LTER
Network News
Newsletter of the Long Term Ecological Research Network
Vol. 17 No. 2 Fall 2004

LTER Network Plans For The Future

As human-induced environmental change continues, society is facing an increasing array of pressing environmental challenges. Answers to these complex challenges will come from many avenues, one of which must include coordinated, long-term, interdisciplinary research. Following a very successful two decades of science, training, and outreach, the LTER Network is now poised to pursue a set of new initiatives in response to a number of important "Grand Challenge" research areas (see Fig. 1 on p. 2). It is this background that has set the stage for an intensive Network-wide planning effort to develop a new set of multisite activities that integrate research and education. This planning effort started at the LTER All Scientist Meeting in September 2003 and will continue intensively over the next 24 months funded by an NSF grant. Participants will include a number of non-LTER scientists many of whom represent other existing or developing networks, such as the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUASHI), Collaborative Large-Scale Engineering Analysis Network for Environmental Research (CLEANER), Organization of Biological Field Stations (OBFS), and NEON. Indeed, the LTER planning process will be coordinated with NEON, which is undergoing a parallel and intensive development process over the same time period.

The LTER planning effort has three major objectives:

❖To develop a plan for new LTER network-level science, technology, and training. This effort will include (1) new initiatives in long-term thematic, regional, and network-scale science; (2) increasing the technological capabilities of scientists and sites; (3) fully integrating graduate and undergraduate education into Network-level science and synthesis; and (4) integrating LTER and non-LTER sites and networks into a comprehensive international network of networks for ecological research.

❖To explore alternative governance, planning, and evaluation structures for managing LTER Network science. LTER governance has remained unchanged even though the Network has grown to 26 sites plus a Network Office. Any LTER governance structure should include (1) a structure to serve and support a more highly coordinated scientific network, (2) a structure for network-wide science planning and evaluation, (3) a process for seamless integration of new sites and collaborative networks, and

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Nancy Grimm Elected ESA Chair


Dr. Nancy Grimm

Dr. Nancy B. Grimm of the Central Arizona Phoenix LTER project and Arizona State University was recently elected president of the Ecological Society of America (ESA). She will succeed Jerry Melillo, another LTER scientist affiliated with Harvard Forest, whose term expires in 2005. ESA is a nonpartisan, nonprofit organization of more than 8000 international scientists founded in 1915 to promote ecological science by improving communication among ecologists, raise the public's level of awareness of the importance of ecological science, increase the resources available for the conduct of ecological science; and ensure the appropriate use of ecological science in environmental decision making by enhancing communication between the ecological community and policymakers.

In addition to being co-director of the CAP LTER project and a Professor of Biology at ASU, Nancy is a senior associate of SAHRA, the Science and Technology Center — Sustainability of Semi-Arid Hydrology and Riparian Areas, and a collaborating investigator in the Lotic Intersite Nitrogen Experiment (LINX). Her research interests include biogeochemistry, stream ecosystem structure and function, and urban ecosystem structure and function. Congratulations, Nancy and CAP!

Bob Waide
Executive Director, LNO

In This Issue

Editorial

The Network News

Vol 17 No 2 Fall 2004

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http://www.lternet.edu

This issue of the Network News introduces a new format for communicating information to LTER scientists, students, and colleagues. Based on comments from readers of the newsletter, we have decided to emphasize the communication of newsworthy activities while continuing to provide summaries of important scientific results.

Under the new format, the printed version of the newsletter will include stories that are shorter and more focused on important LTER accomplishments. These stories will provide links to other documents that expand and provide more detail on LTER activities. The new format will provide us with the opportunity to improve the appearance of the newsletter by expanding margins, adding graphical material, and making the text easier to read. Most of the present features of the newsletter, including editorials, scientific articles, informational pieces, calendar items, and significant new LTER publications, will be preserved under the new format.

The electronic version of the newsletter will also undergo changes to permit expanded use of Web technology. The electronic edition will consist of headlines and short summaries linked to full stories available on the LTER web page. This approach will allow us to increase the frequency of the electronic version of the newsletter to quarterly and also provide us with the capability of issuing special editions to communicate important activities and events to LTER scientists. We believe that this new approach will make information more accessible to LTER sites and scientists, and will allow us to communicate important news to the LTER community in a timely manner.

We welcome comments and suggestions from our readers that will lead to additional improvements in the newsletter.

Bob Waide
Executive Director

Fig. 1: Grand Challenge Conceptual Domains

- **Alterations in biodiversity** are one of today's most important global environmental challenges, profoundly affecting ecosystem processes and the services they provide. Of particular human and economic impact are the introductions and spread of exotic species and infectious diseases.
- **Altered biogeochemical cycles at multiple spatial scales** are caused directly or indirectly by human perturbations. We must learn how to minimize future degradation and restore altered element cycles and ecosystem functioning where possible.
- **Climate change and climatic variability** of anthropogenic and natural origin are now well documented. The ecological responses to these changes on generational time scales are as yet poorly understood. Of particular interest are the effects of long-term climate fluctuations and trends, as well as the impacts of sudden climate change on ecosystem structure and function.
- **Coupled human-natural ecosystems** include interactions between patterns and processes in biophysical systems and among social groups in human systems which give rise to emergent behaviors within each system. Fundamental questions in coupled human-natural systems thus have evolved far beyond one-dimensional attention to human activity, to considerations of feedbacks, of human design and engineering of ecosystems, of ecosystem goods and services, and of emergent behavior and stability properties of coupled human-biophysical systems.

For a more detailed set of questions and objectives see http://www.lternet.edu/grandchallenges.

Planning Grant (cont. from p. 1)

(4) a plan to implement our new integrated research and education objectives.

❖To envision and plan for K–12 education, undergraduate and graduate student training, public outreach, and knowledge exchange activities to link LTER science with application needs. This activity includes (1) establishing priority areas and key targets for education and training activities, (2) exploring mechanisms to facilitate collaborative activities and research across sites, (3) enhancing the participation of groups underrepresented in the discipline, and (4) developing skills and mechanisms for better exchange of knowledge among scientists, policymakers, and resource managers.

By meeting these three objectives, our planning activity can create a framework to increase the scale and scope of activity needed to address a number of ecological Grand Research Challenges, achieve a higher level of coordination and complementarity among the research sites; incorporate new, enabling technologies into LTER research; broadly train the next generation of ecologists; and improve and increase the exchange of knowledge between scientists, managers, and policy makers. In doing so, the LTER Network will actively pursue a new level of collaboration, synthesis, and integration to address challenging ecological questions now and in the future.

We must achieve these goals while preserving the fundamental strength of the current LTER Network: long-term, site-based, integrated ecological research. We have been given the opportunity to add a new level of collaborative, cross site, and synthesis research to that base, one that fully integrates graduate and undergraduate education. This is a highly ambitious activity, but it is vital that we successfully accomplish our objectives. We can only do that with your help. Please, participate when asked, get involved, and help define the next two decades of Long-Term Ecological Research.

Scott Collins
SEV LTER and Co-PI, Planning Grant

News Briefs

LNO and SEV Acquire New Offices

LNO and SEV LTER's new home at the University of New Mexico

Photo: MARSHALL WHITE

The LTER Network Office (LNO) and Sevilleta moved to new facilities at the University of New Mexico main campus in July. The new offices are located on the third floor of the CERIA Building (no. #83 on the campus map), with LNO occupying Suite 320 and Sevilleta a range of suites on the same floor. Mailing addresses for both LNO and Sevilleta remain the same, but phone numbers and other contact details for staff are available on the LTER website (*http://lternet.edu/*) or on the respective websites of LNO (*http://lno.lternet.edu/*) and SEV (*http://sevilleta.unm.edu/*).

Baltimore Celebrates Ecosystem Day

October 20, 2004 was *Baltimore Ecosystem Day*. The mayor of Baltimore, Martin O'Malley, issued a proclamation to that effect and urged Baltimore citizens to join in celebrating the day, noting that the people of Baltimore valued their natural ecosystem and its importance to the physical, social, and economic health of their neighborhoods.

Mayor O'Malley noted that neighborhood residents and community groups throughout the city had contributed their knowledge, skills, and labor to improve their neighborhoods through tree planting projects, community gardens and parks, and beautification and education projects with the support from the Parks & People Community Grants program.

The proclamation singled out the Baltimore Ecosystem Study (BES) and the U.S. Forest Service for praise, observing that they had "conducted groundbreaking research on the urban ecosystem in Baltimore City, making significant contributions to our understanding of Baltimore's urban ecosystem to improve how we manage, conserve and restore our natural environment, and supporting restoration of our ecosystem through the Revitalizing Baltimore program."

The mayor's proclamation further noted that BES had received renewed funding for an additional six years to conduct research and education projects that will continue to improve our understanding of Baltimore's urban ecosystem. "We recognize our Community Stewards and the scientists and educators of the Baltimore Ecosystem Study and the U.S. Forest Service for their outstanding contributions in working to improve the quality of life for the Baltimore community," the proclamation stated.

NSF Funds LTER's 2-Year Strategic Plan Development

The National Science Foundation has agreed to fund an intensive 2-year Network-wide planning effort by LTER. The planning activity is expected to create the framework necessary for the LTER Network to achieve its mission, goals, and objectives. For more information, download the pdf document "New Planning Grant" on the main LTER website *http://lternet.edu/* (also see the lead story beginning page 1).

Coweeta Completes Major Facilities Improvement and Expansion

Over the past two years, three major building projects have been completed that further support research collaboration and education at Coweeta Hydrologic Laboratory. The facility improvements resulted from cost-shared funding from the USDA Forest Service, the National Science Foundation, and the University of Georgia.

The Analytical Laboratory was remodeled and expanded and was completed in February 2002. The lab now includes additional bench space, a walk-in drying oven and cold room, and state-of-the-art safety features. The 5200 ft^2 (483 m^2) lab generates on average 63,000 chemical determinations per year for both experimental and long-term ecological monitoring projects.

The Coweeta Residence was remodeled and expanded and was completed in August 2003. The Residence—originally the Coweeta Administrative Office built in 1937—has seen several expansions in its 67 years, but its historic exterior stone and wood architecture has been maintained. The interior has been completely updated and includes space for 20 visiting researchers—including bedrooms, kitchens, restrooms, utility areas, a social room, computers, and full internet connections via a T-1 line. The social room was named in honor of the late Dr. Tom Callahan, formerly of NSF, for his many contributions towards science and education at LTER research sites. A plaque honoring Tom was presented to his wife, Anne, and son, James, at a Coweeta Facility Open House in October 2003.

Photo: BRIAN KLOEPPEL

Improved and expanded: The Coweeta Conference Center

A new Conference Center was completed in October 2003 with several related components to be completed in 2004. The Conference Center includes indoor and outdoor meeting areas and eight offices with supporting facilities (see photo). The 6400 ft^2 (595 m^2) center is designed for both formal and informal meetings. The 80-person conference room can be arranged for a variety of purposes and the living room with its large fireplace and the large hallways provide areas for informal networking. The center's outside walls are mostly floor-to-ceiling windows that provide a panoramic view of Coweeta's natural setting.

Brian Kloeppel
Coweeta LTER

For more information, please visit the Coweeta website http://coweeta.ecology.uga.edu.

Jornada Helps BLM to Answer Land Management Questions

A unique collaboration between researchers from the Jornada Basin LTER, the USDA-ARS Jornada Experimental Range, the USDA Natural Resources Conservation Service and the Bureau of Land Management (BLM) personnel is tackling ecological problems in the western United States and attracting the attention of policy makers.

Photo: BRANDON BESTELMEYER

Rangeland Specialists from the Bureau of Land Management Las Cruces Field Office evaluating soil/landform relationships of an assessment site in order to match the site to its state-and-transition model.

In June 2004, the BLM director, Dr. Kathleen Clarke, invited Jornada researchers and collaborating local BLM staff to the Bureau's Washington, D.C. headquarters to brief BLM staff, who were developing new national assessment strategies, on their collaborative activities.

BLM oversees about 105 million hectares of land in 12 western states of the USA. Increasingly, these states are interested in carrying out comprehensive assessments of the health of the nation's public deserts, grasslands, shrublands, and woodlands. Questions that engage them include how standards for public lands health can be identified, how deviations from this standard can be measured and interpreted, and how millions of hectares of land can be examined efficiently.

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Interdisciplinarity is the Key for '04 Supplement Funding

LTER supplement proposals in FY04 were characterized by the interdisciplinary nature of funding sources within the NSF. LTER's traditional home in DEB (Division of Environmental Biology, Directorate for Biological Sciences) took the lead with continued support for Schoolyard, REU (Research Experiences for Undergraduates), and equipment purchases at all the sites, along with support from LTER's other two main core programs, the Bio-Oceanography Program in the Geosciences Directorate and the Office of Polar Programs. But record additional support for new and exciting supplements was obtained through critical co-funding agreements with the Directorate for Education and Human Resources (EHR); the Directorate for Social, Behavioral, and Economic Sciences (SBE); and the Office of International Science and Engineering (OISE). Award abstracts can be looked up in NSF's Award Abstracts database at *http://www.nsf.gov/awardsearch/index.jsp*.

Education

This year saw seven new Environmental Education (EdEn) supplement awards, six from EHR with matching funds from DEB and Bio-Oce and one funded solely by DEB. Support will expand Schoolyard LTER and REU activities, teacher/educator training and professional development workshops, the development of new educational products, and some international education collaborations. The sites that received awards this year include KNZ, PIE, CWT, HFR, CAP, SGS, and SEV. Total environmental education supplements exceeded $380,000; added to the Schoolyard support, this became a record year for support of education in LTER, with almost $750,000 in supplements awarded. An example of a new EdEn initiative is at KNZ, which will expand its current environmental education and Schoolyard programs to reach teachers and students outside of its local area by targeting teachers and students in district USD 475, the 11th largest out of Kansas' 303 districts. USD 475 includes 13 elementary schools (five of which are associated with the Fort Riley army base), two middle schools, and a high school. About half of the students are minorities and over half are eligible for free or reduced price lunches. Therefore, the KNZ EdEn initiative has the potential to significantly impact lower-income and minority students in the state.

New Collaborations with the Social Sciences

Social science in LTER received a strong boost this year with support from the Environmental, Social, and Behavioral Sciences (ESBS) program element in SBE, directed by Tom Baerwald. ESBS explicitly looks to promote interdisciplinary research across a broad range of social and behavioral sciences, especially in conjunction with funding from other programs at NSF. Seven awards were made totaling $350,000 to support new social-ecological research, other types of interdisciplinary collaborations, and capacity building in the social sciences at LTER sites. An example of a new project is from BNZ, where social scientists will work with two interior Alaska Native communities in the upper Yukon River watershed to study Alaska's boreal forests as a coupled social-ecological system that is responding to directional changes in climatic, social, and economic forces. They will focus on identifying ecosystem services of greatest importance to society and then use this information to modify long-term monitoring programs to concentrate on the effects of climate and fire on those services most significant to the local communities. Another new project from HBR will develop a spatially explicit dataset that links land-use history, satellite imagery, socioeconomic data, and ecological data for the Hubbard Brook Experimental Forest and adjacent towns. These data will then be used to develop spatially explicit models of land-cover change. Major emphasis will be placed on identifying sources of spatial and temporal variability as it relates to peoples' accessibility, location of natural amenities, soil quality, and institutional policies influencing settlement and land-use patterns.

International LTER

NSF's Office of International Science and Engineering (OISE) joined with BIO/DEB to provide almost $390,000 in supplements to add new or expand existing international collaborations between 15 US LTER sites and international counterparts, focusing on establishing new ILTER linkages. Activities will include workshops and other meetings, undergraduate and graduate student training, data sharing, and collaborative research in a wide range of areas. Topics include natural tropical reforestation, forest carbon dynamics, lake variability, soil dynamics, environmental justice, extreme events in deserts, climate-vegetation transects, watershed biogeochemistry, grassland dynamics, historical ecology and synthesis, and inter-lake comparisons. Foreign partners will include Argentina, Asia, Brazil, Canada, China, Costa Rica, Croatia, Finland, France, Hungary, Mexico, the Netherlands, South Africa, and Sweden.

Henry Gholz, LTER Program Director and
Michelle Kelleher, Science Assistant
NSF BIO/DEB

Call for Proposals

$18–$20 million available for long term research

The California Bay-Delta Authority Science Program is seeking to invest in projects that develop new knowledge about how water use and management activities interact with and affect key aquatic species and environmental processes across spatial and temporal scales. The geographic areas of interest are the San Francisco Bay Estuary and the Bay-Delta System. To access detailed information about this opportunity, please visit: *https://solicitation.calwater.ca.gov* or call the Proposal Solicitation Package (PSP) Helpline at 877/408-9310.

Network News

The Comings…

Mark Servilla joined LTER Network Office (LNO) as Lead Scientist on the Network Information System (NIS) project in May 2004. Mark has a professional background in developing networked data distribution and analysis systems and an educational background in computer science and geology. Mark is currently familiarizing himself with the LTER sites and working on NIS tasks identified in the draft NIS strategic plan developed by the Network Information System Advisory Committee (NISAC). The plan, though still being developed, provides a framework for budgeting development time.

Also in May, **McOwiti Thomas**, a Kenyan, joined the LTER Network Office (LNO) as Public Information Officer. McOwiti, who has a long and wide ranging experience in journalism and public communication, replaces Patty Sprott, who relocated to North Carolina in Spring 2004. His initial tasks are to develop and implement strategies and tools for communicating LTER accomplishments to its various constituencies. McOwiti holds a bachelor's degree in Physics and Mathematics from Kenyatta University in Nairobi, Kenya and a master's degree in Communication from the University of New Mexico.

In June 2004, **Karen McGlathery** replaced Bruce Hayden as lead PI for the Virginia Coast Reserve (VCR) LTER site. Karen's background is in coastal ecology, in particular the coupling of nutrient cycling with plant ecology in shallow coastal ecosystems. She began working at VCR in 1996, linking watershed nutrient inputs to the fate and transformations of nutrients within the lagoons on their trajectory to the open ocean. This work complements similar work she has done in coastal bays in the tropics and in Scandinavia. Recently, Karen has begun a collaborative project for large-scale restoration of formerly extinct seagrass populations in the VCR lagoons.

In August LNO hired **Katy Perry** as Administrative Assistant II. Katy's duties are to assist with all general administrative office duties; process travel reimbursements for local, national, and international meeting participants; coordinate various national and international meeting logistics, and serve as a liaison between the Network office and various LTER sites and affiliates to resolve problems and questions of a general nature.

Marjorie Hudson joined the Network Office in September as Senior Program Manager. Formerly a Senior Contract and Grant Administrator in the Office of the Vice Provost for Research at the University of New Mexico, Marjorie is also a Certified Research Administrator—a professional certification acquired through experience, knowledge, and passing a written exam that covers a broad spectrum of knowledge in federal, state, and university rules and compliance regulations. She has extensive experience in grant, contract, and cooperative agreement management, and is finishing her doctorate in social science. Her dissertation project involves an international collaboration (Chile, Panama, and the US) of ecologists, medical personnel, and social science in hantavirus prevention outreach. Marjorie will divide her time between the LTER Planning Grant, the SEEK project, and LNO. Initially, her principal duty will be to help manage and supervise the accounting for all three projects.

Laura Downey joined the LTER team in October as a usability engineer for the SEEK project, initially focusing on Kepler. Laura has an MS in computer science with a concentration in human-computer interaction. She has 12-plus years' experience in the usability arena, and her background includes experience in applied research, industry, and government contracting. Most recently she developed a methodology and scenarios for user evaluation of a monitoring and control system for the Federal Aviation Administration. She led the evaluation, identifying problem areas and user needs. Laura's focus is all about making technology work for people and she plans to bring her considerable analysis experience to SEEK to help make existing software more usable for our scientists.

…and Goings

Patty and Aldo Bonito, Blowing Rock, North Carolina, Oct., 2004

Patty Bonito (née Sprott), who served as technical writer/editor and publications specialist in the LNO since 1997, relocated to North Carolina in Fall 2004. Patty continues to work part-time with LTER to develop site brochures and other projects.

Bruce Hayden, formerly PI for VCR, is the new co-leader of NEON together with Bill Michener, who retains his position as Associate Director at LNO. Commenting on the changes, Henry Gholz, director of the LTER Program at NSF, said Bruce's "long-standing, high-level participation in LTER, both at the VCR site level as well as at the network level, has inspired a generation of new scientists and has been critical in bringing the LTER program to its current prominence in ecology." He commended VCR for anticipating and planning for Bruce's departure and thus preparing Karen McGlathery to take over smoothly as PI. Henry pointed out that Bruce's leadership of the NEON project over the next two years would be equally critical for the science and the general community at large. Noting that Bruce's LTER background will ensure the exploration of joint development and possible synergisms between LTER and NEON, Henry observed that the coordination of the two development efforts over the same two-year time period would be a huge challenge for Bruce and his team, but that it was essential that they use the resources and time as efficiently as possible.

John Norman, the GIS Manager at the SGS-LTER has accepted a position with the Natural Resources Ecology Lab at Colorado State University as GIS Modeler. We appreciate John's contributions to the project since he started as an REU over five years ago.

After three successful years with LNO, **Sonia Ortega** returned to NSF in late September. Sonia leaves LNO and LTER after spurring the Network's education component to new heights. She says she plans to collaborate with Henry Gholz at NSF and will continue her connection with the Network.

LTER CC Holds Successful Meeting in Alaska

Twenty-three sites were represented at the fall 2004 Coordinating Committee meeting held in Fairbanks and Toolik Lake, Alaska from August 16-22. The meeting began with an Executive Committee session followed the next day by a science theme workshop on the interactions of disturbance and climate change that was organized by Terry Chapin. The main session of the CC meeting took place at the University of Alaska Fairbanks on Thursday, August 19th and was followed by a two-pronged field trip to the Bonanza Creek field sites. The group then traveled by bus to Toolik Lake for the second half of the meeting and concluded the trip with a bus ride up the pipeline road to Dead Horse and a return flight to Anchorage. Some highlights:

Members of the Coordinating Committee had an opportunity to meet with Dr. Arden Bement, then Acting Director of the National Science Foundation, at a reception organized by the University of Alaska. Dr. Bement spoke briefly about the National Science Foundation and chatted with several LTER scientists, including a number of former NSF program officers. Dr. Bement later visited Toolik Lake, site of the Arctic LTER.

Photo: McOWITI O. THOMAS

At Toolik Lake, John Hobbie described ARC LTER's long-term research activities.

Henry Gholz reported on activities at NSF via videoconference from Washington. He discussed five specific items: the open Assistant Director position in BIO, the Network Office strategic plan, the schedule for site reviews in 2005, the development of an LTER children's book series, and the funding of the LTER planning grant.

Don Henshaw gave an overview of the activities of the Network Information System Advisory Committee (NISAC), including strategies for network information system development, current technology issues, and the protocol for selection of new NIS modules. The coordinating committee approved the protocol for selecting new modules proposed by the NISAC.

Bob Waide discussed the status of the LTER Network Office (LNO) strategic plan. He described the process and mechanism used to get feedback from the Executive Committee, the Coordinating Committee, and the National Advisory Board. He summarized the structure of the plan, focusing on four main issues and strategies to address them. After discussion, the Coordinating Committee voted 19-4 to accept the current version of the strategic plan and authorized its submission to NSF.

Photo courtesy of NANCY GRIMM

Coordinating Committee meeting participants posed for photos at the Arctic Circle

Jim Gosz laid out forthcoming planning grant activities and introduced members of the Science Task Force Advisory Committee—Jim Gosz (LTER Chair), Scott Collins (SEV), Barbara Benson (NTL), Allison Whitmer (SBC), and Dan Childers (FCE)—proposed by the LTER Executive Committee. The Coordinating Committee then discussed the next steps in the planning process. In a separate session, members of the Coordinating Committee proposed participants for the first planning meeting (dubbed "the meeting of 100"), to be held from November 9-12. The Science Task Force will select final participants for this meeting.

Bruce Hayden gave an overview of the status of the National Ecological Observatory Network (NEON) and answered questions about the development phase of the project. The main goals of NEON's organizational phase are to develop a cost plan for utilizing the infrastructure award and to set up an interim project office, initially at the American Institute of Biological Sciences (AIBS). Bruce encouraged LTER scientists to participate in the NEON planning process.

Photo: McOWITI O. THOMAS

Arden Bement, Acting Director of NSF speaks to CC members at UAF, Fairbanks

Hugh Ducklow gave an overview of preparations for the next LTER mini-symposium in Washington in mid-March 2005. The theme of the mini-symposium will be Long-term Research in the Marine Environment and the organizers are Ducklow, Dan Reed, and Chuck Hopkinson.

The schedule for future Coordinating Committee meetings was reviewed and finalized. The Spring 2005 meeting will be held at the Florida Coastal Everglades LTER site, and the Fall meeting will take place at Virginia Coast Reserve. In 2006, the Spring meeting will be at Cedar Creek, and the All Scientists Meeting will take place in the Fall.

To close the meeting, Mark Ohman made a presentation on the new California Current Ecosystem site (see CCE story on page 8).

Bob Waide
Executive Director, LNO

Details of the minutes of the meeting, committee reports, and PowerPoint presentations can be found at http://lternet-183.lternet.edu/doc_archive/minutes/.

LTER Grows

NSF Awards $10 Million to Ocean Sites for Long-Term Ecological Research

Coral reefs and coastal upwelling ecosystems are the foci of two new LTER sites awarded funding this summer by the National Science Foundation (NSF). With the addition of the California Current Ecosystem (CCE) and the Moorea Coral Reef (MCR) LTER sites, there are now 26 NSF-funded sites in the LTER network. Henry Gholz, director of NSF's LTER program, noted that the two sites significantly augmented the LTER network, which hitherto included only one marine site—Palmer in the Antarctic. The awards ensure that high biodiversity and productivity ecosystems in most of the world's major biomes, both on land and in the oceans, are represented. The two newest sites will receive approximately $820,000 for the next six years, for a total of about $5 million each.

The following two articles introduce the two newest members of the LTER Network.

The California Current Coastal Pelagic Ecosystem (CCE) LTER

The new California Current Ecosystem (**CCE) LTER** site represents a pelagic (i.e., the ocean water column) **coastal upwelling biome**, as found along the eastern margins of all major ocean basins. These are among the most biologically productive coastal ecosystems in the world. Research at this site will focus on mechanisms leading to transitions over time between different states of the pelagic ecosystem. Observations from the remarkable California Cooperative Oceanic Fisheries Investigations (CalCOFI) coastal ocean time series—currently in its 55th year—demonstrate the effects of external factors in forcing alterations to this ecosystem on multiple time scales. These factors include a **warming trend** that has been documented over the past 5 decades, the long term warming and cooling cycles (ca. 20-30 years) represented by the **Pacific Decadal Oscillation**, and the year-to-year temperature fluctuations dominated by **El Niño**. Combinations of these processes, together with interactions among living organisms, can lead to ecosystem responses that may be manifested as relatively abrupt transitions.

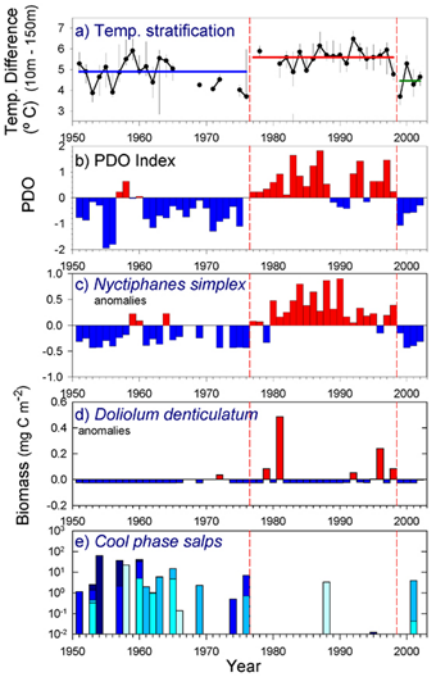

Fig. 1. Multidecadal variability in (a) ocean thermal stratification, (b) the Pacific Decadal Oscillation index (annual averages, Mantua et al. 1997), (c) biomass anomalies of the krill *Nyctiphanes simplex*, (d) biomass anomalies of the uncommon doliolid *D. denticulatum*, and (e) biomass of an assemblage of salps that predominate in the cool phase. All records begin in 1950 (from Ohman and Venrick 2003). Dashed lines indicate hypothesized nodes.

Research Focus

The CCE site proposes to evaluate four hypothesized mechanisms for these kinds of rapid ecosystem transitions:

- *Localized food web changes in response to changes in ocean temperature stratification and nutrient supply*
- *Sustained, irregular alongshore transport of different assemblages of organisms*
- *Changes in cross-shore transport and loss/retention of organisms*
- *Altered predation pressure*

Our site will address these hypotheses with an integrated research program having three primary elements:

(1) **Experimental Process Studies** will initially focus on the hypothesis of localized food web changes in response to changes in water column stratification. Here we will use space as a substitute for time, since many of the temporal changes that are observed in this region have clear spatial analogs. For example, the nitracline depth (depth where nitrate first exceeds 1 μM) deepened dramatically during the 1997-98 El Nino, after which it may have returned to a shallower average depth. At a single point in time we find spatial variations in nitracline depth within our LTER region that encompass these temporal variations. Variations in nitracline depths over this range are associated with changes in composition of the food web's primary producers, in this case tiny unicellular cyanobacteria, which show highest abundances at intermediate nitracline depths (Fig. 2). We will exploit such spatial differences to develop continuous functions that describe growth and loss rates of different members of the plankton assemblage in relation to nitracline depth. These functions will then be used in our coupled bio-physical models to simulate the ecosystem effects of changes in nitracline depth over time.

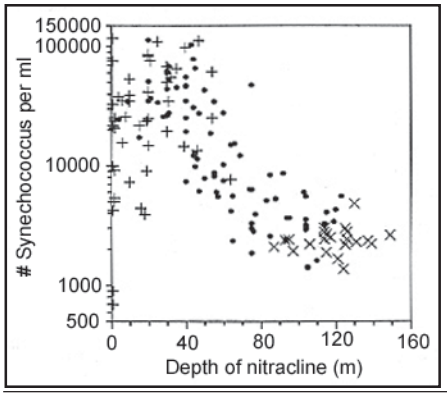

Fig. 2. Nonlinear relationship between the abundance of coccoid cyanobacteria *Synechococcus* sp. and the depth of the nitracline (from Collier and Palenik 2003).

(2) **Time Series Studies** will evaluate our alternative hypotheses, using time series measurements from a variety of CCE LTER research stations (Fig. 3). These measurements will include (a) a quarterly measurement program at sea that will capitalize on and significantly enhance the CalCOFI time series by also assessing the microbial community, dissolved

and particulate organic matter, and iron geochemistry; (b) satellite remote sensing observations, including phytoplankton pigments and sea surface temperature; and (c) frequent temporal measurements at different nearshore locations through collaborations with coastal observing systems. These collaborations include the Santa Barbara coastal (SBC) LTER site, the newly developed SCCOOS (Southern California Coastal Ocean Observing System) program, and our Education and Outreach partner, the Ocean Institute.

(3) **Modeling studies** will be an integral part of this site. Models will be used to help interpret and understand the dynamics underlying observations; to provide a platform for hypothesis testing through numerical experiments; and to provide a means for dynamic interpolation between observations in space and time. Three different types of models will be employed: coupled 4-D, eddy-resolving bio-physical models of the California Current ecosystem based on ROMS (the Regional Ocean Modeling System); nonlinear time series hindcast models; and control volume property flux models. Control volume models will enable us to estimate net fluxes of properties such as heat, salt, nutrients, oxygen and phytoplankton biomass through the 3D box defined by the stations and the coast, by assuming that the convergence of mass into the box created by horizontal currents is balanced by upwelling-related divergence of mass out of the box, and solving for the net flux.

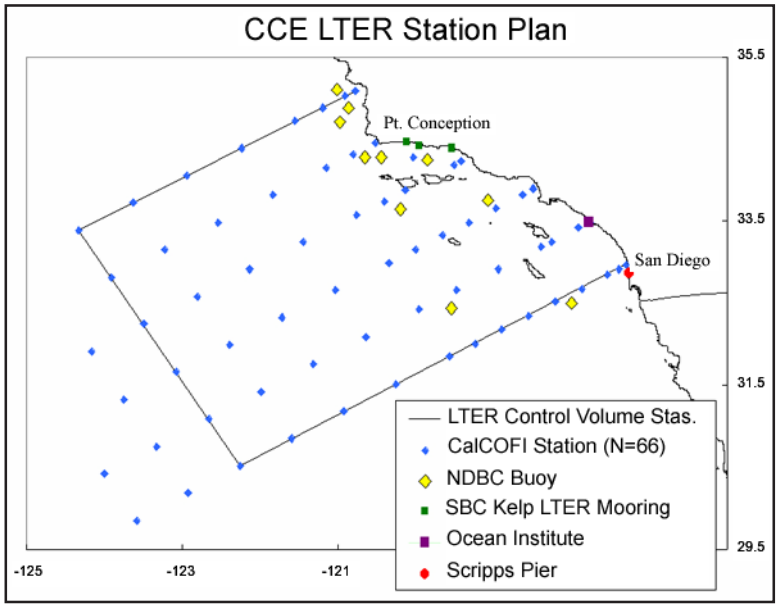

Fig. 3. CCE LTER station plan, including CalCOFI stations, control volume boundaries, NODC buoys, Santa Barbara Coastal kelp moorings, Ocean Institute at Dana Point, and the Scripps pier.

Information and Outreach

In addition we will advance **Information and Data Management** to support data and metadata internally, and facilitate the exchange of research findings with other LTER partners, educators, the general public, and policy makers. Our information system will contain multiple layers for storage, access, and discovery, and act as an interface to users, other systems, and analysis packages. Documentation and data storage will be organized through an electronic hub at the Integrative Oceanography Division (IOD) at the Scripps Institution of Oceanography. Our **Education and Outreach** program will team scientists with California COSEE and three external partners to engage the "K through grey" community in both the *process* and the *understanding* gained from this research. We will train undergraduates, graduate students (in collaboration with a Scripps-based IGERT), and postdoctoral scholars across disciplinary boundaries. Through collaborations with informal science education organizations, we expect to reach many K–12 schoolchildren each year, including local low-income and minority students.

Site Location

The CCE site is in the southern sector of the California Current, which is part of the great clockwise circulation pattern of the North Pacific. Our site extends from the major upwelling site at Point Conception to the U.S.-Mexican border, and from the shoreline approximately 500 km offshore. This region lies between ca. 30-35° N and 117-124° W.

Participants in this site come from the Scripps Institution of Oceanography/U.C. San Diego, the Southwest Fisheries Science Center of NMFS/NOAA, Pacific Fisheries Environmental Laboratory, Duke University, Georgia Institute of Technology, and the Point Reyes Bird Observatory.

The proposed study region is an ideal location for an LTER site for many reasons, including:

- ❖Five decades of climate and ecosystem context provided by CalCOFI
- ❖Inclusion of a biogeographic boundary region, making it an early sentinel of climate change
- ❖Pronounced spatial gradients that represent much of the dynamic range of the entire ocean environment
- ❖Anoxic basins that provide a unique connection to paleoceanographic studies
- ❖An existing physical ocean circulation model of the region that will permit rapid advances in the development of coupled bio-physical models relating to ecosystem transitions.

We look forward to working together actively with colleagues in the LTER network to compare coastal pelagic upwelling ecosystems with other biomes, with respect to the five core research themes of LTER as well as other topical issues.

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Mark D. Ohman
Lead PI, CCE LTER, Scripps Institution of Oceanography, University of California, San Diego

The Moorea Coral Reef (MCR) LTER

New site offers scientists opportunity to study the structure, function, and dynamics of coral reef ecosystems

The newly established Moorea Coral Reef (MCR) LTER site will focus on the coral reefs that surround the south Pacific island of Moorea (17°30'S: 149°50'W). Moorea, located in the Society Islands of French Polynesia, also is home to the University of California's Richard B. Gump South Pacific Research Station (*http://moorea.berkeley.edu*) which will serve as the logistical base for all MCR related field operations.

Photo: R. WILDER

UC Berkeley's Gump Research Station property (lower left), base of field operations for the MCR LTER, looking northeast to the Maharepa Lagoon back reef and reef crest on the north shore of Moorea.

Scientists rank coral reef ecosystems near the top of all ecosystems with respect to annual total gross productivity and biodiversity despite the fact that these systems typically occur in warm, nutrient-poor waters. The large and diverse communities of corals found on coral reefs are fueled by efficient nutrient recycling processes. In turn, stony corals and their photosynthetic zooxanthellae (single-celled algae that live symbiotically within the coral tissue and provide photosynthetic energy to the coral host) serve as the foundation upon which tens of thousands of other species rely. Indeed, more than one third of all species of marine fishes occur in coral reef ecosystems despite constituting far less than one percent of the ocean bottoms.

Because of their complexity, scientists have an incomplete understanding of the multitude of abiotic forcing functions—external variables like temperature, currents, light, etc.—and biotic processes that collectively determine the structure, function, and dynamics of coral reef ecosystems. Global climate change and other perturbations are predicted to cause sweeping changes on coral reefs in the coming decades. A combination of monitoring and experimental studies carried out at a range of spatial scales will be necessary to elucidate the mechanistic basis of change in these systems.

Research Focus

Research at the MCR site will estimate long-term trends and address key gaps in our understanding of these complex ecosystems through long-term observations and experiments supplemented by shorter-term process studies. The goals of MCR LTER are to better understand coral reef processes that drive the functions of this ecosystem, the nature of coral reef animal and algal community structure and diversity, and the factors that determine the abundance and dynamics of related populations. These goals will be met through studies of trophic dynamics, such as the relationships among corals, fishes, and zooplankton; the physiological ecology of corals and their zooxanthellae symbionts; controls of reef productivity and ecological controls; and functional significance of biodiversity.

Two additional research components cut across these themes and will help to integrate and generalize the various research endeavors. These include an explicit focus on physical-biological coupling over multiple scales, and hydrodynamic, food-web, and ecosystem modeling. The understanding derived from the research will allow more accurate predictions of how coral reef ecosystems respond to environmental change, whether human-induced or from natural cycles. It will also serve as a knowledge base to inform government officials, resource managers, and others charged with the conservation and management of coral reefs.

Photo: R. SCHMITT

Sally Holbrook, co-PI of the MCR LTER, and former graduate student Bill Douros, set up an experiment in a lagoon at Moorea, French Polynesia.

Educational training and outreach both will be important components of the MCR site. Moorea will provide training in research and team research experiences for undergraduate and graduate students, as well as engage in post-doctoral training. One goal of the training will be to build linkages between US students and scientists and those in South Pacific and Pacific Rim nations. Outreach activities associated with MCR LTER will include K-12 programs in Southern California as well as community and school outreach in French Polynesia, and an internship program for Tahitian university students.

Photo: R. SCHMITT

An adult orange-fin anemonefish and juvenile three-spot dascyllus on their shared host sea anemone in a lagoon at Moorea, French Polynesia.

The four principal investigators for the award are affiliated with the University of California at Santa Barbara (Russell Schmitt and Sally Holbrook), and California State University at Northridge (Robert Carpenter and Peter Edmunds). In addition, scientists at the University of California at Santa Cruz, Scripps Institution of Oceanography, the University of California at Davis, and the University of Hawaii comprise the interdisciplinary team on the project. Research activities will include field monitoring and process studies, plus laboratory experimentation and modeling by the research team of ecologists, geneticists, physical and biological oceanographers, physiologists, modelers, biogeochemists, and molecular microbial biologists.

Turn to "Moorea", p. 11

Moorea (cont. from p. 10)

Location

Moorea is an ideal locality for an LTER site focused on coral reef ecosystems. All major coral reef types are present, are in good condition, and are highly accessible the year round. The UC Berkeley's Gump Research Station provides an excellent base for field and lab operations, and the station is just a 30-minute ferry ride from the international airport on the island of Tahiti. There are daily non-stop flights to Tahiti from the west coast of the United States, and these flights last only a couple of hours longer than flights to Honolulu.

Moorea is a small volcanic island with an offshore barrier reef that forms shallow, narrow lagoons around the 60 km (40 mile) perimeter of the island. The rich research opportunities afforded by the reefs of Moorea are greatly facilitated by the existence of appropriate infrastructure and the ease with which field research can be conducted. The Gump Research Station has been operated by the University of California and administered by UC Berkeley since the early 1980s. Station facilities include two long-standing laboratory buildings with all the appropriate facilities, plus a third laboratory building containing research labs, a molecular lab, an IT center, and office space, which is nearing completion. In addition, the station has a flow-through sea water system, a dock, launch ramp, a fleet of small boats and vehicles, as well as a Scuba compressor and dive lockers. Station housing includes a dormitory and bungalows.

"We view the Moorea Coral Reef LTER to be the flagship research program of the Station," says Neil Davies, Executive Director of the Gump Research Station, "and we look forward to a long and productive partnership."

"All of us associated with the Moorea Coral Reef LTER are thrilled to be part of the LTER network. It will afford a fantastic opportunity to interact with scientists working in a diverse array of ecosystems, and to conduct comparative studies to seek a more general understanding of the structure and function of natural systems," says Co-PI Peter Edmunds.

For more information about the Moorea Coral Reef LTER please contact Andrew Brooks (brooks@lifesci.ucsb.edu); for more information about the Gump Research Station please contact Neil Davies (ndavies@moorea.berkeley.edu).

Photo: McOWITI O. THOMAS

LTER Education Representatives meeting at Andrews LTER

EdReps Chart Course for LTER Education

LTER education representatives met at Andrews Field Station August 29-31 and held three days of intense, multipurpose discussion. The group held a conference call with Henry Gholz, LTER program officer at NSF, who briefed us on funding, state of the LTER planning grant and other related issues. We spent considerable time at the meeting discussing the role of education representatives in the planning grant and came up with suggestions for the different working groups. Ali Whitmer, a member of the education committee, is a Co-PI in the planning grant, while John Moore volunteered to chair the planning grant Education and Outreach committee.

Photo: McOWITI O. THOMAS

Kari O'Connell, Andrews director taught the Education Representatives a thing or two about old growth forests.

We also discussed strategies to coordinate education activities after my departure from the Network Office. We re-organized the Education Executive Committee to match each member with a specific activity, such as the development of a children's book series, completion of the Education Handbook, and so on. Robert Bohanan agreed to chair the committee for another year, with Monica Elser as co-chair. However, after one year Monica will take over as sole chair. We decided on this structure to keep us in line with the planning grant. The representatives also nominated graduate student Brett McMillan to join the committee.

Photo: McOWITI O. THOMAS

The Education Representatives bid farewell to Sonia Ortega

We devoted a large part of the meeting to working on three NSF Education grant proposals. Earlier this year three groups of education representatives submitted pre-proposals to the NSF Teacher Professional Continuum program. Two of these groups were encouraged to submit full proposals. These

Turn to "Education", p. 12

Education (Cont. from p. 11)

are cross-site proposals that involve 10-12 sites to start with. The idea is to integrate the research questions identified by the Network into education activities (teacher training, curriculum development, and teaching materials).

The Education Handbook, developed solely by education representatives, is almost complete and the new California Current Ecosystem (CCE) site agreed to test it. We also reviewed the Strategic Plan for education and will continue to update it as needed.

Photo: MCOWITI O. THOMAS

The Education Reps formed small groups to work on the LTER education manual

My three-year involvement with LTER went by incredibly fast. It was a wonderful and rewarding experience. I'm very happy to see the education group working together and developing collaborations. It was a pleasure to have contributed to the advancement of LTER education activities and I hope to stay in touch with the group in the future.

Sonia Ortega
NSF/formerly at LNO

Harvard Forest Sets up Summer Institute for Teachers

Harvard Forest (HFR) LTER hosted 20 teachers in a newly created *Ecology Research in the Schoolyard Summer Institute for Teachers*. The institute, which is funded by the National Science Foundation's EdEn Venture and in part by Green Leaf Foundation, got an enthusiastic response from participants. Participating teachers met the Harvard Forest ecologists who developed the research protocols that Schoolyard Coordinator, Pam Snow, adapted for use by elementary and middle school students. Scientists led indoor introduction sessions followed by outdoor sessions in the forest to try out the field projects while teachers asked questions and tried their hands at field research.

The summer institute was created jointly by Harvard Forest, the Millers River Environmental Center (MREC), and the Hitchcock Center for the Environment (HC) as part of a yearlong science teacher professional development project in central Massachusetts.

The teachers spent their afternoons in outdoor and indoor activities modeled for use with K-12 classes. They explored HFR's Fisher Museum and learned forest history from museum coordinator, John O'Keefe.

Photo courtesy of PAMELA SNOW

Dr. David Orwig introduced teachers to the exotic pest, the Hemlock Woolly Adelgid

Photo courtesy of PAMELA SNOW

Dr. John O'Keefe demonstrates to summer school participants protocol procedures for the Leaf Phenology Study

Participating teachers received notebooks containing protocols, data sheets, background information, supplementary activities, related Harvard Forest Research abstracts, and resource lists, and were allowed to select additional materials appropriate for their respective students' academic levels. Later, they formed groups and worked with each other to plan how to adapt HFR's curriculum to meet the needs of their particular students and districts.

The teachers were also assigned forest ecology project "coaches" to support them in training and throughout the school year. Project coaches visit individual teachers at their schools to plan and flag field sites for learning activities, and to help them introduce this exciting new project to their students.

Photo courtesy of PAMELA SNOW

Harvard Forest Schoolyard Coordinator, Pam Snow worked with teachers inventorying plots to compare Hemlock and Hardwood Stands

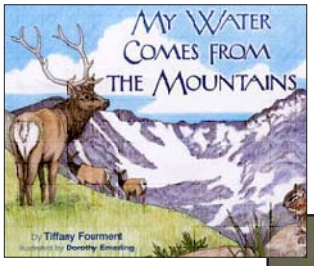
The core group of teachers that were trained this summer and their coaches are set again to gather at Harvard Forest in November 2004 for the first of three academic year seminars to supplement their field ecology training. Topics such as data analysis, assessment, and community outreach will be addressed in more detail during the seminars. By spring 2005 HFR expects to have a model for LTER schoolyard education to share with the rest of the network.

For more information please contact Pamela Snow psnow@fas.harvard.edu with any ideas or questions.

Children's Book Venture

New LTER book teaches ecological literacy to children

Outreach efforts at the Niwot Ridge (NWT) LTER site in Colorado—the only LTER site in an alpine tundra environment—have inspired a children's book about the water cycle. *My Water Comes from the Mountains* explores the ecosystems along Boulder Creek as snowmelt flows through the mountains, becomes the water supply for the City of Boulder, and moves into prairie habitats as the irrigation supply for farmers, plants, and animals.



Cover for *My Water Comes From The Mountains*

The author, Tiffany Fourment, began this project while participating in the Schoolyard LTER program at Niwot Ridge. NSF funding supported production of the book and enabled its distribution to local elementary schools. The Institute of Arctic and Alpine Research (INSTAAR) of the University of Colorado, which oversees the Niwot Ridge site, distributed the book to local elementary schools in May 2004—a requirement of the contract between NWT and the publishers.

Ms. Fourment is an environmental educator who took the course "Alpine Ecology and Experiential Learning" taught at the Niwot Ridge LTER site. The course is held each summer for in-service and pre-service teachers. For three weeks, teachers learn alpine ecology in a field setting, lead field trips of children from local K-8 programs, and create curriculum projects they can use in their own classrooms.

My Water Comes from the Mountains began as Fourment's final project for the alpine ecology course. She completed the material after teaching third grade students about the Boulder watershed the following year. Dorothy Emerling, a well-known children's book illustrator who lives just a few miles from Niwot Ridge, illustrated the text with scenes of animals and habitats found along the creek. She got plenty of help from Ms. Fourment's third graders, who contributed drawings and their impressions of the field site. Roberts Rhinehart signed on as publisher.

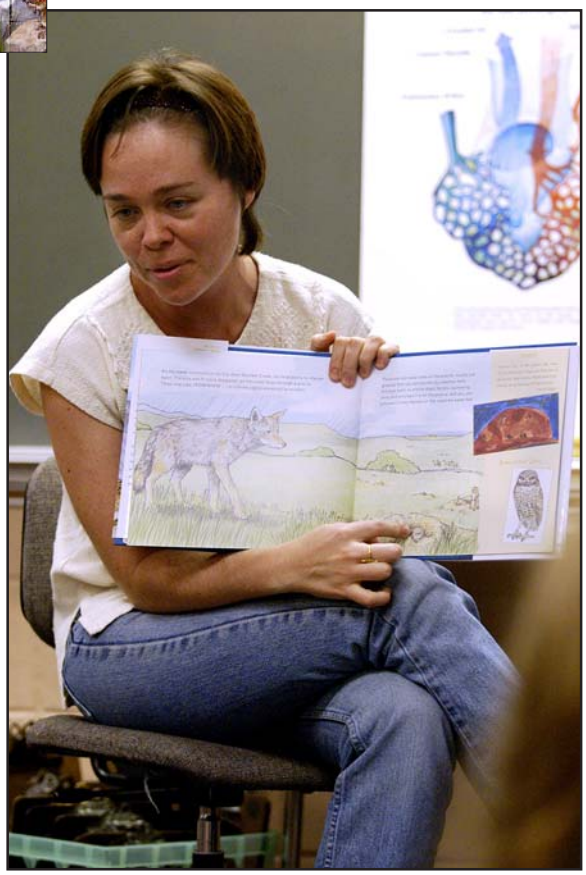


Photo: PATRICK KELLEY

Colorado University grad student Nataly Ascarrunz reads the book *My Water Comes from the Mountains* to a fifth grade class at Fireside Elementary School, Boulder, CO.

Designed for third to fifth grade students, *My Water Comes From The Mountains* is consistent with the science standards for those grades. Its strengths include its focus on the local environment and its integration of material on natural and human-influenced systems. Diane McKnight, the INSTAAR fellow and professor of civil, environmental, and architectural engineering at the University of Colorado who conducts the alpine ecology course, said: "We feel it's important to help local children understand the connection between the lives they lead and the alpine tundra."

The process of preparing the book involved extensive consultation with the City of Boulder Water Department, and it can be used in the classroom in conjunction with materials available through their K-12 outreach program. Graduate students affiliated with INSTAAR distributed classroom sets of the book to every elementary school in the Boulder Valley and St. Vrain Valley school districts. The book will also be sold in bookstores and U.S. National Park stores.

Another children's book, *The Lost Seal,* is already in the works at the Antarctic LTER site. It focuses on the harsh environment of the McMurdo Dry Valleys through a story about researchers, encounter with a live seal in 1992. Currently, the LTER Network (through the efforts of McKnight), NSF, and Roberts Rhinehart, are exploring the possibilities for a series of children's books inspired by LTER work.

Shelly Sommer
Outreach Coordinator, Information Center, Institute of Arctic and Alpine Research (INSTAAR), University of Colorado at Boulder

Michelle Kelleher, BIO/DEB Science Assistant, National Science Foundation (NSF), contributed to this story.

MUCH ADO ABOUT CHILDREN'S BOOKS

LTER sites express interest in publishing books for K-12

According to Phil Robertson (Chair, Education Committee), an informal email survey of the LTER sites shows there is considerable interest in pursuing LTER site-level children's books. The survey shows that at least 10 sites currently have definite interest in publishing a children's book, while two indicated tentative interest. But the process will not be easy, Phil says, as Diane McKnight—who facilitated the publication of Niwot Ridge's *My Water Comes From The Mountains* and is currently working on a similar project for McMurdo—discovered. The process will require concerted effort and coordination to get off the ground. However, Phil says, "The fact that we already have contacts with an established publisher is a huge plus in this intensely competitive market, and we should captitalize on the groundwork already laid by Diane and colleagues."

The activity will also need good resources. In addition to a few thousand dollars paid to the illustrator and author (not counting royalties), Niwot spent $15,000 to purchase copies of their book for local elementary schools—a stipulation in the site's contract with the publisher. Phil suggests that the process might work better if the sites treat it as a network-wide initiative, thus enabling them to join forces to seek external funding for the activity. He suggested further that the LTER executive appoint an *ad hoc* committee, with representatives from the publication and education committees, to take the process through the next steps.

Children's Books and Ecological Studies: Long-Term Processes

My Water Comes From The Mountains has captured LTER imagination and prompted reflection on the many ways sites could get involved in book series projects

The writing and publication of a book is a long-term process that becomes more complex when a book project involves capturing the stories of ecological science in remote sites or the research activities of an LTER site. Superintended by an author with a vision, the book process involves multiple steps such as identifying resources and themes, gathering contacts and materials as well as coordinating staff including photographers, artists, educators, and editors.

Books provide a unique avenue for an LTER site to share elements of ecological research with children and young adults. Participation in the design and production of books for primary and secondary aged readers evolves over an extended time period and may be done in synergy with other programs supporting writers. One example is the opportunity afforded the Palmer LTER Education Outreach Program to work with the Artist's and Writer's Program of the NSF Office of Polar Programs. This program annually selects participants who are deployed to polar regions to experience the environment they have chosen as a project topic. Those deployed to Palmer Station, Antarctica, often interface with Palmer LTER field participants who share their field experiences and provide material about the study of a polar marine ecosystem, local factors such as the warning signs of global change, and life cycles such as of the Adelie penguin. Books such as *Science on Ice: Research in the Antarctic* by Michael Woods (1995) for grade levels 9-12 and *Antarctic Journal* by Meredith Hooper (2000) for grade levels 3-6 have benefited from such interactions.

Palmer Station LTER participants have contributed to other steps of the book production process such as editing on topics related to the Antarctic environment (*Life Under Ice* by Mary Cerullo, 2003) for grade levels 9-12 and creating discussion forms for authors going into the field as with Lucy Bledsoe (*Antarctic Scoop*, 2003; see Fall 2003 Network Newsletter) for grade levels 4-8.

A book author's writing project is often a long-term collaborative process. As Niwot Ridge's and Palmer's experiences illustrate, LTER sites may be able to engage in some of the multiple phases of design and development of books for children and young adults as part of their education outreach programs.

Beth Simmons and *Karen Baker*

PAL LTER

Newfound Grasshopper Takes to the Trees on Konza Prairie

"In the last five years students in our SLTER Fall Grasshopper Inventory have added six species to the Konza Prairie grasshopper list"

—Valerie Wright, Environmental Educator/Naturalist, Konza Prairie LTER.

Grasses typify the Great Plains, so it's not surprising that more than 108 species of grasshoppers are at home on the range in the central United States. However, a grasshopper that doesn't love grass lives in Kansas too, a recent discovery at Kansas State University's Konza Prairie Biological Station shows. This newfound hopper prefers trees.

The first specimen was actually collected in September 2001 by a student from Fort Riley Middle School, according to Valerie Wright, Konza's environmental educator and naturalist. However, it wasn't at first recognized as a new species for the Konza Prairie list, she said. The student collected the insect as part of an ongoing ecological study of grasshopper diversity on Konza called "Schoolyard LTER," a program funded by the National Science Foundation. Every fall elementary, middle school, and high school classes come to Konza to inventory the grasshoppers.

The rare tree-dweller has now been positively identified as the Grizzly Spur-throated Grasshopper. Ted Hopkins, retired K-State entomology professor, longtime grasshopper researcher and Konza Prairie volunteer docent, made the identification. "This appears to be the first recorded sighting of the Grizzly Grasshopper in the Flint Hills region of Kansas," Hopkins said. He discovered two large, dark-colored female hoppers basking in the sun on the stone wall of the old ranch house at Konza in mid-October 2002. Wright, also an entomologist, subsequently collected five males and females from Hackberry tree trunks in October 2003.

Photo: VALERIE WRIGHT

Girls use nets and tins to catch grasshoppers in Konza

Melanoplus punctualatus, the Grizzly Spur-throated Grasshopper, was first identified in the United States in 1862 by an entomologist named Scudder, who specialized in grasshopper identification studies. The Grizzly has preferred eastern hardwood forests and the pine forests of the southeastern region of the country. The species has been reported twice before in Kansas, in Onaga and Oswego, both eastern locations where trees abound. Hopkins verified the specimens in a search of K-State's extensive entomology collection. "Its discovery on Konza is a big surprise," Hopkins said. Plans are to begin in-depth research on the Grizzly's lifecycle and habitat for the first time, just as soon as the insects emerge this summer.

Writing in the Spring 2004 issue of *Tallgrass Gazette*, the newsletter for Konza Prairie docents, Hopkins said: "The Grizzly grasshopper is a rather unique grasshopper that spends most of its life in trees and is seldom observed because of its secretive habits. It occurs in very low numbers, and that makes it more difficult to determine its habitat." He speculates that its potential distribution on Konza will be limited to wooded areas along creeks and to trees around the headquarters and the Hokanson Homestead.

The Grizzly is a relatively large, very slow moving insect, and given its protective coloration—medium-gray speckled with dark dots, sometimes with yellowish and whitish areas— it disappears against the lichen-covered tree bark.

Photo: VALERIE WRIGHT

The Grizzly Hopper, *Melanoplus punctualatus*

Hopkins plans to begin his research observation near the Hackberry trees where the hoppers were last seen. "I'll be watching for tiny first-stage grasshoppers that hatch from the eggs in late spring and I will observe their development to adulthood," he said. Grasshoppers typically go through five molting stages before becoming adults. Later in the fall, he'll try to collect enough adult specimens to determine food source and feeding habits.

Hopkins says though so little is known about this insect, it's likely the Grizzly Spur-throated Grasshopper has been in Kansas "as long as there have been trees."

This story appeared originally in Tallgrass Gazette*, a newsletter of the Konza Environmental Education Program (KEEP) at Konza LTER. The story subsequently was carried by the* Washington Times *courtesy of* United Press International*, which picked it up from a Kansas State University press release. KSU media had seen the story in* Tallgrass Gazette *and issued the release. The story was also carried by* sciencedaily.com.

EDUCATION BRIEFS

Andrews LTER Inspires "lessons in ecology"

In 2003, New York City high school teacher Lyn Neeley worked with LTER scientist Kari O'Connell collecting data on understory vegetation at the Andrews Forest and assisted with wildfire research as part of the NSF-RET program. The winter of 2003-04, Neeley developed a series of PowerPoint presentations based on work by scientists at Andrews and inspired by Jon Luoma's book *The Hidden Forest*. The presentations, entitled *The Andrews Forest: lessons in ecology,* are part of an ecology unit for 9th and 10th graders and fulfill New York standards for the Living Environment Regents examination. The presentations are available to teachers and others on the Andrews website *http://www.fsl.orst.edu/lter/edu/schoolyard/modules/eco.cfm?topnav=78.*

Kari O'Connell
Director, Andrews Experimental Forest

CAP's *Ecology Explorers* Receives University President's Award…

Ecology Explorers, the K-12 education program of CAP LTER, received the 2004 Arizona State University President's Award for Innovation. This award recognizes ASU individual employees or teams for innovations that improve the educational, administrative, or other organizational processes through creative approaches. Check out our website *http://caplter.asu.edu/explorers* with interactive games as well as the new data analysis feature.

Photo: JUSTIN GOERING

Students from Greenfield Elementary School at the City of Phoenix 's Rio Salado Project

… As *Explorers'* Education Team Wins $100,000 Grant

The Ecology Explorers education team of Charlene Saltz and Monica Elser along with Arizona State University colleagues received a $100,000 Nina Mason Pulliam Charitable Grant to develop after-school science clubs in four low-income urban middle schools. The "Service at the Salado" program brings together ASU undergraduate students and middle-school children to develop service projects and conduct CAP LTER protocols relating to the restoration of a section of the Salt River in downtown Phoenix. Supplemental funding to continue this program for an additional semester was obtained through NSF's EdEn Venture Fund. For more information on Service at the Salado go to *http://ces.asu.edu.*

Monica Elser
Education Liaison, CAP-LTER

NEON Design Process Energized

The scientific community's work to create a National Ecological Observatory Network (NEON) began in mid-September 2004. With a two-year, $6 million cooperative agreement between the American Institute of Biological Sciences (AIBS) and the National Science Foundation now in place, the NEON Design Consortium and Project Office will be set up to develop a blueprint for the network and a plan for its implementation. NEON will be the first national ecological observation system designed to address "grand challenge" scientific questions at regional and continental scales and to enable ecological forecasting.

At NEON facilities distributed across the country, scientists from many disciplines will work in teams to improve scientific understanding of several challenging issues, such as the ecological implications of climate change; the relationships among biodiversity, species composition and ecosystem function; the impacts of land use and habitat alteration; the ecology and evolution of infectious diseases; the causes and consequences of invasive species; the ecological implications of biogeochemical cycles; and the effects of hydrological alterations on ecological patterns and processes (i.e., hydroecology). NEON will transform the way ecological research is conducted by bringing ecologists and engineers together with social, computer, and earth scientists to investigate ecological phenomena across large geographical areas and long periods of time (i.e., up to decades), and by creating new collaborative environments across multiple scientific disciplines. The network will also develop and provide unique educational opportunities for students and the general public.

A 10-member Senior Management Team will lead the consortium's suite of committees comprising more than 150 scientists, educators, and engineers in the development of the NEON blueprint and implementation plan. Bruce Hayden, a former director of the Virginia Coast Reserve LTER and Senior Scientist at AIBS, and William Michener, an Associate Director of the LTER Network Office and Senior Scientist at AIBS, will direct the NEON Project Office at AIBS headquarters in Washington, DC. Jeffrey Goldman, AIBS Science Director, will serve as the project manager and will direct day-to-day staff operations.

The NEON design process depends on the engagement of the broad stakeholder community via a series of large meetings that will take place in January, March, and June of 2005. Many LTER scientists and educators will contribute to the design process and opportunities will abound for scientists and educators to contribute ideas and feedback in various ways and to participate in the peer review of NEON design documents. Please visit the NEON web site (*http://www.neoninc.org*) and get involved.

William K. Michener
LTER Network Office and the American Institute of Biological Sciences

Meeting Criterion 2 with *TIEE (Teaching Issues and Experiments in Ecology)* and Your LTER Data

Here is a suggestion for meeting criterion 2 in your next grant proposal. *TIEE* (*Teaching Issues and Experiments in Ecology),* an NSF supported and ESA sponsored website and CD, has a section called "Data Sets" that is perfect for LTER data. As co-editor of *TIEE* I will work with you to get selected Data Sets into the *TIEE* format and with the education sections.

TIEE allows undergraduate and graduate students to work with data in Excel files and learn an ecological concept or idea especially well illustrated at the LTER site. *TIEE*'s foundation is that students who actively engage with data in lecture and lab learn ecological concepts better—and about the process of science. Hundreds of studies based on theories of learning and cognition support this kind of "student active" learning (D'Avanzo 2003 a,b).

To see what I am talking about, go to the Cedar Creek *TIEE* Data Set called *"Effects of Plant Biodiversity on Ecosystem Productivity within a Savannah Grassland Community*" by Joe Fargione and David Tilman (http://TIEE.ecoed.net/vol/v2/toc.html).

The authors include several data sets here: 1) mean plant biomass and standard errors for species richness treatments over seven years (students explore the relationship between species richness and plant productivity); 2) percentage of plots that exceeded the maximum monoculture biomass, allowing a test of the sampling effect hypothesis; and 3) "bonus" data from 168 plots, including the presence/absence of functional groups.

In addition to the Data Sets themselves there are sections called "Overview" (about the research), "Student Instructions" (explains the data), and "Faculty Notes" (suggests ways to use the Data Set in ecology classes.

Actually you don't have to wait until your next proposal to submit a *TIEE* Data Set. I am working with several LTER sites—including Konza, Harvard Forest, and Santa Barbara—for the next volume of *TIEE* (published January 2005).

A final note for grad students and post-docs interested in teaching as well as research: *TIEE* is a peer reviewed ESA publication and will be useful on your vita. In addition, some colleges want you to describe your teaching "philosophy"; you will learn a lot about modern teaching approaches and theory by working on a *TIEE* Data Set.

Snapshot of the TIEE Website (www.tiee.ecoed.net)

If you are interested in meeting criterion 2 via *TIEE* or in submitting a Data Set, please contact me at *cdavanzo@hampshire.edu.* You can also go to the website (*www.tiee.ecoed.net*) and select "submit work" on the homepage. Your effort will be worthwhile—*TIEE* receives thousands of hits weekly and is quickly becoming well known and valued by college and university faculty.

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Land Management (cont. from p. 4)

In response, BLM sought scientific guidance to translate the policies resulting from this renewed interest in ecological questions into practice. The collaboration has resulted in several direct applications of Jornada LTER scientific findings, such as state-and-transition models describing nonlinear vegetation responses to disturbance on particular soils (described in Bestelmeyer et al., 2003; 2004), process-based indicators that allow managers to infer the nature of vegetation change based on snapshot or short-duration monitoring (Pyke et al., 2002), and remote-sensing approaches that link state-and-transition models and indicators as well as simulation models to broad-scale patterns (Peters and Herrick, 2001).

For more information, please contact Jornada researchers, Brandon Bestelmeyer (bbestelm@nmsu.edu), Kris Havstad (khavstad@nmsu.edu), or Jeff Herrick (jherrick@nmsu.edu).

New Outlet For LTER Research Results

The National Biological Information Infrastructure (NBII) is working with several organizations and societies to create an electronic journal related to *Sustainability: Science, Practice, & Policy*. The mission of the journal is to address a wide range of issues related to sustainability by incorporating all social, economic, political, and biological/environmental interactions within the framework of one's specific research. We are trying to bring social scientists and natural scientists to the table (or 'journal,' if you will), and push the discussion beyond that discipline. Authors will use discussions of science, practices, and/or policy to examine ways that can lead to solutions to sustainability problems.

Those who are interested in serving on an Editorial Board and in submitting an essay or editorial should contact ***Amy Forrester*** *(aforrester@CSA.com) or visit our website ejournal.nbii.org.*

Climate Committee Takes Aim at Extreme Climatic Events

Recent activities of the climate committee have focused on a new research initiative to study the effects of extreme climatic events. The Extreme Events Working Group (XEWG) formed as a result of a climate committee-sponsored workshop held at the 2003 All-Scientist's meeting in Seattle. The extreme events project is intended as a follow up to the highly successful Climate Variability Ecosystem Response (CVER) project headed by David Greenland during his tenure as Climate Committee chair. The XEWG project borrows many concepts and ideas from CVER, including a cross-perspective and use of a series of guiding framework questions. However, we hope to enhance the cross-site synthesis component of the project. Ultimately, our goal is to create a "typology" of LTER sites according to their response to various types of climatic extremes. We believe that this initiative will provide insight into how various ecosystems might respond to the changes in type, magnitude, and frequency of extreme climate events that are hypothesized to occur under various global climate change scenarios.

In June, XEWG held a two-day workshop at Portland State University to outline the project and formulate synthesis questions to guide the research. The meeting was attended by Tony Brazel (CAP), Andrew Fountain (MCM), Doug Goodin (KNZ), Julian Hadley (HFR), Glenn Juday (BNZ), Brian Kloeppel (CWT), Alan Knapp (SGS & KNZ), Mark Losleben (NWT), and Melinda Smith (KNZ). Early in the discussion, we realized that we needed to consider both extreme climate events (as drivers) and extreme ecological responses in order to address our research objectives. Much of the workshop was spent defining and refining definitions of these two types of extremes. For climate extremes, we came up with two broad definitional characteristics: 1) extremes exceed some sort of limit in terms of magnitude, duration, and frequency, and 2) extremes are sensitive to the context in which they occur (i.e. the local climate) relative to some predefined time horizon (e.g. 30-500 years). Based on these two characteristics, we agreed on the following definition:

Extreme climatic events are statistically rare in frequency, magnitude, and/or duration for a single climate parameter or combination of parameters for a particular ecosystem. The ability to recognize and categorize extreme events is dependent upon the length of reliable observational records. An extreme climatic event may or may not induce an ecological response.

This definition conforms fairly well to existing definitions, but extends them by explicitly acknowledging the link between climate extremes and ecological responses. The definition also "works" from a climatological, as opposed to a meteorological perspective—which is especially important for us because most of the specific research goals we laid out assumed that we would search LTER and other climate databases for longer-term anomalies.

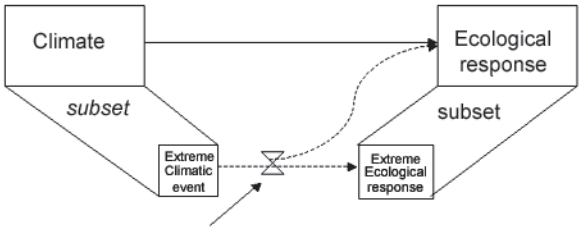


Fig. 1: Guiding framework

Defining an extreme ecological response turned out to be a bit more complicated than defining climatic extremes. We considered a number of definitional concepts, most of which seemed to be framed in terms of ecosystem composition, process, or structure. Like the climatological definition, the definition of ecological response seemed to hinge on the idea of limits, but the complexity of ecological systems and their responses necessitated a more complex consideration of the concept of limits. Thus, extreme ecological effects might exceed limits at single or multiple hierarchical levels. Changes might be transient or persistent, and they may or may not affect the future response of the ecosystem or its components. We also discussed directional change and the reestablishment of baselines. We reached a consensus that new baselines could result from a climatic disturbance, but that baseline change was not required for an ecological response to be considered important or significant. Thus:

A extreme ecological response is a change in ecological attributes that is statistically rare in frequency, magnitude, and/or duration, or a persistent alteration of ecological properties at any level of organization.

We spent the rest of the workshop refining the definitions and devising a set of framework questions to guide the research. We summarized the guiding framework in a diagram proposed by Smith and modified by the group during the discussion (Fig. 1):

Much of our analysis will focus on unearthing the nature of the contextual "switch" that determines whether a system reacts in an extreme or non-extreme manner. Fig. 1 also lists some possible factors in this response. Once it is determined that an extreme response has occurred, we will try to tackle other questions that concern the nature of that response.

Trying to initiate this program at all LTER sites and including all possible climate extremes would be very difficult to pull off, so the group decided to begin with a limited pilot program consisting of just two types of climate extremes—temperature and precipitation—for a selected subset of LTER sites. Currently, we are in the process of gathering data and determining which sites will be part of this pilot project. Our goal is to complete this pilot analysis by next spring. Although members of XEWG are mostly associated with the climate committee, we invite comments, suggestions, and participation from all interested LTER researchers.

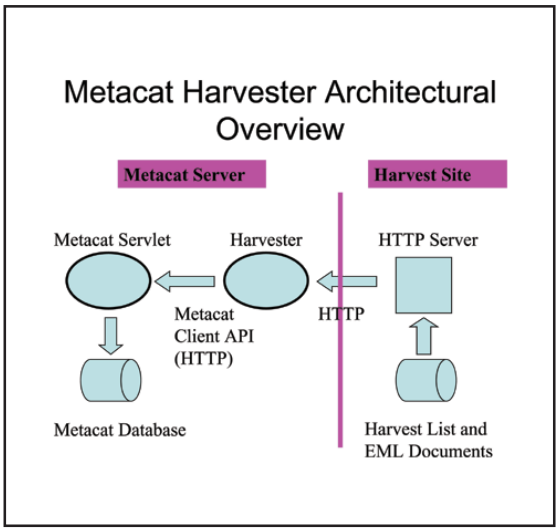
Douglas G. Goodin
Konza LTER and Chair, Climate Committee

INFORMATICS BITS AND BYTES

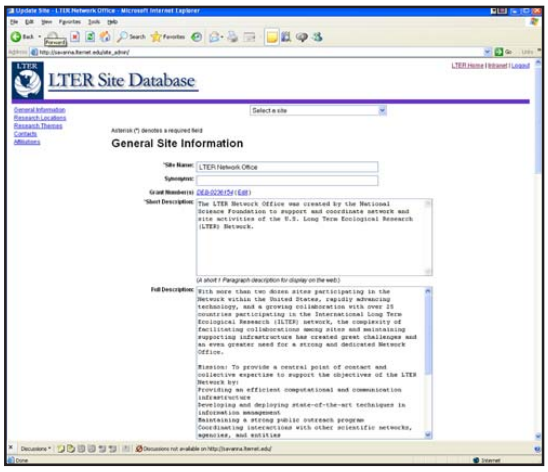
It was an exciting summer for informatics in the LTER Network and here are few highlights...

The LTER Network Office (LNO) has entered into a cooperative agreement with the United States Geological Survey's National Biological Information Infrastructure (**NBII)** to work jointly on a NBII/LTER metadata standards initiative. This effort will initially focus on completing the mapping of the Federal Geographic Data Committee's Biological Data Profile (BDP) to Ecological Metadata Language (EML). LNO will hire a new technical person to help users understand and implement these important standards.

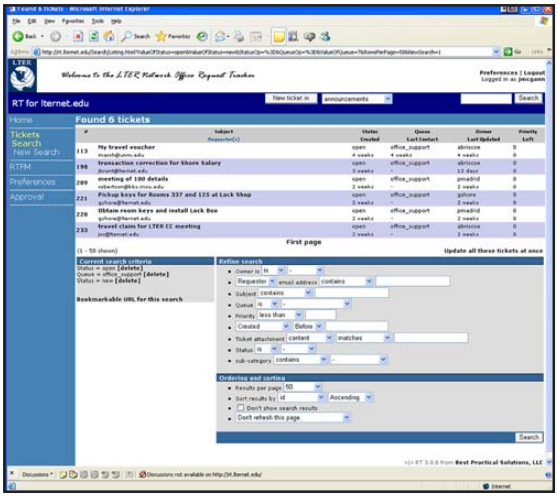
The **EML Harvester** was released October 1 along with the next version of *metacat* (a database for storing EML documents). **Duane Costa**, an LNO Programmer/Analyst, designed and developed the EML harvester as a mechanism for automated one-stop gathering and updating of metadata from each site in the network to a central metadata catalog. So far six sites have metadata harvested into the LTER data catalog.



LNO has upgraded our internal **request tracking** (RT) system to be more responsive to network user requests as called for in the LNO strategic plan. The new system, based on open-source software, was configured by LNO data manager **Michelle Murillo** to match the approved tracking plan. There are now two new addresses for all email requests to the Network Office: *tech_support@LTERnet.edu* for technical issues, and *office_support@LTERnet.edu* for administrative and logistical issues. The requestor will not observe directly the workings of the system, but will receive a minimum of three notices providing feedback information while the request is processed—upon receipt of the request, upon its assignment to an appropriate handler, and upon its completion.



The Intranet **Informatics Projects** page now provides links to database and interface work in progress. This effort, organized by LNO Senior Web Developer **Marshall White** in response to an action item in the Portland Information Managers (IM) meeting agenda, provides an opportunity to observe and comment on projects in progress at *http://intranet.lternet.edu/projects/informatics*. One of those projects, the **site characteristics database**, went live on September 1 when data from the database was used to populate the new site web page format *(http://www.lternet.edu/sites/)* implemented by LNO web designer, **Jeanine McGann**.



In addition to giving sites the ability to control information about their sites on the network web site, the database also enables cataloging of an expandable variety of research location types and themes.

James Brunt
Associate Director for Information Management, LNO

For more information read *DataBits*, the Information Managers' magazine, online at *http://lternet.edu/*

International LTER News

China Establishes Committee for Long-Term Ecological Research

The Committee for Long-Term Ecological Research was formally established in Beijing, China on June 11, 2004. Prof. Zhao Shidong, who serves as chair of the East Asia and Pacific Regional Network of ILTER, was elected chair of the committee. Prof. Zhao, a member of the Institute of Geographical Sciences and Natural Resources Research (IGSNRR) of the Chinese Academy of Sciences, will be assisted by five vice chairs and 37 ecological scientists who are members of the committee. Their term will last four years.

A total of 80 participants attended the launch, including managers and scientists from the Ecological Society of China, the Chinese Academy of Forestry, the State Forestry Administration, the Chinese Academy of Agriculture, the China Meteorological Administration, the Chinese Academy of Sciences, and the East China Normal University, among other participants.

During the ceremony, academician Jiang Youxu of the Chinese Academy of Forestry gave a keynote presentation on the mission of ecology in 21st century while Prof. Zhao focused on the progress of international long-term ecological research. Members discussed the committee's role and reached consensus on the work plans for 2004 and the next four years.

Prof. Zhao Shidong

According to Prof. Zhao, CLTER is a cross-agency academic organization specializing in long-term ecological research at the national level and the first of its kind in the world. It aims to enhance the academic exchange and cooperation in long-term ecological research domestically and internationally, and contribute to sustainable development in China.

The Committee will operate under the auspices of the Ecological Society of China and has a secretariat at IGSNRR. For more information, please contact Mr. Lai Pengfei, A11 Datun Road, Chaoyang District, Beijing 100101, China. phone + 86 10 64889438, fax + 86 10 64868962, e-mail *laipf@cern.ac.cn.*

Lai Pengfei
The Secretariat, The Committee for Long Term Ecological Research, the Ecological Society of China, Beijing, China

Photo: LAI PENGFEI

Participants at the launch of the Committee for Long-Term Ecological Research in Beijing, China

Highlights from the 2004 International LTER Meeting in Brazil

ILTER 2004 Coordinating Committee meeting took place July 7-9, 2004 in Manaus, Amazonia, Brazil. Of 30 Member Networks, 12 were represented at the meeting.

Eun-Shik Kim of the Korean network proposed an ILTER symposium at the August 2005 INTECOL (the International Society for Ecology) meeting in Montreal, to be held in conjunction with the Ecological Society of America annual meeting. The theme of the meeting is "Ecology at Multiple Scales." For more information about INTECOL see the website: *www.intecol.net.*

Július Oszlányi, representative from the Slovak Republic, presented information on the ALTER-NET project, which has been funded by the EU for five years, including •750,000 for new proposals. See *http://www.alter-net.info/* for more information.

Evandrino Barros gave a presentation on a digital library system constructed for data exchange within the Brazilian ILTER Network. The digital library is based on open technologies for database and web distribution. The library is based on metadata which itself is based on standard Ecological Metadata Language, which is XML based and used by the larger ecological community as a standard. His presentation is available on the meeting Web site (see address below).

Frances Li of the U.S. National Science Foundation (NSF) gave a background on the current status of U.S. funding for the International LTER Network. Li says the NSF envisions a network in which responsibility and initiative is more widely distributed. This vision was discussed at the 2003 LTER All Scientists meeting (Seattle, Washington, U.S.A.). The goal is to have the ILTER Network become more autonomous with a diversity of funding sources and more active participation by more of the member countries in data management activities, workshops, and international collaborative research. Funding for the newly established U.S. LTER International Committee has been approved for a period of two years. This funding includes a coordinator for the ILTER Network. The current two-year period is seen as a transition while the ILTER Network develops a plan for sustainable funding and staffing of the ILTER coordinator function.

At the meeting, the ILTER Coordinating Committee worked to revise the ILTER policy document, including the ILTER bylaws, to prepare them for a vote for adoption by the Committee. The wording was very difficult and generated much discussion. There was not a quorum present for a vote, and the bylaws will be open for further discussion and final vote. The current version of the ILTER policy document, including the ILTER vision, mission, goals, and bylaws is available on the ILTER website at *www.ilternet.edu.*

Manuel Maass presented plans for the 2005 Coordinating Committee Meeting. The meeting is now planned for Colima, Mexico at the end of October. The University of Colima has agreed to help host the meeting, located on the Pacific Coast of Mexico.

For complete meeting notes, representatives' presentations, contact information for attendees, and photos, see *http://www.ilternet.edu/meetings/*.

Publications

Recent publications from the LTER Community

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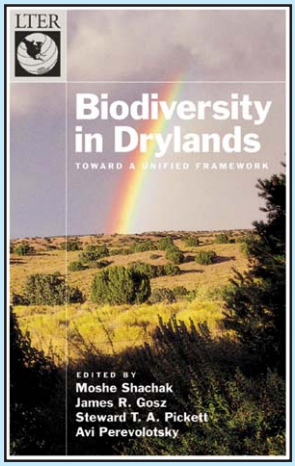
Publications of Special Interest



Biodiversity in Drylands (edited by M. Shachak, J. R. Gosz, S.T.A. Pickett, and A. Perevolotsky), the latest volume in the LTER series, is now available for order from Oxford University Press.

"Learning to roll with the punches: Adaptive experimentation in human-dominated systems," a collaborative paper by several LTER scientists, appears in the November 2004 issue of the ESA journal *Frontiers in Ecology and the Environment*.

The paper is a product of the workshop on the same topic held at the 2003 All Scientists Meeting in Seattle, WA. CAP LTER postdocs William Cook and David Casagrande, along with field project manager Diane Hope, Peter Groffman (BES), and Scott Collins (SEV) tackled the thorny issue of how to incorporate humans into manipulative ecological experiments.

Adaptive experimentation modifies the traditional reductionist approach by incorporating realistic system complexity and involving *in situ* human subjects. Experiments are devised with the expectation that hypotheses, as well as the experimental treatments themselves, may be modified in mid-course, using the behavior and feedback of the human subjects. However, unlike adaptive management, adaptive experimentation incorporates most of the formal aspects of classic experimental design (e.g. independence of study units, use of replicates, and controls). In the paper, the approach is explained using a real example – that of the residential landscaping experiment (or 'suburbosphere') currently being established at CAP LTER, to answer the question "How does landscape type affect a number of key ecosystem processes in a residential urban environment?" This involves the installation of four experimental landscape 'treatments' at 24 virtually identical rental homes on Arizona State University's East campus. The landscapes are designed to recreate the prevailing residential yard styles and methods of water delivery most typical of the Phoenix metro area. Each landscape type will be replicated at six homes and arranged in mini-neighborhoods around an adjacent common area, with an additional six homes and common area being monitored as a control. Monitored variables will include water use, microclimate, insect and bird diversity and abundance, soil chemistry and trace gas fluxes, along with the perceptions and behaviors of the residents living on the experiment.

"**Forests in Time: The Environmental Consequences of 1,000 Years of Change in New England**" by David R. Foster and John D. Aber, editors. 2004. New Haven, Connecticut: Yale University Press. Cloth, $45. ISBN: 0-300-09235-0. 496 pages.

The book has been reviewed in several publications, notably *BioScience* Vol. 54 No. 10 of October 2004 and *Ecological Restoration* Vol. 22 No. 3 of September 2004.

According to *BioScience*, "*Forests in Time* discuss the period of New England's human settlement (first by Native Americans and then by Europeans), the physical environment (soils, topography, and climate), and natural disturbance factors (wind and fire)."

Ecological Restoration stated: "*Forests in Time*…is really a landmark achievement that brings together a series of important, interdisciplinary studies about the interactive effects of natural and human disturbances on contemporary and future forest composition, structure, and processes."

Gus Shaver (ARC) and John Magnuson (NTL) were quoted in feature articles in the September 2004 issue of ***National Geographic*** magazine. There were several articles in the issue on global climate change and various LTER sites and LTER data sets were important in providing hard evidence of changes in long-term trends.

For more information please visit the webiste: *http://magma.nationalgeographic.com/ngm/0409/features.html*

Peters, D.P.C, Pielke, R.A. Sr., Bestelmeyer B.T., Allen, C.D., Munson-McGee, S., Havstad, K.M. 2004. *Cross scale interactions, nonlinearities, and forecasting catastrophic events.* Proceedings, National Academy Sciences (in press).

Calendar

Coming Events of Interest to the LTER Community

2004

NOVEMBER

November 5: NEON/Rocky Mountain Ecological Observatory meeting, Colorado State University, Fort Collins, CO.

November 1–6: Annual All-Hands Meeting, KU Union, Biodiversity Research Center & Dole Institute of Politics, University of Kansas, Lawrence, KS.

November 9–12: LTER Planning Project Meeting, Cape Canaveral, FL.

DECEMBER

December 13–17: SEEK Biodiversity and Ecological Analysis and Modeling (BEAM) meeting, University of New Mexico, Albuquerque, NM.

2005

JANUARY

January 7–8: Sevilleta Annual Meeting, University of New Mexico, Albuquerque, NM.

January 3–7: Training workshop in ecoinformatics and relevant information technologies for new faculty and postdoctoral associates, University of New Mexico, Albuquerque, NM.

January 14: Shortgrass Steppe Symposium, Colorado State University, Fort Collins, CO.

January 15–16: Luquillo Annual Meeting.

January 17–28: LTER Planning Project Meeting for Working, Governance, and Education groups (venues to be decided).

FEBRUARY

February 11–12: GCE-LTER annual meeting, Georgia Center, University of Georgia, Athens, GA.

MARCH

March 2005: NSF-LTER Symposium, "*Long-term Research in the Marine Environment*," NSF Headquarters, Arlington, VA.

March 29–31: LTER Planning Project Meeting (venue to be decided).

APRIL

April 5–7: CC Meeting, Florida Coastal Everglades (FCE) LTER, Key Largo, FL.

April 13–17: LTER Student Collaborative Research Symposium, Andrews Experimental Forest, Blue River, OR.

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