ECOS
Ecologists, Educators, and Schools: Partners in GK-12 Education

Newsletter

Winter

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No Child Left Indoors!

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.

Inside:

Upcoming Events:

Debut of 2006 ECOS Nature Art Calendar!

February 3rd In-service meeting

February 3rd: PhD applications due

February 17th undergraduate applications due

March 10th: School applications due

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From the Director: Be a Part of the ECOS Footprint

Application time is upon us once again! We are now well into our second year and currently accepting applications for our third cohort of fellows and schools.

The ECOS team is gratified by the ever growing footprint of ECOS in the Missoula community. From creating curriculum pieces specific to our environment, to building schoolyard demonstration projects, our ecologists-in-residence and their partner teachers have involved community members and businesses, taught quality science to hundreds of Missoula students, and gained priceless professional experience.

Our website is continually expanding to include ECOS publications and curriculum pieces for local and national use. And we have printed hundreds of our newsletters to share with colleagues, schools, students and community members.

If you want to be a part of our exciting team check our website for application information. We are looking for undergraduate and PhD students, along with teacher teams from Missoula schools.

We look forward to welcoming our new teams next Spring. Thanks to all of our current and past teams for making ECOS such a vital program!

Carol Brewer, Director

Tips from Teachers

During our ECOS In-service Meeting on November 4th, the ECOS teachers let us in on some of their "secret teaching powers". With open ears, the fellows gained tips and ideas to help them teach science.

During Mike Plautz's career as a 7th grade teacher at Hellgate, he realized that students are not empty vessels needing to be filled, but full vessels needing to challenged. Mike seeks to discover how students explain concepts, and then develops his teaching around their conceptions. His colleague Jo Fix agrees with Mike's techniques, adding that every lesson should start by asking students, "what do you know? and what do you want to know?".

Target Range teachers Debbie Caron and Peggy Purdy, offered the following "ideal teaching tips". Nurture and care about developing minds. Listen, question, and be responsive. Be flexible and willing to experiment. Enjoy and have fun with the students. They also offered some key "realistic teaching tips". Bribery with candy really works. Laughing about a bad day can keep you sane.

Byron Weber of Florence Carlton shared his success in introducing the scientific method to first graders. Weekly demonstration projects take students through the process of asking a question, making a hypothesis, doing a simple experiment, and concluding what happened and why. The weekly repetition of this exercise has clearly driven home the scientific process for these young students.

Brent Heist's number one tip? Don't take it personally. Being an 8th grade teacher at Florence Carlton, he has learned to transform frustrations into challenges. He advises to always over prepare, use the resources that are out there instead of trying to design every lesson from scratch and ask "How will I measure success? By a test score or by the actions of my students?"

John Parker, a 4th grade teacher at Florence Carlton, reminded teachers to listen to their own voice, and realize its importance in making students want to listen. He also advised not giving children measuring, writing, or any other science "stuff", before they need to use it; once they have "stuff" their attention is not on the teacher!

Julie Greil, first and second grade teacher at Lewis and Clark Elementary, had some great tips of how to get the students' attention. Use sounds or key phrases (One,two,three eyes on me/ Crisscross applesauce/ Deer ears). Do not rush activities and always ask them to recap the instructions before beginning.

And Carol Reeves a 5th grade teacher at Lewis and Clark, shared her five step teaching method.

1. Motivation
2. Modality (use all 5 their senses)
3. Keep students attention with audio or visual objects
4. Let the students know the teacher's expectations
5. Give positive feedback.

Thanks to all the ECOS teachers, and keep those good tips coming!

Integrating Physical Sciences into ECOS

by Johnny MacLean and Katie Hailer

Although ECOS stands for *Ecologists, Educators and Schools*, this year's cohort of fellows includes 2 physical scientists.

Johnny MacLean is a PhD student from the Geology Department. How does ecology link to ECOS? "An understanding of geologic processes helps elucidate the evolution of several factors that affect ecosystems through time. Without including the geologic perspective, our ecological studies would be incomplete".

He notes that, "This year, I have had the opportunity to bring the geologic perspective to the ECOS program. Being the only geologist in ECOS has its challenges and opportunities. I often find myself asking the other fellows questions that must make me seem quite ignorant. At the same time, I've been able to fill a void in the teachers' curriculum concerning earth science. I already have led a number of mineral exercises, the Rock Walk is going to become a useful teaching tool for the entire school, and I have begun to team up with a sixth grader for a special project. The impact of adding geology to the ecology-based program was immediately realized, and I hope we can continue to discover new ways of incorporating earth science education into the ecology curriculum".

Katie Hailer is a PhD Student from the Chemistry Department. Katie tells us, "Being the only chemist in the ECOS program has, thus far, been a fantastic and truly positive experience. I have always felt that the natural world encompasses all disciplines of science and to understand the world around you, you need to be exposed to all the different areas in science. I am very happy with my role of trying to bridge the gap between chemistry and ecology at the grade school level. The students at Lewis and Clark Elementary School have been an inspiration to me during this first semester as an ECOS fellow. The students are very curious about the work that I do at the University, and they all want to know about the "potions" I make at work. I hope that I can show the students at Lewis and Clark that chemistry is not a scary subject, and that it is an important part of the ecology they are learning about this year".

Katie makes a Halloween "potion" in Julie Greil's class

Johnny explains his research to other fellows and teachers

Connecting Community volunteers with ECOS

by Carl Rosier

Calling all ecologists! A new ECOS project "Science Community Connections", will unite scientists, scientist-in-training (graduate students), non-profit organizations, community groups, and amateur experts who might be interested in doing a presentation, leading a schoolyard field trip, mentor schoolyard projects, or just be a resource for information.

Classroom environments are truly enriched when members of the community take an active role in developing or participating in classroom events. Classroom ecologist volunteers contribute to student learning by providing students with opportunities to see how classroom knowledge can be transferred to real world situations.

Enriching ecological science in schools requires a whole slew of folks willing to bring their special knowledge to the classroom. Currently our Senior Fellow, Carl Rosier is developing a questionnaire to send to agencies across the Missoula Valley to learn about local ecological expertise. Please let us know if you would be willing to volunteer with ECOS by contacting Carl at carl.rosier@umontana.edu. Also, if you know anyone who may be interested please pass the word.

Young Ecologists in the Making

by Jo Fix

Jo Fix, 3rd grade teacher at Hellgate Elementary

My fondest memories of the outdoors engaged me at a very young age, from desert explorations every Sunday on family outings to discoveries walking to and from school through a desert each day. It was not uncommon for me to be "caught up in the moment" checking out new creepy-crawlies. I would become so intrigued observing them, and creating my own environment with my imagination, that I would be late coming home (much to my Mom's concern). I was a storyteller at heart and would weave these fabulous tales of how horny-backed lizards and ants were building their own towns, and I was trying to help them. My curiosity about desert life kept me in awe. Why do the tails come off some lizards when you try to catch them? Does it hurt them? Why are there so many ants in one small hole? Why do tarantulas have fuzzy legs? Why can't I find those rattlesnakes I keep hearing about? Are tumbleweeds an actual plant? Why does a Joshua tree bloom in the desert? Many questions came from independent exploration and my wanting to know answers.

High school opened up a whole new scope with biology and venturing to the Pacific Ocean to investigate tide pools and marine biology. I had no idea there were so many fascinating creatures living underwater, let alone on the shoreline. It developed a whole new awareness, understanding, and respect for life that ventured beyond the human aspect of existence. Everything seemed to have its place and value within the environment. Diversity in life had much more meaning and opened new ways of looking at the surrounding beauty that existed not only outwardly, but within. This had a major impact on my whole being and way of living.

Seasonal changes also brought even more opportunity for inquisitiveness- especially with the first snowfall in the high desert in years. It gave me new eyes and a new perspective of the desert ecosystem. It was like looking at relationships of living and non-living organisms with a freshness and excitement that carried over to my everyday adventures. It is because of the richness in experiences when I was young that I have such a love of the outdoors.

My personal goal for my students is to provide opportunities for them so that they too can feel that connectedness to their environment and have appreciation and respect for all organisms and their place on this earth. I feel it's important for kids to understand nature exists all around us- not just in the mountains skiing or on a river fishing or floating. I want them to be able to enjoy that freshness of discovery and apply it to any environment they may be in, be it their backyard, school, city, etc. The ECOS program is truly a gift for students and teachers providing outdoor explorations and activities that enhance our learning experience and continuum of growth in gaining more knowledge through discovery. I have learned an incredible amount of new information from the fellows and also from my own students about how they process through active learning.

"The enthusiasm and expertise of the fellows is a powerful incentive for me as a teacher. The kid's love and emulate the fellows as scientists. We all look forward to having science." **ECOS teacher, November 2005**

ECOS News From Partner Schools

Students help restoring the outdoor classroom

Florence Carlton School

Work continues on The Outdoor Classroom (OC) at Florence Carlton School! The OC was cleaned up this fall with a school-wide knapweed pull. Design work on the nature trail has been completed, a contractor has put a bid on the work, and ECOS fellows have secured an entrance kiosk for entrance to the nature trail. The Florence Carlton middle school art classes have begun work on their contribution to the OC by creating the markers for each of the nature stations. When they are not working on the demonstration project, ECOS fellows have done an inquiry on weather and have been putting the finishing touches on the "Discovery Booklets" which will have interesting ecological inquiries teachers can pursue with their students in the Outdoor Classroom.

Whitney Bowditch shows her river erosion drawing

Hellgate Elementary and Middle School

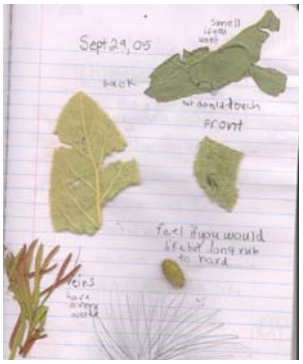
The Hellgate Demonstration Project made a grand appearance on the school's campus recently. Andrew, one of the team's undergraduate fellows and a construction wiz, designed and built the signs for each of the four learning centers which were installed over the Veteran's Day weekend. Notable progress has been made in developing and marking the insectary sites and the 3rd grade ECOS students have added shrubs and perennials to the Native Plant Garden Learning Center. The Hellgate Demonstration Project is well on its way to helping students explore the eco-diversity within their community. Meanwhile, the fellows have done many activities with their students including a simulation game involving predator/prey relationships and inquiries on soils, minerals and erosion with a follow-up art project on erosion in rivers.

Nneka Trem answers the question "What's a scientist?"

Mikaela Samson draws the life cycle of a frog

Lewis and Clark Elementary School

Through exploration of the Outdoor Discovery Core, first, second and fifth grade students at Lewis and Clark Elementary School have learned compass skills, made observations and formulated questions, recorded these in a nature journal, and became familiar with trees, shrubs, forbs and graminoids using a dichotomous key. A recent trip to Bancroft Pond allowed students to apply their newly attained skills in a novel setting as well as learn about the painted turtles that live in the pond. These lucky students will soon receive a laminated plant guide, developed by their ECOS fellows, to help them become more familiar with the plants in the Outdoor Discovery Core.



Abbey Hege's nature journal

PhD fellow Mike Machura leads an inquiry about dichotomous keys

Target Range School

Renovation and construction on the cottonwood grove has begun! Montana Vocational Technical College removed the picnic tables, smoothed the perimeter of the grove and terraced the western edge. Students have been introduced to this special part of their schoolyard through activities on observing and describing the natural world and journaling, with plenty of time for exploration. Students learned how to use a compass and then mapped out potential ideas for the cottonwood grove. Finally, the fellows created a three week unit on plants and trees that included an inquiry in which students hypothesized what part of the schoolyard would have the most plants. Then they went outside, collected data and compared the results to their hypotheses.

Kids say the coolest things...

At the end of our first ECOS academic year, we asked students to tell us about their experience with ECOS fellows. Their candid responses certainly excited and entertained us here in the ECOS office! It is evident that students overwhelmingly enjoyed learning about science with their ECOS mentors!

Target Range 5th graders

"Carl is cool because he knows so so so much about bacteria"

"They taught me that my everyday surroundings are very important"

"My favorite part about ECOS was being able to do experiments, not just looking at sheets on the overhead projector"

Big Sky High School

"They taught me how to ask and answer scientific questions."

"We got to go outside and actually see things happen other than hear about things that happened"

[The ECOS fellows] are hip and cool. Their young so you can relate to them...and they taught me how to set up scientific equations"

Sussex School

"My favorite thing about ECOS is that I learned all the different abbreviations of the gases in the air"

"ECOS taught me how to make compost"

"[I learned that] you need to think about all the things that affect what you are studying instead of just one."

ECOS Staff

Dr. Carol Brewer, Director
Carol has a PhD in Botany and directs research programs in both plant ecology and ecological education. She serves as the VP of the Ecological Society of America and is an Associate Editor for the journal *Conservation Biology* (Education).

Dr. Paul Alaback, Co-Director
Paul has a PhD in Forest Ecology. His research centers on disturbance ecology and plant biodiversity patterns. His skills have allowed ECOS to develop a fantastic local plant guide.

Josh Burnham, Webmaster
Josh is responsible for the design, management, and maintenance of the ECOS website. He also provides much appreciated technology support to ECOS staff, fellows, and teachers.

Jennifer Marangelo, Program Coordinator
Jen is responsible for ECOS recruiting, web content development, and tracking progress at the school sites. She is a first year student in the Interdisciplinary Program in museum exhibit design and curriculum development.

Kim Notin, Administrative Assistant
Kim is responsible for all the odds and ends of the ECOS project. She is a second year Masters student in the College of Forestry and Conservation.

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- Mike Matranga,
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