Acidification and Amphibian Declines

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Outline

• Introduction
• Evidence
• Problems
• Importance

Acidification of streams – How can it occur?

• Acid precipitation
• Snow Melt
• Percolation Through Foliage
Acid Precipitation

- Negatively charged particles such as sulphur dioxide (SO₂), nitrogen oxide (NOₓ) and ammonium (NH₄) released into the atmosphere

Acid Precipitation

- These particles react in the atmosphere to form acids
- Acids then transferred to the ground by wet deposition (attached to small airborne particles) and wet deposition (attached to droplets of rain, snow, sleet, etc.)

Acid Rain Video

Snow Melt

- Acid that has been tied up in the snow all winter is released into the soil and streams in a relatively short time
- This causes a rapid spike in acidity, known as “episodic acidification”

Snow Melt Video 1
Snow Melt Video 2
Percolation Through Foliage

- Rain filtering through some types of foliage (particularly pine canopies) can become up to 3x more acidic.

Effects of Acidification on Amphibians

- Decrease in activity level, foraging ability, predator evasion and effectiveness as a predator
- Lower recruitment
- Decreased egg distribution
- Inhibition of egg development and reproductive activity


Effects of Acidification on Amphibians

- Decreased aquatic invertebrate populations
- Increased embryo mortality
- Perturbation of sodium metabolism
- Low growth rates
- Weakening of natural defenses (immunosuppression)

Effects of Acidification on Amphibians

- Increased bacterial infection
- Disruption in ion transportation
- Decreased white blood cell count and viability
- Direct mortality

( Brodkin et al. 2003, Green and Peloquin 2008 )

Why Is Acidification So Important?

- Acidification has negative effects on all types of amphibians and at all life stages

Why Is Acidification So Important?

- Negative effects are magnified when acidification is coupled with other environmental stressors, such as cold
Why Is Acidification So Important?

- Acidification has many direct negative effects on reproduction and development, both of which are essential for species sustainability.

Why Is Acidification So Important?

- Acidification causes direct mortality.

References
