

# CONSERVING NATURE IN THE WATERSHED LANDSCAPE



Spotted salamander

The Hudson Valley boasts remarkable biological diversity. Comprising only 13.5% of New York's land area, it hosts 25 of the state's 31 vegetation cover types and 86% of its bird, mammal, reptile, and amphibian species. Roughly 40% of New York's animals in greatest need of conservation occur here – one of the highest densities of such species in the state.

Biodiversity encompasses more than flora and fauna. The term includes habitats and the web of interactions by which species adapt to or modify their physical environments. Similarly, the valley's human residents benefit from its unique habitats and the ecological processes they maintain.

## HEALTHY ECOSYSTEMS BENEFIT PEOPLE

Conserving biodiversity is a proven, cost-effective way to sustain the vitality of human communities as well as the estuary's health. Biologically diverse habitats and ecosystems prevent the spread of diseases and pests and provide pollinators and rich soils for growing food. Wetlands absorb floodwaters. Natural vegetation stabilizes soils and limits erosion.

Nature can often provide these services at lower cost than built systems. Wetlands and forests are natural filters that can minimize the need for filtration infrastructure in water supply systems. And maintaining ecosystem health lessens the likelihood of disruptions of these essential services due to climate change.

an inventory of the region's natural communities and then an analysis of changes and trends driving them.

In an example of work designed to assess the integrity of the valley's ecosystems, Cornell researchers collected population and distribution data for nearly 50 species of frogs, toads, woodland salamanders, and marsh birds at hundreds of sites across the Hudson Valley between 2009 and 2012. This baseline information is essential to future studies of trends in the status of these creatures.

Long-term data sets do exist for forests, allowing trend analysis. Forest cover here peaked in the latter half of the 20th century;



Laura Heady/DEC

Tropical Storm Irene provided a telling example. Flooding occurred from the Hudson Highlands through the Catskills and eastern Adirondacks into Vermont's Green Mountains. In Rutland, Vermont, Otter Creek wreaked havoc as its flow peaked at 15,700 cubic feet of water per second (cfs). Thirty miles downstream in Middlebury, peak flow was only 6,180 cfs. What happened in between? Floodwater spread into a large wetland area on the creek's floodplain, was stored there, and slowly drained over two weeks, preventing severe damage in Middlebury. Similar attenuation of flooding occurred on some small tributaries of the Moodna Creek in New York's Orange County.

Engineers are imitating natural processes when restoring and maintaining ecological assets. In Dutchess County, water quality in Wappinger Lake is deteriorating due to sedimentation and nutrient enrichment. While the problems stem from cumulative inputs upstream, the Village of Wappingers Falls decided to pilot an artificial wetland system to treat stormwater from part of the lake's watershed within the village boundaries. Completed in 2013, the system uses engineered wetlands on a two-acre site to reduce flooding impacts, remove nutrients, and filter out over 85% of the sediment from a 110-acre drainage area.

## ECOSYSTEMS IN FLUX

The Hudson Valley's ecosystems face many challenges – climate change, invasive species, rapid urbanization, and sprawl. Conserving biodiversity and bolstering ecosystem resilience – the ability to respond effectively to change – first requires

today it extends over roughly 75% of the watershed. Forests were becoming more fragmented even when forest cover was increasing. In Rensselaer County for example, the average size of forested areas shrank as overall forest acreage expanded from 1958-2010.

In recent years, counties bordering the estuary north of New York City have lost woodland. Their core forest acreage – a reserve of forest biodiversity and integrity – is dwindling faster than forest overall. Core forest fragmentation can cause loss of forest-breeding songbirds and woodland salamanders, diminish water quality, and increase forest susceptibility to the impacts of invasive species and climate change.

## LINKING HABITATS

Sprawling development and habitat fragmentation are likely to complicate adaptation to climate change. As temperatures rise, some plants and animals will need to move north or to higher elevations. In addition, fragmented landscapes threaten the valley's distinctive character by promoting the spread of invasive and overabundant plants and animals.

To meet this challenge, we must keep natural areas connected across the landscape. Forest and wetland loss and fragmentation limits opportunities to maintain connectivity, as do barriers in streams. Without routes for migration and dispersal, many wildlife species that require a complex of habitats for survival may decline.

## CONSERVING BIODIVERSITY: AN ECOSYSTEM APPROACH

While charismatic wildlife grab public attention, the core task of conserving biodiversity is maintaining habitats and ecosystems in which these species live. Habitats created by development in the Hudson Valley do support wildlife; white-tailed deer, raccoons, and coyotes live there. But conserving biodiversity requires safeguarding other unique and valuable habitats to preserve ecosystem integrity and their benefits to people.

Intact core forest is critical to the survival of many creatures — bobcat and black bear, woodland warblers and forest thrushes, for instance. Clean, cool headwater streams in such forests are vital habitat for trout as well as amphibians such as spring and two-lined salamanders. Forests aid human communities by absorbing rainfall, filtering pollutants, and slowing runoff that might otherwise cause flooding.

Well-functioning wetlands are essential to the health of natural and human communities, yet few ecosystems have been as misunderstood and undervalued. New York has lost nearly half of its original freshwater wetlands over time. In the Hudson Valley, nearly 3,000 acres disappeared between the 1980s and 1990s, endangering wetland species such as bog turtle, Blanding's turtle, and northern cricket frog. Human communities also suffered from wetlands' diminished capacity to regulate water flow, control shoreline erosion, and improve water quality.

Stream corridors link habitats, while streamside trees can moderate water temperature, reduce erosion and sedimentation, and create critical fish habitat. Their fallen leaves fuel aquatic food webs. The proximity of aquatic and terrestrial habitats here promotes biodiversity, as do rich, moist soils well suited to ferns, orchids, and other unique plants. Protection of such habitats is a priority; creation of the Black Creek State Forest in 2011 is an example. DEC and local land trusts added 600 acres to an eight-mile corridor of public and private conservation lands along this Ulster County stream, with benefits for water resources, flood control and recreation.

## THE LOCAL ROLE IN CONSERVING BIODIVERSITY

Conserving the region's diverse ecosystems and their benefits for people requires partnerships among stakeholders and decision-makers. Given New York's home rule tradition, success depends on community involvement — working through local governments and private landowners to encourage sound initiatives grounded in science.

Many communities have identified and inventoried critical habitats and important natural resources, prioritizing those with high conservation value. These inventories and priorities inform comprehensive plan updates, open space acquisitions, and project reviews.

As a result, communities are employing new planning approaches. In Red Hook (Dutchess County), linkages among forests, wetlands, and streams have been carefully mapped. Planners and stakeholders strategized ways of improving land-use decision-making to preserve these linkages as the community grows. Recognizing that natural systems cross town boundaries, counties are providing "big picture" guidance. Dutchess County's Centers and Greenspaces initiative integrates regional land use, transportation, and ecological planning to prevent residential sprawl.

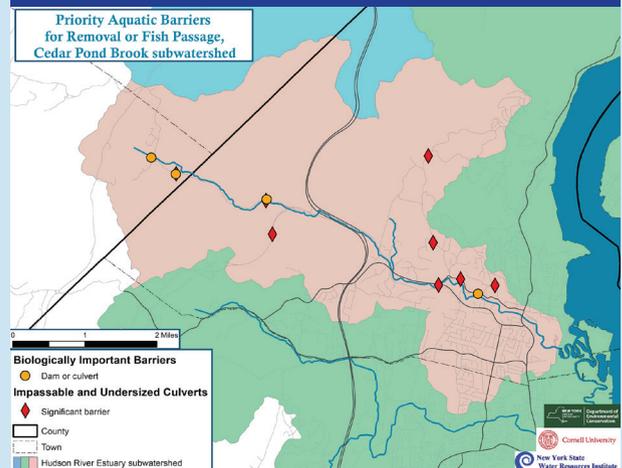
Such approaches encourage a broader view of the ecological landscape that facilitates watershed planning, inter-municipal agreements, and regional initiatives. Whether on a local or regional scale, considering biodiversity early in the planning process contributes to long-term protection of our natural heritage and the benefits it bestows on our communities.

**TREND:** From 1996-2010, there was a small but consistent loss of forest cover in all ten counties bordering the estuary north of New York City.

County	% Forest 1996	% Forest 2010	% Change Overall	% Change in Core Forest
Albany	61.78	60.90	-1.43	-2.39
Columbia	58.19	57.91	-0.48	-1.20
Dutchess	59.74	58.83	-1.53	-2.61
Greene	84.38	84.01	-0.44	-0.93
Orange	64.05	62.98	-1.67	-2.49
Putnam	76.04	75.36	-0.90	-1.50
Rensselaer	63.45	62.82	-1.00	-2.33
Rockland	57.15	54.63	-4.40	-5.97
Ulster	83.23	82.84	-0.47	-0.81
Westchester	48.58	47.46	-2.32	-3.66

The integrity of forest habitat depends on the amount of core forest present. Far from a forest edge, core forest offers protection from disturbance. Every Hudson Valley county has seen more core forest loss than total forest loss, which may be linked to reduced habitat integrity and water quality.

**BASELINE:** Barriers on Hudson River tributaries are a problem for fish and people. Of over 1,000 culverts that have so far been assessed in the watershed, about 14% are both impassable to fish and too small to pass the high flows associated with increasingly intense rainfall.



Cedar Pond Brook flows to the Hudson in Rockland County. In its watershed, 8 of 62 culverts assessed have been prioritized as being impassable to fish and undersized in relation to expected high flow events. Upgrading such culverts offers a two-for-one deal, facilitating fish passage and capacity to handle floods.

**TREND:** When asked about their community's willingness to conserve natural areas and wildlife, roughly half of a group of local planners and conservation advisory committee members said that, over the last five years, their communities have increased or greatly increased their willingness to conserve.

