



AT THE CENTER

News and Notes from the
Center for Earth and Environmental Science

Fall/Winter 2009

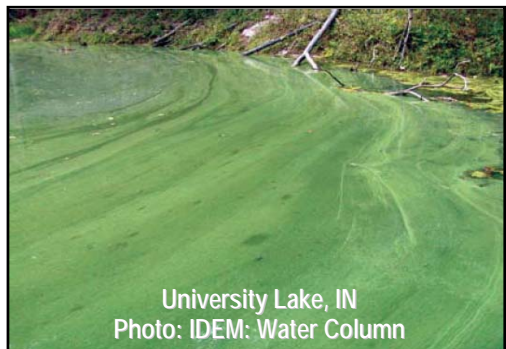
Director's Note

As we wrap up 2009 and look towards 2010 we want to thank our friends for your interest and support in CEES' work. Our mission of translating research into applied environmental solutions is at the center of our work. Our diverse collaborations are what make this mission possible. Highlighted in this edition of *At The Center* are examples of our mission in practice, including CEES' continual research and education in blue-green algae and watershed alliance stakeholder work in the Eagle Creek and Upper White River watersheds. To further CEES' mission through research and education efforts, please consider making a tax-deductible contribution through our Friends of CEES program. Enclosed in the newsletter is a self-addressed contribution envelope. We greatly appreciate your gifts and support as we strive to better understand our natural environment. Have a wonderful holiday season and new year!

Regards,

Lenore P. Tedesco, Director

Blue-green Algae in Indiana – A continuing update



University Lake, IN
Photo: IDEM: Water Column

Our research efforts on blue-green algae have continued through another algae "growing" season and we have learned a lot more about these organisms and their impacts on central Indiana reservoirs. This year we developed a Microcystin analysis lab at CEES/Earth Sciences, and this enabled us to analyze a lot more water samples for the presence of microcystin. Microcystin is the most commonly occurring blue-green algal toxin in the US and is a potent liver toxin. We are the only lab in the state having these lab capabilities and our analyses shed light on the levels of microcystin that are present in the three focus reservoirs (Geist, Eagle Creek and Morse) but also on other reservoirs throughout the state.

At the time of the writing of this newsletter piece (Thanksgiving) both Geist and Morse Reservoirs still have blue-green algae cell counts in excess of 100,000 cells/ml and Eagle Creek Reservoir just went below that threshold last week. This is a relevant threshold because it has been designated by the World Health Organization as the level where there is a high risk for adverse health effects from recreational contact with waters and the State of Indiana uses this level as the trigger to issue health alerts. Conventional wisdom (and research) said that these algae were dependent upon warm water to flourish – clearly not the case here! Also of note is that the general patterns of cell counts, the specific species of blue-green algae and overall toxin levels were similar over the 2 years of our research. This year the level of microcystin was highest and most frequently found at Geist Reservoir, followed by Morse Reservoir, with Eagle Creek having the lowest concentrations and the fewest detections of the toxin. We found higher toxin levels this year compared to last year, but toxin concentrations generally remained low. The only notable exception was Geist Reservoir, which had some detections above 6 parts per billion in August. This is an important threshold as it has been used as a trigger by several states to notify the public of the risk of blue-green algae, and the State of Indiana also used this threshold as a trigger to again notify the public of risk.

Our research this year has been successful at identifying the specific species of blue-green algae that are responsible for the production of the toxin as well as taste and odor compounds in two of the three reservoirs. We are still testing these conclusions and are looking back to

2008 data to see if they hold. This is pretty exciting since there are usually many different species capable of producing toxins in the reservoirs at the same time, so figuring out which species is responsible provides us with another tool to figure out how to manage blooms. Our efforts went statewide this year as well, mostly by necessity. Our reputation as experts on blue-green algae and their toxins became well known this year and numerous requests came in for information, sample analyses and any help we could provide. Naturally we wanted to help – but this is also a difficult situation as we could get overwhelmed pretty quickly and don't have the staff or resources to run an analyses lab for the state and concerned municipalities – at no cost. This is basically what we did – in the interest of science – but also to try to gather critical information about the risk of blue-green algae and microcystin statewide. Our efforts to inform the public of the risks, educate state agency staff, and the state legislature about the need for a statewide monitoring program and public information strategy were stymied by the perception that this was a central Indiana problem. This perception was born of the lack of credible information elsewhere in the state coupled with the wealth of information we had generated in central Indiana.

By last week, we had analyzed samples from 15 different lakes and reservoirs statewide. The results were pretty interesting. 53% of the samples had blue-green algae cell counts in excess of the 100,000 cells/ml threshold for public notification set by IDEM and the State Department of Health. Coupled with this were the results from the microcystin analyses of these samples. 94% of these samples were positive for microcystin, the average concentrations was more than 12 ppb (remember our high in central Indiana was 6 ppb), and 3 of the samples had very high microcystin concentrations. Two were above 60 ppb and one was above 20 ppb! Twenty ppb is the World Health Organization threshold for high risk for adverse health effects from recreational contact! So our little study unfortunately confirmed what I had suspected – that blue-green algae and their toxins are an emerging and present risk in the state of Indiana.

On October 26th, I was asked to present the results of our work to the Environmental Quality Service Council (EQSC) by Senator Gard. The EQSC gathers information about environmental issues and makes recommendations to the legislature about potential legislation in upcoming sessions. My presentation stressed the need for a statewide monitoring program, coordination among state agencies responsible for water resources, public and animal health (IDEM, IDNR, State Department of Health, and State Board of Animal Health), and a coherent and comprehensive education program about blue-green algae. The EQSC unanimously adopted this recommendation. Now we wait and see if there is any legislative action in the upcoming legislative session, or if simply raising the issue to this level is enough for the state agencies to address the situation on their own!

In October, the need for public education and statewide monitoring was underscored again. A golden retriever in Elkhart County, Indiana became violently ill and died shortly after swimming in a wetland. The veterinarian diagnosed the cause of death as blue-green algae toxin poisoning. Dogs are highly susceptible to poisoning because they drink the water when they swim and also because they lick their fur when they finish swimming. Ingestion is the most direct and potent route of exposure and dog illness and death is a well-known effect. Oregon reported four dog deaths this summer as well.

I am hopeful that our efforts at education on this issue are effective. In the coming months, we will be developing education and outreach materials about blue-green algae for our website. We will include the general public, water resource managers, municipalities, veterinarians, and state agency officials – as they all appear to be in desperate need of information. CEES' mission is to translate our applied research into action and we will do so on this topic.

In the meantime, please take precautions. Since we are past the human recreation season for a while, focus on your pets. If the water has a greenish hue or a visible surface scum, keep your dogs out of the water. If they are out swimming, try to prevent them from drinking a lot of water (not likely but worth mentioning), and finally rinse them off with clean water as soon as possible.



Watershed Alliance Updates

Eagle Creek Watershed Alliance

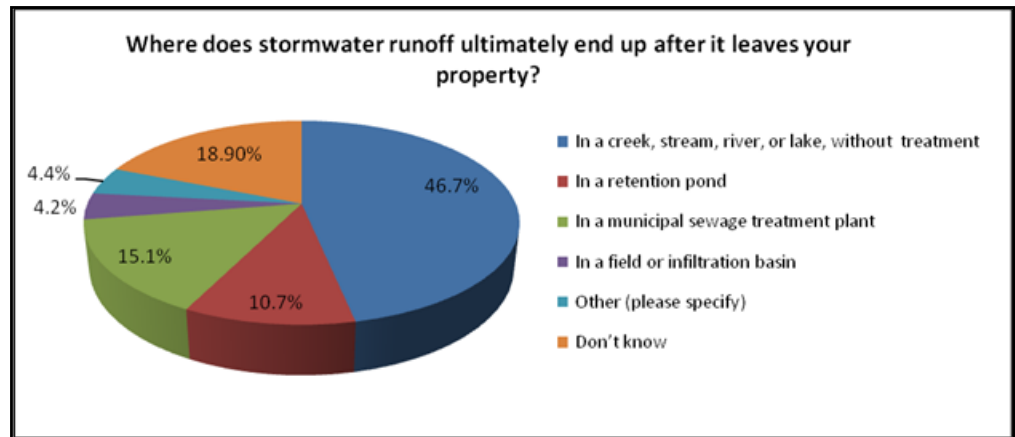
The Eagle Creek Watershed Alliance recently concluded its first round of grant funding for best management practice (BMP) project implementation. The ECWA Technical Committee worked with seven different landowners and installed more than fourteen different BMPs over two and a half years. Projects ranged from standard agricultural practices such as livestock fencing exclusion from streams to more urban practices such as rain gardens. One of the largest projects funded involved a complete overhaul of the drainage and manure management system at a horse farm/riding stable. The combined efforts of all cost-share projects resulted in the following estimated pollutant load reductions: 5,781 tons/year (~294 tri-axle loads) of sediment, 7,666 lbs/yr (1,276 50 lb bags for fertilizer) of phosphorus, and 16,090 lbs/yr (2680 50lb bags of fertilizer) of nitrogen. These on the ground projects coupled with broad scale education efforts of



the Education Committee is resulting in a growing awareness and willingness of watershed resident to engage in water quality protection efforts. Early on in the grant, the Education Committee organized a targeted outreach effort to local decision-makers and town planners regarding Low Impact Development (LID) techniques for stormwater management. The Town of Zionsville has embraced LID concepts and is beginning to implement them in many Town infrastructure projects (see photo). The high visibility of these bioretention planters/rain gardens will raise awareness and encourage the application of LID techniques in other watershed locations. The ECWA is strengthened by the commitment of its active committee members and the responsiveness of our municipal partners. As a result, a second implementation grant has been awarded to the ECWA by the Indiana Department of Environmental Management (IDEM). This new grant will allow for the continuation of cost-share project implementation, as well as an expanded educational effort focused on urban stormwater impacts. Stay tuned for more success stories!

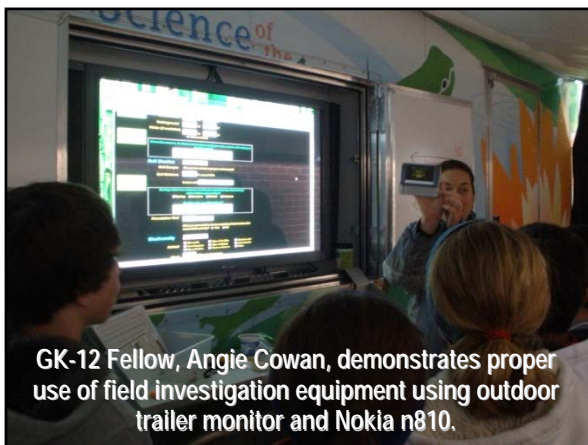
Upper White River Watershed Alliance

The Upper White River Watershed Alliance (UWRWA) is busy pushing on towards its regional commitment to stormwater education and outreach. An active group of local municipalities is leading the efforts of the Alliance's regional stormwater program. Data from a wide-spread public survey is serving as the foundation of the new regional campaign. The survey provided the municipalities a strong understanding of people's



knowledge, attitudes, and willingness to engage in various behavior changes. The aim is to find messages and delivery mechanisms that help people find ways to positively impact water quality. One of the important findings of the survey included the misconception and confusion people have about where stormwater ultimately ends up (see figure). This finding is leading the UWRWA Education Committee to move into 2010 with a strong outreach effort focused on the water cycle and individual human interactions and impacts on it. Complementary to this effort, a subcommittee is actively organizing the details of the annual Central Indiana Stormwater Workshop targeted toward engineers, builders, and their contractors. Mark your calendars – the workshop is scheduled for Feb.10-11 at the Marriott East in Indianapolis. The Technical Committee recently revised its work plan and welcomed a new Chairperson, Ms. Sheila McKinley. Efforts of the Technical Committee continue to be project driven – the 2010 work plan remains on par with this approach, promising new products and tools. The Committee expects to release its long-awaited stormwater BMP selection tool at the annual conference. All of these efforts are dependent upon establishing a solid financial framework for the Alliance. The UWRWA Board of Directors is committed to this effort and is therefore busy planning for a broad membership campaign in 2010, as well as some unique outreach and fundraising events. New members and committee participants are always welcome. Visit www.uwrwa.org to get your feet wet!

Discovering the Science of the Environment



GK-12 Fellow, Angie Cowan, demonstrates proper use of field investigation equipment using outdoor trailer monitor and Nokia n810.

Do you have the skills to survive the PIT? Or conduct a detailed ecosystem investigation? Can you explain global primary productivity? Or evaluate the physical, chemical and biological health of a local river? Can you measure soil respiration? Or estimate a surface's temperature by measuring albedo and permeability? Hundreds of middle school students throughout Central Indiana can! Full of knowledge and learning, the Fall 2009 Discovering the Science of the Environment (DSE) trailer program visited an astonishing 1675 students in 63 classes in just 12 weeks. For the third year in a row, the DSE program was happy to return to Creekside Middle School, Craig Middle School, Forest Glen Elementary and Clay Middle School. During these programs, 5th-7th grade students participated in Plant Photosynthesis and Biodiversity, Physical, Chemical and Biological Water Quality Assessment, and Woodland Ecosystem Investigation, respectively. New this season, 6th grade students at Westfield Intermediate School participated in a Pond Ecosystem Investigation, while 4th-7th grade students

at Saint Thomas Aquinas participated in Bird Observations, Woodland Tree Monitoring, Understanding Global and Local Albedo, and Soil Biology and Respiration. As a special collaborative effort this season, the DSE program worked with the Indiana State Museum (ISM) to bring an innovative program, "Our Environment: Past, Present and Future," to students at the Columbus Signature Academy in Columbus, Indiana. This collaborative program offered 5th – 8th grade students a unique opportunity to explore Indiana's natural history through a visit to the ISM, investigate Indiana's local environments by participating in DSE trailer programs (Prairie Bird Observations, Woodland Ecosystem Investigation, Chemical Water Quality Assessment, and Soil Biology and Respiration) at Mill Race Park, and continuing their studies in the classroom, with their teachers and fellow students, to create and implement projects for improving Indiana's future environment. From the familiar to the unexpected, this has been a rewarding Fall programming season and we look forward to the Spring!

Introducing New Affiliated Adjunct Faculty

Dr. Ross A. Brittain

Ross Brittain's research interests and projects involve the intersection of ecology and public policy by analyzing the effectiveness of current avian conservation practices and recommending modifications within an adaptive management framework. A particular focus is placed on the effects of land use and climate on population trends. His research utilizes stable isotopes of C, N and D to assess avian food webs and habitat relationships for species of birds breeding at the ecotone between upland and wetland communities, and to determine the approximate geographic origin of migratory species that utilize Indiana habitats as stopover refugia. As the Indiana Director of Bird Conservation for the National Audubon Society he coordinates volunteers and interns to conduct avian population monitoring research on Important Bird Area (IBA) properties throughout the state. Research includes the design of bird conservation plans for specific IBAs, such as the Goose Pond Fish and Wildlife Area in Linton, and a spatially-explicit statewide bird conservation plan based on the combined principles of GAP analysis and the Indiana Biodiversity Initiative (IBI). His work additionally involves coordinating research of Northern Saw-whet Owl (*Aegolius acadicus*) migrations patterns and demographics across Indiana as part of Project Owlnet (www.projectowlnet.org). Ross will be co-locating his office with CEES starting in January 2010.

Dr. Gwen White

Gwen White works as a project manager for D.J. Case & Associates (a natural resources communication firm) where she focuses on freshwater and marine sciences, with skills that encompass program analysis and development, meeting facilitation, and report writing on issues ranging from exotic species prevention and control to natural resource management planning and biodiversity conservation in aquatic ecosystems. Gwen has a doctorate in conservation biology (University of Minnesota), a master's in zoology (University of Maryland), and a bachelor's in biology (Goshen College, Indiana). In the late 1980s, she served with the U.S. Peace Corps aquaculture program in Honduras. During 12 years with the Indiana Department of Natural Resources, Gwen oversaw contracts for control of nutrient and sediment inputs to lakes and rivers and assisted in assessing the biological impacts associated with the design and monitoring of wetland restoration, agricultural conservation, and stream bank stabilization projects. She served as a DNR representative on many state and regional government committees. Gwen is an active lifetime member of the American Fisheries Society, where she just completed five years as the registered parliamentarian for the Governing Board and was recently elected as 2nd Vice President for the North Central Division.

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