Supplemental Proposal for Schoolyard LTER program
to NSF DEB-9211776 for FY2001


Introduction

The NWTLTER has carried out a K-12 outreach program from 1998 through 2000 by collaborating with existing programs for children in the Denver/Boulder area and by working specifically with the Boulder Valley School District. The conceptual theme of the outreach is the connection between the alpine systems in the mountains and the communities of the Rocky Mountain Front Range. These communities are located at the intersection of the Great Plains and the Rocky Mountains, and have been expanding in population and development. We have found that in elementary and middle school years, children are particularly receptive to environmental education that emphasizes discovery, exploration and empathy with their local environment. As discussed by D. Sobel in his text "Beyond Ecophobia", a locally based approach to educational education is more effective in both conveying ecological concepts and developing empathy than are approaches emphasizing more distant and abstract environmental crises, such as destruction of rain forests. We have used these approaches as the educational basis for our outreach program.

Here, we propose to continue involving teachers from the Boulder/Denver area in our current K-12 NWTLTER outreach program by building on the program we have implemented over the past three years.

Current K-12 Outreach Program

The NWTLTER has an outreach program to elementary and middle school students in the Boulder/Denver area through a collaborative effort with Science Discovery (1998-2000) a local program based at the University of Colorado, Bixby School (1999-2000) in Boulder, and Wild Bear Science School (1999-2000) in Nederland, a mountain town located near the Mountain Research Station (MRS). The age range of the children is 5-12 years and the group size is 12-18 children, with 4-6 scientists and student teachers as leaders. In the summer 2001 we will expand our program to include a group of middle school students from Longmont, a city north and east of Boulder. Each of these programs and schools serves children with different backgrounds and interests. Science Discovery offers a wide range of summer science programs for children, including one-day programs, one week classes based in Boulder and one-week field trips within the Rocky Mountains. The program with Science Discovery offered two Saturday field classes in conjunction with our NWTLTER program, one for elementary and one for middle school children. Bixby School is a private elementary school that uses an experiential theme for all their classes during the academic year and the students attending Bixby School in the summer have been in an informal experiential learning environment. Bixby teachers integrate the students' experiences from the field trips to the MRS into subsequent activities during the school year. The Wild Bear School has a two-week session for elementary students on an ecological theme, and a one-week session for middle school students. These students are primarily from the mountain communities. The field trip to the MRS is integrated into the middle of the program for each week of these classes, as a component that emphasizes observations and recording by sketches and note taking. The program in Longmont is targeted for “at-risk” middle school students who can benefit from learning through formats outside a typical classroom.

All of these field trips are coordinated with a MRS summer course- “Elementary Education in Alpine Ecology”. 5-15 students have taken this course each year, with about half of the students being in-service teachers. The course is taught by NWTLTER scientists (e.g. Diane McKnight, Susan Sherrod and Hector Galbraith) and by Dr. Jane Larson, an expert in science education from the College of Education at the University of Colorado. In July 2001, Hector Galbraith, Diane McKnight and Jane Larson will teach the class. As the service learning aspect of the summer course, the undergraduate and graduate students, along with the course instructors, lead the field trips described above. In some cases, the instructors from the school programs participate as well. Prior to leading the field trips, the undergraduate students lead “practice” field trips with children of friends and colleagues at the University of Colorado.

Field Trip for K-12 children to the Tundra Laboratory- Although all of the school programs involve a field trip with the children to the MRS, including a hike with activities to the Tundra Laboratory and the snow fence experiment at 11,500 ft., each trip is tailored to match with the background and interests of the particular group of children. A common feature of all the field trips are chance encounters with NWTLTER and other scientists in the field on the way up and back down from the Tundra lab. In these encounters the scientists explain to the children what they are doing in their measurements and experiments. The basic elements of the field trip are described below. The duration of the field trip is about 6 hours from time of departure from the Marr Laboratory at the MRS. The distance of the hike is about 1.5 miles one way. We have found that some energetic 4-5 year olds can easily complete the trip, but some children unaccustomed to high elevation can become tired towards the end of the trip. We are diligent about having the students drink fluids and take rest stops, and with a 4-6 leaders of the trip can adjust as necessary. This basic trip has also been used with teacher groups visiting the MRS, and can be adapted for high school students:
Outreach to Elementary Teachers

A major use of the funds provided by this supplemental proposal has been and will continue to be for stipends to support the participation of current elementary school teachers in this program. We are now enrolling teachers for the coming summer program (July 2001) and will use funds to enroll teachers for the summer program in the subsequent year (July 2002). We will support the teachers for a month while they take the MRS class. We propose to use the supplemental funds to offer stipends to seven teachers. We have found that providing stipends greatly encourages participation by teachers. We expect that the interest in the outreach program in future years will also be sustained by word of mouth based on the experience of the teachers who have participated in the course. The other use of funds is for van rental for transporting the students in the class from Boulder to the MRS, and for van rental for the teachers who have taken the MRS course to bring their own classes to the MRS either in the early fall or late spring. The provision of resources for transportation to the MRS greatly helps the teachers plan for the field trip.

With funds provided by an additional previous supplement we are also providing computers to the teachers who have participated in the class. This allows the teachers to access the NWTLET database and use other materials with which they became familiar during their classes during the school year. For example, the teachers can access the images from the Tundracam, a camera located at the top of the Tundra lab that provides continuous images of the surrounding alpine area and can be steered by remote access over the web.

Outreach to Middle School Students and Teachers

We have conducted an additional outreach activity that more directly reaches middle school students. For the past two years INSTAAR has held an event in which 400-500 middle school students come to INSTAAR for a half-day of lab tours and a science lecture. As part of the INSTAAR event in the fall 1999 and 2000, NWTLTER scientists conducted 5 sessions of an activity for the students at Boulder Creek (located two blocks from INSTAAR) in which we demonstrated methods for stream flow measurement, water quality sampling and measurement, and collection of aquatic biota, and discussed the connections between Boulder Creek as it travels through the city and its origins in Green Lakes Valley. The activity is completed in about 45 minutes, with stops at 3 stations along the creek. The activity at the creek is followed by a tour of the limnology laboratory at INSTAAR, including looking at algae in a microscope. Some of the students who took the middle school Science Discovery class had participated in the field activity at INSTAAR. From this activity, one middle school student conducted a science fair project with a NWTLTER graduate student, and she won an award at the state competition. We plan to continue this activity in the Spring 2001.

Summary

During the summer and fall of 2000, the involvement of elementary and middle school students in NWTLTER outreach activities was as follows:

- Summer field trips to the MRS: 12 groups, about 180 children
- Field trips by teachers with their classes: 4 classes, about 120 children
- Field sampling exercise in Boulder Creek at INSTAAR for middle school students: about 300 students

Because we provide teacher training and computer resources, all of these activities involve some continuing opportunities for in-class involvement by the teachers and the students. The resources requested in this supplement will sustain this program. The approach has applications to other communities in the Rocky Mountain Region.