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# 1997 LTER Network Office Annual Progress Report

Long Term Ecological Research Network

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# ANNUAL PROGRESS REPORT

SUMMARIZING ACCOMPLISHMENTS OF THE LTER  
NETWORK OFFICE DURING THE FIRST YEAR

OF COOPERATIVE AGREEMENT

DEB-9634135

## ANNUAL PROGRESS REPORT

### **Introduction**

The University of New Mexico assumed responsibility for the operation and management of the Long-Term Ecological Research (LTER) Network Office (NET) on March 15, 1997. During the first year of the Cooperative Agreement, a sub-award to the University of Washington provided for continuity in the operation of the LTER electronic communications network including the LTER and International LTER (ILTER) home pages. All activities proposed for the initial year of the Cooperative Agreement are on schedule. The most challenging task during the first year of operation was the transfer of Network Office activities from the University of Washington to the University of New Mexico. This translocation included the recruitment of new staff for all positions but one, the search for an Executive Director, the purchase of

new computer hardware and software, and the transfer of network servers and data bases from Seattle to Albuquerque.. Dr . James Gosz coordinated the functions of the Network Office until Bob Waide was hired as Executive Director in October. A list of major accomplishments since the initiation of the grant is shown below followed by descriptions of progress made in the major areas of responsibility of the Network Office.

- March 15 – Starting date of the grant
- April 22 - Recruitment of Administrative Assistant (Louise Williams)
- **Recruitment of Publications Specialist (Patty Sprott)**
- August 15 - Transfer of John Vande Castle, Associate Director for Technology Development, from Seattle to Albuquerque
- October 6 - Recruitment of Associate Director for Information Management (James Brunt)
- October 15 - Recruitment of Executive Director (Bob Waide)
- January 15, 1998 (anticipated) – Recruitment of Systems Manager
- March 15, 1998 (anticipated) - Recruitment of programmer/analyst

### **Facilitating electronic communication**

One of the principal responsibilities of the Network Office is the development and maintenance of effective electronic communication the among the 20 LTER sites, among ILTER sites and networks, and between the Network Office and LTER, ILTER, and other networks. The tasks associated with this activity include the maintenance of a personnel directory and e-mail aliases for scientists working at U.S. LTER sites, development and maintenance of LTER and ILTER home pages, and support of the hardware and software required for data bases and electronic communication. The time needed to purchase new network servers and recruit a new Systems Manager in Albuquerque has delayed needed updates to the personnel directory and home pages. However, these updates should be well underway by the first anniversary of the Cooperative Agreement.

Transfer of the LTERNET server to UNM required the purchase of advanced hardware and software including (**JAMES AND JOHN: need some help here**). Most of these purchases have been completed. Transfer of the Domain Name from **xxx to xxx** was finalized on **December ??**. During the period of transition, access to LTER and ILTER home pages and data bases has been maintained continuously, and services to LTER and ILTER users have continued uninterrupted. The changeover to the newly-purchased servers should be complete by mid-March, 1998.

The responsibilities of the Network Office for maintaining communication among ILTER networks increased during the past year as networks in Brazil, Mexico, and Venezuela began to come on line. NET personnel have assisted these new networks in determining levels of connectivity desirable for their sites and in selecting appropriate technology. Rudolph Nottrott, and John Vande Castle made presentations and led working sessions on information management and network connectivity at meetings in Foz do Iguacu, Paraná – Brazil (9-13 June, 1997) and the Sevilleta National Wildlife Refuge, New Mexico (1-5 April, 1997 with Mexican collaborators). James Brunt, John Vande Castle, Patty Sprott, Bob Waide, and James Gosz organized and participated in a planning meeting for Latin American information managers at the Sevilleta National Wildlife Refuge (December 6-8, 1997) in which electronic communication was one of the major topics of discussion. NET personnel are involved in planning working groups on connectivity for a meeting scheduled for Puerto Ordaz, Venezuela, in April, 1998. The Network Office has also offered support to the NSF-funded project to develop data management and connectivity standards for tropical field stations being conducted by Jorge Jimenez of the Organization for Tropical Studies.

Projected activities for NET personnel during the upcoming year include:

- A complete review and reorganization of the LTER web site
- An update of the LTER personnel directory
- Addition of graduate students to the LTER personnel directory
- An update of the all-site bibliography, last revised in 1993
- The development of an ILTER personnel directory
- Assistance in the development of home pages for Latin American networks
- Continued negotiations with the Global Terrestrial Observing System (GTOS) for NET to provide assistance in the establishment of connectivity for this network.

### **Facilitating scientific exchange**

The ultimate goal of all activities of the Network Office is to help increase the quantity and quality of scientific studies performed by the U.S. LTER Network and its associated national and international partners. The principal mechanism by which the NET achieves this goal is the facilitation of scientific exchange at all levels of LTER activity. To this end, the NET is charged with the development of activities that enhance the capabilities of LTER Networks and their opportunities to interact. The long-term plan for these activities is still in a formative stage. However, the Network Office engages in a large number of activities that are directed towards achieving the goal of improved scientific exchange. Some of the activities carried out during the first year of the Cooperative Agreement are described below.

## Facilitating exchange within the U.S. LTER Network

- NET distributed packets of information about LTER activities to the two new urban sites. NET staff have offered to assist these sites in their integration into ongoing LTER projects.
- NET facilitated the meeting and will publish the proceedings from the climate standards working group that met at the Seville National Wildlife Refuge from October 2-5, 1997.
- The Network Office will provide support for planning activities for a cross-site study of weathering being organized by Berry Lyons of MCM. The short-term product of this activity will be a proposal to the Coordinating Committee (CC) for a workshop.
- NET staff facilitated the discussion on Climate Variability and Ecological Responses organized by Ray Smith (PAL) at the Santa Barbara Coordinating Committee meeting. We will continue to participate in follow-ups to this meeting being organized by Glenn Juday (BNZ).
- Network Office staff participated in the organization of a discussion of Ecological Applications to Policy and Management held at the H.J. Andrews Experimental Forest.
- Personnel from the NET helped organize and fund CC meetings at Andrews and UC-Santa Barbara.
- NET staff organized Executive Committee meetings at Andrews Experimental Forest and in Albuquerque and Washington, D.C.
- Chris French and Louise Williams helped organize the meeting of LTER graduate students held during the ESA meeting in Albuquerque. One object of that meeting was to familiarize graduate students with opportunities for cross-site studies within the LTER Network.

## Facilitating exchange between the U.S. LTER Network and the national scientific community

- Jim Gosz, John Vande Castle, Bob Waide, and Louise Williams helped organize a joint symposium addressing areas of possible collaboration between the U.S. LTER Network, the Association for Ecosystem Research Centers, the Organization of Biological Field Stations, and the Long-Term Studies Section of the Ecological Society of America. This symposium was held before the annual meeting of ESA in Albuquerque.
- Bob Waide and James Brunt are involved in the preparation of a proposal to the Knowledge and Distributed Intelligence competition of NSF. The goal of this proposal is to develop mechanisms for the rapid exchange of information between sites of ecological research worldwide. Partners in the proposal include the National Center for Ecological Analysis and Synthesis (NCEAS), the Organization of Biological Field Stations (OBFS), and the San Diego Supercomputer Center (SDSC).

- Patty Sprott is preparing a brochure describing research and other activities for each of the U.S. LTER sites.
- Jim Gosz, Patty Sprott, and Bob Waide are participating with the Publications Committee in the development of the Oxford Press book series.
- The Network Office is continuing to develop interactions with NCEAS.
- Patty Sprott, John Vande Castle, and Louise Williams organized an LTER information booth at ESA and distributed information on LTER activities to many meeting attendees.
- NET facilitated the "Math in the Middle of Nature" video filmed at LTER sites

#### Facilitating exchange between the U.S. LTER Network and the international scientific community

- The Network Office facilitated the Latin American LTER workshop in Foz do Iguaçu, Brazil. Jim Gosz, Chris French, John Vande Castle, and Rudolph Nottrott participated in the meeting.
- NET facilitated and helped support ILTER Network meeting in Taiwan in November, 1997. Jim Gosz, Chris French, and Bob Waide participated in the meeting.
- Jim Gosz and Bob Waide initiated a data-sharing effort among members of the East Asia-Pacific Regional ILTER group at the Taiwan meeting. This included participation as a body in the GTOS network.
- Jim Gosz and Bob Waide attended the dedication of the Venezuelan LTER Network in Caracas on September 29, 1997, and consulted with CONICIT about the continued development of their network
- Patty Sprott is preparing a new edition of the LTER book on International LTER networks to be completed for the INTECOL meeting next July.
- The Network Office facilitated 2<sup>nd</sup> East Asia-Pacific Regional ILTER Conference in Tsukuba, Japan
- Chris French and NET staff organized and acquired funds for an exchange of U.S. and Asian student.
- Jim Gosz will represent NET and the LTER Network at the EMAN meeting in Canada in January 1998.
- Staff from the Network Office facilitated 2<sup>nd</sup> U.S.-Mexico workshop at Seville National Wildlife

Refuge and participated in the preparation of a proposal to the Mexican government for the establishment of an LTER network.

- Chris French is collaborating with the ESA International Section to increase participation by U.S. and International LTER networks.

## **Activities Associated with development of ilter**

In the four years since the first exploratory discussions associated with the All Scientists' meeting in Colorado, promotional efforts by US LTER scientists have led to the adoption or consideration of the US LTER network model in many other countries. NSF funding has enabled US scientists to visit countries where there is demonstrated interest in LTER and has facilitated the development of national and regional networks through regional and international meetings of the growing International LTER network. The following is a description of international development activities involving the US LTER Network Office since the start of the Cooperative Agreement in March 1997.

### 1997 ILTER Coordinating Committee (CC) Meeting, Taiwan, November 1997

The NET co-organized this annual meeting with the Taiwanese hosts, arranging the first participation of representatives from newly emerging LTER networks in Mexico, Venezuela and Portugal. In all, 16 countries were represented at this meeting. Schedule conflicts prevented the participation of founding members the UK and Canada, as well as representatives from Israel and South Africa who have expressed firm interest in joining the ILTER community. We sponsored a special presentation by Nancy Grimm of CAP on the theme of Urban LTER, which was of particular interest to several of the highly urbanized Asian countries. During the business meeting, we pressed the ILTER group to begin seriously considering cross-site and international research partnerships.

### ILTER Symposium and 1998 CC Meeting, Florence, Italy

NET staff organized a symposium (to be held at the INTECOL Congress in July 1998) to publicize accomplishments and developments of ILTER networks to a new audience. A majority of LTER speakers will be from outside the US Network. We expect that South Africa and Israel will be represented for the first time at the CC meeting which will take place in conjunction with the symposium.

### East Asia Regional ILTER Meeting, Japan, March 1997

NET staff and several US LTER scientists made presentations on LTER work at this meeting, which was attended by scientists from ten Asian and Pacific Rim countries including Russia and Mongolia. There were discussions of several possible collaborative activities, including exchange visits to LTER sites by U.S. and Asian graduate students.

### Latin American Regional ILTER Meeting, Brazil, June, 1997

Three NET staff made presentations and participated in working group discussions during this first substantive Latin American meeting, which had representatives from six countries. Participants discussed objectives, management issues, site criteria, and infrastructure needs, including information management (IM), for both national and regional networking efforts. They agreed that early attention needed to be paid to IM and connectivity, and that this should be a special theme for the next regional meeting, which Venezuela offered to host. **(See ILTER Web site for more details.)**

Venezuelan Network Inauguration, September 1997

Gosz and Waide accepted the Venezuelan government invitation to participate in the inaugural ceremonies for their network. They met with CONICIT and other officials to discuss LTER management issues, and also met with the PI's of the national sites. Gosz traveled to the field station which will host the next regional meeting and reviewed organizational plans with the leaders of the Venezuelan network and hosts of the regional meeting.

Latin America Information Management Planning Meeting, Albuquerque, Dec. '97

As agreed at the LA regional meeting in Brazil, NET staff hosted a small working group meeting in New Mexico of Latin American Information Managers to develop plans for the major IM component of the upcoming LA regional meeting. This included arrangements to survey existing and needed IM infrastructure in the region, the desirable characteristics of participants, the establishment of a regional IM steering committee, and a time line of tasks to be accomplished prior to meeting in April. The core participants in the December meeting (from Venezuela, Brazil, Mexico and Uruguay) will be the interim IM steering group for Latin America.

US/Mexican cooperative LTER meeting #2, New Mexico, March 1997

NET staff and several US LTER scientists participated in two workshops (January and March, 1997) co-organized by UNM LTER biologists and their Mexican partners. Participants exchanged information about LTER research interests, reviewed management and other issues related to the establishment and effectiveness of a national LTER Network, and drafted plans for collaborative research which will involve LTER scientists from several locations in the US and Mexico. The Mexican participants also completed the first draft of a formal proposal they will submit to their government to seek funding for a Mexican LTER network. Since this workshop, Mexican LTER proponents have broadly disseminated information about these meetings and engaged many other Mexican institutions in refining a national plan for their Network. They will submit these plans to their governmental funding agencies in the near future, and hope to be able to establish a formal network in 1998/

Site Visit to Poland, June, 1997

Gosz and Vande Castle traveled to Poland at the invitation of their national LTER development committee,

and met with potential governmental sponsors as well as Directors and research staff of several of the candidate LTER sites in Poland. In October, the Polish Academy of Sciences formally confirmed the establishment of a National LTER network.

Canadian National Network Meeting, January 1998

Gosz and Magnuson (NTL) have accepted an invitation to attend the upcoming meeting of the Canadian national network, **ERIN(or EMAN?)** , where they will present technical information on the US Network.

Review Team for World Bank Loan to China, November 1997

Gosz (and Wilfredo Franco of Venezuela) visited several LTER sites in China and met with officials of the Chinese Academy of Sciences and Chinese National LTER Network (CERN) as part of a major scientific and management review of the development of CERN.

International Committees at ESA Annual Meeting, August, 1997

A NET staff member attended the business meetings of the International Affairs Committee and the International Activities Section during the ESA conference to explore the opportunities for using these venues to promote further international linkages among scientists interested in LTER. Both groups are quite small and need additional members and volunteer time to have any impact.

## ACTIVITIES INVOLVING LTER GRADUATE STUDENTS

NET staff arranged a two-week long visit in August 1997 to three US LTER sites by a group of junior researchers and ecology students from Asian LTER sites. These included three Mongolians, five Japanese and ten Taiwanese students. US LTER students from the NTL, SEV, and HJA sites arranged excellent programs at their sites, which included research presentations by both hosts and visitors and discussion of possible future visits between sites. We later received enthusiastic reports from both U.S. and Asian students about the value of the visits to their international perspective and professional development. The group also attended the ESA annual conference, where we arranged for them to participate in the meeting of the US LTER graduate student group, and also a meeting/reception held by the Asian Ecology Section of the ESA. Four Mongolian and Japanese visitors stayed in New Mexico for several days and joined local LTER scientists in field research on stream chemistry and on small mammal populations. This sparked serious mutual interest in expanding these US projects into international collaborations with Mongolia and Japan.

NET staff are now working out arrangements for a reciprocal visit by US LTER students to several sites in East Asia, which will probably take place in June 1998

## Other Activities

NET staff members are involved in a variety of other activities directed at promoting international LTER

development and collaboration. One of these, reported elsewhere, was to elicit the agreement of the ILTER Network members to participate in GTOS. Another is the preparation of a new book about the composition and accomplishments of the ILTER Network. NET maintains the ILTER WWW home page with information about future and past meetings and accomplishments of ILTER groups and links to web sites of other ILTER members and international ecological organizations. With information collected this year, we are assisting with the preparation of web pages for foreign LTER groups which do not yet have the capability of managing their own web sites. We will host these pages on the US LTER servers on an interim basis.

Outside of ILTER meetings and WWW dissemination, we have also engaged in discussions about the LTER network model with scientists and managers from South Africa, Israel, Morocco, Portugal, Spain, the Ukraine, and the European Science Foundation. The latter organization approached us recently to express interest in encouraging a scientific network in Western/Central Europe focused on LTER. During and following the ESA and U.S. LTER CC meetings, we have fielded a number of inquiries from U.S. scientists contemplating international partnerships.

## **Promoting information management protocols**

The LTER Network Office (NET) has contributed to several major advances toward the development and use of standards and standard protocols for managing and accessing LTER Network data. These advances have come both through financial support of the work of the LTER Data Management and Climate Committees and direct participation of NET personnel. The development of a prototype of "CLIMDB", an interactive, web-based access system to integrated climate data from all sites, was accomplished through support to the LTER Data Managers and the LTER Climate Committee. Parallel development of the Data Table of Contents (DTC) is the first in a series of efforts aimed at developing a framework for the LTER Network Information System (LTERNIS), which is supported through the work of the data management committee. In addition to these two initiatives, NET personnel are actively cooperating with several national agency/interagency efforts to assure interoperability between the LTER Network and the greater scientific community. Two important efforts this year were the advancement of the NBII metamaker project and the U.S. National Committee for CODATA. In addition, the LTER Network Office has begun a collaboration with the National Center for Ecological Analysis and Synthesis (NCEAS), the Organization of Biological Field Stations (OBFS), NPACI, and others, to develop a proposal to the NSF Knowledge and Distributed Intelligence (KDI) program. This proposal is aimed at further development and dissemination of integrated data and metadata standards outside the LTER Network of sites. Internationally, the LTER Network Office sponsored a meeting in December to develop training in data management for the regional ILTER effort in Latin America.

### **CLIMDB**

CLIMDB is an interactive, web-based, interface to standardized LTER Network climate data (<http://www.limnology.wisc.edu/climdb.html>). The methods employed in developing CLIMDB involved engaging data managers (database expertise) with researchers (data expertise), a relationship, that culminated at a meeting

September, 1997 where the database technology was applied to the climate data standards. These methods are now being refined in such a way that they can be applied to other, more ecologically oriented data sets and eventually become a component of the LTER Network Information System Interoperability Framework (NISIF). The LTER Network Office supported the data management meeting in August and the climate/data meeting in October, 1997 (<http://www.geog.unc.edu/~greenland/CLIMSTAN.html/Default.htm>), which generated the prototype, as well as all the preceding meetings that led to the recent breakthroughs. Plans are now in progress to incorporate CLIMDB, currently supported by the NTL server in Madison, into the NIS at the Network Office.

## DTOC

DTOC is an automated, web-based data catalog for LTER site data sets. It contains a streamlined, standardized metadata set related to each research data set. This information is "harvested" from the site information systems, using similar conceptual methods to those developed in the CLIMDB project. This project provides the groundwork for the implementation of a cross-site, standardized metadata model that would be the backbone of the NISIF. The Data Management Committee, with the support of the LTER Network Office, developed this project which was housed on the VCR site information system. The DTOC has just been moved and is being tested on the LTER Network Office computer system at the University of New Mexico (<http://lternet.unm.edu/~jporter/DTOC/index.html>).

## NBII

The National Biological Information Infrastructure Center for Biological has been in the forefront of developing standards for metadata and tools to manage metadata. The group has recently adopted a superset of the Federal Geographic Data Committee (FGDC) standard that includes biological metadata. They have incorporated the new biological descriptors into their METAMAKER software program. METAMAKER is designed to make it easier for Department of Interior (DOI) researchers to comply with the FGDC standards for spatial data. Metamaker has also been ported to a web-based interface and has an associated metadata clearinghouse. In an effort to maintain compatibility between standards developed and adopted by the ecological community and federal agencies, the LTER Network Office Associate Director for Information Management (ADIM) met with the coordinator of the NBII/CBI metadata effort, Susan Stitt. This meeting helped to further understanding and cooperation between the two groups and open communication channels.

## CODATA

The National Academy of Sciences / National Research Council has sponsored the U.S. National Committee on Data for Science and Technology (CODATA), an interagency committee on managing and integrating scientific data across diverse systems. The LTER Network Office is supporting the ADIM's participation in this year's CODATA meeting to promote LTER-developed standards and protocols in the greater ecological/scientific community, and to keep abreast of other developing efforts including those produced as a result of the FGDC, the Future of Long-term Ecological Data (FLED) Committee, and

NCEAS.

## ILTER Network Information Management

LTER Network Office personnel participated in a data management working group as part of the ILTER meeting June, 1997 in Brazil. This workshop led to the development of a planning meeting that was held in early December in Albuquerque hosted by the LTER Network Office to prepare Latin American Information Management experts for a data management training effort in Venezuela in April, 1998 ([http://lternet.unm.edu/ilter/latin\\_america/im](http://lternet.unm.edu/ilter/latin_america/im)). The April meeting will bring together data managers from LTER sites all over Latin America. This meeting will lay the groundwork for developing international standards for data exchange and interoperability and will provide exchange of information that will be valuable to the developing ILTER networks.

## FUTURE DEVELOPMENTS

Activities for the coming year will focus on development of the Network Information System Interoperability Framework. This framework will provide the protocols and procedures for "plugging in" LTER site information modules into the LTER Network Information System. In February, 1998 NET will support a planning meeting of the LTERNIS working group and computer scientists at Oregon State University that are interested in furthering collaboration on the LTERNIS "centributed" database concepts. Organizational activities have begun towards developing the Nitrogen Dynamics module for LTERNIS and discussions are in progress on other LTER Network data areas for integration. All these efforts include the implementation of broad metadata standards and will require continued support of the Data Management Committee and various NIS working groups in cooperation with key LTER Network Office personnel.

## **Encouraging new technologies**

The largest effort regarding technology development of the LTER Network Office (NET) is in relation to the transition of the Office from the University of Washington to the University of New Mexico. Attention has been paid to ensure a smooth transition with minimal downtime, enhancing operations and ensuring that the NET has state-of-the-art equipment for efficient operation. The transition has involved the acquisition and installation of new computer servers, laptops, and peripherals as specified in the NET grant proposal. The equipment includes a pair of quad processor Sun SPARC and MS-NT servers for LTER computer network support and development. Workstation and laptop computer systems for NET staff have also been configured into the LTER Network system. The Network Office is also equipped with CROM recorder, slide scanner and recorder, flatbed scanner, large format plotter, color laserjet, and digital video technologies.

A variety of support for Technology development in the LTER Network included interactions with associated programs such as NASA Mission to Planet Earth. The purpose of these interactions have been to maintain research links between LTER site programs and research efforts within NASA programs. This has included continued support for state-of-the-art instrumentation including sun photometer deployment and

data processing for six LTER sites (AND, NTL, VCR, BNZ, MCM, SEV) as well as acting as a contact point for LTER sites with NASA's associated "AERONET" program. This interaction is documented on the LTER home page at <http://www.lternet.edu/nasa>. The LTER Network Office has also supported an affiliated project on atmospheric correction of satellite data, documented at <http://www.lternet.edu/nasa/atmcor>. Both of these projects have been integrated with planned LTER "MODLERS" interactions, including support from NET at NASA "Global Landcover Test Site", "NASA SWAMP Validation Workshop" and "Field Test Site" meetings (<http://eospsa.gsfc.nasa.gov/validation/valinfo.html>). NET also helped with support for the NASA "PROVE" field campaign (the first test site field validation effort for NASA future EOS programs) at JRN/LTER which arose from ATM COR project interaction. This included ground truth data collection work with associated LTER researchers Carol Wessman and Greg Asner (Niwot LTER).

Interaction with the NASA Oak Ridge Distributed Active Archive Center has enhanced other LTER/ NASA collaboration, in particular the LTER Information Management group. Future technology developments will be incorporated into the LTER world wide web pages ("<http://www.lternet.edu/technology>") by providing a single contact point for new technology issues both at the LTER Network Office as well as individual sites and associated research groups. A reorganization of the LTER Technology Committee is currently underway to evaluate and coordinate new technologies for the LTER program

## **Developing linkages with other long-term research programs, site networks, and science and technology centers**

The Network Office served as a point of contact between AERC, OBFS, and LTSS for the development of the joint symposium at the ESA meeting in Albuquerque. NET is discussing the possibility of future collaborations with NCEAS, an exercise which is leading to the development of a joint KDI proposal with NCEAS, OBFS and SDSC. Staff of the Network Office has taken the lead in interactions with GTOS, which may lead to a formal arrangement for NET to handle arrangements for e-mail connectivity within the GTOS network. In addition, the Network Office has facilitated the applications of the LTER Network and the East Asia-Pacific and Latin American Regional ILTER Networks for membership in GTOS. Bob Waide will represent the LTER Network at the science conference to be held by the Global Change and Terrestrial Ecosystems (GCTE) and Land Use/Cover Change (LUCC) Core Projects of IGBP in Barcelona. Jim Gosz and Chris French have organized and obtained funding for a symposium on long-term research to be held at the INTECOL meetings in Florence in July, 1998.

## **Promoting the relevance of long-term research**

Nearly all of the activities of the Network Office could be viewed as promoting the relevance of long-term research. However, some accomplishments in particular have been directed towards promoting a greater awareness in the scientific community and the public regarding the importance of our mission. These include both research and educational activities.

- Organization of the jointly-sponsored LTER, OBFS, AERC, and LTSS symposium at ESA provided a forum for discussions of the application of long-term research.
- Interactions with OBFS have been oriented towards developing an appreciation of long-term research and the need for data management at ecological field stations.
- Discussions with GTOS have been directed towards coordinating the goals of our two networks.
- Publications of articles about long-term research (e.g., article by Jim Gosz in Trends in Ecology and Evolution) help to bring the accomplishments of the LTER Network to a larger audience.
- Development of a symposium on "Planning for Urban Systems" for the upcoming ESA meeting demonstrates that the LTER Network is on the cutting edge of this important area of study.
- Planning for a symposium at the INTECOL meeting in Florence will provide an international forum to stress the importance of long-term research.
- Promoting a meeting on long-term research in the Antarctic scheduled for Christchurch in 1998 will extend the ILTER efforts.
- Facilitation of the development of a video on biodiversity studies at LTER sites will provide access to a large segment of the public.
- Facilitation of the "Math in the Middle of Nature" video filmed at LTER sites will emphasize the importance of long-term research to grade school students.

## **List of publications, presentations, organizational workshops, and technical reports**

### **Projected budget – FY-1998**

### **FY-1997 Financial report**

### **UNM Cost-sharing report**

### **UCSD sub-award budget and justification**