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[NREL Leads Consortium to Provide R&D for Greenhouse Gas Reductions](#)  
[Graduate Student Fellowship Recipients](#)  
[Covich Receives AAAS Award](#)  
[Hobbs Earns Honor for Mapping Project](#)  
[Welcome to Visiting Scientists](#)  
[NREL Is Making a Difference](#)  
[Life After NREL](#)

## **NREL Leads Consortium to Provide R&D for Greenhouse Gas Reductions**

An innovative program is emerging to help meet US goals for reducing greenhouse gases: sequester carbon in agricultural soils. NREL scientists Keith Paustian and Ted Elliott are leaders of a national Consortium for Agricultural Soils Mitigation of Greenhouse Gases (CASMGs). The Consortium includes leading scientists, computer modelers and economists from nine universities and federal agencies who propose to provide the information and technology necessary to develop, analyze and implement strategies for carbon storage on agricultural lands. The Consortium is seeking Congressional approval for a five-year program to develop scientifically reliable and economically feasible carbon-sequestration plans.

The environmental benefits of carbon sequestration and its potential as a new income source for farmers have generated much interest in the agricultural community. A program could be designed similar to the existing Conservation Reserve Program which pays farmers to protect highly erodible land. Or a market strategy could be designed whereby farmers, using appropriate conservation practices, could sell carbon "credits" to emitters such as power companies. Before carbon markets or other solutions can be implemented, research is needed to better quantify carbon sequestration rates for the range of climate and soil conditions and for farming practices across the US.

Crops and other plants take up carbon dioxide (the dominant greenhouse gas) from the atmosphere and convert it into biomass. As plants die and decompose, some of their carbon is retained in the soil. Carbon accumulation in agricultural soils can be greatly improved by various practices such as no-till farming, crop rotation, and plantings of perennial grasses in conservation buffer areas. Sequestering additional carbon in soils could meet up to 20-40% of targeted emission reductions of CO<sub>2</sub> recommended by the Framework Convention on Climate Change while improving soil quality and reducing erosion.

Paustian and Elliott, along with Vern Cole, Dennis Ojima, and Bill Parton of NREL, are contributing to the Consortium's program through their research on climate change, carbon cycling, and carbon sequestration in soils. For example, analyses using the Century model (developed at NREL) will allow scientists to predict carbon sequestration from various agricultural practices. Analyses will be linked with other models to study the economic implications of government policies and the development of carbon markets in the private sector. Currently, Paustian and Elliott's team are estimating CO<sub>2</sub> emissions and sinks in agricultural soils for the entire US. These data will be added to EPA's national greenhouse gas emissions inventory. The team is also working state by state with

USDA's Natural Resources Conservation Service in developing regional and local assessments of carbon sequestration potential, and assembling tools for land managers to explore conservation management options that build up soil carbon.

K. Muldoon, L. Christensen, K. Nydick, T. Hochstrasser, N. Barger  
(Not pictured: . Worden and B. Moraska)

### **Graduate student Scholarship Recipients**

Seven exemplary graduate students received prestigious scholarship awards for the 1999-2000 school year. Francis Clark Soil Biology Scholarships were presented to Tamara Hochstrasser and Nichole Barger, each receiving 2,000. Francis and Evelyn Clark, who endowed the scholarship, were present at the fall ceremony to offer the awards and meet the scholars. NREL Scholarship Awards of 1,000 each were presented to Lindsey Christensen and Jeff Worden. These scholarships are based on donations to NREL each year. Jeff also received the 3,000 Oscar and Isabel Anderson graduate scholarship and the 1,400 George M. VanDyne Memorial Scholarship. Brenda Moraska received the 1,000 College of Natural Resources Hill Memorial Fellowship. Kate Muldoon received 1,000 from the American Water Resources Association Rich Herbert Memorial Fund. Last, but not least, Koren Nydick was named a prestigious Canon National Parks Science Scholar and will receive up to 3,000 over three years. Koren proposes to determine the effects of Nitrogen deposition on high elevation lakes in Rocky Mountain National Park.

### **Covich Receives Award**

Alan Covich was elected an AAAS Fellow by the American Association for the Advancement of Science. Alan received this recognition for his research into food web dynamics, ecological integrity of freshwater ecosystems, and for service to professional societies. Alan will receive his award at the Association's Annual Meeting in February 2000.

### **NREL Director Named ESA President**

In August the Ecological Society of America elected Diana Wall as President for 1999-2000 to guide the premiere professional organization of 10,000 ecologists into the next millennium. The Society encourages members to responsibly apply their research and ecological expertise to public issues through teaching and public interaction. Wall says, "The present rate of change in our environment is unprecedented in the history of the Earth. Ecologists provide accurate, credible scientific information to policy makers and the general public on critical management issues for the environment."

### **Hobbs Earns Honor for Main Project**

Tom Hobbs has been honored with the 1999 Society of Conservation Biology's Distinguished Service Award for the "Individual in Government" category. The award recognizes his research on the System for Conservation Planning (SCoP) and the Natural Diversity Information Source (NDIS). NDIS maps plant and wildlife communities and serves as a reference for developers, advocates, and planners needing information about effects of development on wildlife. Hobbs and colleagues developed the Internet site that displays maps of land ownership, plant communities, rare plant and animal species, and the habitat of some 400 species of wildlife, including ecologically and economically important species. Financial support for this project was provided by the Great Outdoors Colorado Program and the Rocky Mountain Elk Foundation. NDIS is available for use by the public on the web at <http://ndis.nrel.colostate.edu>.

### **GeoScience Leaders See Interdisciplinary Focus for Future**

At a November meeting sponsored by the American Geophysical Union in Washington, DC, forty heads and chairs of geoscience departments from around the country discussed how to incorporate life sciences into earth system science. NREL scientist Jason Neff introduced the interdepartmental programs at NREL and was invited to facilitate a discussion on the need to be more interdisciplinary in earth sciences. "Many of the exciting new fields in the geosciences are actually cross-disciplinary, integrating life sciences and embracing new fields of science such as biogeochemistry and

astrobiology," reported Neff. "The overwhelming sentiment at the meeting was that these new developments should be a central focus of geoscience departments."

### **ecome to isitin cientists**

Victor . aramillo is on sabbatical from the Institute of Ecology of the National Autonomous University of Mexico, Morelia Campus. He has joined the Century modeling research team to simulate and better understand the dynamics of the tropical dry forest and the consequences of land use change. Victor received his Ph.D. in Range Science from Colorado State in 1999. Steven DeGryze is a visiting Master degree student from Belgium who is studying soil organic matter dynamics with ohan Six and Keith Paustian. Nataly Chubarova, a research meteorologist from Moscow State University (Russia), visited Dave Bigelow and im Slusser at NREL. Their USDA UVB Project is assisting Chubarova with ultraviolet broadband meter calibrations for instrumentation used to determine if long-term differences between city and rural light levels affect crops. ose Rincon from the Universidad de ulia in Maracaibo, Venezuela, is working with Alan Covich on leaf litter processing in tropical streams by conducting cross-site comparative studies in Puerto Rico and Venezuela through the International LTER Program.

### **NREL s Main a Difference**

NREL scientists contribute new knowledge to policy and management decisions promoting environmental sustainability. Here are some recent examples:

In October, Tom Stohlgren and Geneva Chong attended the th Biennial Scientific Conference at Mammoth, Wyoming, on Exotic Organisms in the Greater ellowstone Ecosystem -Native Biodiversity Under Siege. Tom helped organize the meeting and moderated a session titled "Managing Exotic Plant Threats." Both presented papers.

Dave Theobald co-organized a successful campus-wide GIS day held on November 1 to demonstrate the real-world variety of applications for graphic information systems technology. The open house attracted a broad audience which viewed posters on issues such as management of natural resources on military bases (CEMML), soil maps for planning applications (NREL), and siting new developments (Landscape Architecture).

ill Baron spoke to Senate and House staff in Washington, DC, at a Congressional Briefing on "Acid Rain Revisited." ill was one of four scientists presenting an analysis of the ecological responses to changes in atmos-pheric deposition of sulfur and nitrogen compounds that have resulted from the Clean Air Act. The Briefing on December 2 was sponsored by the Ecological Society of America and Hubbard Brook Research Foundation.

### **Life fter NREL**

After twenty-eight years of visionary leadership and research at NREL, im Gibson officially retired in March 1999. im's long service to ecology began in 193 as a chemistry professor at Colorado State. In 191, he joined the Grassland Biome Study of the International Biological Program at NREL. From 193 -194, im served as director of the NREL. In 19, im founded the National Atmospheric Deposition Program which he coordinated until 1992. In addition, im obtained significant funding for NREL's current facilities. Although im has taken advantage of his new found freedom to travel to exotic places, he continues to donate many hours to the NREL project which he initiated in 1992-a national UVB monitoring program for the USDA. Rather than worrying about administration, im now enjoys the scientific challenges of the project, such as calculating ozone levels from UV data. His ozone figures have already been compared favorably to those measured by Canadian scientists for Toronto where the UVB program has one of its monitoring sites. Comparisons with NOAA ozone figures for Mona Loa, Hawaii, and Boulder, Colorado, will also be used to further verify the calculations. This added value of the UVB data from the Project's thirty monitoring sites around the US (two in Canada) means that the project could become a source for ground-truthing of ozone data collected from NASA satellites. im's legacy continues.

NREL Scientists David Schimel and Beth Holland are now in ena, Germany. Dave has a 2 -year appointment as director of the Max Planck Institute for Biogeochemistry and Beth is a professor and group leader at the Institute.

Ben Balk is now employed by the NOAA National Weather Service in Anchorage and will be working on river flood forecasting. Ben successfully defended his thesis research entitled "Statistical methods for spatial modeling of snow distribution in a Colorado Front Range watershed" on April 1, 1999.

Serita Frey has accepted an assistant professor position at Ohio State University after successfully presenting her Ph.D. defense on April , 1999, on "Microbial Community Composition and Soil Organic Matter Dynamics in Agroecosystems."

The AAAS Science, Engineering, and Diplomacy Fellowship has been awarded to Laura Powers, a recent post doctoral scientist with Diana Wall. She will spend the next year in Washington, DC, learning about and contributing to the public policymaking process.

Amy Treonis successfully defended her Ph.D. thesis entitled "Environmental controls of the diversity, activity and function of soil nematodes in the McMurdo Dry Valleys of Antarctica." She is now stationed at the Macaulay Land Use Research Institute in Aberdeen, Scotland.

ohn Gross is now a rangeland/landscape ecologist with the Division of Tropical Agriculture, Commonwealth Scientific and Industrial Research Organization (CSIRO) in Townsville, Australia. He maintains a 20% time appointment at the NREL to continue work on his USDA project "Applying Dynamic Modeling and Adaptive Management to Brucellosis."

After fifteen years, Martin Fowler, the NREL Unix network manager, has moved down the road to Hewlett Packard. A replacement will begin in anuary 2000.

## NREL N E

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Have a good holiday season

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