

Annual Report of the Long Term Ecological Research Network Office (2007-2008)

Introduction

This report summarizes activities and accomplishments of the LTER Network Office (LNO) during the period March 1, 2007 until February 28, 2008. Along with the survey of sites administered by the Executive Board, this document will be used to facilitate the annual review of LNO performance.

Major Findings

Executive Summary

Organization of the activities of LTER Network Office (LNO) has evolved over time to more closely match the changing needs of the LTER Network. The 2003 LNO Scope of Work, described in the Cooperative Agreement, comprises ten core task areas (see Research and Education Activities above). During the course of strategic planning by LNO and the LTER Network, we have reorganized LNO tasks into four groups of closely related activities: Synthesis, Cyberinfrastructure, Core Services, and Outreach/External Relations. This revised configuration reflects more closely the new research and education goals of the LTER Network as defined in the The Decadal Plan for LTER, and emphasizes the important supporting function that LNO activities play in facilitating Network research and education.

The present report covers LNO accomplishments during the fifth year of the Cooperative Agreement, from March 1, 2007 until February 29, 2008. We organize the findings described in this Executive Summary around our new task structure, and we intend to follow this new organization in the renewal proposal that will be submitted to the National Science Foundation (NSF) at the end of March, 2008. Seventeen of our most significant accomplishments are discussed first, followed by a separate section with detailed specific accomplishments under our four categories of activities.

Synthesis

The Decadal Plan for Synthesis - The major accomplishment of the LTER Network during 2007-2008 was the completion of two key planning documents, Integrated Science for Society (ISSE) and the Environment and the Decadal Plan for LTER (<http://www.lternet.edu/decadalplan>). Together, these documents lay out strategies for an integrated science program for the LTER Network and the scientific community in general. LNO personnel made significant contributions to all aspects of the LTER planning activity, contributing intellectually to the various planning elements (Research, Education, Governance, and Cyberinfrastructure) and participating in writing the planning documents (James Brunt, John Vande Castle, Mark Servilla, and Bob Waide).

Working Groups - The LNO provided \$75,000 to support LTER synthesis activities. The EcoTrends editorial committee received \$10,000 for a meeting to complete work on the book "Our Changing World: An Atlas of Long-Term Trends in Ecological Systems." At the request of the LTER Executive Board, \$65,000 was provided for continued development and implementation of the LTER Decadal Plan.

Science Council - The second meeting of the LTER Science Council (formed as part of the restructuring of LTER governance) took place in May 2007 in Portland, OR. The LNO provided funds for this meeting, during which three working groups focused on primary production, biogeochemistry, and discovery through synthesis. In addition, a workshop on one aspect of the ISSE framework, ecosystem services, was organized by Chapin, Kinzig, and Carpenter at the Portland meeting. Two manuscripts emerged from this workshop, one on biofuels and one focused on synergies and tradeoffs in ecosystem services. LNO also provided support for this workshop.

Remote Sensing Data for LTER Sites - John Vande Castle was named associate director for the Center for Rapid Environmental Assessment and Terrain Evaluation (CREATE) at the University of New Mexico (UNM), which provided half of his salary for this position. In his new role, John was able to integrate activities of the Center with LTER. One major activity with CREATE was to program scripts and schedule processing for automated data acquisition for all LTER sites within the reception coverage of the Center for MODIS data from NASA's Aqua and Terra satellites. Standard data products have been acquired and archived for 22 of the 26 LTER sites. The system is now nearly operational, and data are available through a link on the LTER remote sensing/GIS web page at: <http://www.lternet.edu/technology/ltergis/> or directly on the CREATE website at: <http://create.hpc.unm.edu/create/lter.php>.

Network Research and Education – The Science Environment for Ecological Knowledge (SEEK) project continued to advance development of software under the Kepler Workflow System. Key successes included the development of code that facilitates the automatic transformation of a conceptual workflow to an executable workflow, code that extended GIS capabilities for exploring ecoregion-based biodiversity data, and code that enhances ontologies, conceptual actors and workflows for ontology-driven composition and validation of scientific grid workflows.

Cyberinfrastructure

Information Management - Cyberinfrastructure Strategic Plan completion – A major milestone was reached this fall with the final submission of the LTER Network Cyberinfrastructure strategic plan as part of the Decadal Plan for LTER. LNO Associate Directors Brunt and Vande Castle played a major role in the facilitation, development, and writing of the Cyberinfrastructure strategic plan and in subsequent efforts to provide initial cost estimates and implementation strategies for the plan.

Network Information System - Metadata Standardization Milestone – The LTER network information system reached an important milestone with regard to standardized

data documentation this summer with the addition of metadata contributions from the two newest LTER sites, Moorea Coral Reef (MCR) and the California Current Ecosystem (CCE). All LTER sites are now contributing metadata standardized in Ecological Metadata Language (EML) to the LTER Network Data Catalog. The LTER Data catalog hosts over 15,500 EML documents searchable at <http://metacat.lternet.edu>. LNO staff contributions, particularly the one-on-one efforts of Inigo San Gil, have made reaching this milestone possible.

Network Information System – EcoTrends Data Delivery Portal – Major advances have been made this year in the design and development of the Network Information System. With NISAC approval and additional funding from NSF, the NIS development team has spent the year on the development of the EcoTrends data delivery system. Work on this system advances and demonstrates the efficacy of several major components of the PASTA architecture (Figure 1). LNO instituted a formal usability review process of the website and administered it to the EcoTrends editorial committee in December 2007. Final adjustments to the website will be made through early 2008.

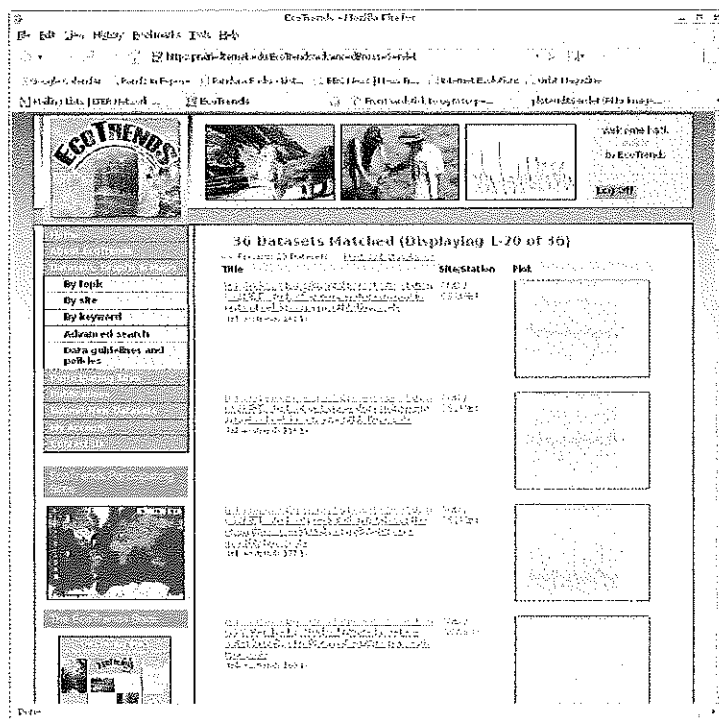


Figure 1 – EcoTrends Data Delivery Web Portal

Network Information System – Data Access Server RFC and prototype - The LTER NIS development team has identified and prototyped a general model for a Network-wide LTER Data Access Policy implementation strategy called the Data Access Server (DAS). The DAS model uses a NIS service that would perform all necessary policy actions, including the pass-through of LTER site data, on behalf of the site. The pass-through process relies on the use of a "proxy" URL in site metadata that point to the DAS, which is hosted by the LNO, instead of the site. The purpose of the DAS is to validate the user credentials, thus confirming their compliance with LTER Data Access Policy, before

allowing access to any site data. The proxy URL has the additional advantage of being persistent in the event that site URLs change. The NIS development team has deployed a minimal proof-of-concept DAS that utilizes data made available for the EcoTrends Project [prototype web](#) application for demonstrating the use of a proxy URL in place of a data URL. While there are advantages and disadvantages, the DAS model is a method for sites to easily take advantage of the LTER Data Access Policy. The LTER NIS Development Team has solicited comments and suggestions for improving this model, and anticipates working closely with beta-sites to evaluate and test the DAS model. A fully functioning DAS implementation is expected sometime during 2009.

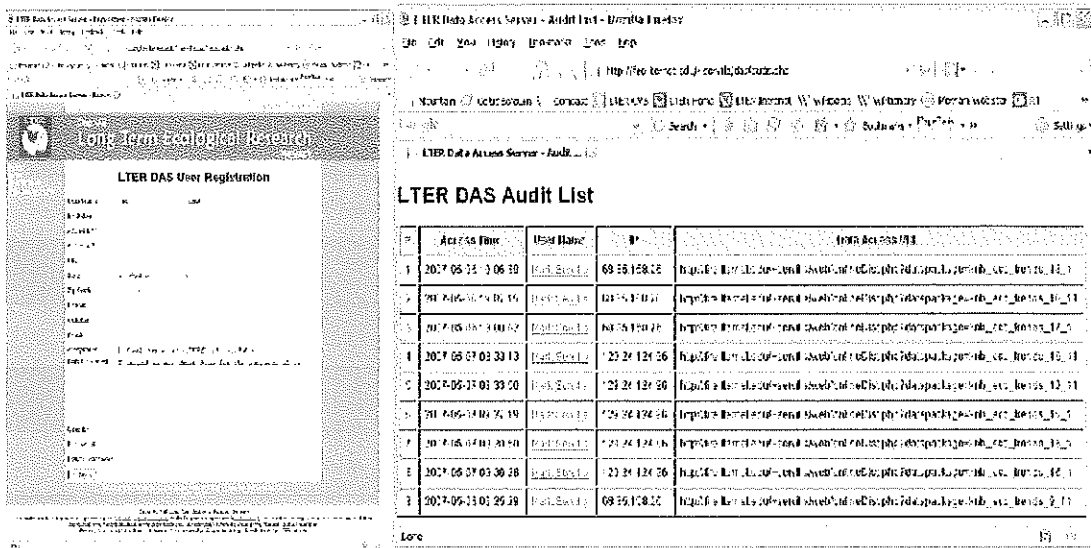


Figure 2 – DAS prototype registration form and audit results page

Basic Cyberinfrastructure Support - New Servers add new capability and security - LNO staff replaced 6 aging servers (7-10 years old) with new multi-processor servers. These servers provide basic support for email, web, database, metacat, archive, authentication and communication, local user directories, and backups. These replacements have allowed us to implement new, more rigorous security policies. These include the use of virus and spam scanners for all LTERnet.edu email communication, restrictive IP filtering for all servers, extensive logging and monitoring capabilities, and the ability to provide greater user flexibility and access to basic services. In addition, the server room and its environmental system are now supported by an emergency backup generator to help us maintain uninterrupted access to LTERnet services.



Figure 3 – New LTERnet System Administrator Dez Wyman

Basic Cyberinfrastructure Support - PVX site license speeds VTC adoption – To speed the adoption of video teleconferencing (VTC) technology within the Network, LNO purchased a 50 seat license for Polycom PVX software and distributed two software licenses and cameras to each of the LTER sites. This hardware and software implementation at the sites moves the LTER Network closer to having VTC capability available to all investigators for use in LTER research efforts. Currently, regular meetings of the Executive Board, the Information Management Steering Committee, and the CI team are being held via VTC. A test of a 13 simultaneous site meeting was held in January 2008.

Core Services

Meeting Support – Staff of the LNO facilitated 32 meetings, working groups and trainings involving 384 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 activities, including meetings of the Science Task Force, the Science Task Force Advisory Committee, Governance, Education, and CI teams, LTER site representatives, and research working groups for each of the Planning Grant research themes.

Persistent Record of LTER Activities - Revision of LNO web page and archive – In response to suggestions from the annual survey of LTER sites, we revised the LNO web page to provide additional functionality and clarity with regard to services provided by the Network Office. In addition, LNO staff reviewed and standardized documents on the

LTERR intranet site and upgraded the search capability of the document archive (<http://intranet.lternet.edu/modules.php?op=modload&name=UpDownload&file=index>).

Preparation of Proposals – LNO renewal – The LNO prepared for the submission of a proposal in March, 2008, to renew the Cooperative Agreement between NSF and the University of New Mexico. LNO staff developed an outline of continuing activities for the proposal and identified elements of the Decadal Plan that required new funding. Logic models were developed for each proposed activity, which identified resources needed and allowed estimation of costs. The LNO worked closely with the Chair and the Executive Board, as well as the Information Management Committee, to insure that the activities proposed address the priorities of the Network.

External Relations/Outreach

Outreach - Developing distributed scientific communities – Deana Pennington received a National Science Foundation CI-Team grant for a 1 year demonstration project late in 2006, and received a grant for a full scale implementation project late in 2007. The project, titled CI-Team: Advancing Cyberinfrastructure-Based Science through Education, Training, and Mentoring of Science Communities, develops a process for mobilizing a group of distributed, interdisciplinary scientists into a community of practice that is able to effectively embed technology-enhanced approaches into their work, and investigates methods for enabling collaborative research design. The project uses a combination of activities informed by creative thinking and problem-solving theory, social science, and organizational learning theory. All activities integrate research with education through problem-based, experiential learning by a community of practice in the context of real problem solving. The project is being conducted with a group of scientists engaged in forecasting the impact of climate, population, and land cover/land use change on plant distributions in the American Southwest, and investigating human and environmental consequences of those changes. The proposed project will partner the scientists with technology and cyberinfrastructure specialists and make use of our best understanding of community learning and innovation theory to collectively discover effective ways to overcome the technical, social, and cognitive barriers to cross-disciplinary collaboration.

External relations – Developing new partnerships – William Michener collaborated with community partners on three major information technology proposal efforts aimed at 1) enhancing the interoperability of data collected and archived by LTER (INTEROP), 2) enhancing data preservation and use across a broad array of biological and environmental research networks (DATANET), and 3) enhancing communications and networking at approximately one-third of the LTER sites, as well as several additional field stations and international research sites (CI STARRED). These proposal efforts advance LTER Cyberinfrastructure involvement and engage LTER scientists in new research and education efforts.

Outreach – Understanding social networking within LTER – James Brunt and Bob Waide participated in a LNO-funded working group led by Robert Christian to examine changes

over time in the strength of social networking within the LTER Network. Social relationships were estimated using data on joint authorship from the LTER Bibliography, which is managed by the LNO. Results from the study show a strong increase in interactions among LTER sites over time (Figure 4). Analysis of the results of this study is underway to provide additional insight for future LTER cooperative projects.

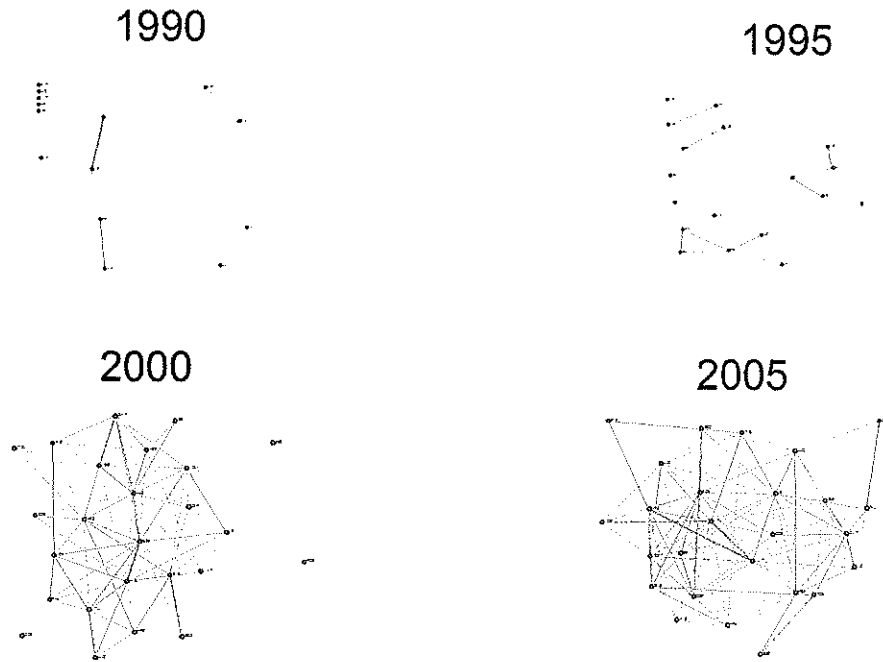


Figure 4. Changes in social networking in LTER over time (Christian et al. in prep)

Additional detail of LNO activities is available in the full report at:

<http://intranet.lternet.edu/modules.php?name=UpDownload&req=viewsdownload&sid=65>.