Managing Forests in a Changing Climate: What the Evidence Suggests

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NYSDEC Division of Lands & Forests

- Bureau of Forest Preserve Management
  - Conservation Easement Section
- Bureau of Forest Resource Management
- Bureau of Invasive Species and Ecosystem Health
- Bureau of Real Property
- Bureau of Division Direction
Severe landscape impacts such as erosion and fire lead to public call to protect the state's forest resources.
Adirondack and Catskill Parks created
State Reforestation Law of 1929 and the 1930 Hewitt Amendment authorized Reforestation Area acquisition.
Plantations have served their purpose, and now need to be transitioned to the next phase of forest restoration.
Basic Climate Benefits of Rural Forests

Widescale temperature regulation and moisture retention
Stream and watershed cooling
Flood and erosion control
Wildlife habitat connectivity
Woody biomass production
Production of timber for carbon sequestering wood products
Some Currently Observed Forest Specific Indicators of Climate Change

Observed changes in biological processes, such as growing season length

Increased forest pest and invasive species distributions

Shifts in flowering phenology

Changes in wildlife emergence and migration

Trends showing reductions in lake ice

Shorter timber harvesting season (less time with frozen ground)
Anticipated Additional Impacts on Existing Rural Forests

Many invasive plants will increase in extent or abundance.

"On a global basis...the two great destroyers of biodiversity are first, habitat destruction and second, invasion by exotic species“ E.O. Wilson-- established the Biodiversity Foundation.

Many species are expected to lose regeneration potential over the next century, but mature individuals could continue to grow for much longer in the absence of other mortality factors.

Forest productivity will be influenced by a combination of factors such as carbon dioxide fertilization, water and nutrient availability, succession, disturbance, and species migration.
Additional Impacts (Continued)

Forest vegetation may face increased risk of physiological drought during the growing season and extreme weather events

Many northern and boreal tree species will face increasing stress from climate change
Big Picture Long-term Impacts

Adaptation, migration or extirpation??

Sally N. Aitken, Centre for Forest Conservation Genetics and Department of Forest Sciences, University of British Columbia

Species distribution models predict a wholesale redistribution of trees over the next century

But….

Other models indicate that populations can and will adapt

**Strong evidence on both sides**

Species with small populations, fragmented ranges, low reproduction potential, or suffering declines due to introduced insects or diseases may be candidates for extirpation if migration is not facilitated.
Detected Invasive Pest Distribution

Asian Long-Horned Beetle
Emerald Ash Borer
Hemlock Woolly Adelgid
Southern Pine Beetle
Spotted Lantern Fly
Gypsy Moth
Dutch Elm Disease
2016 Forest Fire—Shawangunk Mountains, Ulster County

2,000+ acres
Invading Forest Pests are:

“The East Coast’s Wildfire”

EAB Invasion 2009-2018
Hemlock Woolly Adelgid

Slow growth to no growth
Needle loss
Recovery cycles

Climate sensitive dynamics
Fish habitat and watershed protection loss?
Confirmed Hemlock Wooly Adelgid in New York State by Town

New York State Department of Environmental Conservation
Bureau of Invasive Species and Ecosystem Health

PROSPECT MOUNTAIN
HEMLOCK WOOLY ADELGID

NEW YORK STATE OF OPPORTUNITY
Department of Environmental Conservation
Southern Pine Beetle
Southern Pine Beetle Marches North
Rural Forest Management Implications

Climate change will present risks to forest management such as more disturbance, as well as opportunities such as longer growing seasons.

Over the next century, climate change is expected to have profound effects on forest ecosystems, leading to habitat changes for a variety of plant and animal species.

Land conservation planning will require more emphasis on climate adaptation strategies related to carbon mitigation, refugia for at-risk species and habitats, landscape connectivity for migration corridors, and water supply protection.

Changes in climate and extreme weather events are expected to affect infrastructure such as roads, bridges, and culverts on forest lands throughout the region.
New York’s Maturing Forests

Area of timberland by stand size class in New York by year
Total timberland area = 15.9 million acres
Rural Forest Ownership—A major Challenge to Implementing Needed Management

Number of owners (left axis)-- total = 614,000

Acres (right axis)-- total = 11,176,000
Regenerate NY

New grant program supporting private landowners to implement forestry BMPs.

Funded by the state’s Environmental Protection Fund.
Climate Applied Forest Research Institute

New institute being formed at SUNY College of Environmental Science and Forestry

Initial research project will develop methodology for an inventory of forest carbon in New York State

Future research
NYS DEC--Forest Management on Rattlesnake Hill Wildlife Management Area—Young Forest Initiative
New York’s Firewood Regulations
Adopted: March 18, 2009
Trees for Tribs – A Program of the NY State Nursery, Saratoga Springs, NY
Private Landowner Initiative

*Climate Smart Land Network* in New York and New England

An alliance of forest landowners and managers owning 33 million acres of forest, working to understand and address the implications of climate change.
Urban Forests

Active planning, management, and care of the urban forest can improve its resilience to climate change and help cities and communities better adapt.

Active stewardship of a community’s forestry assets can strengthen local resilience to climate change while creating more sustainable and desirable places to live.
Climate Benefits of Urban Forests

Carbon capture and energy savings

Provision of usable wood products (Longer term carbon sequestration)

Adaptation to climate and weather changes

Increased community resilience
Options for Urban Forest Management--Proactive management is necessary to protect urban forests against climate-related threats, and to sustain desired urban forest structures for future generations.

“Climate Action Plans”, focusing on:

*Mitigation*. Climate change mitigation in urban areas focuses primarily on reducing GHG emissions

*Adaptation*. Incorporating climate resilience into tree planting and urban forest management plans helps improve the adaptive capacity of a community’s tree canopy

*Collaborative Local governance

*Community stewardship through volunteer citizen involvement*
NIACS Climate Change Response Framework Can Help by:

• Working with communities to assess the vulnerability of their urban forests to climate change.
• Providing distance learning with an urban focus.
• Organizing and facilitating workshops related to climate change impacts and ecosystem adaptation.
• Creating tools to aid adaptation of urban forests to climate change.
• Developing real-world examples of climate-informed management of urban forests.

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Urban Forest Adaptation Demonstration Project in New York

Encouraging Robust Urban Forests Through Restoration with Climate Change-Adapted Species Mixes
Thank You!

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