Ecosystem disturbance in Catskill Mountain streams: Coincidence or indicators of climate change?

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Stony Clove near Phonecia (01362380)

Trend: 5.1 µeq L⁻¹ yr⁻¹
p < 0.01

Hollow Tree Brook (01362342)

Trend: 3.0 µeq L⁻¹ yr⁻¹
p < 0.01
1. Background - Stream Chemistry

2. Clear Cut Study
   (chemistry & toxicity tests, 1993-2001)

3. Indicators of Climate Change

4. Implications and Linkages

5. Impacts on stream ecosystems?
Catskill Stream Survey: ANC (N=180)
Atmospheric Nitrogen ($N_2$)

Plants

Assimilation

Denitrifying Bacteria

Nitrogen-fixing bacteria living in legume root nodules

Decomposers (aerobic and anaerobic bacteria and fungi)

Ammonification

Ammonium ($NH_4^+$)

Nitrification

Nitrites ($NO_2^-$)

Nitrates ($NO_3^-$)

Nitrifying bacteria

Nitrogen-fixing soil bacteria
Trout mortality at Clear cut, Partial cut, and Control Watersheds, 1995-2000
Indicators of Climate Change:

Temperatures are increasing

Warmed by 3.9 °F since 1962
y = 1.6415x - 3134.1
R² = 0.2223

Climate is getting wetter
Flow regime is changing in some rivers

Annual peak discharge, in cubic feet per second

100-year
50-year flood
10-year flood

100-year flood
50-year flood
10-year flood

Beaver Kill at Cooks Falls, NY
Implications: Channel Instability - flooding, property damage, turbidity, erosion, aggradation, & habitat degradation
Implications: Increased threats to forest and stream ecosystems
Nitrate trends in two tributaries to the Upper Esopus Creek, 2000-07

Hollow Tree Brook (01362342)
Trend: 3.0 µeq L^{-1} yr^{-1}
\( p < 0.01 \)

Stony Clove near Phoenicia (01362380)
Trend: 5.1 µeq L^{-1} yr^{-1}
\( p < 0.01 \)
Nutrient Biotic Index, Upper Esopus
(Macroinvertebrate data from the NYSDEC Stream Biomonitoring Unit)
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