Ecosystem Effects and Indicators

AQMP Workshop

June 5, 2008

Outline

- How might ecological effects fit into comprehensive multi-pollutant air quality planning?
- Ecological indicators
- Summary

How might ecological effects fit into comprehensive multi-pollutant air quality planning?

Multi-pollutant Effects

- Multi-pollutant air quality planning facilitates consideration of effects due to interactions among multiple pollutants, e.g.,
  - Acidification: NOx and SOx
  - Nitrogen enrichment: Reactive nitrogen species
  - Mercury methylation: Sulfur reducing bacteria are the principal agent of Hg methylation. SO_4^{2-} deposition increases their activity
- EPA is taking a multi-pollutant approach reviewing the secondary NAAQS for NO2 and SO2 together

Desired Outcomes

- Comprehensive air quality management planning is an opportunity to link with ecosystem-related planning efforts
  - Total Maximum Daily Loads for impaired waters:
    - Reduce mercury deposition to achieve fish tissue targets
  - Protect sensitive high altitude ecosystems at Rocky Mt National Park
    - Multi-agency plan to achieve N deposition targets with regulatory and voluntary measures

Ecological Indicators

Uses of Ecological Indicators

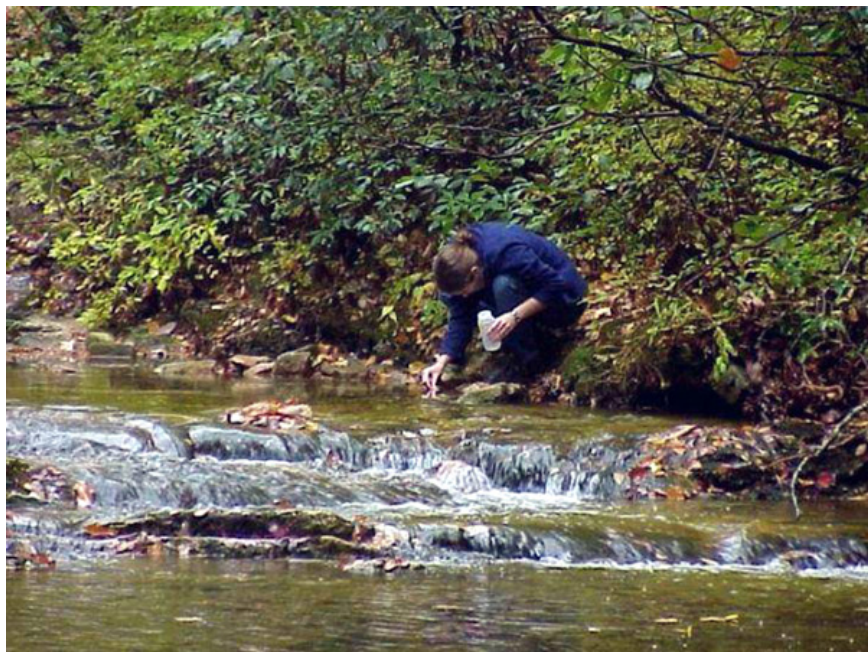
- Identify ecological concerns
- Show compliance or progress toward goal
- Assess impacts of a program
- Education and outreach

- Challenge to relate indicators meaningful to scientists to those meaningful to the public

Chemical and Environmental Indicators

Pollutant concentrations in air, water, soil

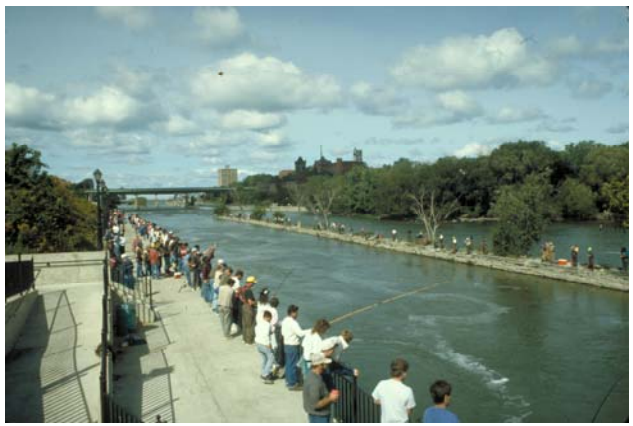
- Wet and dry deposition load
- Other chemical attributes, e.g.
  - pH,
  - buffering capacity
  - dissolved oxygen



Terrestial Ecosystems

- Reduced growth rate or dieback in sugar maple and red spruce as the result of acidification
- Success of nesting bird colonies exposed to pesticides and PCBs
- Community plant structure – is this changing as the result of nitrogen enrichment

Aquatic Ecosystems



- Nuisance or harmful algal blooms
- Percent of estuary with submerged aquatic vegetation
- Concentration of toxic pollutants in fish and shellfish
- Condition of fish

Summary

- A multi-pollutant air quality management plan provides opportunities
  - Address multi-pollutant ecosystem effects
  - Link to ecosystem planning efforts
- Choosing appropriate indicators includes consideration of how the indicators will be used, and the range / complexity of ecosystem effects
- Linkage with ecosystem planning efforts
  - Show additional benefits of air pollution reductions
  - Partner with natural resource managers in developing and using ecological indicators