

Backyard Ecology



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High school students participate in urban ecological research

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When secondary science teacher Birgit Musheno signed up for a summer internship studying birds with Arizona State University (ASU) researchers, she had no idea it would lead to such exciting opportunities for her high school students. Her work at ASU allowed her high school students to participate in urban ecological research at a local university, connecting them to the academic research process and their community.

Ecology Explorers, the community education component of ASU's Central Arizona-Phoenix Long-Term Ecological Research (CAP LTER) project offers teacher internship programs that link university researchers, K-12 teachers, and students in studying urban ecology. The Phoenix metropolitan area is a rapidly expanding city located in the Sonoran Desert, and scientists from the project are studying the impact of urbanization on this ecosystem.

Linking teachers and scientists

During the summer internship, Musheno worked with CAP LTER researchers to learn how to identify and survey birds in the Phoenix metropolitan area. By the end of the internship she developed a plan enabling her to incorporate the research project into her honors biology curriculum, meet state science standards, and accom-

plish her own classroom goals by involving students in research on birds found in their own community.

The guidelines for many biology courses list independent research projects as part of the course, but this is not always interpreted as requiring actual scientific inquiry. Musheno was searching for an independent research project feasible for 145 students and wanted something that would allow students to independently collect data over time. She also wanted to involve students in an open-ended project involving the community.

Developing activities

The key component to a successful teacher-student-scientist relationship is the ability of the teachers to translate the process of science research into classroom activities that fit into a traditional classroom setting (Wormstead, Becker, and Conglaton 2002). Musheno developed a timeline (Figure 1) to move her students from understanding the components of urban bird research to developing their own testable research questions to presenting their findings via a poster session.

Students raised a variety of research questions such as: "Does the type of vegetation in a backyard affect the number of birds?" "Does living in an apartment or having a pet affect the number of birds?" and "Will there be

FIGURE 1

Timeline for biology bird research project.

Bird Survey Timeline

Weeks 1–3:

- ◆ Conduct bird survey protocols on school grounds

Weeks 4–8:

- ◆ Conduct backyard bird surveys
- ◆ Learn mapping techniques (pace and space)
- ◆ Learn local plants with help from CAP LTER scientists
- ◆ Form collaborative research teams
- ◆ Develop testable research questions

Weeks 9–12:

- ◆ Collect additional data
- ◆ Analyze and interpret data (using school computing facilities)
- ◆ Organize data and analysis on a scientific poster
- ◆ Present poster to peers and researchers

more birds in a yard with a reliable water source?” These questions were similar to the ones being studied by the university’s CAP LTER scientists, which include: “Which birds are living in the Phoenix metropolitan area?” “Which landscape designs attract which types of birds?” and “Are there different kinds of birds in different urban landscapes (residential, commercial, parks)?”

The generation of the final poster was a major effort for many students—not only did they write insightful lab reports to include on the poster, but they put in a great deal of time to make the final product visually appealing and representative of their personalities. The students had a poster session in which they shared their research with one another. During the poster sessions as students viewed everyone’s completed work, many students were really impressed with the work their peers had produced. Many of the students were sure they had truly submitted their best effort. Some students had posters selected for display at ASU’s Center for Environmental Studies and reviewed by the CAP LTER scientists.

Dynamic ecosystems

One of the challenges in urban ecology is showing that neighborhoods are dynamic ecosystems in the same way that “pristine forests” or “deserts” are dynamic ecosystems (Collins et al. 2000). What did students think about being asked to study birds and vegetation in their own neighborhoods, instead of researching more exotic lo-

cales such as tropical rain forests? According to Musheno it was surprising to see how this project affected the students. “Big, tough athletes” came to her with photographs of birds stored on their digital cameras and wouldn’t rest until they figured out which species they had seen. Students also came in before school to report unusual bird sightings. Other students mentioned how they enjoyed pointing out local birds when they were out with their friends and family after school. For many students, this was the first time they had spent so much time by themselves in their backyards. Much to their own amazement, many students developed a new awareness of and appreciation for the ecosystem in which they live.

By conducting the initial surveys on the school campus, this project generated interest from other students and teachers as well. Students connected with research taking place at the local university and learned that the school was a habitat for all types of creatures, not just humans.

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- Wormstead, S.J., M.L. Becker, and R.G. Conglaton. 2002. Tools for successful student-teacher-scientist partnerships. *Journal of Science Education and Technology* 11(3): 277–287.

Web resources

- ◆ To view lesson plans and a grading rubric for Backyard Bird Research and student posters, visit: caplter.asu.edu/explorers/resources/newsletter/newsletter5/newsletter5.htm
- ◆ To learn more about CAP LTER and Ecology Explorers: caplter.asu.edu and caplter.asu.edu/explorers
- ◆ To learn more about LTER network and schoolyard programs: www.lternet.edu and schoolyard.lternet.edu