LTER

The Network Newsletter

2003 All Scientists Meeting a Success

The recent LTER All Scientists Meeting proved very successful in energizing existing cross-site projects and in identifying new research initiatives, says Robert Waide, executive director of the LTER Network Office, which organized the meeting.

The meeting drew more than 700 registered students, scientists, and educators from at least a dozen different countries, representing all LTER sites and ILTER regions, as well as several program directors from the National Science Foundation."The ideas generated from bringing this group together for common brainstorming is invaluable," Bob Waide says. "It's important to spread the participation and leadership among a larger sample of the Network," Waide adds. "Student participation is good, but considering the benefit to the Network, it could be better and we'll be looking for

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Dr. Mary Clutter (right), Assistant Director, Directorate for Biological Sciences at the National Science Foundation, addresses the September 2003 LTER All Scientsts' Meeting (above) in Seattle, Washington. Below, participants review some of the 300+ posters. The meeting attracted more than 700 students, scientists and educators from all 24 LTER sites.

A piñata party for international participation capped the event with a festive flare.

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The Network News

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LTER All Scientists' Meeting 2003

Litter Decomposition in the LTER Network: Gaps and Bridges to Synthesis

Organizers: Grizelle González, Whendee Silver and D. Jean Lodge (LUQ); *Corresponding organizer (ggonzalez@fs.fed.us).*

The objectives of the workshop were to present the "state" of decomposition research in the LTER Network, identify the gaps in knowledge of data and study factors in sites within the Network, and determine "bridge" questions in an effort to start the process of synthesis given available data. The workshop consisted of invited talks and discussion on synthesis and research initiatives. Talks covered three main factors affecting litter decay: climate (I. Burke, SGS), substrate quality (M. Harmon, AND), and organisms (D. Coleman, CWT) and considered modeling (W.J. Parton, SGS; J. Moore, ARC/SGS) as an integral component of the synthesis effort (Fig. 1). Participants represented 14 U.S. and 4 International LTER Sites.

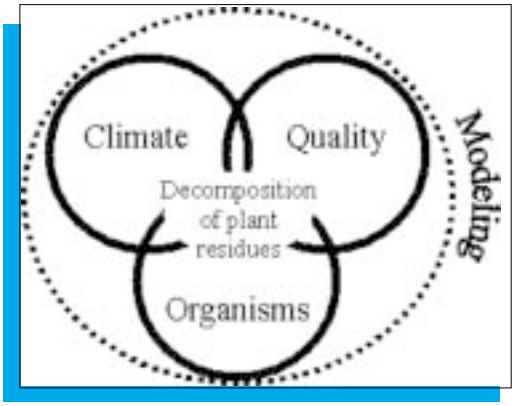

Figure 1. Regulation of decomposition by three interacting factors (modified from Swift et al., 1979).

Recommendations towards synthesis include updating and accounting of published studies on the LTER Bibliography. At the Network level, there is a wealth of data related to N dynamics and organismal aspects of litter decay. Models incorporating long-term chemical data as well as organismal information are needed to accurately predict ecosystem functioning, particularly C and N dynamics.

Participants agreed that this is an important theme on which to built cross-site and interdisciplinary synthesis and the integration process will greatly advance the science of decomposition studies in the Network. Ideas for accomplishing this are a symposium and a book. A detailed report of the workshop will be available at LUQ, through presenters and the LTER Network Office.

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methods for improvement." Waide also notes there was much positive feed back from participants, including several National Science Foundation program officers. And follow-up activities already underway.

"It was an outstanding meeting," says David Coleman of Coweeta LTER. "The poster sessions were a bit crowded," Dave recalls, "but maybe it encouraged folks to gather round and cut loose with the important questions.... This is a really hard working group, and I am proud to be a part of such a productive group."

"My compliments to all of you..." comments James Gosz, "for an excellent All Scientists' Meeting." Gosz notes that the NSF people were "very pleased," and the workshops were "extremely productive... especially the Research Initiative Workshops, which will be crucial to our long-term strategic research efforts." Keep eyes and ears open for more information about these initiatives!

Now the real work begins. The LTER Network Office has already sent information regarding funding for follow-up workshops. Awardees for mini-grants will be notified by Bob Waide.

Milestones

Dr. Gene E. Likens (left) and Dr. F. Herbert Bormann

IES Director Dr. Gene E. Likens Receives the Blue Planet Prize

On June 11th, the Asahi Glass Foundation announced that IES Director Dr. Gene E. Likens was a co-recipient of the 2003 Blue Planet Prize for outstanding scientific research that helps to solve global environmental problems. Dr. Likens was awarded the distinction along with Dr. Herbert Bormann, his long-time collaborator at the Hubbard Brook Experimental Forest in New Hampshire.

The Blue Planet Prize recognizes Drs. Likens and Bormann's roles in understanding human impacts on ecosystems and informing national decisions regarding the management of air, land, and water resources. At Hubbard Brook, Dr. Likens identified the relationship between fossil fuel use and acid rain in North America. He contributed critical data to the U.S. Congress for the 1990 Clean Air Act Amendments.

The Blue Plant Prize is an international environmental award sponsored by the Asahi Glass Foundation, chaired by Hiromichi Seya. Two Blue Planet prizes are awarded annually to individuals or organizations that make scientific discoveries that help solve global environmental problems. Dr. Vo Quy (Vietnam) was the other recipient of the Blue Planet Prize for his key role in conserving and restoring Vietnam's war-damaged environment and initiating community-based conservation projects.

This is the 12th year the Blue Planet Prize has been awarded. Past recipients prize have included Dr. Paul R. Ehrlich (Director of the Center for Conservation Biology, Stanford University) and Dr. Theo Colburn (World Wildlife Fund).

LTER Investigators Honored with Ecological Society of America Awards

The William Skinner Cooper Award honors an outstanding contributor to the fields of geobotany, physiographic ecology, plant succession, or the distribution of plants along environmental gradients—the fields in which W. S. Cooper worked. The award is for a single contribution in a scientific publication (single or multiple authored).

The William Skinner Cooper Award was presented to David R. Foster, Glenn Motzkin and Benjamin Slater for their contribution: Foster, D., G. Motzkin, and B. Slater. 1998. Land-use history as long-term broad-scale disturbance: regional forest dynamics in central New England. *Ecosystem*s 1: 96-119

The Eugene P. Odum Award recognizes an ecologist for outstanding work in ecology education. Dr. Alan R Berkowitz (Baltimore Ecosystem Studies) was presented the Odum Award for his contributions through teaching, outreach, and mentoring activities, his demonstrated ability to relate basic ecological principles to human affairs.

Nine LTER Sites Experience Mid-term Reviews

Nine LTER Sites had their mid-term reviews this year, including Cedar Creek, Florida, Georgia Coastal, Harvard Forest, Jornada, Santa Barbara, Sevilleta and Virginia Coast.

Getting concentrated and comprehensive presentations from so many sites provides a unique perspective, says Henry Gholz, program officer for LTER, Directorate for Environmental Biology. "The contrast among the LTER sites, in terms of their scientific focus and especially their management paradigms, is very high" says Henry. "Although it is a lot of trouble and time commitment for the sites to prepare for these reviews, the overwhelming (but not unanimous) feedback I receive indicates that these reviews are extremely valuable to the sites."

Kristin Vanderbilt, information manager at the Sevilleta LTER site, found herself on both sides of the review experience this year. "I would say that it was a valuable experience," Kristin says. "It caused us to reassess where we are with respect achieving our information management goals." As a reviewer, Kristin voices the opinion that more time is necessary for the process. "It's not possible for a thorough review of a site's information management system to be done based on a general talk given by the IM to the whole review committee."

As lead principal investigator of a relatively new LTER site, Dan Childers (Florida Coastal Everglades 'FCE') had a good experience. The experience was an excellent one for the FCE group. It will prove very helpful as we begin our renewal proposal preparations."

From the Virginia Coast LTER site, John Porter has participated many reviews, from both sides. "Apart from the value of getting 'outside' opinions, [the review] motivates introspection. With the day-to-day focus on ecological data and analysis, it's important for us to periodically step back and look at what we are doing in both a past and future context." The review process also helps investigators put their research in context with the site research, Porter says. "With the wide array of activities at our site, it is not possible for a researcher to be fully in touch with all the LTER activities," Porter says. "The review provided an opportunity for the exchange of information among our group that went well beyond what we are able to accomplish at our annual 'all-hands meeting.'"

During her time with the LTER Network, Sonia Ortega had the unique opportunity to visit the sites and observe many of the reviews. "I think having some reviewers who are not at LTER sites has a very positive effect on the site reviews because they bring a different perspective," Sonia says.

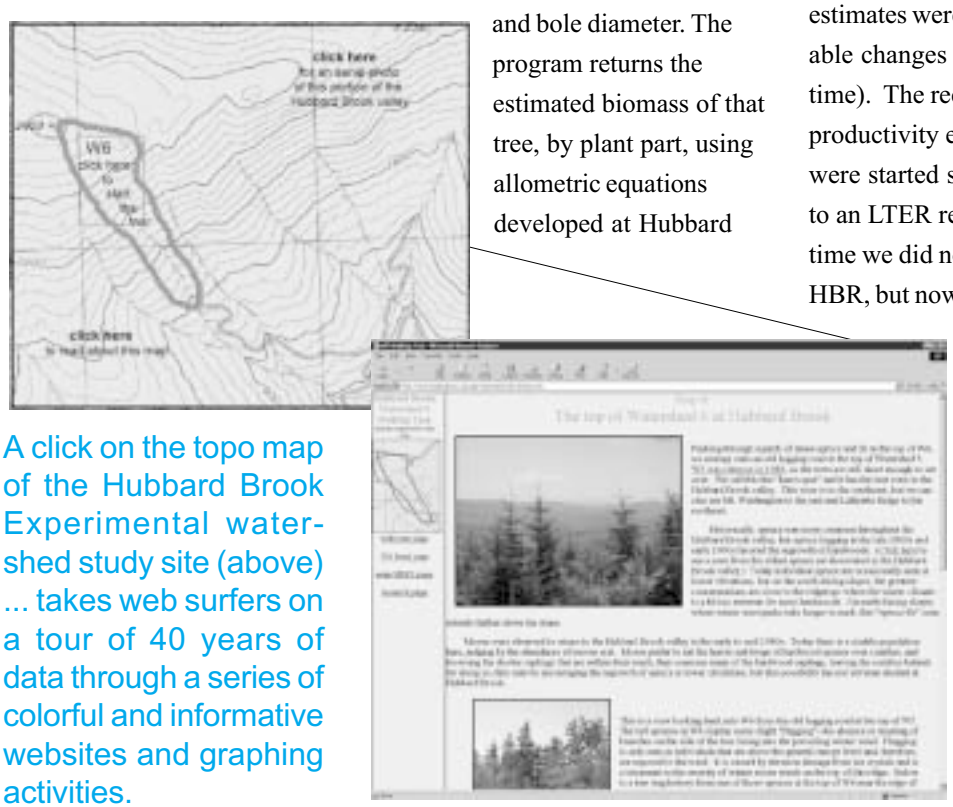
While it made for a travel-heavy year for Henry and others on the review teams, the visits painted a bright picture of LTER. It is clear that LTER overall is contributing "in major ways" to the progress of ecological science, Henry says, "as well as to the progress of the evolution of information management strategies and protocols that are having impacts way beyond LTER."

Hubbard Brook LTER Launches Online Education Project

Interactive Web site offers virtual tour for armchair ecologists

Tom Siccama and Ellen Denny, HBR LTER

Long-term analysis of vegetation data is fundamental to the LTER program. However, vegetation monitoring produces tremendous amounts of data that are difficult to summarize. At HBR we were faced with 38 years of accumulated long-term forest plot monitoring data becoming buried and inaccessible in the lab (and in the database on the web!!). Over the last two years, we have made significant progress in making these data more of a living tool, converting what was static into something dynamic and useful. The result is several PERL-based programs that allow the web user to summarize and graph the forest plot data from several Hubbard Brook study areas in a variety of ways—all of them online and on the fly!



A click on the topo map of the Hubbard Brook Experimental watershed study site (above) ... takes web surfers on a tour of 40 years of data through a series of colorful and informative websites and graphing activities.

Datasets utilized in this effort include inventories spanning almost 40 years for Hubbard Brook's biogeochemical reference watershed (Watershed 6), 20 years for a clearcut watershed (Watershed 5), and 5 years for a watershed (Watershed 1) treated with calcium (*see the LTER Network Newsletter online, Spring 2000, page 2)*. Also included are 20 years of data in a lower elevation tagged-tree study area, and a mid-1990s inventory that encompasses the entire Hubbard Brook valley. Forest communities include the northern hardwood forest (largely beech, sugar maple and yellow birch) and the boreal transition forest (dominated by spruce, fir and white birch). As of July 2003, we have the following interactive programs operating:

* A single tree biomass/chemistry program allows the user to choose a species, elevation, and bole diameter. The program returns the estimated biomass of that tree, by plant part, using allometric equations developed at Hubbard Brook. The elemental content for several elements by plant part is also output from this program, as well as the number of leaves and the leaf area. There is also an option to "grow the tree" by decreasing or increasing its diameter and or height to compare the "real" biomass with projected biomass.

* A phytosociology program uses tree census data dating back to 1965 to calculate basal area, density and frequency by species for diameter and health (or "vigor") classes selected by the user. These summaries can also be made by any number of combinations of plots as well as selected elevation bands. Graphs are made "on the fly" for species-specific basal area and density, basal area by elevation, and species-specific stem diameter distributions.

* A "landscape" biomass program returns biomass estimates by species for the same sets of data used in the phytosociology program. This is presently only operational for the biogeochemical reference watershed forest (Watershed 6). This program also calculates the forest productivity for 1997 — the only recent period for which we have extensive annual diameter-based growth functions for all the species and subdivided by elevation. (Although older productivity estimates were available for 1965, considerable changes have occurred since that time). The recent efforts toward forest productivity estimates at Hubbard Brook were started several years ago in response to an LTER request for such data. At the time we did not have this level of detail at HBR, but now it is available online and productivity can be estimated for a wide variety of species and elevations.

* A mortality/in-growth program allows the user to track the in-growth and death of individual trees through 12 years (1991 - 2003) within one of our study areas. The program also follows the rate at which dead trees become snags, the rate at which dead trees and snags fall to the ground, and other possible combinations of fates. This study includes about 6000 tagged trees and was developed in response to a 1989 LTER "mortality" workshop where it was suggested that HBR establish such an inventory in order to follow individual stems over long periods of time to get mortality rate estimates.

All of these programs can be accessed at the following URL: http://www.hubbardbrook.org/yale/watersheds/w6/index.html

We are constantly learning how to use new programming tools and these websites are a work in progress. The next leap we hope to make is to be able to spatially map the data in a colored GIS-type map and from there, who knows!

Why is the Coastal Marsh Grass Dying?

Georgia Coastal Ecosystem LTER Investigators Approach Marsh Die-off

Merryl Alber and James T. Hollibaugh, GCE LTER

Reports of salt marsh dieback in Georgia began in the spring of 2002. There are now large areas of marsh with little or no live above-ground vegetation, and they have caused great concern along the Georgia coast as well as in South Carolina. All Georgia coastal counties are reporting marsh die-offs. Although some dieback areas are showing signs of recovery (particularly small patches), others have shown no signs of regrowth since observations began a year ago. Current estimates exceed 1,000 affected acres, with both Spartina alterniflora (salt marsh cord grass) and Juncus romerianus (black needlerush) affected. Broad-leafed plants (for example Borrichia frutescens) are not affected. Once the plants die their roots and rhizomes decompose, and in some areas the marsh is down to bare mud and beginning to slough into the water (Fig. 1).

Initial observations in Georgia of affected areas of marsh were made in October 2002 by a team from the Georgia Coastal Ecosystems (GCE) LTER program in conjunction with staff of the Coastal Resources Division of the Georgia Department of Natural Resources. The group surveyed transects at 3 sites exhibiting signs of dieback (one in an area that was completely devoid of vegetation and two that were only partially denuded) as well as at a nearby control site. Pore water salinities ranged from 21-36 in dieback areas and from 27-36 in the reference site; epifaunal snail and crab densities were variable and did not obviously relate to the die-off; and analysis of fungal populations did not indicate any unusual organisms (the report of this survey is available on the Georgia Coastal Research Council site: www.marsci.uga.edu/coastalcouncil/marsh_dieback.htm.)

Figure 1 B.

Figure 1 D

Figure 1 C.

Fig. 1: Examples of salt marsh die-off in coastal Georgia: (B) a close-up of rhizome "stubble"; (C) a study site at where erosion, caused by grasses dying, is evident; (D) aerial photograph of Sapelo Island showing a common dieback pattern.

Of particular interest are the results of two greenhouse trials conducted by GCE investigator M. Alber with material collected from dieback areas. In the first trial, blocks of soil (approximately 25 cm2) containing Spartina alterniflora rhizomes were collected (see Fig. 1B), brought back to the greenhouse and watered regularly. None of these rhizomes resprouted. These observations were corroborated by histological analyses demonstrating that rhizomes from die-off areas are not viable (C. Franklin, Savannah State Univ., pers. comm.). These results suggest that, even if the causes of the die-off were removed and further damage did not occur (e.g. one early theory was that the die-off was related to drought and now that the area is receiving normal rainfall after a 5-year drought, recovery might be expected), the areas that have already been affected will not regenerate and will likely require replanting. We are therefore in danger of losing this habitat due to erosion (see Fig. 1C).

In the second greenhouse trial, healthy S. alterniflora seedlings, ranging in size from 5 - 15 cm, were transplanted into 5 replicate pots containing soil from either a dieback area or a nearby healthy marsh and growth was monitored for two months. All plants survived, and there was no difference in growth between treatments, suggesting that plants can survive in soil from a dieback site. In keeping with this, live plants collected from the edge of the dead marsh site also survived in the greenhouse. These observations argue against the presence of a

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Schoolyard Students Learn Serendipity in Marsh Die-off Investigations

By Patricia Hembree, GCE LTER

While researchers with the GCE-LTER have been busy investigating the marsh die-off, the summertime Schoolyard 'field collaborators' a group involving teachers and students at elementary schools in Georgia coastal communities has been busy collecting and logging physical and photographic data- documenting changes in the marsh grasses over time.

When asked about their work , the students' voices suddenly become serious as they explain the potential impact of their own study. "You don't know you need to collect data until it's too late to start collecting data." Words of wisdom from one 10-year old involved in the project. "We get to take science for two years in a row with Ms. Pat. Last year," the student explains. "We set up this site [pointing to a map]. Every month, we went there and took pictures, used our quadrats to do counts...you know, just the usual stuff. Well, last month, after the whole summer off, we went back...to this site. Nothing was there!" All the marsh grasses had dies off over the course of the season.

Georgia Coastal Ecosystem LTER Schoolyard Students measure marsh grasses regularly, and witnessed changes resulting from die-offs.

"It was completely dead," the student continues. "Thank goodness, we had our notes and pictures! We could prove that it just happened...over the summer...in only a few months!"

These 10 year old scientists actually documented the transformation. The lesson in this Schoolyard LTER project is clear: Take the time to work with your schoolyard program. You never know how far your voice will travel!

GCE Marsh Die-off study

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pollutant or pathogen in the soil, but these explanations cannot be completely ruled out because it is possible a pollutant was washed out during the greenhouse manipulation, or that a pathogen is transmitted through live plants or a biological vector and is short-lived outside the host.

GCE personnel are actively collaborating with the Georgia Coastal Research Council (see Box) as part of a state-wide effort to study marsh dieback. The Research Council has established a marsh monitoring protocol that is being used to collect information about dieback sites in a consistent, standardized way. At present, GCE personnel from the University of Georgia are working with scientists from the state DNR, the Sapelo Island National Estuarine Research Reserve, and Savannah State University to follow dieback patches through time. There are also plans underway to include dieback areas on Sapelo Island as part of a remote sensing effort being conducted for the GCE. Finally, GCE personnel are continuing to work with transplants as the first step toward designing an appropriate restoration strategy for the State.

From left: GCE students Susan White and Matt Ogburn sampling a marsh dieback site with Georgia Dept. of Natural Resource's personnel Jill Huntington and Jan MacKinnon.

The Georgia marsh dieback phenomenon has been described in numerous local newspaper articles, and the issue was recently featured on NBC nightly news. It is not clear whether this die-off is the same as the brown marsh phenomenon that has occurred in the Gulf of Mexico. Although some aspects of the situation are similar (both occurred during periods of prolonged drought), there are also differences between the sites: plants in Louisiana go through a progressive color change, from green to brown, whereas in Georgia standing dead plants are not observed; die-off in Louisiana affects Spartina spp. but not J. romerianus, whereas in Georgia both are affected; dieback areas in Louisiana are often in the marsh interior, whereas in Georgia both creekbank and high marsh areas are affected.

The Research Council is currently working with the Georgia Sea Grant Program, the Louisiana Sea Grant Program, the Georgia State Department of Natural Resources and the Sapelo Island National Estuarine Research Reserve to organize a symposium for investigators from Louisiana, Georgia, and South Carolina. The symposium is planned for winter 2004.

Integrating LTER Research and Education through Graduate Students

—Sonia Ortega, National Science Foundation and the LTER Network Office, with help from Laurel Hartley, Shortgrass Steppe LTER

How can graduate students develop skills to communicate science to a wider audience? How can K-12 teachers increase their ecological knowledge and gain confidence to teach ecological concepts?

Answers to these questions are currently being developed at four LTER sites that participate in the NSF funded Graduate Teaching Fellows in K-12 Education program most commonly known as GK-12. The program, initiated in 1999 supports fellowships for graduate students and upper level undergraduates to serve as resources in K-12 schools.

Students troll a stream for macroinvertebrates in Colorado. Photo courtesy Shortgrass Steppe LTER.

Currently Central Arizona Phoenix (CAP), Short Grass Steppe (SGS), Jornada Basin (JRN) and North Temperate Lakes (NTL) LTER participate in the GK-12 program.

At CAP, GK-12 fellows are directly involved in the Ecology Explorers program. They are using research protocols developed by CAP scientists to incorporate in teacher workshops and summer internships. They study bird populations, ground arthropods, bruchid beetles and plant diversity. This GK-12 program run by Arizona State University is centered on experimentation and exploration.

Human impact on land use along the Front Range of Colorado is the GK-12 theme at SGS. This matches well with the current research emphasis at this site. GK-12 fellows are using the Schoolyard ecology model to bring science into classrooms by engaging K-12 teachers and students in research related to grassland ecology, soil micro-arthropods in SGS, effects on prairie dogs on vegetation and water qulity monitoring among other topics.

This summer, JRN started participating in New Mexico State University's GK-12 project by involving fellows in a teacher workshop attended by one science teacher from every middle school in the county surrounding Las Cruces, New Mexico.

Surveys of GK-12 Fellows at NTL indicate that the program serves as professional development for graduate students. Fellows who have participated in the program report an increased interest in grant writing and outreach, and an improvement in making presentations and working as members of a team. They also find that the time spent in the program has little or no negative effect on their research. GK-12 also provides professional development for teachers and enhanced science learning for K-12 students.

> The GK-12 Program helps teachers, students *and* graduate students become better scientists.

As reported by a GK-12 fellow at the recent All Scientist Meeting: "I have learned a lot about my own research, time spent in the classroom is more satisfying than being a teaching assistant"

Fellow Laurel Hartley knows that she "will always be involved in K-12 education" and adds that "GK-12 teaches fellows ways to merge their goals of being scientific researchers with their desire contribute to science education."

While the goal of the GK-12 program is not necessarily to make K-12 teachers out of all graduate fellows, the are many lessons to be learned from spending time with high school students.

"If you can get up in front of 30 high school students and coherently talk about your research," says Shortgrass Steppe LTER fellow Sanjay Advani, "there shouldn't be an audience out there capable of intimidating you."

Graduate student fellow Sanjay Advani relates to students in the class room. Photo courtesy Shortgrass Steppe LTER.

Enhancing the Environment for Ecological Synthesis

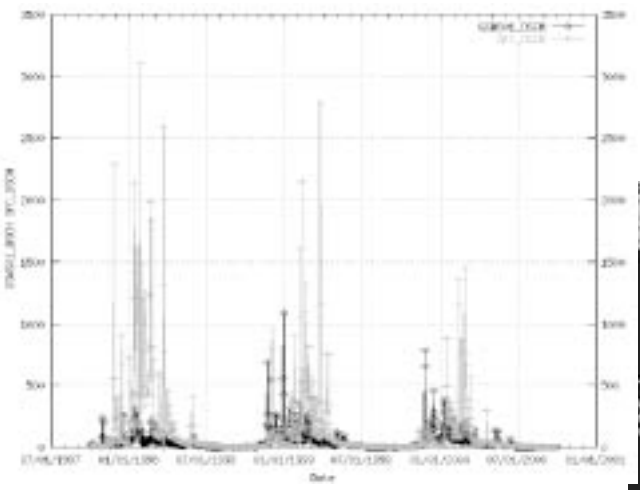
Introducing the Climate and Hydrology Web Harvester System

Don Henshaw, Andrews LTER, Wade Sheldon, Georgia Coastal Ecosystems LTER, and Kristin Vanderbilt, Sevilleta LTER

The LTER Network faces significant challenges in strengthening existing cross-site integrative research. Climatic and hydrological data are critical to these synthetic efforts and LTER Network sites and U.S. Forest Service (USFS) experimental watersheds are committed to populating and updating these basic data sets. The cross-site ClimDB and HydroDB projects facilitate synthetic research among this network of sites through production databases widely used in intersite comparisons, modeling studies, and land management-related studies.

Supplemental NSF funding coupled with USFS Forest Health Monitoring funding has enabled major system functionality improvements and significant increases in site participation over the past year. The database has surpassed over 5 million daily records from 33 sites including all LTER sites and many USFS Experiment Stations. Air temperature, precipitation, and streamflow are the most consistently harvested measurement variables. LTER faces the continuing challenge of maintaining the currency of these variables while also extending this consistency to other meteorological measurements and accompanying metadata. Two significant projects are described below that are directed toward meeting this challenge.

Public access to the database has also been greatly improved and public use of this resource is steadily growing. The download and graphics interface now allows complete access to the combined climate and hydrology databases and supports a flexible graphical display system for comparing all sites and variables. See example (Figure 1). Since February 2003, visitors have generated graphs, downloaded, or displayed over 1300 data sets. The ClimHyDB web pages average over 400 visitors per month (http://www.fsl.orst.edu/climhy/).



This graphic (above) was generated by the system available at the HydroDB web site (right) generated graphic comparing streamflow from the Andrews Forest and Casper Creek

USGS Data Harvesting Service for HydroDB

In January 2002, Wade Sheldon (GCE LTER) developed an automated system for harvesting streamflow data from any real-time USGS gauging station and processing it for submission to HydroDB, the LTER All-site hydrological database at Andrews LTER. Working in collaboration with Suzanne Remillard and Don Henshaw (AND LTER), this system was generalized and offered as a service to the broader LTER community in June 2003.

In this system, recent provisional data are harvested on a weekly basis from one or more stations requested by each participating site. The data are converted to units compatible with HydroDB and undergo several levels of quality control analysis and flagging to identify questionable values. Values flagged as invalid (e.g. negative discharge) are removed from data sets prior to submission to HydroDB. Also, any updates to provisional data by USGS are automatically synchronized with the database each week, and provisional values are overwritten with finalized data as soon as they are released.

This harvesting service provides several important benefits to the LTER and broader scientific community. USGS has made great strides in providing timely access to national monitoring data via the WWW, but the vast size of this monitoring network (over 5500 streamflow stations alone) makes finding data relevant to LTER sites a significant task. Data are also not provided in standard metric units, and provisional data are often not subjected to any quality checks prior to web posting. Harvesting, transforming, and quality-checking data from stations near to or within LTER sites on a regular basis and providing access through a single web interface greatly enhances the usability of these data, facilitating synthesis. It also serves as a useful demonstration of how metadata-based data processing technology (see http://gce-lter.marsci.uga.edu/lter/research/tools/usgs_harvester.htm), data format standards, and web-based communications protocols can ease the application of information technology developed at sites to network-level problems, providing a significant research benefit with almost no added cost.

The San Diego Supercomputer Center (SDSC) scientists and LTER information managers have been collaborating since February 2002 to develop a web services implementation of ClimDB (Network News, Fall 2002, p. 3-4).

Science Environment for Ecological Knowledge

This is an excerpt from an article by SDSC science writer Paul Tooby that originally appeared in the NPACI publication "Envision" April-June 2003 (http://www.npaci.edu/envision/v19.2/seek.html)

Researchers working on the National Science Foundation (NSF)-sponsored Science Environment for Ecological Knowledge (SEEK) are building a Powerful information infrastructure that will offer a unique capabilities for research and synthesis.

SEEK is an ambitious five-year NSF Information Technology Research project that will access, model, synthesize and display ecological data across ecosystems and spatial and temporal scales, facilitating investigations involving all of the physical and life sciences.

"It's a lot of work to build a comprehensive system like SEEK, but it's the key to being able to achieve an overall understanding of ecological systems," says Bill Michener, principal investigator. "All the parts an ecosystem are connected, and to understand them you need to encompass all the components in your model."

SEEK will also provide researchers with analysis and visualization capabilities, freeing them from needing specialized IT knowledge, and offering a powerful platform to do science much more rapidly and on a larger scale than possible before.

SEEK is an outgrowth of ecological and biodiversity informatics research and includes computer scientists, ecologists, and technologists. The lead organizations involved are part of the Partnership for Biodiversity Informatics, a consortium made up of the National Center for Ecological

Analysis and Synthesis (NCEAS) at UC Santa Barbara; the San Diego Supercomputer Center (SDSC) and UC San Diego; the Natural History Museum and Biodiversity Research Center at the University of Kansas (KU); and the LTER Network Office at the University of New Mexico. Additional partnering institutions are Arizona State University, the University of North Carolina, the University of Vermont, and Napier University in Scotland.

The researcher uses the SEEK interface to identify data sets containing observations such as temperature, rainfall, and soil type. SEEK then pulls in specimen databases that also have locality information. Initially, SEEK will include sources such as the Species Analyst at KU, which accesses museum databases, the MetaCat catalog from the Knowledge Network for Biocomplexity (NCEAS, LTER, etc.), and other ecological data sources (*see* LTER NETWORK NEWS - Fall 2000 http://intranet.lternet.edu/archives/documents/Newsletters/NetworkNews/fall00/fall00_pg07.html).

"The trick is that all the data layers have to be integrated using the same cell size and spatial extent, taking into consideration the effects that scaling and other transformations might have on an analysis," say Matt Jones, SEEK project manager and a researcher at NCEAS. "SEEK will then transform them so that they're all at the same scale." Once the data is available in SEEK, it is pushed into the ecological niche model, which may be running elsewhere on a different machine. The results are then overlaid onto a map of the study area, producing a graphic that highlights information vital to the project.

"An important feature of SEEK is that it goes beyond providing data integration and analysis services," Jones says. The output from the ecological niche model may turn out to be useful also for other apparently unrelated processes. In this way, SEEK can become "smarter" with use, "leading eventually to vastly expanded virtual collaborations that could eventually become community-wide," says David Vieglais, a research scientist at the Natural History Museum and Biodiversity Research Center at the University of Kansas.

In order for SEEK to work, scientists will need to adopt common protocols for gathering and recording data, and will need to use common "metadata," the information that describes their data. These and other changes will take some adjustment in the research community, says Michener, who will host workshops and other outreach activities to initiate and train growing numbers of ecologists about the benefits of doing ecology in this new way.

Ecoinformatics Training For Ecologists (e.g., Information Technologies for Ecology) January 4-9, 2004

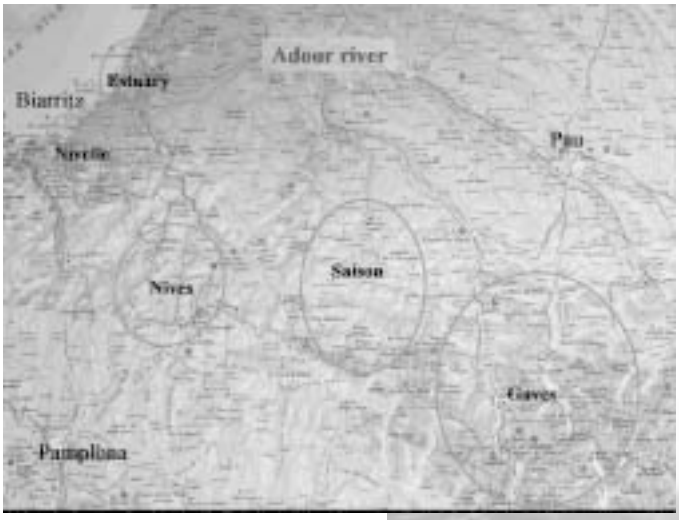
The Long Term Ecological Research Network Office at the University of New Mexico, in collaboration with the San Diego Supercomputer Center at UCSD, the Natural History Museum and Biodiversity Research Center at the University of Kansas, and the National Center for Ecological Analysis and Synthesis at UCSB, will be conducting a one-week training workshop in ecoinformatics and relevant information technologies for new faculty and postdoctoral associates. The goal is to develop cutting edge technologies for the integration, analysis, and synthesis of heterogeneous ecological data through a large ITR grant from NSF, called the Science Environment for Ecological Knowledge (SEEK).

The goals of SEEK are to make fundamental improvements in how researchers can gain global access to ecological data and information, rapidly locate and utilize distributed computational services, and exercise powerful new methods for capturing, reproducing, and extending the analysis process itself. The seminar will be held at the University of New Mexico. Application deadline is 1 November 2003. For more information, please contact dpennington@LTERnet.edu

Approaching the Social Dimensions of Ecological Research

The Coweeta LTER – Hydrosystèmes Pyrénéens SA Collaboration

Ted L. Gragson (CWT) & Pascal Palu (HPSA)



Including a social dimension to long-term ecological research is increasingly recognized as critical to understanding and managing ecological systems since "most aspects of the structure and functioning of Earth's ecosystems cannot be understood without accounting for the strong, often dominant influence of humanity" (Vitousek et al. 1997: 494). The challenge is determining how to integrate data, information and knowledge as researchers move beyond traditional disciplinary and site boundaries. We are facing the challenge in a collaboration between the Coweeta LTER and the Hydrosystèmes Pyrénéens Site Atelier in southern France by integrating ecological, physical and socioeconomic information to achieve a comprehensive understanding of land use and land-use change.

The LTER Core Research Areas—primary production, population studies, movement of organic matter, movement of inorganic matter, and disturbance patterns—do not explicitly require the incorporation of a human component to LTER research. There has consequently been little structured or systematic social science research in the LTER Network, and few attempts to either identify integrated science questions or conduct cross-site studies. The mandate of the Zones Ateliers network, however, is to explicitly focus on ecosystems that have been subject to the effects of human activities (Lévêque et al. 2000). Each Zone Atelier comprises a number of individual research sites (Sites Ateliers) in a geographic unit (e.g., watershed, gradient, ecoregion, etc.) where intensive data collection achieves a representative sample of the social-ecological system of said geographic unit.

Experimental and observational research activities at the Coweeta LTER and the Hydrosystèmes Pyrénéens SA are carried out at paired sites with gradients representative of the socio-natural variation in factors relevant to land use and land-cover change and disturbance regimes across each study region. Remote sensing analysis of coarse- and fine-grained resolution imagery with ground-truthing is used to integrate site and gradient results with regional-level analysis. The purpose in both cases is to develop an information and knowledge system that permits management of heterogeneous data sets, common access through the web to all datasets by project investigators, and identification of driving variables. To achieve our research objectives depends on a scientific information system that not only archives data and information, but also fosters its use.

Our purpose in collaborating is to promote and enhance understanding of long-term phenomena across regional, national and oceanic boundaries contributing scientifically to ecosystem management. The distinct advantage of the collaboration between researchers in the Southern Appalachian and Pyrenees Mountains is that both sites present ideal natural laboratories for evaluating the synergism between the socio-natural template and the resulting patterns and processes in ecological and socioeconomic systems. The particular strength of our sites is that we bring ecological and social scientists together as equal partners in the development of an integrative approach to the study of ecosystems.

The Coweeta LTER - Hydrosystèmes Pyrénéens SA collaboration facilitates interaction between scientists across disciplines and sites by sharing knowledge and expertise based on a common set of research priorities, and the need to solve similar methodological and conceptual issues. Our structured and systematic approach to integrated science questions also promotes comparability of observations and experiments and encourages data exchanges that transcend traditional disciplinary boundaries. We ultimately anticipate a fundamental impact on the education and mentoring of the scientists-in-training represented by the students working at each site.

References

Lévêque, C. et al. 2000. Les zones ateliers, des dispositifs pour la recherche sur l'envrionnement et les anthroposystèmes: Une action du programme "Environnement, vie et sociétés" du CNRS. Natures, Sciences, et Sociétés 8:44-52.

Vitousek, P. M. et al. 1997. Human domination of Earth's ecosystems. Science

International LTER

New networks, new committees and a new chairperson all mark exciting developments for the ILTER initiative in 2003.

A group from the All Scientists' Meeting 2003 Seattle, Washington

The recent activity has also increased the interest of the Office of International Science and Engineering (the group at the National Science Foundation that oversees international science funding, known as INT), as well as renewed interest from the LTER and ILTER communities.

Following a close look at Network Office international activities, INT offered a "Discussion Draft" of a Proposal to LTER concerning U.S. involvement in International LTER activities. This proposal is available on the LTER Web site. Main points include the offer to fund a coordinator to facilitate communication and international collaborative activities, including information management training. This preliminary proposal was presented to the LTER community for discussion at the Sept 2003 All Scientists' Meeting. The initiative, previously supported mainly by supplements to the LTER Network Office, is growing into a much more structured effort. Through this transition the ILTER community and the NSF will continue to discuss the options for growth, welcoming input from the larger community.

The U.S. LTER has formed an International Networking Committee Membership includes: Nick Brokaw (Luquillo), Patrick Bougeron (Niwot), Ted Gragson (Coweeta), Steve Hamburg (Harvard Forest), Dave Hartnett (Konza), Brian Kloeppel (Coweeta), Dick Lathrop (North Temperate Lakes), Kate Lajtha (Andrews), Berry Lyons (McMurdo), Chris Madden (Florida Coastal), Dennis Ojima (Shortgrass Steppe), Deb Peters (Jornada), Kristin Vanderbilt (Sevilleta), Bob Waide (Luquillo). No chair has yet been selected.

The ILTER Network has formed a committee of representatives from each of the six regions: Christian Leveque (Western Europe), Julius Oszlanyi (Central and Eastern Europe), Manuel Maass (North America), Jorge Jimenez (Central and South America), Zhao Shidong (East Asia/Pacific), Johan Pauw (Southern Africa). Also, the ILTER Committee has elected new chair - Henbiau King (Taiwan-ROC). These individuals can be reached via the LTER personnel database on the Website.

Two countries have joined the ILTER Network recently. Slovenia and Romania presented the merits of their science and network infrastructure to attendees at the All Scientist's Meeting in Seattle and these presentations are available on the Website.

In addition, regional network level activity in southern Africa has increased (see article, next page), as well as good cross-site science developing between Coweeta LTER and France's Zones Ateliers (see article, page 10).

Recent International LTER Publications — a sample

BRAZIL

Abreu, PC; Roerig, LR; Garcia, VM; Odebrecht, C; Biddanda, BB. 2003. Decoupling between bacteria and surf-zone diatom Asterionellopsis glacialis (Castracane) in Cassino Beach, Brazil. Aquatic Microbial Ecology 32:219-228.

Barbosa, F. A. R., F. R. Scarano, M. G. Sabará and F. A. Esteves 2003. Brazilian LTER: ecosystem and biodiversity information in support of decision-making. Environmental Monitoring and Assessment, 00: 1-13 (in press)

Odebrecht C; Abreu, PC; Fujita C & Bergesch B. 2003. The impact of mud deposition on the long term variability of the surf-zone diatom Asterionellopsis glacialis (Castracane) Round. Journal of Coastal Research, USA. Vol. 35:493-498.

Seeliger, U; Kjerfve, B. (Eds.) 2001. Coastal Marine Ecosystems of Latin America: Ecological Studies 144, Springer Verlag, Berlin, Heidelberg. 360 p.

CANADA

Environmental Monitoring And Assessment Special Issue "Monitoring Ecological Change In Canada-Part 1" - FEB-MARCH, 2001 Volume 67 pp1—291.

Environmental Monitoring And Assessment Special Issue On "Monitoring Ecological Change In Canada Part 2" Volume 88 pp1- 468 October 2003

AMBIO Special Issue: " Biological Recovery From Acidification: Northern Lakes Recovery Study" Ambio, Vol. 32, No. 3 pp 162-248

MEXICO (Chamela, Tropical deciduous forest).

Balvanera, P., Lott, E., Segura, G., Siebe, C., Islas, A. 2002. Beta diversity patterns and determinants in a tropical dry forest of Mexico. Journal of Vegetation Science 13: 145-158.

Campo, J., J.M. Maass, V. Jaramillo, & A. Martínez-Yrízar. 2000. Calcium, potassium and magnesium cycling in a Mexican tropical dry forest ecosystem. Biogeochemistry. 49 (1): 21-36

Campo, J., J.M. Maass, V. Jaramillo, A. Martínez-Yrízar, and J. Sarukhán. 2001. Phosphorus cycling in a Mexican tropical dry forest ecosystem. Biogeochemistry 53:161-179.

Castellanos, J., Jaramillo, V.J., Sanford Jr., R.L & Kauffman, J.B. 2001. Slash-and-burn effects on fine root biomass and productivity in a tropical dry forest ecosystem of México. Forest Ecology and Management 148:41-50.

García-Oliva F., B. Sveshtarova and M. Oliva 2003. Seasonal effect on soil organic carbon dynamic in a tropical deciduous forest ecosystem in western Mexico. Journal of Tropical Ecology 19 (2): 179-188.

García-Oliva, F., R.L. Sanford Jr. and E. Kelly 1999. Effect of burning of Tropical Deciduous forest soil in Mexico on the microbial degradation of organic matter. Plant and Soil 206 (1): 29-36.

García-Oliva, F., R.L. Sanford Jr. and E. Kelly 1999. Effects of Slash-and-burn Management on Soil Aggregate Organic C and N in a tropical Deciduous Forest. Geoderma 88 (1-2): 1-12.

Giardina,C.P., Sanford Jr., R.L., Døckersmith, I.C. & Jaramillo, V.J. 2000. The effects of slash burning on ecosystem nutrients during the land preparation phase of shifting cultivation. Plant and Soil 220:247-260.

Jaramillo, V.J., Kauffman, J.B., Rentería-Rodríguez, L. Cummings, D.L. & Ellingson, L.E. (In press). Biomass, C, and N pools in Mexican tropical dry forest landscapes. ECOSYSTEMS.

Kauffman, J.B., M.D. Steele, D.L. Cummings and V. J. Jaramillo. 2003. Biomass dynamics associated with deforestation, fire, and conversion to cattle pasture in a Mexican tropical dry forest. Forest Ecology and Management 176:1-12.

Kelly, C.K.., Banyard-Smith, H., Buckley, Y.M., Carter, R., Franco, M., Johnson W., Jones, T., May B., Pérez I., R., Pérez-Jiménez A., Solís M. A., Steers H. & Waterman, C. 2001. Investigations on commonness and rarity: a comparative analysis of co-occurring, congeneric Mexican trees. Ecology Letters 4: 618-627.

Maass, J.M., A. Martínez-Yrízar, C. Patiño & J. Sarukhán 2002. Distribution and annual net accumulation of above-ground dead phytomass and its influence on throughfall quality in a Mexican tropical deciduous forest ecosystem. Journal of Tropical Ecology 18:1-15.

Segura, G., Balvanera, P., Durán, E., Pérez, A. (In press). Tree community structure and stem mortality along a water availability gradient in a Mexican tropical dry forest. Plant Ecology.

Cotler H. 2001. Soil aggregation as vulnerability indicator for geo-ecosystems at the Pacific coast of Mexico. Proceedings of the International Symposium on Land Degradation and Desertification, México 5-12/05/2001.

García-Oliva, F., L. Barajas, M. Nava-Mendoza and J.M. Maass 2002. Long-term C, N and P losses by sediment yield in five watershed in a Mexican tropical deciduous forest ecosystem. In: G. Anze and H. Wenyuan (Eds.) Process of soil erosion and its environment effect. II. Proceedings 12th ISCO, Tsinghua University Press, Beijing, pp: 251-255.

Martínez-Yrízar, A., A. Búrquez y J.M. Maass. 2000. Structure and functioning of tropical deciduous forest in Western Mexico. In: R.H. Robichaux and D Yetman (ed) The tropical deciduous forest of Alamos: biodiversity of a threatened ecosystem in Mexico. University of Arizona Press, Tucson. Pp:19-35.

Vose, J.M. and J.M. Maass 1999. A Comparative analysis of hydrologic responses of tropical deciduous and temperate deciduous watershed ecosystems to climatic change. In: C. Aguirre-Bravo and C. Rodríguez-Franco (comp). 1999. North American Science Symposium: Toward a Unified Framework for Inventorying and Monitorian Forest Ecosystem Resources. Guadalajara, México (November 2-6, 1998). USDA Forest Service Proceedings RMRS-P-12 :292-298.

NAMIBIA

Henschel, J. et al. 2003. "Developing the Environmental Long-Term Observatories Network of Southern Africa (ELTOSA) South African Journal of Science 99, pp. 100-108.

USA

Christian, R. R. 2003. Coastal initiative of the Global Terrestrial Observing System. Ocean & Coastal Management 46: 313-321.

Publication Marks Milestone for Southern Africa LTER Network

Developing the Environmental Long-Term Observatories Network of Southern Africa (ELTOSA)

*by Joh Henschel, et al.**

**This is an excerpt of an article published in the South African Journal of Science 99, March/April 2003. Please see the complete article on the LTER Web site: lternet.edu/newsletter*

The Environmental Long-Term Observatories Network of Southern Africa (ELTOSA) is a regional LTER network of country Environmental Observatories Networks (EON) encompassing the natural environments and their socio-economic context.

EON involves the documentation, analysis and information dissemination concerning long-term, large-scale ecological and socioeconomic processes, which are elucidated through multidisciplinary research and monitoring over a network of institutionally operated field observation sites. Basic functions concern fieldwork, data management and sharing, analyses and interpretation, and information dissemination, all operated in such a way as to benefit most from cooperation among professionals and with resource managers at all levels.

Requirements for continuity include programmatic tenure and funding, data archiving, data sharing, training, and networking.

EON involves networking at four scales. First, the level of the EON centre interconnects specific study plots over time and space, and facilitates collaboration between researchers and students using the centre. Second, the country network level interconnects several institutions and programmes with common goals and activities. Third, the regional network level, such as ELTOSA, promotes subcontinental programmes, synergy, and complementarity. Fourth, the global network (ILTER, International Long-Term Ecological Research Network) facilitates planning and information exchange concerning such programmes across the world.

The photos on these pages were taken by Dan Childers (FCE), July 2002 on Inhaca Island, Mozambique, where the first ELTOSA annual general meeting began formulating the modus operandi and business plan of the ELTOSA network. The authors acknowledge the participants in this workshop in the formulation of this position paper.

Background

In May 2001, we, scientists from six countries in southern Africa, formed the Environmental Long-Term Observatories Network of Southern Africa (ELTOSA). ELTOSA connects country Environmental Observatories Networks (EON), the African adaptation of LTER (long-term ecological research). The International Long-Term Ecological Research Network (ILTER) has accepted ELTOSA as a regional member, and currently three ELTOSA country members have individual ILTER membership (Namibia in 1999, Zambia in 2001, South Africa in 2002) and others are working towards membership.

While the word 'observatories' expresses the idea of monitoring at multiple fixed sites that is fundamental to this kind of long-term data acquisition, 'network' expresses the interdisciplinary, multi-institutional synergy and large-scale ('big science') scope of EON. Finally, EON also expresses the long-term scope and the challenge of elucidating events across landscapes, species assemblages and eons.

EON tackles the formidable task of improving understanding of ecosystem function and change, as well as agents of change, to promote wise use and management of ecosystem goods and services through policies, strategies, public awareness and environmental education. Although environments are complex and dynamic with many interacting factors that vary at different scales, EON can provide a mechanism for effective early-warning systems and for the prediction of deleterious environmental change.

These strategies towards national and regional environmental information systems must be non-profit orientated and require synergy and good coordination among many scientists and institutions. EON therefore concerns monitoring, data archiving, data accessibility and sharing, and ensuring continuity of such programs.

Environmental conventions

In the aftermath of the 2002 World Summit for Sustainable Development, it is important to stress that EON and its related programmes (including LTER and the Global Terrestrial Observation System, GTOS) are crucial to nations and the international community meeting the goals of Agenda. EONrepresents a network of programmes and field stations that monitor environments and can provide data on baseline conditions, changes and trends, or a lack of changes. This provides input of time-series data and reflection on the conditions in which the Conventions operate, including their successes and failures. Such monitoring is an important element in the implementation of the UN Convention on Biological Diversity (CBD), the UN Convention to Combat Desertification (CCD), the UN Frame Convention for Climate Change (FCCC), the Ramsar Convention on Wetlands, the Convention on International Trade in Endangered Species (CITES), as well as numerous other global programmes, such as the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme (IHDP), and DIVERSITAS. EON therefore promotes the development of the interest, understanding, and political will in African countries to incorporate the environment into informed development planning.

The great need to meet basic human requirements, especially food security, is given top priority in Africa and research needs to support this priority. This requirement for relevance and applicability does not diminish the need for African research to be academically sound, based on sound data and scientific analyses. Dependence on natural resources in rural areas is not only a challenge for resource management, but also provides opportunities for resource users to participate directly in research, including recording data and assisting with its interpretation.

EON focuses on parameters that are good indicators. Are efforts to improve water/soil/atmosphere, or to improve the basic living conditions of people or biota working or not? At which scale? How can we make predictions? What chronic changes may affect people and the environment in the future and how can one obtain early warnings? Most reliable answers can be gained by examining well-documented lessons extending over time, space and ecosystems, lessons learnt from quantitative data obtained through monitoring and synergy among compatible institutions and data archives. EON can provide this.

Conditions for EON in Africa

EON is developing according to African needs and capabilities. Few African countries have national research councils or science and technology ministries mandated to fund or otherwise directly support research institutions, even government research departments operate in conditions of serious financial shortage. Where fully-fledged councils do not exist (this applies to all southern African countries except South Africa), networks tend to be based on associations between institutions. Furthermore, because there are so few African researchers, collaboration and innovation are crucial to achieving the challenging goals set by the agenda. Government does support research, but this is largely by recognition and endorsement. Government also plays an important role in planning and outsourcing commitments resulting from the ratification of environmental conventions, largely donor-funded. The focus of such funding is on furthering sustainable development directly; the fundamental role of EON lies in monitoring the effects of such support.

Country	ILTER member	Own government funding	Developing country EON	EON centres
Botswana	N	N	Y	Y
Kenya	N	N	N	Y
Mozambique	N	N	Y	Y
Namibia	Y	N	Y	Y
South Africa	Y	Y	Y	Y*
Tanzania	N	N	Y	Y
Zambia	Y	N	Y	N
Zimbabwe	N	N	N	N

*Updated since *South African Journal of Science* publication.

Table 1. Current status of ELTOSA members in December 2002 indicating whether or not (Y/N) they are ILTER members, have government commitment for funding, are actively developing a country network, and have declared EON centres.

Publications

Recent Publications of the LTER Community

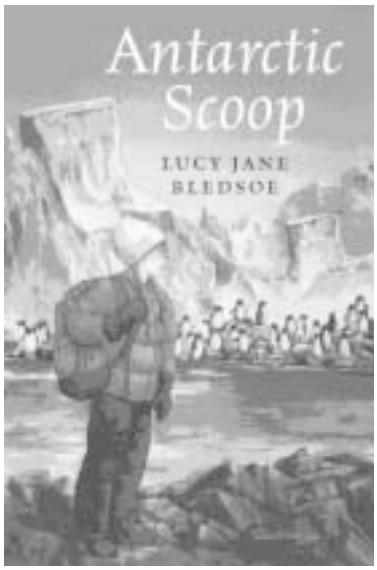
Palmer LTER Site Participates in Publication of New Children's Book

by Dawn Rawls, Palmer LTER

Fiction can be an important tool for engaging a student's interest in scientific subjects. When research scientists and the author collaborate during the early developmental stages of creating fiction, the reader's experience of the underlying science is greatly enriched.

The Antarctic Scoop by Lucy Bledsoe (October, 2003; Holiday House) grew out of the author's visits to McMurdo Sound in Antarctica, and consultations with Palmer LTER investigators at Scripps Institute of Oceanography in La Joya, California, and San Diego Supercomputer Center.

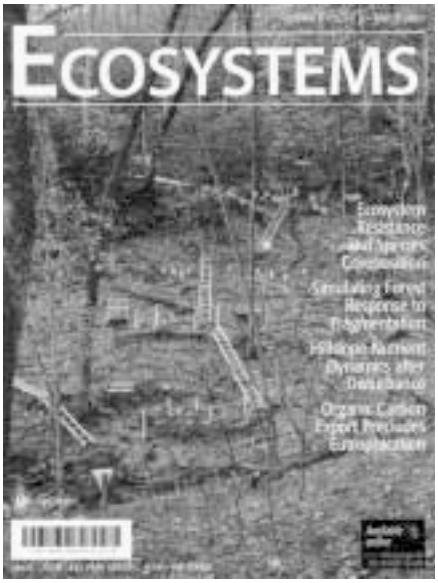
This middle-grades novel features an 11-year-old girl who wins a science contest and the prize is a trip to Antarctica, where she eventually learns that her sponsors have used her to gain access to the science continent. Not only does she expose these foes of science but she solves a problem that has been keeping the South Pole Telescope, built to detect Cosmic Background Radiation, from receiving first light.



This novel for middle-school students grew from Bledsoe's time as the NSF/OPP 1999 Writer-in-Residence in Antarctica. Cover illustration is by Carol Newsom/Artworks, NY.

Coweeta LTER Research Featured on Cover of journal Ecosystems

The March 2003 issue of Ecosystems featured a cover photo from the Coweeta LTER program, based on the article in that issue entitled "Hillslope Nutrient Dynamics Following Upland Riparian Vegetation Disturbance" by J. Alan Yeakley, David C. Coleman, Bruce L. Haines, Brian D. Kloeppel, Judy L. Meyer, Wayne T. Swank, Barry W. Argo, James M. Deal, and Sharon F. Taylor. The article reported on a 9-year study of the effects both of riparian Rhododendron harvest and of hurricane canopy tree wind throw on nutrient and carbon dynamics in an upland watershed at Coweeta.



Microbes Active in Colorado Snows Fuel Tundra Ecosystem

LTER researchers at Niwot Ridge involved in the Microbial Observatories Program have published their results in a recent issue of the journal *Science*:

"Seasonal Dynamics of Previously Unknown Fungal Lineages in Tundra Soils," Christopher W. Schadt, Andrew P. Martin, David A. Lipson, and Steven K. Schmidt *Science* 2003 September 5; 301: 1359-1361

Populations of fungi blanketed by Colorado's snows are more active and diverse than previously thought, and are likely responsible for the productivity of the tundra ecosystem they are a part of, according to these findings.

Christopher Schadt, now of the Department of Energy's Oak Ridge National Laboratory in Tennessee and a former graduate student at the University of Colorado at Boulder, said "the discovery should help scientists gain greater insight into decomposition rates, carbon cycles and the roles of individual fungi in those processes." Surprisingly, the number of active microorganisms in tundra soils, for at least the top 10 centimeters, (about four inches) peaks when the soils are covered with snow.

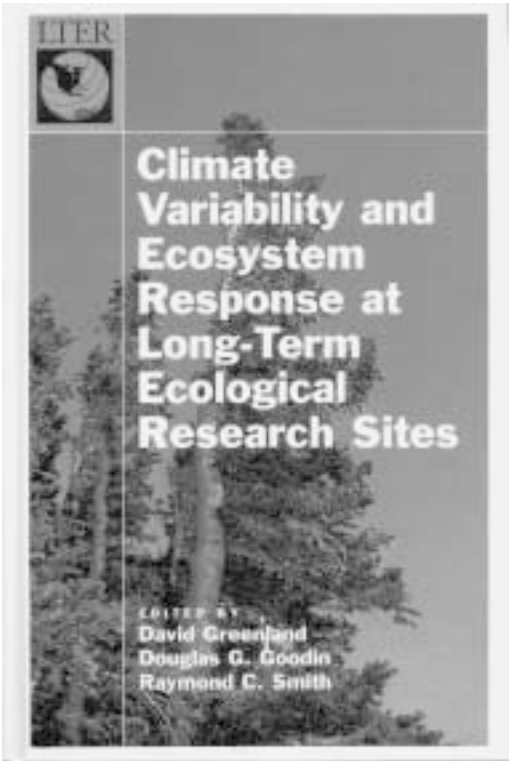
Latest Volume of LTER Synthesis Series Published

"Climate Variability and Ecosystem Response at Long-Term Ecological Research Sites" is now available through Oxford University Press.

This volume is 16 years in the making according to editor David Greenland (Andrews LTER)."It's roots are in the LTER workshop at Niwot Ridge in August 1988." The other editors are: Douglas Goodin (Konza LTER), and Raymond Smith (Palmer LTER).

Several years and meetings later, an outline was agreed upon and a Web page was set up to facilitate collaboration.

"People find the synthesis stimulating and thought provoking," says Greenalnd, following several public presentations of the final chapter of the book.



Publications

Recent Publications of the LTER Community

Florida Coastal Everglades

Busch, D.E. and J.C. Trexler, 2003. Monitoring Ecosystems: Interdisciplinary Approaches for Evaluating Ecoregional Initiatives. Island Press, Washington DC. 447pp.

Anderson, W.T. and J.W. Fourqurean, 2003. Intra- and interannual variability in seagrass carbon and nitrogen stable isotopes from south Florida, a preliminary study. Organic Geochemistry 34(2): 185-194.

Childers, D.L., R.F. Doren, G.B. Noe, M. Rugge, and L.J. Scinto, 2003. Decadal change in vegetation and soil phosphorus patterns across the Everglades landscape. Journal of Environmental Quality 32: 344-362.

Davis, S.E., C. Coronado-Molina, D.L. Childers, and J.W. Day, Jr., 2003. Temporally dependent C, N, and P dynamics associated with the decay of Rhizophora mangle L. leaf litter in oligotrophic mangrove wetlands of the Southern Everglades. Aquatic Botany 75: 199-215.

Fourqurean, J.W., J.N. Boyer, M.J. Durako, L.N. Hefty, and B.J. Peterson, 2003. Forecasting responses of seagrass distributions to changing water quality using monitoring data. Ecological Applications 13(2): 474-489.

Lu, X.Q., N. Maie, J.V. Hanna, D.L. Childers and R. Jaffe, 2003. Molecular characterization of dissolved organic matter in freshwater wetlands of the Florida Everglades. Water Research 37: 2599-2606.

Trexler, J.C. and D.E. Busch, 2003. Monitoring, assessment, and ecoregional initiatives: a synthesis. In D. E. Busch and J. C. Trexler (eds.) Monitoring Ecosystems: Interdisciplinary Approaches for Evaluating Ecoregional Initiatives. Island Press, Washington, D.C. pp. 405-424.

Trexler, J.C., W.F. Loftus, and J. Chick, 2003. Setting and monitoring restoration goals in the absence of historical data: The case of fishes in the Florida Everglades. In D. Busch and J. C. Trexler (eds.) Monitoring Ecoregional Initiatives: Interdisciplinary Approaches for Determining Status and Trends of Ecosystems. Island Press, Washington, DC.

Jornada

V. P. Gutschick and H. BassiriRad, "Extreme events as shaping physiology, ecology, and evolution of plants: toward a unified definition and evaluation of their consequences." New Phytologist, Tansley Review 160:1 (October 2003) Available online: http://www.blackwellpublishing.com/static/tansleyreviews.asp

Kellogg Biological Station

Mulholland, P. J., J. L. Tank, J. R. Webster, W. K. Dodds, S. K. Hamilton, S. L. Johnson, E. Marti, W. H. McDowell, J. Merriam, B. J. Peterson, H. M. Valett, and W. M. Wollheim. 2002. Can uptake lengths in streams be determined by nutrient addition experiments? : Results from an inter-biome comparison study. Journal of the North American Benthological Society 21: 544-560.

Dazzo, F. B., A. R. Joseph, A. Gomaa, Y. G. Yanni, and G. P. Robertson. 2003. Quantitative indices for the autecological biogeography of a rhizobium endophyte of rice at macro and micro spatial scales. Symbiosis 35:147-158.

Elwadie, M. 2002. Spatial and temporal dynamics of nitrogen-water interactions in corn in Michigan. Ph.D. Dissertation, Michigan State University, East Lansing, Michigan, USA.

Grace, P. R., M. C. Jain, L. W. Harrington, and G. P. Robertson. 2003. Long-term sustainability of the tropical and subtropical rice and wheat system: An environmental perspective. Pages 27-43 in J. K. Ladha, J. E. Hill, J. M. Duxbury, R. K. Gupta, and R. J. Buresh, eds. Improving the Productivity and Sustainability of Rice-Wheat System: Issues and Impacts. American Society of Agronomy Special Publication 65, Madison, Wisconsin, USA.

South, S. R. 2003. Identification and mapping of agricultural tillage methods utilizing remotely sensed data. Ph.D. Dissertation, Michigan State University, East Lansing, Michigan, USA.

Fortuna, A. M., R. R. Harwood, K. Kizilkaya, and E. A. Paul. 2003. Optimizing nutrient availability and carbon sequestration in an agroecosystem. Soil Biology and Biochemistry 35: 1005-1013.

Fortuna, A. M., R. R. Harwood, G. P. Robertson, J. W. Fisk, and E. A. Paul. 2003. Seasonal changes in nitrification potential under sustainable management systems. Agriculture, Ecosystems and the Environment 97: 285-293.

Fortuna, A. M., E. A. Paul, and R. R. Harwood. 2003. The effects of compost and crop rotations on carbon turnover in the particulate organic matter fraction. Soil Science 168: 434-444.

Buckley, D. H., and T. M. Schmidt. 200X. Diversity and dynamics of microbial communities in soils from agroecosystems. Environmental Microbiology 5: 441-452.

Six, J., P. Callewaert, S. Landers, S. D. Gryze, S. J. Morris, R. G. Gregorich, E. A. Paul, and K. Paustian. 2002. Measuring and understanding carbon storage in afforested soils by physical fractionation. Soil Science Society of America Journal 66: 1981-1987.

Gage, S. H., J. R. Gosz, and W. Michener. 2002. Site to regional scaling. Pages 37-41 in A. Withey, W. Michener, and P. Tooby, eds. Scalable Information Networks for the Environment. San Diego Supercomputer Center, San Diego, California, USA.

McKeown, C. H. 2003. Quantifying the roles of competition and niche separation in native and exotic cocconellids, and the changes in the community in response to an exotic prey species. Ms. Thesis, Michigan State University, East Lansing, Michigan.

Hanson, E. J., P. A. Throop, S. Serce, J. Ravenscroft, and E. A. Paul. 2002. Comparison of nitrification rates in blueberry and forest soils. American Journal of Horticulture Science 127: 136-142.

Smucker, A. J. M. 2002. Root contributions to soil structure. Pages 1273-1275 in R. Lal, ed. Encyclopedia of Soil Science. Marcel Dekker, Inc., New York, New York, USA.

Harris, C. K., J. Molnar, T. Tomazic, and R. Wimberley, eds. 2002. The Social Risks of Agriculture: Americans Speak Out on Food. Praeger, New York, New York, USA.

Harris, C. K., and C. Bailey. 2002. Public preferences for a clean, green agricultural machine in C. K. Harris, J. Molnar, T. Tomazic, and R. Wimberley, eds. The Social Risks of Agriculture: Americans Speak Out on Food. Praeger, New York, New York, USA.

Smucker, A. J. M., and Y. Kavdir. 2002. Biophysical infrastructures that promote carbon sequestration within soil aggregates. Pages 129-133. Proceedings of the International Conference on Sustainable Land Use and Management. Soil Science Society of Turkey, Turkey.

Kavdir, Y., and A. J. M. Smucker. 2002. Soil aggregate suquestration of cover crop root and shoot residue nitrogen. Pages 134-142. Proceedings of the International Conference on Sustainable Land Use and Management. Soil Science Society of Turkey, Turkey.

Gross, K. L., and R. G. Smith. 2002. Incorporating ecology into agriculture. Trends in Ecology & Evolution 17: 490-491.

Emery, S. A., K. L. Gross, and K. N. Suding. 2003. Summer burning bests controls spotted knapweed (Centaurea maculosa) populations in a Midwest prairie restoration. Ecological Restoration 212: 137-138.

Johnson, N. C., D. L. Rowland, L. Corkidi, L. M. Egerton-Warburton, and E. B. Allen. 2003. Nitrogen enrichment alters mycorrhizal allocation at five mesic to semiarid grasslands. Ecology 84: 1895-1908.

Scriber, J. M. 2003. Plant insect interactions. Pages 912-915 in V. Resh and R. Carde, eds. The Encyclopedia of Insects. Academic Press, New York, New York.

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Augustine, D. J. 2003. Spatial heterogeneity in the herbaceous layer of a semi-arid savanna ecosystem. Plant Ecology 167:319-332.

Baer, S. G., J. M. Blair, A. K. Knapp, and S. L. Collins. 2003. Soil resources regulate productivity and diversity in newly established tallgrass prairie. Ecology 84:724-735.

Bernot, R. J. 2003. Trematode infection alters the antipredator behavior of a pulmonate snail. Journal of the North American Benthological Society 22:241-248.

Bernot, R. J. 2003. Population differences in effects of fish on Physia integra refuge use. American Midland Naturalist 150:51-57.

Callaham, M. A., Jr., J. M. Blair, T. C. Todd, D. J. Kitchen, and M. R. Whiles. 2003. Effects of fire, mowing and fertilization effects on density and biomass of macroinvertebrates in North American tallgrass prairie soils. Soil Biology & Biochemistry 35:1079-1093.

Dodds, W. K. 2003. Misuse of inorganic N and soluble reactive P concentrations to indicate nutrient status of surface waters. Journal of the North American Benthological Society 22:171-181.

Gerlanc, N. M. and G. A. Kaufman. 2003. Use of bison wallows by anurans on Konza Prairie. American Midland Naturalist 150:158-168.

Lett, M. S. and A. K. Knapp. 2003. Consequences of shrub expansion in mesic grassland: resource alterations and graminoid responses Journal of Vegetation Science. 14:487-496.

Porazinska, D. L., R. D. Bardgett, M. B. Blaauw, H. W. Hunt, A. N. Parsons, T. R. Seastedt, and D. H. Wall. 2003. Relationships at the aboveground-belowground interface: Plants, soil biota, and soil processes. Ecological Monographs 73:377-395.

Quist, M. C., P. A. Fay, C. S. Guy, A. K. Knapp, and B. N. Rubenstein. 2003. The influence of disturbance from military training activities on terrestrial-aquatic linkages in a tallgrass prairie ecosystem. Ecological Applications 13:432-442.

Smith, D. L. and L. C. Johnson. 2003. Expansion of Juniperus in the Great Plains: Changes in soil organic carbon dynamics. Global Biogeochemical Cycles 17:13-1-13-12.

Smith, M. D. and A. K. Knapp. 2003. Dominant species maintain ecosystem function with non-random species loss. Ecology Letters 6:509-517.

Tank, J. L. and W. K. Dodds. 2003. Responses of heterotrophic and autotrophic biofilms to nutrients in ten streams. Freshwater Biology 48:1031-1049.

Turner, D. P., D. Urbanski, D. Bremer, S. C. Wofsy, T. Meyers, S. T. Gower, and M. Gregory. 2003. A cross-biome comparison of daily light use efficiency for gross primary production. Global Change Biology 9:383-395.

Webster, J. R., P. J. Mulholland, J. L. Tank, H. M. Valett, W. K. Dodds, B. J. Peterson, W. B. Bowden, C. N. Dahm, S. Findlay, S. V. Gregory, N. B. Grimm, S. K. Hamilton, S. L. Johnson, E. Marti, W. H. McDowell, J. L. Meyer, D. D. Morrall, S. A. Thomas, and W. M. Wollheim. 2003. Factors affecting ammonium uptake in streams - an inter-biome perspective. Freshwater Biology 48:1329-1352.

Wright, V. F., R. L. Huber, and L. C. Hulbert. 2003. Butterflies (Lepidoptera) of Konza Prairie Biological Station: An annotated checklist. Journal of the Kansas Entomological Society 76:469-476.

Calendar

Events of Interest to the LTER Community

26-30 January 2004
American Geophysical Union
2004 Ocean Sciences Meeting
Portland, Oregon
www.agu.org/meetings/os04/

29-30 January 2004
National Council for Science and the Environment
4th National Conference on Science, Policy and the Environment: Water for a Sustainable and Secure Future
Washington, DC
www.ncseonline.org/NCSEconference/2004conference/

15-20 February 2004
Ocean Research Conference
American Society of Limnology and Oceanography
Honolulu, Hawaii
www.aslo.org/honolulu2004

11-13 March 2004
34th Arctic Workshop
Institute of Arctic and Alpine Research
Boulder, Colorado
instaar.colorado.edu/meetings/AW2004/

28-29 April 2004
Spring 2004 Calendar - Events of Interest to the LTER Community
Santa Barbara Channel LTER
Intranet.lternet.edu/meetings

1-6 August 2004
Ecological Society of America
Annual Meeting
Portland, Oregon
http://www.esa.org/portland/theme.html

17-22 August 2004
Fall 2004 Coordinating Committee Meeting
Bonanza Creek LTER
http://intranet.lternet.edu/meetings/
Science theme:
"Interactions of multiple disturbances in a changing climate"

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