rising in New York State. Since 1978, there have been increases at a rate of 0.4 degrees Fahrenheit (0.2°C) per decade. In winter months, this warming effect is even greater, at 1.1 degrees F per decade.
- Sea Level Rise: Due to the 1978 trend, there is an increase in the average temperature, leading to rising sea levels.
- Changing Precipitation Patterns: There are significant changes expected to affect New York State and the country in the 21st century: increasing temperatures, rising sea levels, and changing precipitation patterns.

- Global temperature changes are expected to influence climate conditions and alter weather patterns in New York State.
- Sea level rise is expected to continue, and the rate at which it occurs may increase in the future.
- Precipitation patterns may change, leading to more frequent and intense storms, which can have significant impacts on infrastructure and ecosystems.

Building Resilience

- Increase in winter, spring, and fall, leading to warmer and wetter conditions in the valley.
- Annual average precipitation has increased by 15% in the past 30 years, and the rate of increase is expected to continue.
- Precipitation is expected to increase by 15% to 20% in the next 20 years, leading to more frequent and intense storms.
- In the future, there is expected to be a decrease in summer precipitation.
- Sea level rise is expected to continue, leading to more frequent flooding, especially in low-lying areas.
- The increase in winter, spring, and fall precipitation is expected to lead to more frequent flooding, leading to the need for increased infrastructure and resilience measures.
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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.
Features included in an NRI can inform adaptation:

- large, contiguous forest patches
- shoreline habitats (e.g., tidal wetlands) and shoreline type
- streams and floodplains
- wetlands
- landscape connections
Wetlands and Floodplains with Protective Buffer Zones

Summary: Protective buffer zones keep wetland systems intact, allowing them to protect water quality.
FLOOD ZONES
FLOODED ROADS
CLOSED ROADS
HUDSON RIVER FLOOD ZONES
PROJECTED SEA LEVEL RISE

Note. This map was produced for the City of Hudson Open Space and Natural Resources Inventory and is intended for general planning and information purposes. It relies upon public data sources that may contain errors or omissions and is not a substitute for site-level surveys. Map by Hudsonia Ltd., Annandale, NY, 2018.

Data Sources:
Roads: NYS GIS Program Office, 2018, Railroads: NYS Department of Transportation, 2009
Municipal Boundaries: NYS GIS Program Office, 2017
Background (2017) water level, salinity, water, tidal flats, and low marsh areas in the New York State dataset from the Sea Level Affecting Marshes Model (SLAMM), Sarmiento, Hudson, 2010
FOREST PATCHES
FOREST LINKAGES

Orange County NRI
2018

Forest Patches (acres)
- Stepping Stone Forest (200 - 1999)
- Locally Significant Forest (2000 - 5999)
- Regionally Significant Forest (>6000)
- Regional Forest Linkage Zone

Hydrology
- Major Watersheds
- Major Streams
- Water Bodies

Major Roads
- Interstate
- Federal Highway
- State Route

This map depicts contiguous forested patches of Orange County by acreage. The patches were developed by Cornell University and the New York State Department of Environmental Conservation using forest cover data from the Ecological Change Analysis Program. Data layers were verified and refined by Orange County and were developed by The Nature Conservancy and the New York Natural Heritage Program.

DATA SOURCE: United States Geologic Survey, New York State Dept of Environmental Conservation; New York State Natural Heritage Program; The Nature Conservancy; Ecological Change Analysis
Cartography by Benjamin Freeman 1/3/2018
LANDSCAPE PERMEABILITY and RESILIENCE

Figure 38. Permeability: the ability of a landscape to sustain ecological processes and allow movement of organisms, in Columbia County, New York. Local connectedness describes the continuity of natural cover at the scale of a few kilometers. Areas important for regional connectedness are those where flow across a wider regional network is narrowly concentrated. Columbia County Natural Resources Inventory, 2018.

Figure 39. Resilience: a general estimate of the ability of a living system to adjust to climate and other environmental changes, taking into account both the local connectedness of natural cover (which may help sustain ecological processes and allow movement of organisms) and the landscape complexity (in more varied elevations and landforms may help buffer changes in microclimate). Columbia County Natural Resources Inventory, 2018.
NRIs are a Climate Smart Community action, and inform other actions; e.g.:

- restoration of floodplains and riparian buffers
- conservation of wetlands and forests to manage stormwater, recharge groundwater, mitigate flooding
- conservation of natural areas for ecosystem resilience

➢ NRIs are eligible for CSC grant funding.
NRIs create opportunity to build community relationships, increase municipal capacity, create foundational planning tools, and start the dialogue on adaptation and next steps – even without recent disaster, and despite divergent perspectives.

Photos by L.Heady
“Thank you for supporting the NRI Project. The coordination between the state, county, and local governments with the support of many volunteers has produced a high quality product. We are currently updating our Town Comprehensive Plan and will be integrating much of the newly developed information, which will result in a better plan for our community.”

- Town Supervisor