LTER
Network News
Newsletter of the Long–Term Ecological Research Network
Vol. 19 No. 2 Fall 2006

LTER 2006 Annual Scientists Meeting rated the best ever

Participants at the 6th All Scientists Meeting (ASM) of the LTER Network that was held September 20-24, 2006, at the YMCA of the Rockies in Estes Park, CO, have described the meeting as "a huge success" and "one of the best ever" in terms of organization and coordination. More than 700 scientists and students from across the United States and their international colleagues attended the four day meeting, whose official theme was "The next 25 years of LTER: Contributions to understanding ecological change."

Photo: McOwiti O. Thomas

Members of the LTER Executive Board meeting at ASM: **L** to **R**—Mark Ohman (CCE), Chuck Hopkinson (PIE), Sherri Johnson (AND), Morgan Grove (BES), John Magnuson (Chair), Don Henshaw (AND—IM representative), Berry Lyons (MCM), Deb Peters (JRN), Scott Collins (SEV), Bob Waide (LNO-exoficial), Dan Reed (SBC). Not in the photo—Peter Groffman (HBR), Philip Robertson (Chair-elect).

Attendees singled out the LTER Network Office which, under the stewardship of Bob Waide, organized and oversaw the meeting, for particular praise, noting that the meeting's organization had been superb.

Following the successful conclusion of the ASM, the Science Council (SC) asked John Magnuson (interim chair of the SC) to draft a resolution of appreciation to the organizers of the meeting. The resolution stated: "The LTER Science Council commends Bob Waide and the staff of the Network Office for the many contributions to this excellent All Scientists Meeting. Thank you all for your enthusiasm and diverse talents."

According to Dr. Waide, the ASM represents one of the LTER Network's most effective mechanisms to promote team building for cross-site research and synthesis. The three- to four-day meetings focus the LTER scientific community on new challenges, result in the formation of new research collaborations, help integrate new sites and scientists into the LTER community, and provide the only opportunity for community-wide discussions of the future of the LTER program. "In contrast to a typical professional conference, an All Scientists Meeting focuses less on the presentation of individual research results and more on brainstorming, discussion, and synthesis of results across different ecosystems," Waide observed. Moreover, "All Scientists Meetings present excellent opportunities to share expertise, to transfer technology among sites, and to generate new scientific concepts, approaches, and experiments. They are, in short, the 'town hall meeting' for the LTER research community."

See "ASM," p. 3

LTER site acronyms: AND=H.J. Andrews; ARC=Arctic; BES=Baltimore Ecosystem Study; BNZ=Bonanza Creek; CAP=Central Arizona–Phoenix; CCE=California Current Ecosystem; CDR=Cedar Creek; CWT=Coweeta; FCE=Florida Coastal Everglades; GCE=Georgia Coastal Ecosystem; HFR=Harvard Forest; HBR=Hubbard Brook; JRN=Jornada Basin; KBS=Kellogg Biological Station; KNZ=Konza; LNO=LTER Network Office; LUQ=Luquillo; MCM=McMurdo Dry Valleys; MCR=Moorea Coral Reef; NWT=Niwot Ridge; NTL=North Temperate Lakes; PAL=Palmer Station; PIE=Plum Island Ecosystem; SBC=Santa Barbara Coastal; SEV=Sevilleta; SGS=Shortgrass Steppe; VCR=Virginia Coast Reserve.

In This Issue

The Network News

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Please contact the
LTER Network Office
with your questions, comments,
ideas, and requests for copies:
LTER Network Office
University of New Mexico
505.277.2534

This issue of the
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was edited, designed and produced by
McOwiti O. Thomas
tmcowiti@lternet.edu
and
editorial assistance provided by
Jeanine McGann
jmcgann@lternet.edu

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The LNO year in review

The LTER Network Office (LNO) had an extraordinarily busy year, caused in part by the triennial All Scientists Meeting in Estes Park (see lead story) and the myriad activities associated with the LTER planning project. The involvement of LNO staff in the many emerging national research networks also kept us hopping. I mention a few of the high points below.

Members of the Network Office staff participated in multiple aspects of the LTER planning activity. I worked with the Science Task Force to plan and implement various stages of the planning process. I also was a member of the Governance Team that successfully devised revisions to the governance of the LTER Network. As members of the LTER Cyberinfrastructure (CI) Core team, John Vande Castle and James Brunt worked on the development of the LTER CI strategic plan. Mark Servilla of the LNO also contributed to this document.

The LNO acquired $80,000 through a proposal to NSF which, combined with $50,000 already available, provided funds to facilitate the further development of scientific ideas and collaborations arising from the ASM. Results from the review of proposals are not yet available, but we anticipate funding approximately 20 proposals.

Staff of the LNO facilitated 66 meetings, working groups, and trainings involving 1503 individuals. These meetings focused on research, education, administration, and planning for the LTER Network. In particular, the LNO supported the LTER Planning Grant by providing logistical assistance for a wide variety of planning grant meetings.

With changes in LTER governance and the need for more frequent interaction between LTER scientists, the LNO, in collaboration with Office of Research and Media Technology Services at the University of New Mexico, acquired, tested, and deployed a Polycom MGC-50+ video-teleconferencing bridge that can host multiple simultaneous meetings up to a maximum of 48 endpoint connections.

Interactions with outside experts brought in for the CI planning activities resulted in the implementation of LTER data searches directly through the Oak Ridge National Laboratory Distributed Active Archive Center's (ORNL DAAC) "Mercury"-based search system. More information on this can be found in the ORNL Newsletter at http://www-eosdis.ornl.gov/news/lter_mercury_news.html.

Photo: Jeanine McGann

LNO Systems Analyst David Farris at the console of the Polycom Bridge.

Major advances have been made this year in the design and development of the Network Information System. A framework to support ecological synthesis has been developed by the Network Information Systems (NIS) team building on successful deployment of ecological metadata language (EML), the Metacat repository, and the Metacat Harvester. This framework, code-named PASTA, is efficient because it builds on existing investments and experiences, integrative because it adopts standard interfaces and approaches, and innovative because it incorporates data provenance and data quality into the design. Deployment and operation of the Metadata/Data Catalog has resulted in the registration of nearly 25,000 metadata documents, over 5,500 of which are from the LTER Network. The Metacat Harvester automatically harvests EML documents from 22 of 26 LTER Network sites. We have submitted proposals this year to the NSF Biological Databases and Informatics (BDI) program and OCI-SDCI to continue this work.

Finally, the LTER Executive Board has approved my request for a series of short research sabbaticals. After nine years as Executive Director of the LNO, these breaks will allow me to reconnect with LTER site research and refresh my intellectual curiosity. The first of these breaks will take place from December 1, 2006 until the end of February 2007. During my absence, James Brunt will be acting Executive Director.

By Bob Waide, Executive Director, LNO

ASM (continued from p. 1)

Contributing to the overall success of the meeting was, without doubt, the general setting and ambience of Estes Park, a venue that had been used for two previous successful ASMs. Located 8000 feet above sea level in the picturesque Colorado Rockies, the town is famous for its breathtaking scenery, snow capped mountain peaks, and cool, crisp air.

The YMCA management provided both accommodation and meals, further contributing to the smooth running of the meeting since participants did not waste time searching for restaurants. This left many participants with ample time and opportunity to go hiking and mountain climbing in between, before or after the various plenary, committee, or work group sessions.

Within the YMCA grounds participants routinely shared footpaths with the abundant but fairly tame wildlife, which roamed the lawns and could be spotted grazing outside the cabins. Sometimes the extremely close encounters between the human species and their animal counterparts, notably the elk, was equally exciting as it was unsettling—like when one passed within inches of and looked into the eyes of a bull elk guarding his harem of cows.

However, the small town of Estes Park was only a few minutes away and a few participants found their way to the local dancing halls on one or two occasions.

The meeting proper was a combination of plenary sessions, working groups, committee meetings, mixers, and poster displays. Discussions ranged from topics such as the importance of long-term research in understanding ecological and social change, the ecosystem responses to atmospheric pollutants in and around cities, to the rapid decline in sea ice off the west Antarctic Peninsula and the geochemical evidence of increasing permafrost thaw in the Arctic.

The program included three plenary sessions that were addressed by Pamela Matson of Stanford University ("Integrative approaches to the study and management of human-environment systems"), Steve Carpenter of the North Temperate Lakes LTER ("Ecology for transformation"), and Ed Barbier of the University of Wyoming ("In the long run we are all dead: economics, history and long-term ecological change"); presentations on the origin, development and future of the LTER Network (Paul Risser, University of Oklahoma; Dick Marzolf, USGS retired; Caroline Bledsoe, UC Davis; and John Magnuson, University of Wisconsin); as well as addresses by representatives of the National Science Foundation (James Collins, the National Science Foundation's Assistant Director for Biological Sciences; Thomas Baerwald, a program officer for social, behavioral and economic sciences; Henry Gholz, the LTER program officer at NSF; and former LTER chair, James Gosz, who currently advises the EPSCOR program at NSF).

The plenary speakers, from top left: F. Risser (U. of Oklahoma), T. Baerwald (NSF), J. Gosz (NSF), D. Childers (FCE), D. Marzolf (USGS retired), E. Barbier (U. of Wyoming), C. Bledsoe (UC Davis), S. Collins (SEV), J. Magnuson (U. of Wisconsin), B. Benson (NTL), P. Matson (Stanford U), S. Carpenter (NTL), A. Whitmer (SBC), and H. Ducklow (PAL).

Other presentations included opportunities for network-scale analyses that are emerging from the TRENDS in long-term ecological research project (led by Debra Peters, Jornada Basin LTER), a full day devoted to Research Planning and briefing on the accomplishments and future directions of the ongoing LTER strategic planning process (Scott Collins), and about 50 other working groups—including the Information Management committee and International LTER meetings and the LTER graduate student symposium.

After each plenary session, participants were free to attend any of a number of work groups or LTER standing committee meetings that ran concurrently.

The poster sessions and mixers were held together in the evenings, with the exception of the Information Managers (IM) and International LTER mixers. This format proved very popular, resulting in standing room only in the halls.

Among other interesting things was a trivia quiz, which was won by Stacie Kageyama (AND) and a photo contest, whose various categories were won by Amy Chiuchiolo (MCM—Scenery), Suzanne Remillard (AND—Wildlife, non-elk); Carl Bowser (NTL—Elk); Hongyu Guo, Amy Kunza, Alana Lynes, and Sylvia Schaefer (GCE—Silly photos); Carl Bowser (LTER Scientists); Andrew Corbin (KBS—Posters); McOwiti Thomas (LNO—Workgroups); and Daniel Hernandez (CDR)—honorable mention). You can view the winning photos at *http://www.lternet.edu/asm/2006/photo_win.html*.

Reports from the various committee and work groups can be found online on the ASM webpage *http://www.lternet.edu/asm/2006/reports/*.

By McOwiti O. Thomas, LNO

Rapid network evolution prompts changes to LTER governance

Governance is not a topic that most people think about often. For more than a year, however, it was the subject of the Governance Working Group (GWG), a diverse team of LTER and non-LTER researchers brought together to study this critical issue as part of LTER Planning Grant activities. The goal of the planning effort is to create a framework to increase the scale and scope of activity needed to address the ecological "Grand Challenges" identified by LTER (Collins, 2004).

The GWG was asked to consider modifications to the LTER Network's organizational structure to promote synthetic inter-site research, to foster interaction with other research networks, and to accommodate the growth of the Network. Ultimately, the GWG proposed that the LTER Network bylaws be significantly revised. After some lively discussion at the LTER Coordinating Committee (CC) meeting in May 2006, a new version of the bylaws was voted on and approved by the Committee. The changes went into effect soon afterward. This article describes the factors that led to the revision in the LTER Network governance structure, the considerations behind these changes, and the relevance of the new bylaws to members of the LTER Network.

Governance is a process through which a group makes decisions that direct their collective activity (www.iog.ca). The formal elements of this system, such as constitutions and bylaws, define how the process is supposed to function. In reality, the informal practices or unwritten codes of conduct are equally important in determining how governance works. The LTER Network has had a governance structure since it was formed in 1980. At the first meeting of the six initial LTER sites, the members established a Steering Committee, elected officers, and formed committees that preceded several standing committees that are still in existence today (Magnuson et al., 2006).

Throughout its history, the governance of the LTER Network has been marked by democracy rather than hierarchy and by informality rather than formality. The democratic structure is evident in the fact that during most of its existence the Network's major decision-making body has been a committee comprised of the Principal Investigator from each LTER site.

Photo: Karen Baker

Members of the Governance Working Group (GWG)—***Back row, l to r***: Robert B. Waide (LNO), Lawrence Weider (University of Oklahoma/OBFS), Peter Groffman (BES/HBR), Karen Baker (CCE/PAL), Dan Childers (FCE). ***Front row, l to r***: Chelsea Crenshaw (SEV), Ann Zimmerman (University of Michigan), Katherine Lawrence (University of Michigan), John Magnuson (NTL).

The Network's decision-making process was not codified into a set of written bylaws until 23 years after the Network was formed. In its democracy and informality, the LTER very much fits the definition of a network, which the organizational literature defines as a relationship between independent entities that coordinate their work through informal social systems rather than bureaucratic processes (Barringer & Harrison, 2000; Jones et al., 1997). This history was a major consideration as the GWG pondered changes to the Network's organizational structure.

By October 2004, when the LTER Planning Grant officially started, the LTER had grown to 26 sites, more than 1,800 scientists and students, and a Network Office. In light of this growth and of the goals of the planning effort, the leaders of the Planning Grant asked the GWG to consider two questions:

- Is the LTER Network as it is presently constituted well-governed given the scope of present and known future activities?
- Will the present governance structure of the LTER Network accommodate new sites, collaborations with non-LTER sites, and resources that might result from the planning grant?

After much discussion and research, the GWG concluded that the answer to both questions was "no" for two key reasons. First, the increase in the size and complexity of the LTER Network, though a sign of its success, affected the Network's ability to function efficiently and effectively. The organizational literature shows that this phenomenon is common as the number of sites in a network grow.

See "Bylaws," p. 5

Bylaws (continued from p. 4)

In particular, it was difficult for the CC, a group of 26 individuals, to meet frequently and to make decisions quickly. The Network structure included an Executive Committee (EC), a group of six individuals elected from among the sites, but their decision-making power was limited. The EC primarily prepared action items and issues for discussion and made recommendations to the CC, which made the decisions. Second, the strength of the Network lies in its science. Under the previous structure, the CC's time to engage in discussion about research direction, to set future courses of action, and to implement a higher level of research collaboration, synthesis, and integration was limited. The GWG felt that the intellectual capital of the Network leadership was being spent on management activities that could be handled by a smaller group.

In several face-to-face and teleconference meetings, the GWG drafted a new set of bylaws. These changes were guided by principles of good governance (Graham et al., 2003) and by the need for:

- ♦ greater inclusiveness of sites in Network governance
- ♦ adequate time for envisioning the future of LTER science
- ♦ smaller decision-making group
- ♦ clear expectation of participants in the governance process
- ♦ continuous supply of Network leaders and new ideas

In March 2006, a draft was presented to members of the EC for comment. On May 18, 2006 the CC approved most of the proposed changes and unanimously voted to accept a new version of the LTER Network bylaws. To read the full text of the new bylaws and a table summarizing the major changes between the previous and new version of the bylaws, please read the online edition of this newsletter (*www.lternet.edu/news*).

Main components of the LTER Network governance structure

Science Council

Role and authority: The scientific direction and vision of the LTER Network is established by the Science Council. The Science Council reserves ultimate authority for decisions affecting the Network and may address issues that arise from the Executive Board, the Network Office, or the participating LTER sites.
Composition: The Science Council is composed of a Chairperson, a Chair-Elect (as needed), the Chair of each Network-wide and Targeted Standing Committee, the Executive Director of the Network Office, and the Principal Investigator and an additional participant from each LTER site.

Executive Board

Role and authority: The Science Council grants the Executive Board the power to make rules or regulations for the Network's management; to create, evaluate, and dissolve committees; and to fill vacancies in and change membership of committees. All members of the Executive Board are charged to act on behalf of and are accountable to the membership of the LTER Network.

Composition: The Executive Board is composed of the elected Chair of the Science Council, 9 members selected by individual sites on a rotating basis; an Information Manager; the Executive Director of the Network Office; and, as needed, a Chair-Elect.

Officers and Duties

The *Chair* is elected by the voting members of the Science Council. The Chair presides at all meetings of the Science Council and Executive Board. Along with the Executive Board, the Chair generally oversees and supervises the governance of the LTER Network. The Chair facilitates communication to the Network sites regarding decisions of the Executive Board; provides a receptive ear for any Network member who wishes to raise an issue of concern; and serves as or appoints liaisons to NSF, other agencies, etc. The term of office for the Chair is 2 years. The Chair may stand for re-election for one consecutive 2-year term.

In the absence of the Chair, the Chair-Elect exercises all powers and duties of the Chair. The Chair-Elect serves for 1-year prior to assuming office as Chair.

What do the new bylaws mean for members of the LTER Network? First, they offer more opportunities than ever for individuals to participate in governance. Second, they make clear the responsibilities of those charged with the governance of the Network. These obligations include responding to input from Network members and ensuring good flow of information and effective communication of ideas within the Network. It is up to each person in LTER to participate in the governance process, whether it is to provide information, to hold Network representatives accountable for fulfilling their responsibilities, or to serve on the Science Council, Executive Board, or a committee.

Organizations, like species, continually evolve. The LTER Network's new organizational structure reflects significant changes in governance that were necessary for the big steps the Network has embarked on as part of the planning process. They will certainly not be the last changes to Network governance. The newly formed Science Council and Executive Board have been operating under the revised bylaws since May 2006. They are learning what is working and what may need to be refined or changed. Further, the outcome of the planning process may lead the Network to evaluate its governance structure once again in the not too distant future.

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By Ann Zimmerman, University of Michigan

LTER planning process

An update

The LTER Network planning process has been underway for over three years now, starting in earnest at the 2003 LTER All Scientists Meeting (ASM). The purpose of this effort is to: (1) generate a compelling scientific framework for socio-ecological research, Integrated Science for Society and the Environment (ISSE), developed and endorsed by the scientific community to serve as a cross-directorate budget initiative at NSF and perhaps other agencies, (2) develop a research proposal for a new, comprehensive research program built around a set of core questions that is long-term, multi-site, and cross-disciplinary, and (3) stimulate development of synthetic proposals for existing funding opportunities. These activities require the Network to develop a strategic analysis and synthesis of our existing capabilities and achievements to date and, in the process, develop a plan of action for a one-of-a-kind Network-level science program that is truly long-term, multi-site and interdisciplinary.

In August 2006, representatives from all 26 LTER sites and two additional programs met in Albuquerque, NM, in what was dubbed the "Program Representatives" meeting to begin the process of cross-site integration for Network-level science. At this meeting, the representatives began to "operationalize" the general research framework around the core question: How do climate change and variability, altered biogeochemical cycles, and altered biotic structure affect ecosystem services and human outcomes, and how do human outcomes and responses feed back to affect ecosystem processes and drivers?

The 2006 ASM in September included a plenary session on the planning process along with a series of open workshops that produced many new ideas that will be considered in the development of the comprehensive research program. Sites have been developing research ideas under the general framework and will be asked to produce short descriptions of proposed research by late January. These descriptions will provide the necessary input into the comprehensive research plan. Also during the ASM we began to transfer the development and management of the new research program from the Science Task Force and the planning grant PI's to the new LTER Science Council (SC). The SC voted to create a writing team that will work with the program representatives and the SC to develop a research proposal to request funding for the envisaged integrated, multi-site, long-term research program. We are aiming to have a relatively complete draft of this proposal by late summer 2007.

In October 2006, the Science Task Force (STF) comprising Scott Collins (SEV), Barbara Benson (NTL), Dan Childers (FCE), and Ali Whitmer (SBC), along with John Magnuson (Interim Chair, SC), Ted Gragson (CWT), Morgan Grove (BES) and Bob Waide (Executive Director, LNO), met with the STF Advisory Committee (chaired by Jerry Melillo) at NSF to get feedback on our progress to date and advice on our initiative and proposal writing plans. In addition, the STF and others had an opportunity to brief staff in the Geological Sciences, Biological Sciences and Social, Behavioral and Economic Sciences Directorates, and the Office of Polar Programs about the ISSE initiative and our plans to develop a proposal for a Network-level comprehensive research program. As a result of the positive reception the ISSE received from NSF staff, the Foundation has requested additional briefings for several additional Directorates and Offices, which we hope to do in November 2006. Feedback from these briefings and from potential sponsors (such as scientific societies) is being used to revise and improve the ISSE. Our goal is to produce and submit to NSF what we hope will be the final version of the ISSE by early December 2006.

We envision that the outcome of the ISSE initiative will be a new funding opportunity and an enhanced cyberinfrastructure for environmental research designed to meet the socio-ecological challenges that exist today.

By Scott Collins, Barbara Benson, Dan Childers, and Ali Whitmer

LTER Planning Grant Science Task Force

News briefs

Vande Castle appointed Executive Director of CREATE

In August 2006 John Vande Castle took on a half-time appointment as Executive Director for the Center for Rapid Environmental Assessment and Terrain Evaluation (CREATE) at the University of New Mexico. For CREATE, John will focus on activities of the Center beyond the current funding cycles. He retains a half-time commitment as Associate Director for Technology at the LTER Network Office. This joint appointment is meant to provide close interaction between the remote sensing activities of CREATE and the LTER program, particularly regarding the direct use of data from environmental satellites by LTER sites.

CREATE acquires near real-time remotely sensed data from environmental satellites for rapid assessment of changing environmental conditions. The Center's processing lab is housed at the UNM High Performance Computing Center and its satellite receiving station has two data antennas, currently receiving MODIS data from NASA's Aqua and Terra Satellites, and data from NOAA's polar-orbiting environmental satellites (POES). The Center will also be used as an educational tool to train the next generation of environmental remote sensing scientists for work in a range of environmental fields. More information can be found at *http://www.unm.edu/create*.

-John Vande Castle, LNO

Mark Losleben retires from NWT

Mark Losleben

After 26 years as the climatologist for INSTAAR, the Mountain Research Station, and Niwot Ridge LTER (NWT), Mark Losleben is moving on towards bigger and better things. Mark has accepted a position as the executive director of the new National Phenology Network (NPN).

Mark has outlasted almost everyone on the Ridge except Nel Caine. Most of us that are involved with the MRS and NWT LTER thought we would be long gone while Mark still clambered up Niwot Ridge on a daily basis.

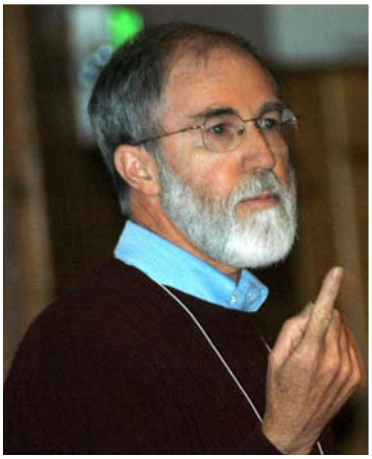
Mark tentatively starts his new position on 1 January 2007. We wish him the best of luck. Mark leaves some awfully big shoes to fill.

-Mark Williams, NWT

Updates from the National Science Foundation

NSF at the LTER All-Scientists Meeting

NSF was well represented at the ASM in Estes Park, CO, this September, with seventeen staff attending from across the Foundation – Biological Sciences (BIO), Geosciences (GEO), Office of Polar Programs (OPP), Social, Behavioral & Economic Sciences (SBE), and the Office of International Science & Engineering (OISE). NSF representatives were involved in numerous presentations and discussions, including a plenary session talk by Dr. James Collins, Assistant Director of Biological Sciences, on "Origin, Development and Future of the LTER Network."



The NSF was well represented at ASM 2006 by, among others (clockwise from top left): James Collins (giving a plenary talk), Henry Gholz and Phil Taylor at the graduate student symposium, and Cheryl Dybas, seen here with Oxford University Press' Peter Prescott at a poster session (Photos: McOwiti O. Thomas).

LTER site renewals

During spring 2006, proposals from 10 LTER sites were reviewed for renewal of funding. Each of these sites—Bonanza Creek (BNZ), Cedar Creek (CDR), Florida Coastal Everglades (FCE), Jornada Basin (JRN), Georgia Coastal Ecosystem (GCE), Harvard Forest (HFR), Luquillo (LUQ), Virginia Coastal Reserve (VCR), Santa Barbara Coastal (SBC), and Sevilleta (SEV)—will be renewed in 2007.

Preparations for the 2007 LTER site reviews

Next year, 11 LTER sites will undergo midterm site reviews. A renewal team, consisting of five independent, external reviewers will visit each site and conduct the review. The reviews will begin in April at the Baltimore Ecosystem Study (BES), continue throughout the year with Kellogg Biological Station (KBS), Hubbard Brook (HBR), Niwot Ridge (NWT), Bonanza Creek (BNZ), Arctic (ARC), Moorea Coral Reef (MCR), California Current Ecosystem (CCE), Central Arizona – Phoenix (CAP), and Plum Island Estuary (PIE), and end in January 2008 with McMurdo Dry Valleys. Currently, NSF is working to recruit the renewal teams.

Recent briefings by LTER Science Task Force at NSF

On October 25-26, 2006, members of the LTER Science Task Force (Scott Collins, Barbara Benson, Dan Childers, and Ali Whitmer) met with representatives from NSF to brief them and discuss developments in the LTER decadal strategic planning process. The Science Task Force (STF) held open briefings with Biological Sciences (BIO), Geosciences (GEO), Office of Polar Programs (OPP), Social, Behavioral, and Economic Sciences (SBE), and the Working Group on Environmental Observing Networks. The Advisory Committee for the STF met concurrently and provided additional feedback to both NSF and the STF regarding their plans. The STF and NSF will continue these discussions throughout the year, including at the LTER Mini-Symposium at NSF on March 8th, 2007, where the discussion themes will be highlighted.

By Jessica R. Corman, Science Assistant, NSF-BIO

Antarctic researchers mull climate change at CSU meeting

A day after the LTER All Scientists Meeting in Estes Park, CO, 25 Antarctic marine and terrestrial ecosystem scientists met at the Natural Resource Ecology Laboratory at Colorado State University (Fort Collins) to share site overviews and discuss issues of mutual interest. The two participating LTER sites, McMurdo Dry Valleys (MCM) and Palmer Station (PAL), are supported by the NSF Office of Polar Programs in coordination with the Division of Environmental Biology and funding for the workshop was provided by NSF-OPP (ANT-0535545). The meeting was organized by lead investigators Berry Lyons and Hugh Ducklow, coordinated by new MCM Principal Investigator (PI) Andrew Fountain and hosted by Sanjay Advani of CSU and Diana Wall, an MCM PI.

The McMurdo Dry Valleys comprise a terrestrial site on the Antarctic Continent, while Palmer Station is a marine site located off the Western Antarctic Peninsula. Located nearly 2,500 miles apart on opposite sides of Antarctica, they present a unique opportunity for comparative Antarctic studies. The Antarctic sites share the challenges and opportunities of conducting field programs in a remote and harsh high-latitude arena. They also represent extremes in the spectrum of environments studied by the LTER network and are crucial in understanding regions where life exists at environmental extremes. Research conducted at both sites has demonstrated the sensitivity of polar region ecosystems to climate change.

According to Diana, this first meeting was important because it will stimulate future collaborations between researchers from the two LTER sites on how climate changes influence Antarctic marine and land ecosystems.

The meeting's focus was how Antarctic ocean and terrestrial ecosystems are responding to global changes. Discussions about ecosystem processes and the distribution of soil, fauna and flora included summaries about effects of marine inputs on soil communities in the Dry Valleys and the extent of sea ice on penguin populations.

At this first meeting, researchers compared research agendas for their field seasons, reviewed recent discussions with the French 'Zone-Atelier' project, and previewed the upcoming International Polar Year, which begins in 2007. Shared themes of interest include abrupt ecosystem transformations in a changing polar climate, state changes in a polar environment, ecological impacts of changing ice conditions in polar environments, and detection of polar amplification in ecosystem structure and function. Although access is difficult, both remote sites recognize tourism as an important outreach mechanism.

Both sites have logistics supported by NSF-OPP and Raytheon Polar Services, but because of the distance between the two sites and differences in logistics in deploying from New Zealand and Chile, interactions between the researchers have been limited during field seasons that run from November to March. The meeting provided a venue for the sites to explore how to exchange personnel and initiate comparative field studies as well as cross-site synthesis of existing results.

The scientists interest in cross-site synthesis was piqued by the discovery of certain periods of climate change, such as 1990-2000, when PAL was becoming warmer and MCM was becoming colder, while in the period after 2000, abrupt weather anomalies saw PAL experience unusual southerly winds, heavy snows, and extensive sea ice while MCM experienced floods.

Furthermore, MCM and PAL work in what some have called our first international park: Antarctica, a continent without a government, is recognized as an important scientific laboratory. The continent is subject to an international treaty that has been the focus of study by political scientist Tom Cioppa (MCM and Brookdale Community College). Tom's work is seen as another element of cross-site interest as political ramifications and human ramifications on high-latitude environments are considered across the Antarctic continent.

The meeting served not only to initiate both scientific discussions between the sites, but also to further planning in terms of network events. The next LTER science council meeting, which is scheduled for 17-19 May 2007 in Portland, Oregon, will be hosted jointly by MCM and PAL, and will provide further opportunity to highlight Antarctic science within the context of the LTER.

By Karen Baker, MCM/CCE

Photo: Karen Baker

Antarctic investigators associated with MCM and PAL LTER meeting at CSU.

Teachers learning from Hubbard Brook science

The Hubbard Brook Research Foundation (HBRF), a nonprofit organization that supports the research work at the Hubbard Brook Experimental Forest, site of the Hubbard Brook LTER site, is expanding its offerings to secondary school teachers and developing ongoing relationships with area schools to bring ecosystem science to New Hampshire students. As a result, more teachers came to the forest this year as participants in several professional development courses that highlight the value of this LTER site for education.

Photo: Jenna Guarino

Photo: Esther Cowles

Top: Teachers design and run an acid rain experiment during a workshop sponsored by the New Hampshire Science Teachers Association and Hubbard Brook. ***Left***: Teachers learn forestry techniques at Hubbard Brook as part of the professional development series called A Forest for Every Classroom.

The most comprehensive program we offer teachers is a year-long series of professional development experiences called *A Forest for Every Classroom*. The program began in May 2006 and will culminate with a session in February 2007 when the 10 participating teachers will present the forest studies curricula they developed during the program.

At our first workshop in May, Nick Rodenhouse, an HBR researcher and ornithologist from Wellesley College, presented his forest songbird research to the teachers. Similarly, Lindsey Rustad, a forest ecologist with the USDA Forest Service, made a presentation on global warming during our August institute. Our hope is that such interactions between Hubbard Brook scientists and teachers contribute to meaningful learning for the teachers, fuel their passion for teaching, and promote their growth as educators. They, in turn, transfer the ecosystem science concepts and experiences they have learned to their students.

In October, the New Hampshire Science Teachers' Association invited us to offer a half-day teacher workshop focused on Hubbard Brook science as a way to profile Hubbard Brook as a rich resource for the state's schools. We are also co-creating a course with Plymouth State University for pre-service teachers called *Ecosystem Science for Educators* that focuses on acid rain research and monitoring. Plymouth will offer the course during its "winterim" term in January 2007. Hubbard Brook scientists Kevin McGuire and John Campbell will help teach the fieldwork portion of the class. Each course participant will develop a lesson plan to teach as a guest educator in the classroom of a practicing teacher, who will serve as a mentor to the teacher-in-training.

Increasingly, Hubbard Brook is used in focused ways to contribute to the professional development of secondary school teachers in New Hampshire. Our goal is to work through these teachers to teach students how to use ecological knowledge to make informed decisions that promote a sustainable future.

By Jenna Guarino, Director of Education, Hubbard Brook Research Foundation

The YMCA of the Rockies was an excellent
Meeting, which was a highly integrated mix o
group meetings, pleasure for those who en
dancing on the last evening of the meeting. Th
the spirit of the meeting.

***1.** The Trends group; **2.** Participants learned interviewed Fred Risser for the LTER oral his ticipants were proud to wear the ILTER t-shirts, junior along; **6.** 'Business' went on even at the James Collins, Penny Firth, Tom Baerwald, Ch listened keenly to plenary speakers; **8.** A herd of **9.** Loretta Thompson and The Heritage Band pro **10.** Duane Costa went hiking in the mountains; **11** was well attended; **12.** Art McKee enjoyed the b and Valli Rivera stepped to the beat of Scottish a workgroup session; **15.** A section of the audie A group photo of participants at the 2006 LTER*

venue for the 2006 LTER Annual Scientists of business in the form of plenary and work- joy the outdoors, and a little bit of Scottish he following pictorial is an attempt to capture

Scottish dancing; **3.** Patty Bonito story project; **4.** International par- ; **5.** Brandon Bestelmeyer brought dining table; **7.** Participants (**l** to **r**: eryl Dybas, and John Magnuson) elk grazing on the YMCA grounds; vided the music for eager dancers; **1.** The graduate student symposium reaththtaking views; **13.** Bob Waide music; **14.** Another well attended ence during a plenary session; **16.** ASM .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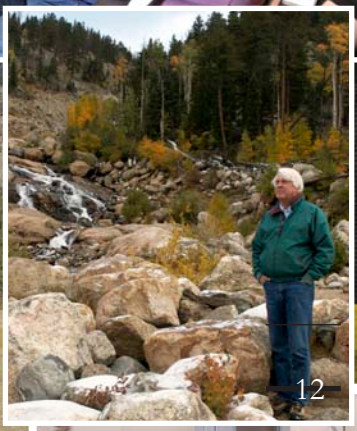
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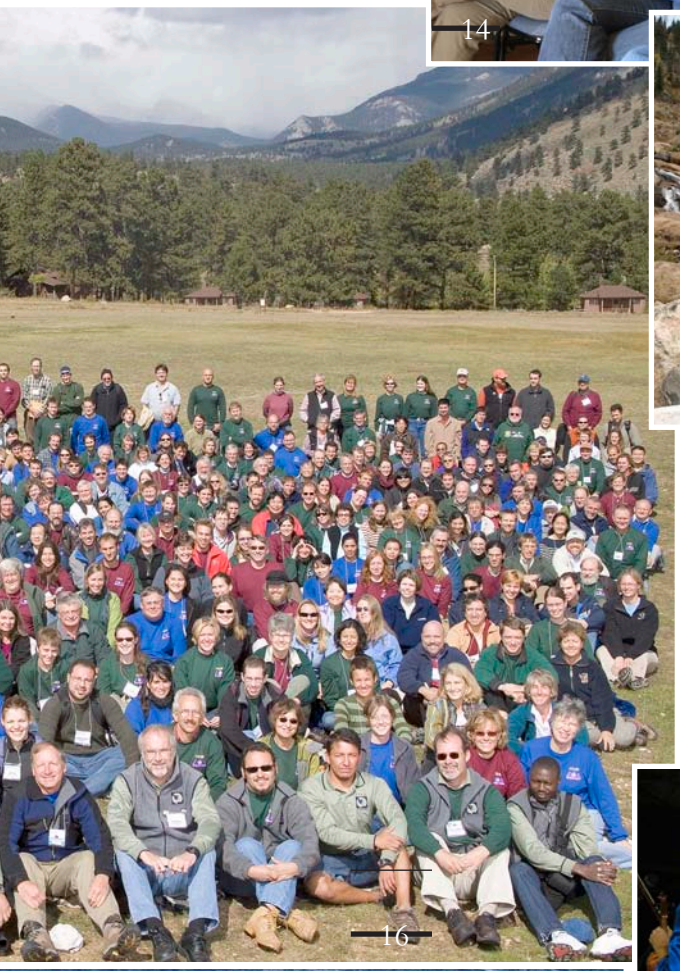
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Photo Credits: McOwiti O. Thomas (1, 2, 3, 4, 5, 9, 11, 13, 14, and 15), Carl Bowser (6, 7, and 12), Mark Servilla (10), and John Magnuson (8).

Binoculars, bats and benefits of Community Service Learning

Valley View Science Club visits Rio Salado

The 30 middle school students from Valley View's after school Science Club anxiously file off the bus at Rio Salado, Phoenix's recently restored riparian habitat. Two Phoenix park rangers are waiting to meet the children before they walk through the park, but getting them to quiet down to listen to the rangers is a challenging task. Aged between eight and 11 years, the children are quick to ask questions and, as the rangers pass out binoculars for them to use, they begin to ask about what they might see in the park. The rangers patiently answer their questions and remind them of the park rules, such as staying on the trails so they don't damage the plant life, and picking up trash after them and putting it in the trash bins that the science club from the previous year painted and donated as their community project. Once their curiosities are satisfied, the children are ready to get started on the park trail.

As the group makes its way toward the water, a student up ahead yells for the others to hurry up: "It's a bat!" With that declaration, the rest of the students scramble up the trail to catch up. And sure enough, hanging upside down on the branch of a small tree apparently taking a late afternoon nap is a bat.

The students crowd around the bat to get as close as possible and begin to take pictures with digital cameras loaned to them by the Service at Salado program, CAP LTER's schoolyard program based at Arizona State University. They stare in awe at this little creature they have previously only seen on television. We are literally inches from the bat and inching closer by the second. Suddenly, one of the students makes a startling noise and the bat's wings fly open. Screams and yells rend the air as we all jump back a foot or two. Thankfully, it seems we haven't disturbed our new friend too much because the bat closes it's wings again and appears to go back to sleep. We decide to back off and continue with our tour of the park hoping to encounter other mini adventures but, ultimately, the bat proves to be the most exciting moment for our group's first visit to Rio Salado.

See "Rio Salado," p. 13

Photo: Nazune Menka

Students from Valley View Elementary's after school Science Club on a visit to Phoenix's Rio Salado project as part of CAP LTER's Service at Salado program. Service at Salado has introduced science and technology as viable career options to a host of middle-school students and shown them the impact of community service.

Rio Salado (continued from p. 12)

This first visit allowed the students to see and experience a restored habitat right in the middle of their community, thus setting the foundation for helping them understand the importance of environmental advocacy, habitat restoration, and water conservation. The Service at Salado program allows four middle schools to hold science clubs, take two trips to Rio Salado, and create a community service project that the students get to showcase at the end of semester celebrations at Phoenix's South Mountain Environmental Education Center.

The park, comprising a five mile stretch of restored habitat, is fairly new to Phoenix, and to the students of Valley View, the program's focus on hands-on, community service oriented learning techniques and associated park visits provides a welcome break from regular classroom learning. The Valley View club is currently creating video public service announcements and environmental education videos that the City of Phoenix can use to publicize Rio Salado. Their videos will also be entered in a digital video contest about Arizona water that is being organized by Arizona State University. The deadline for submissions is March 2007, but the Valley View team intends to submit its entry in early December. Wish us luck!

By Nazune Menka, ASU/CAP LTER

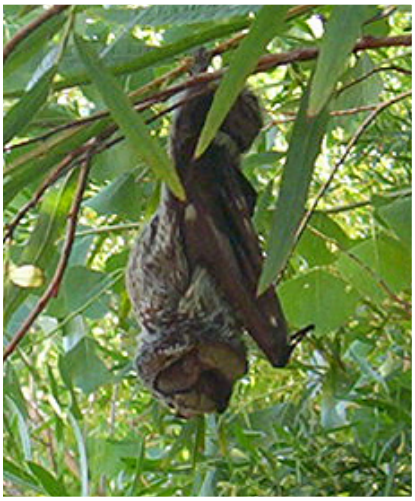

Photo: Nazune Menka

Most of the children had only heard about but never seen a bat, so they were extremely thrilled to see live bats hanging from trees at Rio Salado.

'The Lost Seal' a big hit

***The Lost Seal*, the second book in the LTER Children's Book series, is proving quite a hit with children and adults all over the world. While the first book, *My Water Comes From The Mountains*, and The Lost Seal have both received positive reviews and drawn a lot of attention to LTER, the latter book has particularly been well received.**

Fabiana Silva, a student at the New College of Florida, stopped by to read ***The Lost Seal*** at the LTER Network booth during the 91st ESA meeting August 6-11, 2006, in Memphis, TN. (Photo: McOwiti O. Thomas).

The Lost Seal was recently the subject of a news item that also featured an interview with the author, Diane McKnight, by a CBS News affiliate in Denver, CO (*http://cbs4denver.com/video/?id=25059*). Earlier, Colorado University issued a press release on the Lost Seal (*www.colorado.edu/news/releases/2006/379.html*), which was picked up by the mass media and resulted in several invitations to the author for interviews by a mid-day TV news program, Colorado and Company, and Colorado public radio.

The popularity of the two books were also evident during the 2006 Ecological Society of America meeting in Memphis, TN, and at the SACNAS (Society for the Advancement of Chicanos and Native Americans in Science) annual conference in Tampa, FL, where many people expressed interest in purchasing copies. The huge interest prompted Marshall White, the LTER Network Office's Senior Web Designer, set up a page listing of LTER publications, including the children's books, on Amazon that allowed people to browse and even order or purchase the books.

To guide other colleagues interested in writing children's books based on LTER work, Diane and her team have also produced a DVD titled "Perspectives for Planning the Schoolyard Book Series of NSF's Long Term Ecological Research Network."

For more information about the Children's Book Series, please contact Diane McKnight (*diane.mcknight@colorado.edu*). You may also visit the Lost Seal website at *www.mcmlter.org/lostseal/*

By McOwiti O. Thomas, LNO

Upsetting the balance of nature?

Study finds soil N key to plant response and rising CO_2

Lack of nitrogen may make the earth's terrestrial ecosystems a smaller carbon sink than previously thought. That is because the global nitrogen limitation in terrestrial ecosystems likely results in the earth's vegetation not absorbing as great a share of the rising atmospheric carbon dioxide as some models have predicted, according to a study led by Peter B. Reich at the Cedar Creek LTER site. In April 2006 Reich, a professor in the Department of Forest Resources at the University of Minnesota, and researchers from six universities published a paper, "Nitrogen limitation constrains sustainability of ecosystem response to CO_2," in the journal *Nature* showing how plant communities facing nitrogen (N) supply limitation were also limited in their ability to absorb extra carbon dioxide (CO_2) in an elevated CO_2 environment. Given that a large proportion of the world's soils are nitrogen-limited, the study suggested that the rate of increase in atmospheric CO_2 levels could speed up if nitrogen-limited plants lose their ability to take advantage of the extra CO_2.

The findings derive from an experiment during which researchers planted 16 different perennial grassland species, one, four, nine, or 16 species at a time, in 296 permanent field plots. They exposed the plots to ambient or elevated atmospheric carbon dioxide levels using a free-air CO_2 enrichment technique, and ambient or N-enriched soils. They sampled biomass (both aboveground and roots) in every plot twice a year, and after four to six years, noticed that plots receiving added nitrogen acquired three times as much extra carbon under higher carbon-dioxide conditions than did plots without any additional nitrogen supply. The presence of legumes, capable of converting atmospheric nitrogen gas into biologically usable forms of nitrogen, did not alter the responses of the plant communities. Plants in plots with and without legumes were statistically indistinguishable in their ability to increase their growth in response to elevated CO_2 levels. Nor did it matter whether the plots contained one, four, nine or 16 species of plants. The researchers concluded that soil nitrogen supply (in limiting response to CO_2) was paramount as it occurred across many different kinds of plant communities.

The 6-year study, which is supported by the National Science Foundation's Biocomplexity Program, the U.S. Department of Energy, and LTER, is one of the few long-term research projects looking at how soil nitrogen affects the

See "Nitrogen," p. 15

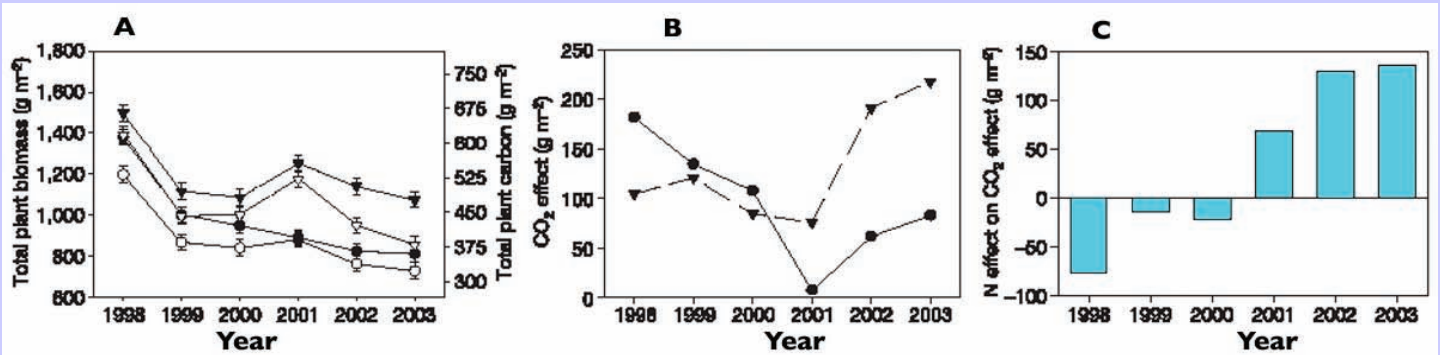

***Figure 1**: Effects of CO_2 and N on total plant biomass over time. **A**:Total plant biomass (above-ground plus 0–20 cm below-ground) and carbon at ambient and elevated CO_2 x N levels from 1998 to 2003. Data were pooled across diversity treatments, and each point shows the annual mean (plus standard error) of 74 plots sampled twice per year. There was a significant interaction (Table 1) between CO_2, N and year ($P = 0.0013$), plus significant main effects ($P < 0.05$) of year, CO_2 and N. Open circles, ambient CO_2 and ambient N; filled circles, elevated CO_2 and ambient N; open triangles, ambient CO_2 and enriched N; filled triangles, elevated CO_2 and enriched N. **B**: The effect of CO_2 on total biomass: the CO_2 enhancement (assessed as (value at elevated CO_2) minus (value at ambient CO_2)) at ambient (circles) and enriched (triangles) N supply each year. **C**: The effect of Navailability on the CO_2 biomass effect, defined as the difference between the CO_2 effect at enriched N and that at ambient N, namely (CO_2 effect at enriched N) minus (CO_2 effect at ambient N).*

Photo: Peter Reich

In CDR LTER's BioCON experiment we grew 296 field plots (each 2m x 2m) containing different numbers and combinations of perennial grassland species under ambient and elevated atmospheric CO2 and with either ambient or enriched soil N supply. In three elevated-CO2 rings, a free-air CO2 enrichment system was used during each growing season to maintain the CO2 concentration at an average of 560 µmol mol^{-1}, a concentration likely to be reached this century. Our results are consistent with the idea that although some models indicate a considerable capacity of land ecosystems to sequester large amounts of C in the coming century, this C accumulation is likely to be constrained over time by N availability.

Nitrogen (continued from p. 14)

abilities of long-lived plants to absorb extra CO_2 in realistic "natural" open-air ecosystems. Only two other long-term experiments in the world have been asking similar questions for more than four years. The study is currently in its 9th field season and the investigators hope to be able to run the study for at least 12-15 years to assess long-term plant-soil feedbacks and the ways in which changing community composition may alter responses to CO_2. A very recent review of all studies of CO_2 x N interaction, published in the *Annual Review of Ecology, Evolution and Systematics* as "Carbon-Nitrogen Interactions in Terrestrial Ecosystems in Response to Rising Atmospheric CO_2" by Reich and colleagues Bruce Hungate and Yiqi Luo, found similar results, including in forests and agricultural crop systems, as in the perennial grasslands at Cedar Creek. Thus reports, including the Intergovernmental Panel on Climate Change's "Climate Change 2001: The Scientific Basis," that predict that terrestrial plants will be a considerable "sink" for excess CO_2 are probably overly optimistic in this regard. Since rising atmospheric CO_2 levels are the largest cause of global "greenhouse" warming, this nitrogen interaction raises the possibility of accelerated global climate change.

References

Reich, PB , SE Hobbie, T Lee, DS Ellsworth, JB West, D Tilman, J Knops, S Naeem, J Trost. 2006. Nitrogen limitation constrains sustainability of ecosystem response to CO_2. Nature 440: 922-925.

Reich, PB, BA Hungate, Y Luo. 2006. Carbon-Nitrogen Interactions in Terrestrial Ecosystems in Response to Rising Atmospheric CO_2. Annual Review of Ecology, Evolution, and Systematics 37: 611-636.

By Peter B. Reich, CDR

LTER advances Ecological Informatics

Most ecologists will agree on the necessity and importance of synthesis to address new ecological questions, yet synthesizing desired data products from a diverse array of complex datasets in a robust and reproducible way is a challenging task. Now, teams of researchers from the Harvard Forest Long-Term Ecological Research site (HFR) and the LTER Network Office (LNO) have advanced the knowledge of designing and building scientifically rigorous on-line information systems that will directly and significantly enhance ecological synthesis.

The LNO team responsible for the design and development of the Network Information System (NIS) has designed and prototyped a data warehouse framework to support ecological synthesis, building on successful deployment of ecological metadata language (EML), the Metacat repository, and Metacat Harvester. This framework, code-named PASTA for Provenance Aware SynThesis Architecture (see Figure 1), is (1) efficient because it builds on existing investments and experiences, (2) integrative because it adopts standard interfaces and approaches, and (3) innovative because it incorporates data provenance and data quality into the design. The PASTA data warehousing architecture has been prototyped against the dynamic part of the Trends project as a case study and demonstrated to scientists on the Trends editorial committee. PASTA has received positive reviews by the Network Information System Advisory Committee (NISAC), members of the Science Environment for Ecological Knowledge (SEEK) development team, the Trends technical committee, and the LTER IM committee. According to Mark Servilla, Lead NIS developer, "The project draws upon current and advanced computing science in the management of data provenance and data quality metrics…. Early prototyping will pay off and accelerate development by giving us material with which to solicit partners and proposals."

While there is much to be done to bring PASTA into production, a major milestone was reached recently in developing and testing the EML Parser/Loader. The EML Parser/Loader, developed in partnership with SEEK and the National Center for Ecological Analysis and Synthesis (NCEAS), reads an EML document and uses the information there to retrieve and load a dataset into a relational database management system. In early tests, datasets from the Georgia Coastal Ecosystem (GCE) LTER site have been successfully extracted, loaded, and queried. The success of the EML Parser/Loader is the next big step in being able to automate part of the synthetic process.

See "Informatics," p. 17)

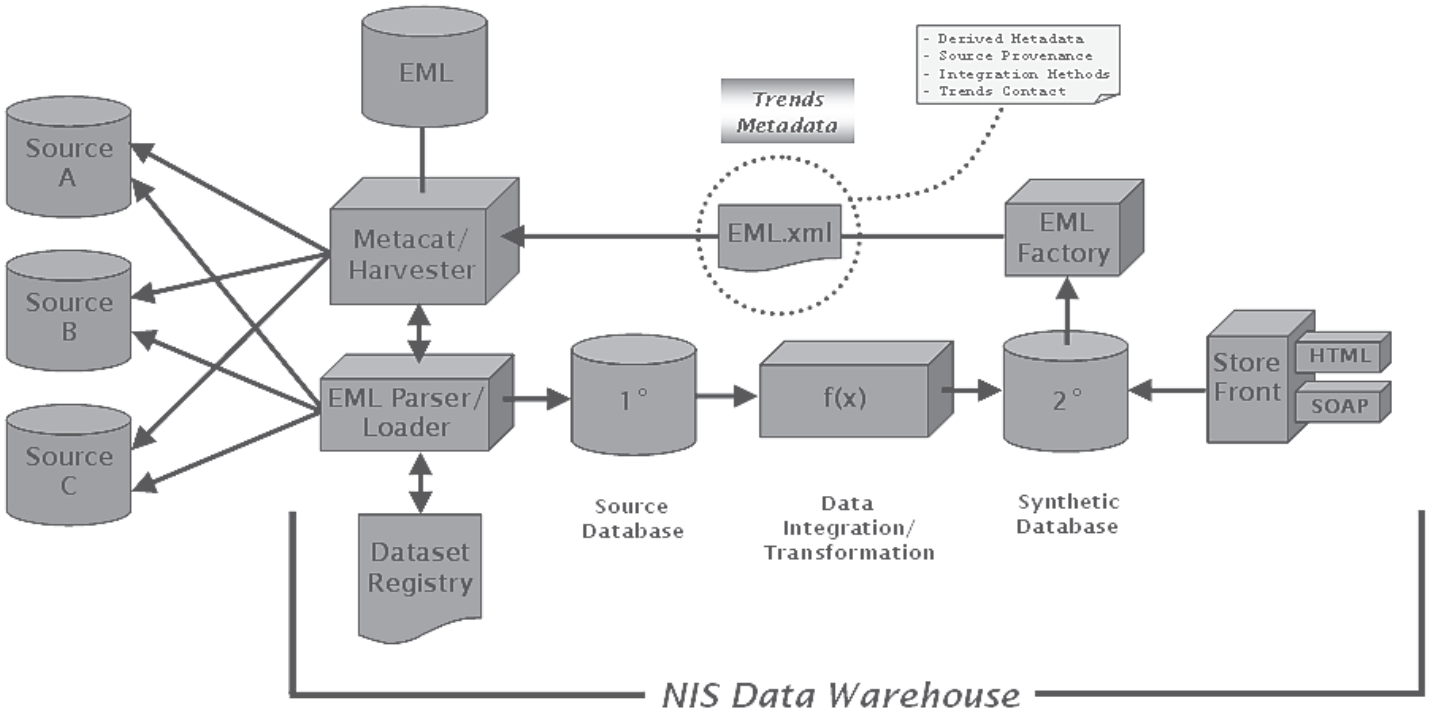

Figure 1 - Provenance Aware SynThesis Architecture (PASTA) diagram

Informatics (continued from p. 16)

One major hurdle in the deployment of PASTA or any architecture that recognizes provenance is defining the mechanism for representing data lineage with complete and precise definitions of the scientific processes that are used to produce scientific datasets. Enter the researchers from Harvard Forest LTER and their partners at the University of Massachusetts. Through a concept called "analytic webs" (first reported as an update to Network News in July, *www.lternet.edu/news/Article98.html*) analytic and synthetic processes can be described accurately through a concordance of directed graphs describing data flow, dataset derivation, and data processes (Figure 2). The precise and formal definitions of these graphs present a promising development in describing data provenance in a robust and reproducible way that can work in harmony with the LTER Network investments in EML. The team comprising A.M. Ellison, L.J. Osterweil, L. Clarke, J.L. Haldley, A. Wise, E. Boose, D.R. Foster, A. Hanson, D. Jensen, P. Kuzeja, E. Riseman, and H. Schultz, whose work was supported by the National Science Foundation, also developed a prototype software tool called SciWalker that is used to create the analytic webs and synthesize the data. The researchers successfully applied analytic webs to the analysis and synthesis of forest carbon-dioxide exchange data from eddy flux towers located at Harvard Forest's Prospect Hill.

These independent developments by researchers in the LTER Network and their partners fit together like the pieces of a puzzle to form a promising picture of the future. Look to this space for continued reporting on advances in Ecological Informatics.

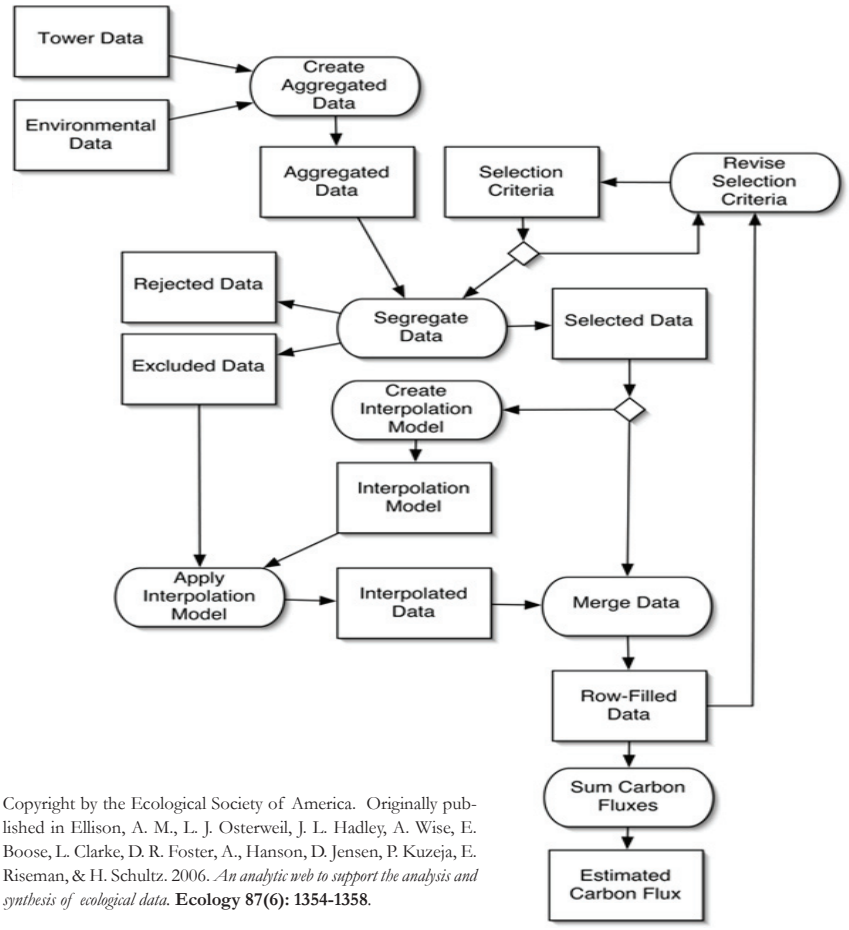

Figure 2 – Data flow graph of the processes used for the analysis of eddy covariance and carbon flux.

Further reading

Ellison, A. M., L.J. Osterweil, L. Clarke, J.L. Haldley, A. Wise, E. Boose, D.R. Foster, A. Hanson, D. Jensen, P. Kuzeja, E. Riseman, and H. Schultz. 2006. Analytic Webs Support the Synthesis of Ecological Data Sets. Ecology, 87(6): 1345-1358.

Servilla, M.S., J.W. Brunt, I Sangil, and D Costa. 2006. Pasta: A Network-level Architecture Design for Generating Synthetic Data Products in the LTER Network. Databits – Fall 2006. Long Term Ecological Research Network.

By James W. Brunt, Associate Director for Information Management, LNO

Don't forget to read *DataBits*, the Information Managers' newsletter, online at *www.lternet.edu*.

On the move

International LTER Coordinating Committee meeting in Namibia develops strategic plans

Photo: Miranda Anderson

ILTER delegation to the Coordinating Committee meeting August 18, 2006 in Gobabeb, Namibia, takes a break from work to pose for a group photo with Namibia's Minister of Environment, Hon. Willem Konjore.

August 2006, Gobabeb Research and Training Center, Namibia: The Coordinating Committee (CC) of the International LTER Network met here against the dramatic backdrop of the confluence of three major ecosystems in southern Africa. Among the major ideas spawned by and among the diverse participants was the novel suggestion to establish an ILTER "stock exchange," in which the market is driven by researchers' needs and the currency is researcher expertise. "This refers to the need to increase the flow of information and experience among the networks that make up the ILTER," says Steve Hamburg, the newly appointed vice-Chair of ILTER. "If everyone barters what they know (e.g. how to run a site, a network, or a specific ecosystem etc.), then the network can maximize the information that is learned and the efficiency of the system and the return on investment."

The meeting was organized by Joh Henschel, Namibia's ILTER representative, with the help of his team at Gobabeb. The meeting's theme, "On the Move: Monitoring Our Variable Environments" set the wheels in motion for the participants. Over five days, ecologists representing six continents and 25 countries hammered out a strategic plan, and ratified clear, quantifiable, and actionable goals and objectives for the next 12 months. Meeting participants developed consensus that adequate cash (not just in-kind contributions) was needed for the survival of the ILTER Network. In particular, members acknowledged the need to raise operational money for the secretariat urgently.

The meeting created three committees—Science and Programs, Fundraising, and Information Management—to oversee various aspects of the Network's operations, elected a Chair (Terry Parr of the United Kingdom's Environmental Change Network), a Vice-Chair (Steve Hamburg, U.S. LTER, appointed by the ILTER Executive Committee), and appointed a treasurer (Jorge Jiminez, Costa Rica LTER Network, elected by the CC). The committees are up and running and showing great progress. The Science and Programs committee (SPC), which is chaired by Patrick Bourgeron of the U.S. LTER, has identified three short-term initiatives to create a strong ILTER science brand, and will draft a science agenda within a few months.

A full day of science presentations provided a platform for participants to discuss successful programs and plan collaborations. Meeting delegates responded enthusiastically to the formation of the Information Management committee. The committee has two representatives from each ILTER region, with Kristin Vanderbilt (U.S. LTER), Avinash Chuntharpursat (South Africa), and Cristiana Cocciufa (Italy) accepting the challenge to become the inaugural chair, vice-chair, and secretary respectfully.

See "ILTER," p. 19

Photo: Laura Sadovnikoff

Namibia's Minister of Environment, Hon. Willem Konjore shaking hands with Hen-biau King. On the left is Joh Henschel, the Namibian ILTER delegate responsible for hosting the conference.

ILTER (continued from p. 18)

"We quickly realized that one of our major challenges is to assess the different metadata management systems used throughout the ILTER and develop a strategy for converging on a common approach," says Vanderbilt, the information manager for the Sevilleta LTER in New Mexico, USA. Toward this goal, the committee organized a working group that met at the LTER All Scientists Meeting in September 2006 to address the issue. "The meeting in Namibia was really a catalyst," Kristen says, "making everyone present realize that the ILTER has matured and needs coordinated information management in order to address new network-wide research projects. It was gratifying to see so much support for information management within the ILTER!"

Photo: Johan Pauw

The ILTER leadership, l to r: Steve Hamburg (USA),Vice-Chair, Hen biau King (TERN), Chair, and Terry Parr (UKECN), Chair Elect.

A draft report of the discussions at the Gobabeb meeting, including the strategic plan that was ratified with only minor modifications, includes a full endorsement of the operation plan for the next five years, the implementation criteria, and a timeline for the next 12 months with respect to the establishment of the secretariat, development of substantive network-level science and products, and fund raising for both the secretariat and the science projects. Governance and legalities, as well as membership criteria, rights, and responsibilities rounded out the products of this fruitful meeting.

Agendas, abstracts, and more are available on the meeting website, *http://www.ilternet.edu/meetings/*.

By Steven Hamburg and Patrick Bourgeron, ILTER

Education News *Extra*

SBC LTER launches Watershed Education program with partners

The Watershed Education program at the University of California Santa Barbara (UCSB) exemplifies the power of partnerships to connect current science research with hands-on learning experiences for K-12 students. The program is a partnership between three UCSB programs: the Santa Barbara Coastal Long Term Ecological Research (SBC LTER) project, the Marine Science Institute, and the Sedgwick Natural Reserve, with the Los Angeles Conservation Corps (LACC). The program includes a student and family visit to UCSB, trips to watershed and restoration sites, and a weeklong residential program that includes ecology lessons based on SBC LTER research. Undergraduate and graduate students serve as docents and provide extensive mentoring.

The SBC LTER and the Marine Science Institute, both at UCSB, support cutting-edge coastal and marine science research and provide undergraduate and graduate students the opportunity to communicate their knowledge about the marine environment in several informal education settings. These docents receive training and coursework in natural history, teaching and learning, and attend lectures by marine science researchers. Docents provide mentoring and educational programming for students on-site at the downtown LACC facility during the school year and during the 1-week summer residence on the UCSB campus. The SBC LTER provides housing and supports field trips throughout the program.

The Sedgwick Natural Reserve is part of UCSB's Natural Reserve System and encompasses 5,883 acres spanning an elevation range of 1,300 feet in the Santa Ynez Valley. The Reserve is noted for both its large size and environmental heterogeneity. Diverse vegetation types include oak forests, woodland, and savannahs; chaparral, scrub, grassland, riparian forest, and agricultural lands. The site contains major portions of two watersheds and wetland habitats, notably vernal pools. Sedgwick provides housing and docents during the student's 3-day field trip.

The LACC offers at-risk young adults and school-aged youth opportunities to succeed by providing them with education and work skills training, with an emphasis on environmental and service projects that benefit the community. LACC's "Clean & Green" program includes participants aged 13 to 17 years who participate in urban beautification projects throughout LA County. Emphasis is placed on keeping team members on track in school and in their personal lives. LACC provides staff counselors, transportation, and administrative support for all aspects of the Watershed Education program.

The Watershed Education program is a year-round program designed for LACC's "Clean & Green" students with the goal of providing basic understanding of watersheds and how humans influence them. The program includes several components. Family Visit: Each winter LACC students and their parents are invited to UCSB to tour The REEF aquarium and attend lectures about maritime history and marine science research. Parents attend a presentation and Q & A session about attending college, the undergraduate experience, and are given a campus tour. Watershed exploration: The following spring, students go on a 3-day field trip to the Sedgwick Natural Reserve. Docents provide educational programs that introduce students to watersheds from an interior valley perspective. Students hike through several habitats with diverse vegetation types and explore a natural creek and vernal pools. Students also interact with Sedgwick researchers and learn about on-going projects. UCSB Residential Program: Docents and staff travel to LACC to provide hands-on lessons in preparation for their immersive, week-long residential program, during which students are introduced to a number of watershed field sites where they learn about SBC LTER research. Students are mentored through a research project, which they eventually present in a public poster symposium. Follow-up: UCSB staff and docents conduct workshops, discussion groups, and informal education activities at the downtown LACC site throughout the academic year. These activities are aimed at maintaining a direct connection with students and their families and encourage continued academic achievement.

The Watershed Education curriculum, including the 6-part lesson plan and a DVD with our interactive watershed model, are available online at *sbc.lternet.edu/outreach/downloads.html* or by sending an email to *sbc_outreach@lternet.edu*.

By Ali Whitmer, SBC

Publications

Lugo, Ariel E.; Swanson, Frederick J; González, Olga Ramos; Adams, Mary Beth; Palik, Brian; Thill, Ronald E.; Brockway, Dale G.; Kern, Christel; Woodsmith, Richard; Musselman, Robert. 2006. *Long-term research at the USDA Forest Service's experimental forests and ranges.* **BioScience. 56(1): 39-48**.

The system of 78 Experimental Forests and Ranges of the USDA Forest Service overlaps with several long-standing LTER sites (Hubbard Brook, Luquillo, Coweeta, Andrews) and complements the full LTER network in the US. Lugo et al. describe the science history and links with natural resource management dating back nearly a century. You can read the full PDF version of the paper online at *www.fsl.orst.edu/lter/pubs/webdocs/reports/pub3843.pdf*.

Linking Restoration and Ecological Succession

Lawrence R. Walker, Joe Walker and Richard J. Hobbs, editors. Springer Series of Environmental Management (publication date: late 2006 or early 2007)

About the editors: Lawrence R. Walker is Professor in the Department of Biological Sciences at the University of Nevada, Las Vegas, USA; Joe Walker is Honorary Research Fellow at CSIRO Land and Water, Canberra, Australia; Richard J. Hobbs is Professor of Environmental Science at the School of Environmental Science, Murdoch University, Murdoch, Australia.

Environmental Disasters, Natural Recovery and Human Responses

Roger del Moral and Lawrence R. Walker. Cambridge University Press (late 2006 or early 2007)

About the authors: Roger del Moral is Professor of Biology at the University of Washington; Lawrence R. Walker is Professor of Biology at the University of Nevada Las Vegas.

Calendar

Coming Events of Interest to the LTER Community

JANUARY 2007

Jan 8-12: Science Environment for Ecological Knowledge (SEEK) training workshop in ecoinformatics and relevant information technologies for new faculty and postdoctoral associates. University of New Mexico, Albuquerque, NM. For more information contact: Samantha Katz (*sroman@LTERnet.edu*) or visit the SEEK website, *http://seek.ecoinformatics.org/*.

MARCH 2007

March 7-9: Executive Board meeting, National Science Foundation, Arlington, VA. Travel days March 6 and March 9 afternoon. Meeting begins 8:30 a.m. March 7.

March 8: LTER Annual Mini-symposium. National Science Foundation, Arlington, VA.

March 8: LTER National Advisory Board meeting. National Science Foundation, Arlington, VA. (For more information about the three events please contact *office@lternet.edu* or Pamela Griego-Madrid (*pgriego@lternet.edu*)).

MAY 2007

May 22-27: EcoSummit 2007--Ecological Complexity and Sustainability: Challenges and Opportunities for 21st Century Ecology. Beijing Interntational Conference Center, Beijing, PR China. For more information contact: Larry Li (*bai-lian.li@ucr.edu*) or visit the Eco-summit website, *www.ecosummit2007.elsevier.com*.

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