



Project Impacts

NSRC-FUNDED RESEARCH FINAL REPORT

Excess Nitrogen from Air Pollution Impacts Decomposition and Carbon in Forest Soils

PROJECT AWARD YEAR AND TITLE:
2009

*Assessing the Role of Tree Species and Nitrogen
Deposition in Mediating Carbon Storage in Northern
Hardwood Forests*

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Effects of excess nitrogen from air pollution on forests are complicated because nitrogen is an essential nutrient for trees, but excessive amounts can be toxic. To learn more, NSRC researchers re-sampled trees and soil in fertilized plots that received added nitrogen for 13 years in the Catskill Mountains of New York State. A single tree species (sugar maple, yellow birch, American beech, northern red oak, or eastern hemlock) dominated each plot. Each fertilized plot had a paired control plot receiving only ambient nitrogen deposition.

Although nitrogen is considered a limiting element for forests in this region, researchers found that trees had only moderate uptake of the extra nitrogen, as shown by the nitrogen concentration in the foliage. They also found that soil microbial (bacterial and fungal) processes such as soil respiration and nitrogen mineralization were inhibited by the added nitrogen. While the decrease in microbial decomposition of organic matter should lead to a greater buildup of material on the forest floor, preliminary analysis of the data did not show an increase in forest floor mass. All responses varied among the different tree species.

Researchers conclude that in the Catskill region, trees are probably less limited by nitrogen than is commonly assumed, but nitrogen deposition can alter microbial processes that may eventually lead to increased mass and carbon storage in the forest floor. Policy and management decisions regarding nitrogen pollution should factor in the varying responses of different tree species, and computer models that predict the effects of nitrogen deposition on the Northern Forest should take tree species into account to make accurate predictions.



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