

PRESENTERS & PRINCIPAL  
INVESTIGATORS  
—*Press Mixer Attendees*—

1993 LTER All Scientists Meeting  
September 18-22, 1993

ESTES PARK CENTER/YMCA of the Rockies  
Estes Park, CO

RICHARD BERK, Department of Sociology, University of California at Los Angeles  
*Urban ecosystems & the humans in them*  
INVITED SPEAKER

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JAMES BROWN, Sevilleta National Wildlife Refuge LTER, New Mexico  
*Intersite comparisons focusing on animal species, guilds, & functional groups*  
INVITED SPEAKER

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JAMES CALLAHAN, Division of Environmental Biology, National Science Foundation  
*LTER Program history and development*  
INVITED SPEAKER

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ROBERT COSTANZA, Chesapeake Bay Land-Margin Ecosystem Research site, Maryland  
*Environmental economics*  
INVITED SPEAKER

Dr. Costanza, director of the Maryland International Institute for Ecological Economics, specializes in ecosystem modeling, landscape modeling and ecological economics. He and his Chesapeake Bay LMER site colleagues are studying processes of recycling, organic transformation and exchange between uplands and the sea.

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WALTER K. DODDS, Konza Prairie LTER, Kansas  
*Terrestrial and stream research following two 50-year floods and one 100-year flood*

Konza Prairie recently experienced the wettest 12 months on record (since the late 1800s); the time period included a 100-year flood, and two 50-year floods. Terrestrial research is concentrating on the effects on nutrient dynamics and plant responses. Stream research is focusing on the rapid re-establishment of communities following the complete scouring caused by the flooding.

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PENNY FIRTH, National Science Foundation  
*Coordination of federal and Earth & Environmental Sciences research*  
INVITED SPEAKER

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DAVID FOSTER, Harvard Forest LTER site, Massachusetts  
*Effects of human versus natural disturbance processes on forested ecosystems*

The theme of the Harvard Forest LTER is the comparison of the effects of human versus natural disturbance processes on the forested ecosystems of the eastern United States. Natural disturbances such as infrequent hurricane impacts destroy much of the forest structure in this region, but have been shown to exert remarkably slight impacts on ecosystem processes such as nutrient cycling or hydrology. In contrast, the onset of European settlement in the 17th to 18th Century initiated a series of structural changes in the landscape, including deforestation and extensive agriculture that have exerted centuries-long impacts on species composition, biodiversity, biogeochemistry, hydrology and carbon storage that persist in the modern landscape. The role of temperate forests as a sink for carbon and as an analogue for other temperate regions in terms of carbon dynamics make long-term comparative studies of international significance.

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JOHN E. HOBBIE, Arctic Tundra LTER, Alaska  
*Human-induced changes, nutrient addition from acid rain, and overfishing*

Through a series of field and lab experiments, we find that arctic terrestrial and aquatic ecosystems are very sensitive to human-induced changes such as climate changes, nutrient addition from acid rain, and overfishing. Experiments in tussock tundra in which we changed air temperature and CO<sub>2</sub> concentrations, light intensity and nutrient additions illustrate that the nutrient supply (predominantly nitrogen) instead of air temperature appears to be the primary control of plant productivity. An increase in soil temperature did increase plant productivity slightly, most likely caused by increases in nutrients from decomposition. Over a decade, small nutrient additions can change arctic vegetation from sedge tussocks to a shrub tundra. The pristine and relatively simple food webs of the arctic lakes and ponds make fish manipulation studies (removal and addition of top predators) very successful in predicting how these ecosystems would respond to human-induced changes in the food web. Overfishing of lake trout, a popular sport fish, results in changes in the structure of the lake ecosystem such as a large increase in numbers of young trout and of burbot and extinction of several species of zooplankton.

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ELISABETH A. (Beth) HOLLAND, Niwot Ridge-Green Lakes Valley LTER site, Colorado  
*Modelling trace gas dynamics based on carbon and nitrogen cycling*  
INVITED SPEAKER

Methane and carbon dioxide are radiatively active trace gases (greenhouse gases). Their emission from soils to the atmosphere represents an important component of biosphere-atmosphere exchange. Dr. Holland has developed a simple model of methane emissions from flooded peatlands which is sufficiently simple that it can be used for extensive land areas. The model uses net primary production (NPP) as the source of carbon for methane production. The proportion of NPP which is converted to methane is controlled by temperature, litter quality (lignin:N), and pH. Preliminary comparisons demonstrate that the model is able to simulate methane production over a range of environmental conditions and that methane production is sensitive to both the amount and quality of incoming carbon. She and her colleagues have also used CENTURY, a model which simulates both carbon and nitrogen, to develop ecosystem carbon budgets for sites distributed globally. The majority of CO<sub>2</sub> respired to the atmosphere from soils is derived from decomposition of recently fixed carbon (the previous year NPP). This result is robust for all of the forest and grassland sites simulated. The partitioning of soil organic matter into pools with different turnover rates, together with the coupling to N cycling, significantly influences the rate at which soil carbon can be respired to the atmosphere.

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JERRY F. FRANKLIN, LTER Coordinating Committee Chair & ESA President  
*LTER 10-Year Review, International Summit,  
Proposed National Biological Survey & LTER-ESA Cooperation*  
INVITED SPEAKER

Dr. Franklin, elected chair of the LTER Network Coordinating Committee, was instrumental in developing the LTER Program and has overall responsibility for leading Network activities and initiatives identified by the National Science Foundation and LTER site principal investigators. As current president of the Ecological Society of America (ESA), Dr. Franklin has been discussing possible collaboration and cooperation between the LTER Network and the ESA and a proposed National Biological Survey with Interior Secretary Bruce Babbitt. Dr. Franklin, a USDA Forest Service scientist for over 30 years, is now a professor of ecosystem analysis at the University of Washington at Seattle. His research specialties include structure and function of natural (especially late) successional forest systems, successional processes following catastrophic disturbances, effects of changing environmental conditions on forest processes, application of ecological principles to the management of natural resources ("New Forestry"), and theory and practical applications of landscape ecology.

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BRUCE P. HAYDEN, Virginia Coast Reserve LTER site, *Virginia*  
*Global climate change and ecosystem dynamics, with special reference to*  
*sea level, coastal storms (northeasters), and hurricanes*  
INVITED SPEAKER

At the Virginia Coast Reserve, scientists are working on the role of hurricanes and winter coastal storms on maintaining and restructuring coastal ecosystems. While a great deal is known about the destructive aspects of these storms, less is known about the important role they play in structuring coastal ecosystems and making them the ecologically rich places they are. Coastal ecosystems are ephemeral and processes which form and destroy them are rapid. Work at the Virginia Coast Reserve focuses on understanding their genesis, the "assembly rules" for building these landscapes, and the processes which give rise to systematic changes observed over time. Given the national goal of conserving wetlands it is important that we understand and appreciate their ephemeral nature. Sea-level rise at the Reserve is currently causing major changes in many ecosystems. Coastal forests and farms are changing to marshes. However, the role of the residual agricultural nutrients in these new ecosystems in the broader behavior of the estuaries and lagoons is not yet understood.

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ROBERT R. PARMENTER, Sevilleta National Wildlife Refuge, *New Mexico*  
*Climate dynamics and disturbances on populations of animals and plants*

Dr. Parmenter conducts research projects on the effects of climate dynamics and disturbances on populations of animals and plants. These studies include the effects of drought, floods, wildfires, and human land-use practices on wildlife and plant communities. Of recent interest is the ongoing study of rodents that carry the virus associated with the Hantavirus epidemic (HARDS) in the Southwest. Dr. Parmenter is collaborating with the CDC and State Health Departments in developing a regional rodent/virus monitoring plan in an effort to combat the epidemic.

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WILLIAM PARTON, Central Plains Experimental Range LTER, *Colorado*  
*Simulating climatic change impacts for the terrestrial LTER sites; the CENTURY Model results*  
INVITED SPEAKER

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EDWARD RASTETTER, Arctic Tundra LTER, *Alaska*  
*Using a general ecosystem model to compare LTER sites*  
INVITED SPEAKER

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WILLIAM REES, Community & Regional Planning, University of British Columbia  
*Ecological footprints & the human carrying capacity*  
INVITED SPEAKER

WILLIAM SCHLESINGER, Jornada Experimental Range LTER, *New Mexico*  
*Desertification and the distribution of soil resources*

Dr. Schlesinger and his colleagues at the Jornada site are testing a hypothesis that during desertification the distribution of soil resources changes from spatially homogeneous, as seen in semi-arid grasslands, to spatially heterogeneous, as seen in creosotebush and mesquite shrublands. This vegetation change has occurred during the last 100 years over much of southern New Mexico and West Texas. The change in the spatial distribution of soil resources is reflected by increasing spatial heterogeneity in other aspects of ecosystem function, for instance in the distribution and abundance of higher animals.

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DAVID KINGSBURY, Human Genome Project, Johns Hopkins University  
*A model of shared information services for a distributed research community*  
INVITED SPEAKER

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JOHN J. MAGNUSON, North Temperate Lakes LTER, Wisconsin  
*Comparative landscape ecology of disparate LTER ecosystems*  
INVITED SPEAKER

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JOHN C. MOORE, Central Plains Experimental Range LTER, Colorado  
*Biodiversity within soil food webs*  
INVITED SPEAKER

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JAMES MORRIS, North Inlet Marsh LTER site/Baruch Institute, South Carolina  
*Sea-level anomalies, CO<sub>2</sub> exchange equilibrium, nutrient-level increases*

North Inlet researchers have observed considerable interannual variation (2x) in primary production of macrophytes at North Inlet. This variation is caused by anomalies in mean sea level which can vary as much as 10 cm annually because of climate. During summers of low sea level, the marshes are dryer and the salinity of the soil increases inhibiting plant growth. The sea-level anomalies are also correlated with commercial landings of fish species that spend their juvenile stages in the salt marsh.

There is a CO<sub>2</sub> exchange equilibrium in a salt marsh/grassland that develops as the canopy biomass increases during the summer. This is analogous to the equilibrium thought to exist in a mature forest, although in the salt marsh it happens on a time scale of months versus decades in a forest. This equilibrium point is not constant, but changes continuously. The temporal scale of this phenomenon in the salt marsh allows North Inlet researchers to manipulate this equilibrium experimentally, providing a tool to explore basic questions related to the global carbon cycle.

Statistically significant increases in nutrients in the tidal waters at North Inlet have been recorded during the past 12 years. Since the Inlet is a lagoon without river inputs, these increases must be due either to increased atmospheric deposition within the watershed or to aging processes occurring within the salt marshes. One additional possibility is a change in the food web, such as a depression in phytoplankton abundance.

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TIMOTHY R. SEASTEDT, Niwot Ridge-Green Lakes Valley LTER, Colorado  
*Alpine snowpack amounts and duration; plant productivity, species composition, soil characteristics, decomposition and trace gas dynamics of the alpine*

High elevational cooling and enhanced winter precipitation, as suggested by the only long-term alpine climate record, provides the justification for the experimental studies at Niwot Ridge, the only alpine site of the LTER Network. Enhanced snowpack amounts and duration are being studied with a snowfence experiment. Plant productivity, species composition, soil characteristics, decomposition and trace gas dynamics of the alpine are being studied as part of this experiment.

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HANK H. SHUGART, JR., Virginia Coast Reserve LTER, Virginia  
*Ecosystem models: LTER and international partnerships*  
INVITED SPEAKER

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SUSAN STAFFORD, H.J. Andrews LTER, Oregon  
*Integration of scientific information management & long-term ecological research*  
INVITED SPEAKER

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DAVID TILMAN, Cedar Creek LTER, Minnesota  
*Effects of global change on biodiversity*

Dr. Tilman, principal investigator at the Cedar Creek site, specializes in community and ecosystem modeling, and plant competition and production. He will present results of Cedar Creek's work on the effects of global change on biodiversity, and the effects of biodiversity on ecosystem stability.

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KEITH VAN CLEVE, Bonanza Creek LTER, Alaska  
*Utilizing a minichizotron to understand the importance of plant root growth*

Bonanza Creek researchers are utilizing state-of-the-art techniques to understand the importance of plant root growth in ecosystem development. Small diameter plastic tubes are inserted 2 meters into the soil as access ports for viewing root growth and death using a color micro-video camera. The camera, attached by cable to the aboveground video recording equipment, is lowered into the access tube for viewing roots. This technique will provide vital information on carbon and nutrient allocation to the belowground components of their successional ecosystems.

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ROBERT B. WAIDE, Luquillo Experimental Forest LTER, Puerto Rico  
*Response of tropical rainforest to natural and anthropogenic disturbance*

The Luquillo LTER site investigates the suite of disturbance types affecting tropical rain forest in Puerto Rico. Response of the forest to both the natural and anthropogenic disturbance is also a prime focus of our research. The premise of our research is that montane tropical forests are subjected to a variety of severe stresses (high temperature and rainfall, hurricanes, etc.) and that the biota is closely involved in restoring ecosystem productivity after such stresses.

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JACK WEBSTER, Coweeta Hydrologic Laboratory, North Carolina  
*Organic matter processes in streams in the United States*  
INVITED SPEAKER

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ROBERT A. WHARTON, Jr., McMurdo Dry Valleys LTER, Antarctica  
*Integration of biological processes within & material transport between  
lakes, streams, and terrestrial ecosystems*

Dr. Wharton leads research at the newest LTER site, the McMurdo Dry Valleys, which are among the most extreme deserts in the world, far colder and drier than those represented in any previously established LTER site. All ecosystems are shaped to varying degrees by climate and material transport, but nowhere is this more apparent than in the dry valleys. The obvious effects of an extreme environment coupled with the general simplicity of ecosystem structure makes the area an ideal location to study these basic relations. Research efforts focus on the integration of the biological processes within—and material transport between—the perennially ice-covered lakes, ephemeral streams, and extensive areas of soil comprising the Taylor Valley landscape.

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