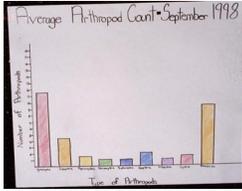


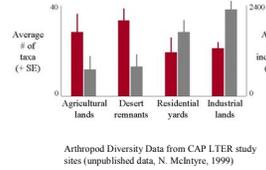
Program Beginnings

- CAP LTER engages the K-12 community in ecosystem research through the Ecology Explorers program. Students and teachers across the Phoenix metropolitan area are collecting data on insects, birds, and plants, and testing hypotheses about the impact of urbanization on their local ecosystem. This approach not only encourages scientific literacy, but also contributes to the long-term monitoring of our desert city.



Arthropod Diversity Data from Brimhall Junior High

- One goal when developing the education outreach component of the CAP LTER project was to link scientists with the K-12 community. Based on conversations with teachers and scientists, we decided to encourage students to collect data similar to that being collected by researchers with the CAP LTER project. We chose studies that were technologically simple so that any teacher could contribute easily to the project. We selected CAP LTER population studies because they used simple, easy-to-find material, covered content required by our state science standards, appealed to students and teachers, and would result in valuable data for the scientists.



CAP LTER researchers are conducting population studies of birds, arthropods, and plants on a large scale across the Valley and on smaller scales at various area schools. The CAP LTER study site encompasses many square miles, and our research teams can focus on only a few sample sites. In contrast, schools are scattered throughout the Phoenix metropolitan area and are associated with different neighborhoods and landscaping practices. The addition of data from these diverse habitat sites could double and triple the number of sampling sites for each project. In addition, our desert climate allows schoolyard projects to be carried on throughout the year, allowing teachers more flexibility incorporating our program into their curriculum.

Schoolyard studies

- The schoolyard studies are relatively simple, allowing students to collect reliable bird, arthropod and plant data, particularly at the middle and high school levels. Students conduct point count surveys at various sites around their schoolyard for the *bird* survey; collect ground arthropods through pitfall trapping and then identify them (to Order) for the *arthropod* survey, and map, identify, and measure plants in their schoolyard for the *vegetation* survey. Finally, the *plant/insect interaction* study focuses on the effects of urbanization on bruchid beetles and their host tree, the blue Palo Verde. Blue Palo Verde trees (and bruchid beetles) are native to the Sonoran desert and are quite common in city and residential landscaping. Students monitor the bruchid beetle populations of their local Palo Verde trees by counting emergence holes on the trees' seedpods.



Students collecting Palo Verde seedpods



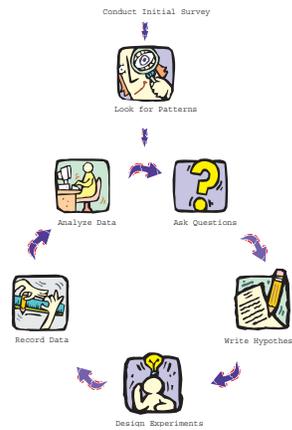
Students collecting arthropods from pitfall traps



Students working with Dr. Nancy McIntyre



Teachers collecting pitfall trap contents



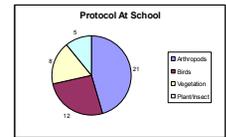
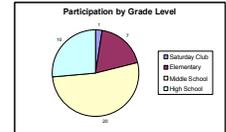
Teachers in the Researcher's World

- Linking teachers with the CAP LTER researchers was important to enhance teachers' understanding of the research project and to give them confidence in collecting reliable data with their classes. In the summer of 1998 and 1999, we sponsored internships for teachers to work with one of the population research teams. The 1999 internships included a 2-day workshop on CAP LTER and scientific inquiry in the classroom followed by internships in research labs. The internship also incorporated planning time with CAP LTER education professionals on how to incorporate real research into their curriculum.



Dr. Tim Craig and his undergraduate research student working with teachers

- In 1999, 19 teachers participated in our program, 8 more than in 1998. Additional teachers have come into our program through other Center for Environmental Studies' programs. For example, our CES education liaisons work with teachers interested in developing native habitats at their schools through a partnership with the Southwest Center for Education and the Natural Environment, some of whom have become interested in contributing to the population studies. Also, an intensive CAP LTER sampling project to characterize 200 randomly selected points across the Phoenix Metropolitan Area has brought 5 more schools into our project, including a charter school and the Phoenix Day School for the Deaf. Currently 37 teachers at 28 schools (encompassing 10 school districts) and one entire K-8 charter school participate in the project.



Technology

- Students are linked to other schools and to the CAP LTER scientists through the data entry and retrieval portion of our Web site. The Web site clearly outlines each of the protocols and provides teaching guides through downloadable PDF files. We also have a data page that allows students and teacher to download data sheets (PDF files), enter their data into the CAP LTER database, and retrieve their data (as well as data from other schools). We are currently working to enhance the site's data entry, retrieval and analysis features. Students may also use the "Ask-A-Scientist" feature to get direct feedback from CAP LTER scientists.



Future

- We will continue to develop protocols that focus on the schoolyard as an ecosystem. The sampling protocols created for our long-term core monitoring effort, the CAP LTER 200 point survey, may be modified for school use. We are also working with one research team to develop a protocol to monitor landscape water use and impact on plants.



Teachers working with seedpods

Community

- Linking teachers to other community resources is important to the overall project. To this end, we have contacted local informal education facilities to host "focused field" trips in which students from Ecology Explorers could conduct population studies in different habitats or reinforce ecological concepts students gain from their local schoolyard studies.



Field Trip to Usery Mountain Park

"This research is exactly what I've been looking for. It will provide relevance to the curriculum. Thank you."—CAP LTER Teacher