



AT THE CENTER

News and Notes from the
Center for Earth and Environmental Science

Summer 2005

Director's Note

This past summer has brought new field research opportunities as well as numerous outreach endeavors. CEES faculty and staff have conducted field tours for environmental professionals from agencies such as Army Corps of Engineers and the Indiana Department of Transportation highlighting our restoration and water resources monitoring research. We have also hosted summer camps at the Lilly ARBOR Project and Scott Starling Nature Sanctuary, providing engaging and thought-provoking science inquiry programs. In June, we opened a watershed exhibit at the Indiana State Museum. Our ongoing field research work in water quality monitoring, remote sensing and vegetation monitoring, has engaged dozens of undergraduate and graduate students this summer. The CEES remote monitoring network for water resources research and GeoInformatics programs are also expanding and developing as new partnerships are formed and new techniques introduced.

Each edition of the "At the Center" Newsletter will introduce the new and exciting programs that CEES is developing in Central Indiana with a diversity of partners. Highlighted below are some of our recent programs with contributions from CEES-affiliated faculty, staff and students.

Please feel free to contact me regarding CEES' programs. I welcome your comments and questions.

Regards,

Lenore P. Tedesco, Director

Friends of CEES

The Fall Friends of CEES event will be held on Saturday, October 1, 2005 at Ritchey Woods Nature Preserve in Fishers, Indiana. Participants will have the opportunity to learn about the ongoing research and collaboration at this site. We will tour the nature preserve and have an opportunity to explore the diverse ecosystems which include wetland, prairie, and forest. The leaves will be turning and migrating fall birds should be on the move. Friends, please save this date and look for additional information in the mail soon.

There is still time to join and participate in this event! By joining Friends of CEES you will receive membership benefits, including updates on CEES environmental research activities, environmental stewardship events, and research site tours.

Visit http://www.cees.iupui.edu/Community_Info/friends.htm or email cees@iupui.edu to learn more about the program. Sign up to become a Friend and help ensure CEES programs remain an important part of environmental stewardship for Central Indiana.

Special note: Friends, if you wish to receive email updates of CEES-related programs or events, please email us with your address at cees@iupui.edu.

Mapping Blue-Green Algae with Hyperspectral Imagery in Central Indiana Reservoirs

The composition and concentration of blue-green algae in reservoirs are critical to drinking water quality. These nuisance and sometimes harmful algae blooms can result in aesthetic degradation of lakes and reservoirs due to the production of surface scum, earthy smells from taste and odor causing compounds, recreational degradation, and possibly human health impairment. Developing tools to track the spatial and temporal occurrence of nuisance blue-green algal blooms is critical to protecting and improving drinking water and recreational use waters for the City of Indianapolis. This project is jointly funded by the Central Indiana Water Resources Partnership (CIWRP), the partnership of CEES and Veolia Water Indianapolis, and through the Lake and River Enhancement Program of the Indiana Department of Natural Resources. CEES is working to develop a survey tool to rapidly determine the concentrations and spatial distribution of blue-green algae in Indianapolis' three drinking water reservoirs: Eagle Creek, Geist, and Morse Reservoirs. The imaging system records reflected versus absorbed light coming from the water surface. Patterns in reflected and absorbed light are controlled by photosynthetic activity of the algae with blue green algae having unique signatures. A spatial distribution map will be generated to aid in generating predictive models using hyper-spectral imagery equipment mounted on an airplane and flown over the reservoirs as well as by sensors mounted on boats. The spatial distribution map will provide water resource managers with information regarding the location and intensity of blooms. The map will also allow for delineation of blue-green blooming from non-blooming areas in the reservoirs, and provide a spatial context about the relationship between the algal blooms and their environmental conditions.



Effects of Land Cover on Water Quality and Nutrient Loading

The Master's thesis research by Leda Casey funded by the Central Indiana Water Resources Partnership (CIWRP) is focused on understanding the influence of land cover on the amount and timing of water and nutrient delivery to streams in Eagle Creek Watershed.

Research was completed in Fishback Creek and School Branch Creek on the Northwest side of Indianapolis. Both watersheds are rapidly developing from agricultural to residential land use and flow directly into

Eagle Creek Reservoir, a source of drinking water for the City of Indianapolis. Increased nutrient input from the watersheds is believed to be a cause of increased algal blooms observed in the reservoir. The study utilizes a holistic approach to watershed research and management, combining in-stream water sampling, continuous monitoring, and remote sensing technologies.

Preliminary results of the study indicate that the influences of different land cover types on water delivery to streams and in-stream water quality vary seasonally and with respect to flow conditions. Additionally, study results suggests that a land cover change from agriculture to development will affect the concentration and loading of some water quality parameters while others will likely remain the same. Abby Campbell, another CIWRP graduate student, is continuing portions of the project, while taking a closer look at how stream reaches currently experiencing the construction phase of development affect in-stream water quality.

To learn more about the Central Indiana Water Resources Partnership, visit:
http://www.cees.iupui.edu/Research/Water_Resources/CIWRP/index.htm





Watershed Exhibit at the Indiana State Museum

CEES and the Pervasive Technology Labs have developed a new interactive “Watching Your Watershed” display at the Indiana State Museum. The display opened in June, 2005. It is located on the third floor of the museum in Tomorrow's Indiana, an area that demonstrates how choices made today will influence the future.

The PercepTable graphically displays the counties and watersheds of Indiana. The user can initiate one of five storm events including the flood of July 4, 2003 when seven inches of rain fell in 24 hours. Visitors manipulate the motion of a wooden tool on the PercepTable, bearing reflecting infrared tape. The motion is caught by an overhead camera and is passed along to a computer. The computer then gives a graphical feedback of water volume as it passes through the watershed into yellow warning and red flood zones before subsiding to normal levels. The exhibit provides visitors an idea of how scientists monitor water quality and stream flow while demonstrating how Indiana's communities are connected via the state's waterways. The information presented in “Watching Your Watershed” is intended to spark interest in discovering how citizens can live as members of an interconnected water system defined by local watersheds and learn ways to be environmental stewards.

To learn more about the watershed exhibit and Geoinformatics Research visit: <http://www.cees.iupui.edu/Research/Geoinformatics/index.htm>.



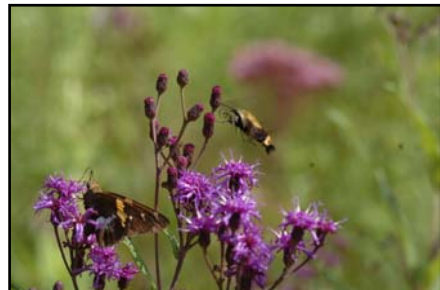
Scott Starling Nature Sanctuary Wetland Restoration Update

The Scott Starling Nature Sanctuary wetlands are flourishing thanks in part to those Friends that helped to plant an additional 2,000 native plants this past spring. The photo to the left displays Showy Black-eyed Susan (*Rudbeckia fulgida speciosa*) and Boneset (*Eupatorium perfoliatum*), among other flowering plants in the Starling wetlands. The photo below captures a Silver-spotted Skipper (*Epargyreus clarus*) and a Hummingbird Clearwing Moth (*Hemaris thysbe*) feeding on a Tall Ironweed plant (*Vernonia*

altissima).

This successful restoration of a groundwater fed wetland was completed in conjunction with Indy Parks and Recreation Land Stewardship Office. The restoration consisted of removing and disabling hundreds of feet of agricultural tile to restore the hydrology to the site as well as re-establishing over 20,000 native wetland plant plugs since 1999.

Numerous community volunteers and sponsors have contributed to the success of this program, including the Efromson Fund of the Central Indiana Community Foundation, Veolia Water Indianapolis, and the CEES Environmental Service Learning Program. Special thanks go to Joanne Durbin for compiling and sending CEES the bird count information from weekly bird hikes at the site. The number of bird species sighted is now up to 99, with around 47 species utilizing the area during the breeding season. The majority of species sighted are short-distance migrants or Neotropical migrants. CEES is working with Nature Sanctuary and Center and the Audubon Society to nominate Scott Starling Nature Sanctuary as an Important Bird Area.





CEES is also working with Alex Greene, a Pike High School Junior, who is identifying butterflies and dragonflies at the site. Alex's keen identification skills have led to the identification of rare and usual dragonfly species including the Jade Clubtail (*Arigomphus submedianus*), which is featured in the photo, and Royal River Cruiser (*Macromia taeniolata*). The Jade Clubtail represents the first sighting of this species in the county and is being reported to the Indiana Department of Natural Resources for their records.

To learn more about the Scott Starling Nature Sanctuary wetland restoration program visit the research website at: <http://www.cees.iupui.edu/Research/Restoration/Starling/index.htm>.

Upcoming Events

Conference: Use of Long-Term Research for Enhancing Water Quality in the Great Lakes Region

The IUPUI Center for Earth and Environmental Science and the USDA-CSREES through the Great Lakes Regional Water Quality Leadership Team, and the Indiana Water Resources Research Center (IWRRC) are cosponsoring a regional water quality meeting *September 8 and 9, 2005* on the IUPUI Campus in Indianapolis, Indiana. The conference will be held at University Place Conference Center and Hotel at IUPUI. Anyone with an interest in water quality research, extension, or urban water resource activities as well as those interested in using water quality data in a decision making process are invited to attend this free workshop. To register, visit the online registration page at: <http://www.cees.iupui.edu/WaterQualityWorkshop/>. The registration deadline is Friday, September 2, 2005.

As watersheds continue to undergo transformation to mixed agricultural and urban land use, new challenges face water resource managers working to improve water quality. Improving water resources in the Great Lakes region hinges on integrated approaches addressing not only water quality, but water use, wastewater treatment, and the physical environment. This meeting will explore approaches currently used at existing field research sites as well as providing a forum for discussion of novel technologies for both the capture and display of water quality data. Workshop discussions will also explore approaches to translating data to information that can aid in the decision making process. The forum will provide an opportunity for hands-on experiences at Central Indiana field sites. This meeting will lead to the development of a set of unique approaches to assessing the impacts of all types of activities associated with watershed functions and provide a framework and timeline to achieving a regional consortium.

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