



AT THE CENTER

News and Notes from the Center for Earth and Environmental Science

Summer 2011

Director's Note

This summer, as always, is a very busy time of year for all of us at CEES. Field work is underway for the new Flood Erosion Hazard program that CEES is working on with our partners at the USGS (see the article below). Blue-green algae season is in full swing with hot and dry conditions leading to alerts at several lakes and reservoirs throughout the State that CEES is monitoring under a suite of partnerships including with IDEM, IDNR, Grace College, Patoka Regional Water Authority, and the Town of Fishers. A new project with Citizens Energy Group will work to ensure that algal monitoring of central Indiana's drinking water supply reservoirs will continue into the future as they assume ownership of the drinking water utility. We have just completed installation of a constructed wetland system to treat agricultural runoff as part of an international research collaboration and are very excited with the results so far. There are several new faces in the Department of Earth Sciences and the School of Science (see articles below) that will provide opportunities for new faculty collaborations and expertise for central Indiana natural resources. We are excited to be a science content collaborator in the FLOW project and to be showcasing the Lilly ARBOR project, our 12 year old riparian restoration project on the IUPUI campus portion of the White River Floodplain and to be sponsors of the first annual White River Celebration and Stewardship Festival coming up in September. It is a busy but very productive time for CEES faculty, staff and graduate students.

This summer also marks a time of great change at CEES. After 20 years at IUPUI and 12 years as the Director of CEES, I am stepping down to take a position as the Executive Director of the Wetlands Institute (www.wetlandsinstitute.org) in Cape May, New Jersey. This is a bittersweet time for me. I am extremely proud of the work that CEES has done under my tenure and the programs and ethic that we have built. When I became director in the Spring of 1999, CEES was 2 years old and on the verge of depleting its operating capital. There were two staff being paid by the IU grant that established the center and was coming to an end. Since that time, CEES has grown to enjoy an annual operating budget of ~\$1,000,000, is an IUPUI Signature Center in water resources, has 6 professional staff, a well-developed science education program (DSE), manages the environmental science learning program at IUPUI, and has an established network of long-term wetland and stream restoration field sites for research and education. We are thrilled to partner with more than 30 community organizations, government agencies, corporations, foundations, watershed groups, museums, and schools. CEES is providing critical expertise to the blue-green algal programs statewide and is a go-to resource on water resource and watershed issues, as well as environmental education and literacy. We have a dedicated staff and all of us truly believe in our mission. We have come a long way and achieved many notable things. As I step down, I leave a strong, financially sound center and a wonderful staff. Many of you reading this have been instrumental in building and maintaining these strong relationships and the foundation of support for CEES. I thank you from the bottom of my heart – we couldn't have done it without you.

As I leave CEES, IUPUI, and Indiana, I can reflect upon my personal efforts to bring science and applied research to work in the everyday lives of Hoosiers. I have always been committed to making knowledge work with a belief that a little knowledge that works is worth infinitely more than knowledge that remains locked up in the academy. I believe the applied focus of CEES over the years has made a difference by improving our understanding of the natural resources we study as well as providing accessible venues for people of all ages to engage. Whether it was through science education programs, volunteer service programs, tours of research sites, lectures or conferences, our constituency has taken the opportunity to engage in science with all of us at CEES. In our own way, we have helped people understand that their well-being is linked to the well-being of our natural resources. Upon reflection, I do believe that we have made a difference.

Stay tuned for announcements regarding the new leadership of CEES, remain committed to the organization, and help the new director understand the importance of CEES in our community. If you are ever in southern NJ, please look me up and do keep up with my new adventures. I will retain an IUPUI email address and can also be reached at ltedesco@wetlandsinstitute.org.

Thank you for all you do to understand, restore, preserve and protect natural resources.

Dr. Lenore P. Tedesco, Director

Fluvial Erosion Hazard Project Update

The first phase of the fluvial erosion hazard (FEH) project is well under way. Underpinning FEH mapping is an understanding of the physical form and variability of Indiana streams. Key tools for investigating the physical form of a stream are regional hydraulic curves. Regional curves are constructed to show the relationship between drainage area and the variables of bankfull width, depth, and channel cross sectional area within an area of similar geology and climate. The relationships between bankfull channel cross sectional form and drainage area were first presented in the classic text, *Fluvial Processes in Geomorphology* (Leopold, Wolman, and Miller, 1964) and the data have become an important tool for understanding not only channel form but also flood prone areas. The data are critical to successful natural stream mitigation. Many states have compiled regional curves, and for some years, hydrologists working with Indiana streams have been using regional curves developed for Ohio in the absence of data for Indiana. As part of the FEH project scientists from the USGS, CEES, and POLIS are collecting data on 72 streams across Indiana's physiographic regions to better characterize Indiana streams. An important initial step is to understand the regional variation of Indiana streams. Investigations are currently being conducted in the three largest physiographic regions of the state: the northern lakes region, the central till plain, and the complex terrain of southern Indiana. These initial sites will help the research team decide on the appropriate number of physiographic divisions for the regional curves. While it may seem intuitive that streams formed in the undulating till of central Indiana will be different in form from streams in the bedrock regions of southern Indiana, until now no data have been collected to describe how or if these streams are different. These data are now being collected around the state in the most natural stream reaches that can be located. These areas are frequently located in national or state forests, state nature preserves, parks, fish and wildlife areas, or regional land trusts. We have been welcomed across the state by property managers and our report of findings will need a long list of acknowledgements. The FEH team is excited. This is the largest study conducted of the physical character of Indiana streams and we are all delighted to be involved in the study.



Watershed Alliance Updates

One-on-One Conservation Leading Eagle Creek Watershed Efforts

Recent activities of the Eagle Creek Watershed Alliance have focused on how individual landowners can better understand their role in local water quality and develop solutions that require individual action. ECWA's Agricultural Liaison, Harold Thompson, is using a variety of programs to draw individual farmers into whole-farm systems management. This means that farmers are encouraged to look at all possible pollution sources and mitigate these impacts through a variety of practices, including nutrient source reduction. Some of these practices are standard conservation techniques such as modifying equipment to plant and harvest fields using a 'no-till' approach. No-till simply means that less soil is disturbed when planting and harvesting. Therefore, more residue (stalks and roots) are left in the field to help hold soil and nutrients over the winter and return more organic matter to the soil, thus reducing future fertilizer needs. Recently, the ECWA has helped pay for such no-till equipment modifications on three sizable farm operations. What is proving to be even more interesting than these standard conservation practices is the involvement of several watershed farmers in a new program called Indiana's On-Farm Network. This program helps farmers evaluate their nitrogen applications through the use of trial plots, aerial photography interpretation, and corn stalk nitrogen tests. The end results will help farmers apply only the optimum amount of fertilizer, therefore reducing runoff to streams. This advanced approach coupled with Thompson's guidance on practices related to manure management, no-till, and animal grazing practices, is leading to more holistic conservation on watershed farms. This approach helps cultivate a long-term conservation ethic and understanding, versus past efforts that apply a single spot-specific approach to pollution reduction.

Farmers are not the only ones the ECWA is working with to cultivate this awareness and ethic – urban and suburban landowners play an important role in conservation as well. ECWA's coordinators have identified 127 home owners' associations (HOAs) in the watershed and have started an outreach program aimed at individual action and behavior changes for these smaller residential properties as well. Individual homes can produce a wide variety of pollutants that make their way into local streams through street storm drains. HOA's in critical areas of the watershed have been approached and presentations to these groups are underway. Educating these groups requires getting each person to realize that their behaviors and landscape practices can contribute to water quality problems. It also then requires these residents to internalize how their small inputs add up to a relatively large collective impact so they feel compelled to act – this is no small feat. To help, ECWA outreach efforts are capitalizing on widespread effort such as the Clear Choice Clean Water campaign that support the idea of individual actions leading to positive cumulative impacts, as well as promoting the use of ECWA cost-share funds for residential practices. Applications are being accepted for residential rain gardens and native plantings in common areas of subdivisions. The ECWA is hoping to find a neighborhood to 'adopt' and apply several of these small scale practices in order to produce a large-scale effect. If you are interested in residential conservation practices and live in the watershed, please contact the ECWA at coordinator@eaglecreekwatershed.org. Real water quality improvement requires collective, individual action by every resident – find a small way to help!

Regional Watershed Efforts Stepping Up Their Role of Education and Social Marketing

The Upper White River Watershed Alliance (UWRWA) works to improve water quality across the 16-county watershed. Conservation efforts at this scale require a unique approach since localized projects could number in the thousands, assuming cost-share funding was even available at that level. With this in mind, the UWRWA helps support the efforts of local groups such as the ECWA, the Morse Waterways Association, the Geist Lake Coalition, and the watershed groups associated with Fall Creek and Cicero Creek, to name a few. Recently, the UWRWA completed watershed management plans for Fall Creek and Cicero Creek through the help of Department of Natural Resource Lake and River Enhancement funding. Public meetings were held to discuss the results of these plans and layout a clear path forward. More than 140 people attended these meetings, including television media, state senators, and local leaders. It was clear that water quality, especially in the drinking water reservoirs, is an important issue for many; yet, the exact solutions seem to be uncertain, in part because the pollution levels are daunting and the sources are diffuse and cross many land use types.

The UWRWA recognizes that because of this and because the sources of pollution are similar in many Indiana watersheds, one of the most effective ways to have the largest impact is wide-spread education. Education about personal behavior change has the greatest potential to result in the biggest positive impact for water quality. With this in mind, the UWRWA applied for grant from the Department of Environmental Management's Pollution Prevention Section. The application was one of the most unique the Section had ever entertained and ultimately, funded. The grant was focused on reducing a common residential pollution source, pet waste. Pet waste is one of the most common, yet unregulated, unmanaged sources of nutrients and E. coli bacteria in urban stormwater. Did you know one gram of dog waste (the weight of a business card) contains 23 million fecal coliform bacteria, almost twice as much as human waste, and the average dog poops between half-pound and three-quarters of a pound per day?

The recent \$60,000 grant will be used to advance the UWRWA's Clear Choice Clean Water program to include a pet waste campaign (currently the Clear Choices program focuses only on no-phosphorus fertilizer use). As a result of this funding, additional funding from supporting partners was also leveraged and is now allowing for the expansion of the Clear Choices Program to include campaigns on native planting (such as rain gardens and shoreline restorations) and septic system maintenance. This means, that by July, the Clear Choices Program will offer four distinct pledges and marketing materials to encourage a wide variety of residential behavior changes. This social marketing approach helps everyone find at least one simple way they can help reduce water pollution. The UWRWA is excited to launch a program of this scale and impact water quality and public awareness state-wide! UWRWA coordinators and committees are busily gathering important resources to insure that Clear Choices website visitors (and pledgees) have all the information they may want and need to make a 'clear choice for clean water'. Watch for updates by mid-summer!

Vegetated Bioretention Swale at Starkey Farm



Nutrient and pesticide pollution remain a major challenge for area streams and reservoirs. In tile-drained areas prominent in central Indiana agricultural fields, existing best management practices provide only limited effectiveness for removal and mitigation of many of these contaminants. To address this challenge, CEES, Dr. Lenore Tedesco, and graduate student Amy Smith are leading a project to create a new best management practice. In a project funded by the Center for Competence for Water in Berlin, Germany and with project partners at the German Federal Environmental Agency, Veolia Water France, and watershed groups in Brittany, France, two pilot projects are underway. The first is in Brittany, France and the second here in the Eagle Creek Watershed.

May 31, 2011 marked the start of construction of the vegetated bioretention swale at Starkey Farm in Hendricks County after over a year of planning. Bob Barr, Bob Hall, Amy Smith, Mike Stouder, Nicholas Clercin, Samantha Simpson and Ty Winslow

were present to lend a hand in the construction. Cardno JFNew offered design assistance and planting materials. Jim Williams with Beechwood Construction, Inc. provided excavation services.

The bioretention swale is a best management practice designed to use natural biogeochemical processes to remove nitrates, phosphates, and atrazine from agricultural tile runoff. Nitrates and phosphates in tile water come from the fertilizer that is applied to crops in the spring. Atrazine is a pre-emergent herbicide used on many agricultural fields in Indiana. The bioretention swale consists of an underground and surface treatment system to remove these contaminants from tile water before they flow into downstream waters.

The water quality monitoring equipment has been set up on the site and we are eagerly awaiting more rainfall to begin collecting data. Many experts have already visited the site including members of the Indiana Statewide Soil and Water Conservation Districts, Indiana State Department of Agriculture, and the Natural Resources Conservation Service. There is continued interest in the effectiveness of this type of natural treatment system for improving water quality in agricultural areas.

Discovering the Science of the Environment

Education outreach and Discovering the Science of the Environment (DSE) at CEES are in full swing! Below are just a few highlights:



Discovering the Science of the Environment is now on Facebook!

The newly created DSE fan page features descriptions and photos of all the opportunities provided through the DSE program including the mobile technology trailer student programs, professional development institute for teachers and our new water resources field trip to Lake Michigan. The site will provide an opportunity for you to share your thoughts on the program, network with past and current DSE participants, and keep in touch with the latest opportunities provided through the program. If you are a member of the Facebook community, we would love your support. You can like our page by visiting: www.facebook.com/IUPUI.DSE



Mobile Technology Trailer Program Updates!

To date, the 2011 mobile technology trailer program season saw the highest number of spring participants and the most extreme weather! From severe thunderstorms and wind to unprecedented ice storms in May, this program was able to reach 1450 middle and high school students in 62 classes. Students from Westfield Intermediate School, Oaklandon Elementary School of Environmental Studies, Perry Meridian Middle School, Lincoln Middle School, Franklin Central High School, South Grove Intermediate School, Doe Creek Middle School, Clay Middle School, and Brook Park Elementary School of Environmental Studies benefited greatly from the 22 field investigation programs available.



Professional Development Institute Updates!

Our fifth annual Professional Development Institute was held June 27 – July 1 at The Earth Discovery Center of Eagle Creek Park. Eight teacher participants from two teams, Siedner Academy – IPS #359 and Oaklandon Elementary School of Environmental Studies were in attendance. This week-long comprehensive training gave the teams the tools they needed to successfully create and implement an action plan to construct an outdoor learning laboratory on their school grounds. Along with beautiful weather, the week was filled with interdisciplinary environmental science education activities, community resources networking, strategic planning and an introduction to the basic principles of ecosystem restoration. Upon completion of the institute, each team is eligible for grant funding from the Dr. Laura Hare Charitable Trust to assist with implementing components from their action plan.



New Water Resources Field Trip to Lake Michigan!

The DSE program is partnering with the DJ Angus-Scientech Foundation to offer an annual summer water resources field trip to Lake Michigan. This past June, nine students and two teachers traveled to Grand Valley State and the Annis Water Resources Institute on Lake Michigan for three fun-filled days that included: a cruise on Lake Michigan and Muskegon Lake aboard the Jackson, hiking and dune ecology at Hoffmaster State Park, and swimming and picnics at Lake Michigan and Spring Lake. The boat cruise afforded the students and teachers the opportunity to collect, analyze and interpret chemical and biological water quality data using research grade equipment housed on the boat. We will be offering this opportunity again next summer! It is open to all students and teachers within the nine county Central Indiana region. We are currently accepting both students and teacher applications.



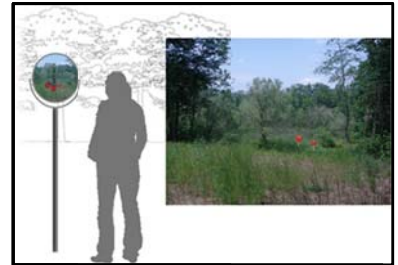
In Other News: Additions to the DSE Program Staff!

The DSE program welcomes new Earth Sciences IUPUI Urban Educators GK-12 Fellow Jessica Adamic. In the upcoming months, through this fellowship opportunity and the DSE program, Jessica will be able to create a unique DSE program that will make her graduate research accessible to hundreds of middle and high school students. We are all looking forward to a great season!

For more information related to any of the opportunities provided through the DSE program, please visit www.cees.iupui.edu. Click on Discovering the Science of the Environment.

Mary Miss FLOW: Can You See the River?

FLOW: Can You See the River? is a visionary art project conceived by visual artist Mary Miss, commissioned by the Indianapolis Museum of Art, with Festival activities facilitated by EcoArts Connections. FLOW includes art installations located throughout Indianapolis (including IUPUI CEES' Lilly ARBOR Project site in downtown Indianapolis), a Raindrop mobile app, and the White River Festival. The purpose of FLOW is to reveal important and unique elements of the White River water system – its history, ecology, origins, and potential – in engaging and innovative ways, inspiring people to experience how it affects their everyday lives. Activities and installations will happen along, over, in, and through the White River, offering opportunities for people of all ages and walks of life to celebrate and rediscover the River and embrace its future.



FLOW: The White River Festival, to be held September 22 – October 1, will premiere the art project with activities presented by more than 20 leading arts, science, environment, and municipal organizations and agencies including CEES and the Upper White River Watershed Alliance.

Visit www.flowcanyouseetheriver.org or join the discussion on Twitter by using #FlowIndy

IUPUI School of Science Welcomes New Dean, Dr. Simon Rhodes

Excerpt from School of Science Press Release

<http://www.science.iupui.edu/news>

Simon J. Rhodes, Ph.D. assumed the position of Dean of the IUPUI School of Science on July 1, 2011. Rhodes was the associate Dean for Research and Graduate Studies in the IU School of Medicine as well as professor of Cellular and Integrative Physiology and Biochemistry and Molecular Biology. Rhodes earned his bachelors from the University of Sheffield in England in 1984 and a Ph.D. from Purdue University's Biochemistry Program in 1991. He came to IUPUI in 1995 as an assistant professor of Biology. Rhodes is succeeding Bart Ng, who has been serving as acting dean of the school. Ng is retiring on September 30, 2011.

New Faculty and Staff Join the Department of Earth Sciences

The IUPUI Department of Earth Sciences and CEES welcome new faculty and staff members. Ms. Ann Park began her position as Undergraduate Advisor appointed to both the Earth Sciences and Physics Departments on July 1. Two new faculty members will join us August 2011 as we begin the new academic year. Dr. Pamela Martin is appointed as Associate Professor in Earth Sciences and the Department of Geography in the School of Liberal Arts. She comes to us from the University of Chicago. Her expertise lies in low-temperature geochemistry, as well as paleoceanography and sustainability science as it pertains to the environment, agriculture, and food. Dr. Bill Gilhooly III, is appointed as an Assistant Professor. He joins us from Washington University in St. Louis. Bill is a stable isotope geochemist and will be setting up a new stable isotope mass spectrometer facility in the department. Dr. Greg Druschel, an aqueous geochemist, comes to the department in January 2012 from the University of Vermont as an Associate Professor. He recently received the prestigious NSF Career Grant, issued to the nation's best young scientists. We also welcome Dr. Gregory "Todd" Ventura as a Visiting Professor of Organic Geochemistry.

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