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Ft Collins

**National Workshop to Develop K-12 Student-Scientist Programs and Partnerships
at the Long-Term Ecological Research Sites**

a proposal for supplemental funds to the National Science Foundation
Dr. Bruce Hayden, Division Director, Environmental Biology
Dr. Trish Morse, Program Director, EHR

on behalf of the
Education Committee of the Long-Term Ecological Research Network
Diane Ebert-May, Chair

Supplement to Slice of Life grant DUE 9254280
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Historically, the institutions involved at the various Long-term Ecological Research (LTER) sites have participated in a variety of educational activities in graduate and undergraduate education. While LTER sites provide research opportunities for scientists and students at universities and colleges, the concept of long-term research has not been applied widely to K-12 educational systems. The National Science Education Standards (NRC 1996) advocate that all students should develop abilities necessary to do scientific inquiry and understandings about scientific inquiry. In order to accomplish this, the number of teachers with a substantive background in science must increase and students from all socioeconomic backgrounds must have equal opportunities to learn and pursue substantive science throughout their elementary and secondary school years. Scientists have the potential to help teachers and students achieve these goals.

In the past there has been no cohesive national or regional effort to link goals of long-term ecological research with long-term systemic change in education. For example, although many secondary school and community college teachers and students participated in summer research institutes during the International Biological Program (IBP), there was no attempt to connect their experiences in "doing" science with the curriculum in their schools. Hence, the majority of students and teachers in schools today remain uninformed about any of the long-term ecosystem studies being conducted by interdisciplinary teams of scientists.

Recently, the NSF began to address this need by developing Student and Scientist Partnership Programs (SSPs) which are "inquiry-based projects that involve strong collaborations between students and scientists and are mediated by innovative classroom teachers. The basis for these partnerships is to address the need for better science education while also creating new opportunities for scientific research" (Morse 1997).

The LTER network can interface with the goals of the SSPs programs and other EHR initiatives in numerous ways. At the K-12 level, the LTERs can inform the non-

LTER audience through programs that can be developed which involve scientists and teachers “doing” science with students in their local ecosystems. Teacher-scientist research partnerships at LTER sites can provide a comprehensive and cohesive focus for teachers to “do” science as well as participate in long-term data collection in the field and shared via computer. Partnerships with scientists-science educators-teachers can lead to substantive reform of school science curricula so that students experience inquiry approaches to learning science. The broad goals of the LTER Network and the National Science Education Standards can be articulated through the partnerships we propose to develop through the LTER Education Committee.

The concept for this supplementary proposal evolved, in part, from communication and exchange of ideas by many committed individuals who have worked with the leadership at LTER and NSF. In general, we would like to participate in a large-scale effort to maximize the potential of LTER sites as learning environments that extend to students and teachers in K-12 schools, as well as to all members of the higher education community, undergraduates, graduate students, post-doctoral students, and faculty.

Therefore, we propose to work as the LTER Education Committee to accomplish the following:

- 1) Serve as an Education Committee to plan a national workshop that will include LTER education representatives, experts in K-12 science education, investigators who have effective K-12 science programs in place, and other national science education leaders.
- 2) Design and implement the workshop designed to accomplish the following:
 - discuss and share information about the status of science education activities, including student and science partnerships, at regional and national levels;
 - develop plans to enhance existing efforts and/or start new initiatives to improve pre-college science education through LTER sites;
 - promote continuing involvement of professional ecologists in pre-college education;
 - develop a network and support system for all LTER K-12 and undergraduate education activities;
 - design assessment and evaluation of educational activities of all participating LTER sites that would be electronically archived.

The workshop would be designed to guide discussions toward the development of action plans for educational programs by teams from the various LTER sites. The following goals from the Education Committee, and others that have not been included, would serve as focal points for small group interactions at the workshop.

- Establish long-term research sites at schools that serve as the connecting point for K-12 teachers, students, undergraduates, and scientists to collaborate on research.

- Implement teacher enhancement programs for K-12 teachers that build on the SSPs model. These programs would provide teachers opportunities to learn how to conduct long-term research at LTER sites, and then to work with their students to investigate relevant problems at their schools that are connected to LTER research interests.
- Design cohesive and continuous curricula and materials for K-12 schools to provide all students (at their level) opportunities to understand and ultimately participate in long-term ecology research.
- Learn about and utilize existing approaches and methods of partnerships that provide frameworks and evidence of effectiveness (e.g. GREEN Global Environmental Education Network-Ken Wheeler; Monarch Watch - Karen Oberhauser; Birdwatch - Rick Bonney; GLOBE data interface - Ted Haberman).
- Develop connections with exemplary curriculum and teacher enhancement projects lead by individuals such as Boris Berenfeld (Global Laboratory, TERC) and Bob Tinker (Microcomputer-based Laboratories - Concord Consortium).
- Develop and maintain LTER educational websites that target both educators and students, and facilitate the use of internet and web sites to share School LTER data.
- Facilitate the development of school LTER programs that promote reform of school curriculum with the National Science Education Standards by engaging students and teachers in the kinds of measurements and experiments that promote inquiry through collaboration with the LTER partnership.
- Develop materials, (both electronic and printed) about the LTER activities for outreach and promotion of the student-teacher-scientist partnerships.
- Develop models of assessment and evaluation for K-12 and LTER programs.
- Facilitate the development of inexpensive scientific tools and techniques for use by K-12 school and LTER sites.
- Develop sustainable funding for K-12 teacher programs and school participation.

Post-Workshop Activities

After the workshop, Education LTER Committee Members would be available to assist LTER sites with further development and implementation of educational partnership models at each site. Funding for the follow-up would be available if the Committee decided to eliminate the June meeting, reduce the number of participants in the National Workshop, and/or could identify a location for the national meeting that is less expensive than the estimate below. Other possibilities for additional funding will be pursued.

Budget and Budget Justification:

The supplemental funds would be used as participant support costs for travel and per diem expenses for participants in National Workshop and preparation for the workshop by Education Committee members.

National Workshop Summary Budget

September, 1998.

Location: Ideally an LTER site that is close to an airport e.g. Mountain Research Station 45 participants (includes LTER teams of 3 from different sites, each team composed of 2 scientists, 1 K-12 teacher; 4 national experts; and LTER Education Committee Members).

The budget will fluctuate depending on the number of people and location. The estimate below is based on a Shaping the Future Workshop for Directors of SMET Centers I held recently at the Biosphere 2 Center, Oracle, AZ.

Budget for National Workshop

F. Participant Support		Request
F.2 Travel	Approx \$500 per person	\$22,500
F.3. Lodging	2 nights @ \$80 per night = \$160 per person	\$7,200
F.3. Meals:	3 days, b/l/d @ \$50 per day = \$150 per person	\$6,750
F.4. Conference rooms rental:	2 days @ \$175	\$350
G.6. Honoraria for workshop experts (e.g. R. Bybee, C. Lenk, B. Means, A. Champagne)	\$465 per person x 4	\$1,860
	Total for National Workshop	\$38,660

Budget for Education Committee
 (based on estimate of 7 members participating)

Meeting 1: April 22-25, 1998. Steering Committee Meeting in Ft. Collins.
 Meeting 2: June, 1998. Location to be determined. Meeting of Committee representatives to finalize plans for the national workshop. Activities include plans for recruitment, agenda, facilitators, action plans, evaluation)

F. Participant Support		Request
F.2 Travel - two committee meetings or one committee meeting and visit to LTER site	Approx \$500 per person X 2 trips x 7 members	\$7,000
F.3. Lodging	2 nights @ \$80 per night = \$160 per person x 2 trips x 7 members	\$2,240
F.3. Meals:	3 days, b/l/d @ \$50 per day = \$150 per person x 2 trips x 7 members	\$2,100
	Total for National Workshop	\$11,340

Total Request: \$50,000