No Child Left Indoors - Partnerships between Montana Ecologists, Educators, and Schools

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Abstract: The Ecologists, Educators, and Schools (ECOS) Program at the University of Montana has been building partnerships with K-12 schools and the broader community in western Montana for three years now. To build partnerships for enhancing science education we have focused on 1) translating ecological research for K-12 audiences; 2) matching teacher and fellow expectations to promote successful collaborations in the partner schools; and 3) building infrastructure and learning laboratories for teaching ecology in local schoolyards and open areas, thereby ensuring that resources for teaching ecology outdoors will remain in our community long after our GK-12 grant has ended. Partner teachers have benefited from ECOS by learning more about the nature of scientific inquiry and the field of ecology. UM GK-12 fellows are learning how to translate their scientific research in ways that are easily understood by children and the general public. Local businesses, parents, and community volunteers have been instrumental partners in working with us to turn areas in the play grounds at partner schools into ecological laboratories where learning about the world around us happens outdoors. UM GK-12 fellows have created dozens of curricular materials focused on learning about ecology in schoolyards and local outdoor habitats (www.bioed/org/ecos). And K-12 students have scientist role models to help them learn about ecology and investigate the world around them. Together, we are working to make sure no child is left indoors!

ECOS Objectives

To meet the need for enhanced understanding of environmental sciences in the northern Rockies, the ECOS Program will:

- Develop scientific ways of thinking and understanding in K-12 students through authentic research experiences in their schoolyards and adjacent habitats
- Promote teaching practices focused on "learning by doing" and inquiry instruction for both teachers and future science faculty (ECOS Fellows)
- Develop and model linkages between educators in the K-16 continuum
- Identify project indicators to make the program sustainable at UM, and facilitate transfer to other sites in Montana and around the country
- Ultimately, ECOS will contribute to a national model of how authentic ecological research can be introduced into the K-16 curriculum to enhance the teaching and learning of science.

Transforming Education through Partnerships

Graduate fellows, schools and the community form partnerships that all interact with each other to enhance ecology education.

For example, **fellows have partnered with the schools** in a relationship that has catalyzed the formation of student-written nature guides, science fairs, and other activities. Through this relationship, fellows and teachers also have learned from each other in developing ecological inquiries.

The ECOS program also has allowed **schools to partner with the community** of parents, local businesses and the University of Montana. This relationship has formed connections that might not have otherwise been realized, such as international pen pal programs and collaborations with the U.S. Forest Service and fisheries biologists.

In serving as a conduit in forming these community relationships, graduate **fellows also have partnered with the community** in ways they might not have done outside of ECOS. For example, fellows have formed close connections with Native American tribal governments and schools and learned much about Montana's Indian Education for All Act. Through working on demonstration projects, they have also forged important connections with local organizations, businesses and consultants and have learned from other fellows and university researchers who are studying scientific disciplines other than their own.

These three different categories of partnerships have acted synergistically, so that fellows and schools work together with the community towards the realization of a common goal: transforming ecology education so that it reflects not just the needs of the school curriculum, but the importance of students, teachers, and the community in understanding the world around us. This unique model ensures that **no child is left indoors**.

Fellows and the Community

The Arlee ECOS team is the first to lead a GK-12 program in a tribal reservation school district. The team has developed and implemented ecological inquiries that incorporate local Traditional Ecological Knowledge. It has become an established outdoor classroom for teachers and students to study ecology and environmental biology.
-Matt Corsi and Flo Gardipee

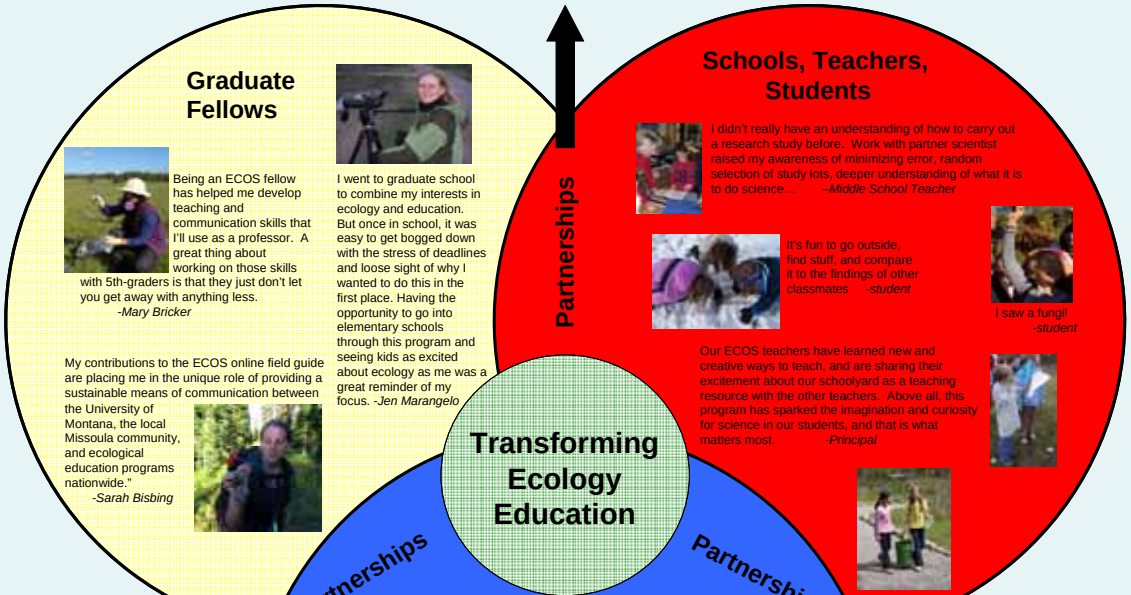
We have partnered with Deborah Lorenzo's Clinton Farms Greenhouse and Nursery. She is a key participant in the logistical planning of greenhouse design. Also, Jon Roske, the president of the Clinton School Board and a professional woodworker, has agreed to provide power tools and manual assistance for our demonstration project.
-Johnny MacLean and Joss McKinnon

Fellows and Schools

We developed a partnership with our ECOS site teachers, Betsy and Christy, to collaboratively teach scientific concepts about weather and climate change, insect behavior and adaptations, riparian processes, and microbial ecology.
-Nate Gordon and Allison Perkins

Fellows and elementary students are working together to create a student-friendly plant field guide for native plants being planted in the schoolyard.
-Mary Bricker and Mike Machura

We are working closely with the administration in organizing the First Annual Clinton Science Fair. This science fair will set the template for future science fairs, which will eventually lead to Clinton students' participation in city- and state-wide science fair competitions.
-Johnny MacLean and Joss McKinnon



Elements of the ECOS Program

What is the ECOS Program? ECOS is a partnership program for enhancing science education in K-12 schools in western Montana by using the schoolyard and adjacent open areas as outdoor laboratories for learning about the environment.

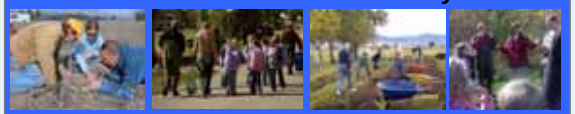
What is the ECOS mission? No Child Left Indoors! Ecology graduate and undergraduate students from the University of Montana are showing K-12 students and their teachers how to use an ecological lens for viewing their schoolyard. Instead of a playground, they learn to see an ecological laboratory filled with organisms with interesting adaptations and interactions. The ECOS teams model what ecologists do by immersing themselves in ecological investigations with their partner school collaborators in their schoolyard and classroom laboratories.

Who is on an ECOS Team? ECOS Teams are comprised of two Ph.D. candidates and one undergraduate from the environmental sciences at the University of Montana, and two lead teachers from the partner school. Each year ECOS supports five partner schools with "ecologists in residence".

What does an ECOS team do? The team works together for an entire academic year to mentor students in ecological investigations, both inside and outside of the walls of the classroom. Teams work together to develop ecological curriculum materials that are well-matched to the habitats in and around the schoolyard, and that meet the recommendations of the National Science Standards for science education. And, the teams provide support for enhancing general science instruction in a school by consulting with all interested teachers.

What is the plan for making a sustainable impact at the participating schools? One activity of the ECOS fellows is the development of *demonstration research sites/laboratories* on the grounds of their "residency" school to provide school-based authentic research experiences for local K-12 students. These projects are designed to 1) take advantage of unique ecological features in a given schoolyard or adjacent "natural area" to develop sustainable outdoor ecological research laboratories, 2) integrate technology, and 3) sustain long-term use of these resources for teaching and learning about science and allied fields in general, and ecology in particular. The projects also serve as models for schoolyard-based ecological research and science education that can be readily transported to other sites and schools, both within and beyond the region.

Schools and the Community



We partnered with the Forest Service to participate in insectary investigations. They have continued their involvement into this school year.
-Hellgate Elementary School

Craig Barfoot, a fisheries biologist for the Confederated Salish and Kootenai Tribes, has radio-tagged several migratory trout in the lower Jocko River. We have been tracking the fates of these fish and mapping their movements to teach students about salmonid ecology.
-Arlee Elementary School

We set up an Eco-Pen pal exchange with two rural primary schools in northern Scotland. Projects are paired between the schools so that data and experiences can be directly connected.
-Target Range School

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www.bioed.org/ecos

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