



AT THE CENTER

News and Notes from the
Center for Earth and Environmental Science

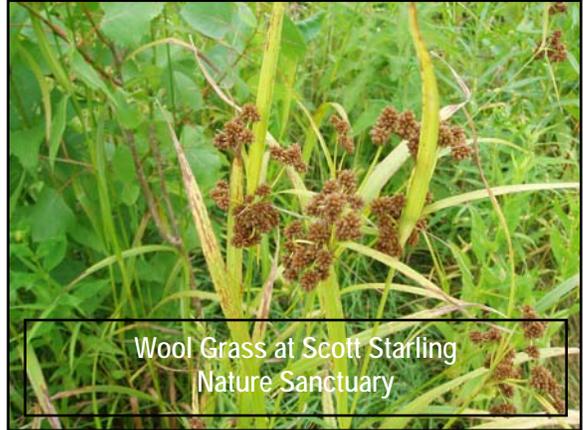
Summer 2007

Director's Note

This summer edition of the Center for Earth and Environmental Science's *At the Center* newsletter highlights many of our ongoing program developments and celebrates the launching of our new Discovering the Science of the Environment (DSE) program. CEES welcomes a new staff member, Brooke Furge, as the Education Specialist for the DSE program. New and exciting updates are highlighted below from the Central Indiana Water Resources Partnership, Discovering the Science of the Environment, the Eagle Creek Watershed Alliance, the Upper White River Watershed Alliance, and a new graduate wetland research project at Beanblossom Bottoms. CEES has also published a four-year report on our water resources research that can be viewed and downloaded from our website.

I hope you enjoy reading our program updates and research interests.

Regards, Lenore P. Tedesco, Director



Friends of CEES

Thank you to all who have renewed or joined Friends of CEES this year! By joining Friends of CEES you will receive membership benefits, including updates on CEES environmental research activities, environmental stewardship events, and research site tours.

Our program successes are due in large part to community partnerships and contributions. By joining Friends of CEES, you help to ensure our programs remain an important part of environmental stewardship for Central Indiana. Visit www.cees.iupui.edu or email cees@iupui.edu to learn more about the program.

Central Indiana Water Resources Partnership (CIWRP)

We are pleased to announce the start of a new research project that expands CIWRP to research partnerships with Veolia into their international research network. "Aquisafe 2007 – Mitigation of Contaminants in Rural and Semi-rural Environments to Protect Drinking Water" is phase one of a research program partnering CEES researchers (Lenore Tedesco, Philippe Vidon, and Pierre-Andre Jacinthe) with research scientists from the Berlin Center of Competence for Water (KWB - KompetenzZentrum Wasser Berlin – partnership between Veolia Water Europe and Berlin Water Company), and Umweltbundesamt Berlin (UBA - German Federal Environmental Agency).

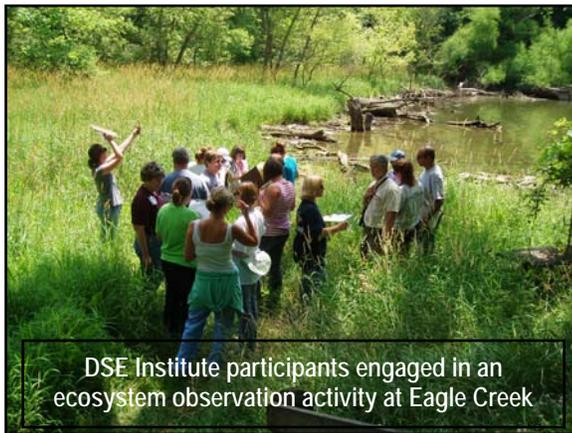
The project will work to develop and design contaminant mitigation strategies for stream corridors and wetlands to intercept and biodegrade herbicides, pesticides, and other "emerging contaminants". These are really contaminants of emerging concern as they have been reaching water supplies for some time but we are just beginning to recognize the threats. These include personal care products, pharmaceutically active compounds etc. that function as endocrine disruptors, as well as pesticides, herbicides and other compounds founding wastewater.

The project includes a series of work packages in both central Indiana and Berlin, Germany. One program component focuses on identifying which emerging contaminants are present and of potential concern in central Indiana. We will sample the White River and Eagle Creek in cooperation with the U.S. Geological Survey (USGS) Indiana Water Science Center. We will be screening for 154 wastewater and pesticide compounds beginning later this summer and extending through the coming year. This dataset will provide very

interesting and important baseline data that will be available for other researchers. This is very expensive analyses being done at USGS national labs in Denver and Kansas City.

A second component focuses on designing a riparian or constructed wetland system that maximizes biodegradation of contaminants prior to reaching our waterways. The first phase of this work will be conducted in Berlin at UBA's experimental facility. This is an incredible site in good German engineering fashion. They have field-scale experimental cells that can be manipulated for flow, residence time etc. to simulate a riparian zone in a very controlled way. The first experiments will evaluate the effects of atrazine (a corn herbicide found in our streams and rivers) and glyphosate (Round-Up) on soil microorganisms to determine the effect on biodegradation processes. We hope to find ways to optimize degradation. Philippe and Pierre are in Berlin as I write this and Lenore was in Berlin in April laying the groundwork. We all expect to go back in October for more work.

This is an exciting project with great potential for application as stream corridor manipulation becomes more and more common. Having information on ways to maximize biodegradation can be a win-win situation.



DSE Institute participants engaged in an ecosystem observation activity at Eagle Creek

Discovering the Science of the Environment

Discovering the Science of the Environment (DSE), the new education outreach initiative, is progressing forward in full implementation mode, with its official kick-off in June. We are pleased to announce many additions to the program, including new staff, the mobile technology trailer and the first professional development program for educators. Brooke Furge joins us as the Education Specialist to deliver programming with the mobile technology trailer, among other program development and management responsibilities. The mobile technology trailer is here, painted, and being outfitted and readied for the first programs. Brooke will travel with the trailer to deliver programming at school grounds and other natural areas this fall. We just completed the first DSE professional development summer institute for educators, which was held June 25-29 at the new Eagle Creek Park Earth Discovery Center. In attendance were 36 educators from 10 schools and

Eagle Creek Park naturalist staff. The professional institute program trained the educators in the development, implementation, maintenance and long term use of outdoor labs for environmental inquiry programs. It was a terrific week, filled with information and collaboration, and a wonderful way to start the DSE program. We thank our generous funders and supporters of the DSE program: Veolia Water Indianapolis, Nina Mason Pulliam Charitable Trust, Eli Lilly and Company, Dow AgroSciences, Duke Energy, and Indianapolis Power & Light Company. Visit www.cees.iupui.edu for DSE progress, program updates, and for mobile trailer scheduling coming in the fall.

Introducing Brooke Furge, CEES Education Specialist

When I graduated in 2004 from Oberlin College with a Bachelor of Arts degree (Double major in Environmental Studies/Biology with a minor in Geology), I could not begin to imagine the direction my career path would take. Filled with a love of nature and education, I began my adventure as a Naturalist at the Indiana Dunes Environmental Learning Center, located within the Indiana Dunes National Lakeshore, Chesterton, Indiana. At the Learning Center, I taught students from the greater Chicagoland area in marine, wetland, forest, and prairie ecosystems and spent a year and a half delivering environmental education programs to grades four through high school. Along the way, I mastered the skills of educator, mentor, administrator and steward, among others; and, for what it is worth, after interacting with thousands of children, I even awarded myself an honorary doctorate in Child Psychology!

In time, I moved on and found myself in the small town of Oregon, Illinois, working at Northern Illinois University's Lorado Taft Field Campus as an Education Program Specialist. I spent my days coordinating outdoor experiences tailored to individual school's needs, teaching typical outdoor education activities, and exploring the new ecosystem that surrounded me. At Lorado Taft, I also definitively learned that Outdoor Education is in fact different from my true passion - Environmental Education.

Coincidentally, shortly after this realization, I first learned about CEES' "Discovering the Science of the Environment" program, and I was smitten! Who wouldn't love a program that allows children to go outside and take their favorite technology toys with them? Who wouldn't be excited about discovering with children, who are eager to learn, the potential that exists in the environment to which they come each day and then sharing with them the knowledge and understanding to improve it? With excitement and anticipation, I look forward to the upcoming months of challenge and success, of developing a vision and building a structure, of "Discovering the Science of the Environment" wherever the 20 foot trailer may take me...



Eagle Creek Watershed Alliance Update

ECWA Technical Committee Awards First Cost-Share Grant to Starkey Farms Partnership

The ECWA Technical Committee is pleased to announce that Starkey Farms Partnership is the first grant recipient of its cost share program. Starkey Farms Partnership has proposed to implement two best management practices (BMPs) on its property in Hendricks County, located in the School Branch sub-watershed of Eagle Creek watershed.

The first BMP is a demonstration project of a recently developed Deep Soil Test for Amino Sugars, which will provide information on nitrogen found in soil. Research has shown that many agricultural fields receive more nitrogen from applied fertilizer than needed to economically optimize yield. In fact, studies show that 60 to 80 percent of the nitrogen used by the crop can be provided by the soil during the growing season, reducing or changing the need for fertilizer application. While the top six inches of soil is where most fertilizers are applied, nitrogen is utilized in the deeper root zone. Different from typical soil testing that occurs in the top six inches of soil, the Deep Soil Test for Amino Sugars tests soil collected from 0-12 and 12-24 inches below the surface.

It is expected that results of the test will enable Starkey Farms to reduce nitrogen application without reducing crop yields where the soil has a high capacity to provide nitrogen. Reducing nitrogen application rates can be a win-win situation - providing cost savings to the producer and ensuring a healthy watershed.

Identified as an area of concern by the ECWA, nutrient loading within the watershed, primarily consisting of nitrogen and phosphorous, can adversely impact water quality and our watershed. Such nutrients contribute to increased algal blooms and can impact the taste and odor of drinking water.

For the second BMP, Starkey Farm Partnership will apply an annual rye grass cover crop to one of its fields over the winter of 2008, which is a relatively new practice in the Midwest. Some of the benefits can include an improvement of nitrogen nutrient cycling, breaking up natural hardpan or manmade compaction, creating macropores, which corn and soybean roots can follow, reducing soil erosion, and providing forage. To assess the water quality impacts of this practice, staff and student interns from the Center for Earth and Environmental Science at IUPUI will monitor tile drainage, surface water runoff, and stream water from the field with the cover crop and a field without the cover crop.

These practices have the potential to help the ECWA meet its mission of improving water quality, increasing public awareness of watershed water quality, and encouraging stewardship of the watershed's resources. We look forward to sharing the results of our work as the project moves forward.

Upper White River Watershed Alliance (UWRWA)

Jill Hoffmann, UWRWA Coordinator

The UWRWA recently received \$81,000 from the Indiana Department of Natural Resources to aid in gathering critical information needed to work toward a regional watershed master plan. The grant will be used to help better understand what is driving land use change in various locations, identify regional hotspots for water quality concerns, and target key potential restoration or conservation areas. The UWRWA plans to use the information to develop educational resources, open up lines of communication across county and municipal boundaries, and begin authoring a regional watershed management plan that can be used to leverage larger funding sources for water quality improvements.

Other recent fundraising included the 2nd annual UWRWA golf outing in Fishers. Twenty-one (21) teams and thirteen (13) corporate sponsors helped make this year's event even better than the last. Municipalities, counties, agencies, consultants, academicians, and material suppliers rounded out the attendees' list. We had the support of four mayor's offices and local press on hand to cover the outing. THANK YOU to our members and partners for helping us raise \$7,375. Look forward to next year!

UWRWA recently elected two new officers to its leadership. Mr. Tim Hewitt of Veolia Water Indianapolis LLC and Mr. Josh Goode of Christopher B. Burke Engineering join Dr. Lenore Tedesco of IUPUI and Mr. Tim Method of the City of Indianapolis as 2007/2008 officers.

Graduate Student Updates

Carbon Sequestration by Invasive Reed Canary Grass (*Phalaris arundinacea*) in a Wetland Complex - Jonathan Bills

Global warming has been correlated with an increase in the concentration of CO₂ in the atmosphere. Terrestrial carbon sequestration is one of several proposed approaches to reduce the rate of CO₂ accumulation in the atmosphere. Reed Canary Grass (*Phalaris arundinacea*) is an herbaceous species that invades riparian fringes and wetlands throughout the United States and Canada. It grows prolifically and quickly forms mono-specific stands, decreasing ecosystem diversity. Invasive species and changes in plant cover have been shown to change soil carbon dynamics in wetlands and grasslands. It is expected that the ability of Reed Canary Grass (RCG) to form mono-specific stands will change the nature of soil carbon dynamics at invaded sites in Bean Blossom Bottoms, a wetland complex in south—central Indiana owned by Sycamore Land Trust.



Shoot and root biomass from native species and invasive RCG will be analyzed for a series of chemical parameters (total C:N, proximate lignin and cellulose, and total phenolic). These factors determine the rates of decomposition of plant debris which determine whether carbon becomes stored in the soil or released to the atmosphere. Soils containing plant residues will be incubated in the lab to analyze decomposition rates of invasive RCG versus native species in areas of the wetland experiencing high and low levels of ponding. The chief objective of this investigation is to test the hypothesis that mono-specific stands of invasive RCG will change carbon dynamics in the soils at Bean Blossom Bottoms. Whether this change will be due to the quality or quantity of plant debris produced by the invasive species is yet to be determined. It is also yet to be determined whether RCG will have a positive or negative effect on soil carbon sequestration; a positive effect refers to an increase in stabilized soil carbon burial in areas dominated by RCG.

Four-Year Report on CEES Water Resources Research

CEES has recently published a report entitled, *A Program of Excellence in Water Resources Research*. The report highlights our work in the following areas: the Central Indiana Water Resources Partnership, watershed research and partnerships, remote sensing, reservoir management, ecosystem restoration, and education and outreach programs. To view the report in pdf format, please visit the follow link: <http://www.cees.iupui.edu/Publications/Index.htm>.

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