

## **Project Summary**

### **Rocky Mountains Cooperative Ecosystem Studies Unit**

**Project Title:** Assessing Ecological and Biogeochemical Responses to Changing Atmospheric Nitrogen and Sulfur Deposition at Local to Regional Scales in the United States

**Discipline:** Natural Resources

**Type of Project:** Research

**Funding Agency:** National Park Service

**Other Partners/Cooperators:** Colorado State University

**Effective Dates:** 6/1/2005 - 12/30/2007

**Funding Amount:** \$82,625

**Investigators and Agency Representative:**

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**Project Abstract:**

Agencies such as the USGS, Environmental Protection Agency, National Park Service, and U.S. Forest Service, are charged with protecting, managing, and restoring ecosystems. An important area of ecosystem protection involves developing and implementing policies and programs to control atmospheric pollutant emissions, atmospheric concentration, and deposition.

CSU researchers developed a model (DayCent-Chem) that couples ecosystem nutrient cycling and plant dynamics with geochemical equilibrium equations. In the first year of this project investigators tested the model on alpine and subalpine ecosystems in Loch Vale Watershed, a long-term ecological research and monitoring site in Rocky Mountain National Park, collected input and validation data necessary for model runs, and got the model running for Noland Divide in Great Smoky Mountains National Park, Watershed 6 in Hubbard Brook LTER, Green Lakes Watershed at Niwot Ridge LTER, Watershed 10 for H.J. Andrews LTER, and the San Bernardino National Forest. Sites still to be initialized and run include Coweeta LTER, Lake Louise catchment in Mount Rainier National Park, and Acadia National Park.

Goals of this project include: a) to better understand biogeochemical processes related to atmospheric deposition; b) to forecast responses to changing atmospheric deposition caused by emissions reductions or increases; and c) to assist in the formulation and evaluation of new, innovative ecosystem protection approaches and benchmarks (e.g., formulation of critical loads of atmospheric N and S deposition for assessing nitrogen saturation, acidification or eutrophication of ecosystems). The proposed work will be cooperatively funded over several years by the Environmental Protection Agency, the US Geological Survey, the National Park Service, and the USDA Forest Service.

**Outcomes with Completion Dates:**

- a. Workshop to evaluate model output and synthesize results. January 2006.
- c. Quarterly reports describing progress (Sept 05, Jan 06, Apr 06, Aug 06, etc.) and final report summarizing findings (May 07).
- d. At least two synthesis papers submitted to a refereed journal, the first describing and comparing biogeochemical and geochemical processes across sites, the second describing responses to deposition scenarios. Anticipated submission by May 2007.
- e. At least two presentations at professional society meetings (Aug 06 at ESA, September 06 at LTER meeting).
- f. Continuously updated website that describes the model and allows access to data, model output, and CMAQ scenarios from each participating site.

**Keywords:** nutrient cycle, ecosystem models, atmospheric deposition, nitrogen, sulfur, Rocky Mountain National Park, Acadia NP, Great Smoky Mountains NP, Mount Rainier NP, Joshua Tree NP, Colorado State University, Niwot Ridge, Loch Vale

**For Administrative Use Only:**

Date Annual Report Received:

Date Final Report Received:

Publications, etc. on file: