IES

ECOfOCUS

INSTITUTE OF ECOSYSTEM STUDIES

Understanding How the Natural World Works *Fall 2007*

Quinn Emmerling

EAVESDROPPING ON YOUR NEIGHBORS

When making decisions about how to navigate the world, many of us take cues from the people sharing our environment. If your neighbor departs on his morning commute carrying an umbrella, you might reconsider your choice of footwear. Similarly, overhearing your neighbor in a heated argument would probably thwart you from asking to borrow a cup of sugar or some pruning shears.

The act of eavesdropping and responding to the cues set out by neighbors is not unique to humans, nor is it species specific. Many of us have engaged in cross-species eavesdropping when we hear a barking dog and wonder what is eliciting such a reaction— a human intruder, a stray cat, or a garbage-plundering bear?

A more elaborate form of behavior-modulating eavesdropping is taking place on the grounds of the Institute of Ecosystem Studies. Beneath a forest canopy of oaks and sugar maples, IES scientists have revealed that small mammals shift their day-to-day activities based on the vocalizations of their avian neighbors.

Led by Dr. Kenneth Schmidt, an avian ecologist and IES visiting scientist, two different studies captured this phenomenon. One looked at grey squirrels and blue jays, the other at chipmunks and eastern tufted titmice. Both shed light on how mammals eavesdrop on birds to gain insight about environmental conditions.

In preparation for winter, grey squirrels collect and store food. Blue jays are known to pilfer squirrel pantries, consuming their hard-earned caches. This phenomenon is called kleptoparasitism. Through a series of audio playback experiments, Schmidt and IES animal ecologist Dr. Richard Ostfeld found that squirrels equate blue jay vocalizations with the loss of stored food.

When subjected to a range of bird calls, squirrels spent considerably less time storing nuts when blue jays were heard near their foraging site. Instead, they focused their efforts on eating food. Conversely, when calls from cardinals and goldfinches were broadcast, or when blue jay calls were perceived to be far away, squirrels allocated more time to burying nuts for future consumption.

Chipmunks also alter their feeding behavior based on bird calls. In this case, the birds in question are announcing the presence of a shared predator. Titmice are small grey songbirds that are vigilant and vociferous. When they identify a threat, they engage in high-pitched alarm calls.

When Schmidt and colleagues exposed foraging chipmunks to several titmouse vocalizations, they were able to discern day-to-day banter from alarm calls. When a mobbing call communicating a low flying hawk was heard, chipmunks abandoned foraging sooner than during non-alarm calls.

Mammals eavesdrop on birds to gain insight into environmental conditions.

Remarkably, the titmouse mobbing call conveyed more risk to chipmunks than an actual hawk call. This may be because the titmouse call signals that hawks are both present and on the prowl. This study was one of the first to document how avian alarm calls regulate the behavior of a mammalian eavesdropper.

Results of the squirrel study will be published in *American Naturalist*; the chipmunk research has been submitted to *Behavioral Ecology*. Schmidt and his team will continue investigating information transfer between mammals and birds; this interface has the potential to reveal the evolution of communication systems.

HIGHLIGHTS

ECOfOCUS

Ecofocus is published by the Institute of Ecosystem Studies, a not-for-profit organization dedicated to understanding the natural world. Our community of more than 120 scientists, educators, and support staff is investigating the ways that air, water, sail, plants, and animals interact. From predicting haw global change will influence forests to ossessing air quality, IES research is critical to environmental management.

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FROM OUR PRESIDENT

Jim Wallace, Duke University Photography

"There has never been a greater need for unbiased ecological science. It is at the heart of effective environmental policy."

Four months ago, I left my position as Dean of Duke University's Nicholas School of the Environment and Earth Sciences to become the President of the Institute of Ecosystem Studies (IES). In my short tenure at IES, I have been impressed by both the strength of the research program and the welcoming nature of the community.

In today's changing world, society is being confronted with a range of serious environmental problems. Open any newspaper, and you will see stories about global change, polluted waters, forest diseases, and degraded air quality. At the end of the day, many environmental issues are also issues of human health and economics.

The research being conducted by IES can make a difference in the world. Our staff of highly regarded scientists has expertise in air, land, water, and disease ecology, with a special emphasis on how human actions are causing environmental change. This unbiased science has the power to inform effective management strategies.

In the coming years, I look forward to connecting IES expertise with decision makers, educators, media, and the public. By taking on this role, IES research will help shape the world we leave for the future.

An elevated communications platform will necessitate shifting organizational priorities, most notably at our public interface. While our campus resides on an arboretum, the future of IES is in its scientific output. As such, we will begin de-emphasizing horticultural functions and strengthening programs that foster science outreach.

History has shown us that people value things more when they understand them. The Changing Hudson Project, detailed on the following page, is just one example of how IES science can help inform the next generation of environmental stewards. The biodiesel conference described on page 4 and the Where We Work column on page 5 illustrate how IES can help educate policy makers about environmental issues.

Stay tuned as we continue to use our scientific expertise to address environmental issues of local, regional, and national importance.

Dr. William H. Schlesinger, President

THE CHANGING HUDSON PROJECT

BRINGING ECOLOGY INTO THE CLASSROOM

For over two decades, IES scientists have been paying close attention to conditions in the Hudson River. Through collaboration and perseverance, they have amassed world-class datasets on invasive species, aquatic food webs, and nutrient pollution. While this information is essential to effective management of the river, it is also a rich resource for educators who want to bring real ecology into the classroom.

Learning is enhanced when students can apply lessons to the world that they live in. The Changing Hudson Project seeks to engage students in ecology by connecting them with current research about the Hudson River. By using an important local resource, and drawing on the expertise of practicing scientists, lessons come to life.

Initiated in the fall of 2006, the Changing Hudson Project is a collaboration among IES scientists, IES educators, and classroom teachers. Directed by Dr. Alan R. Berkowitz, Head of the IES Education Program, the target audience is students from 9th grade to community college. What began as a pilot project has expanded to include fourteen teachers throughout the region.

Ms. Janine Guadagno, a biology teacher at Christian Tabernacle Academy, comments, "The Changing Hudson Project allows students to engage in inquiry-based learning. Instead of being led by textbook examples, they are coming up with their own conclusions by manipulating actual measurements. They are closer to doing real science because they are using real data."

This fall, under the guidance of Project Coordinator Ms. Cornelia Tutschka, participating teachers will be fine-tuning curriculum materials and improving methods of working with IES data in the classroom. Ensuring that teachers are comfortable navigating the large data is essential to effective instruction.

Several times a year, workshops are held to train teachers in data manipluation tools such as Excel.

By sharing materials on the web, the project strives to reach out to a broader audience of educators. Modules have been developed about invasive species, land use, pollution, extreme weather, and the Hudson River ecosystem. Created by educators and reviewed by IES scientists, these materials draw on current research to stimulate inquiry and understanding. Lessons are tailored to support New York State learning standards, making them easy to integrate into existing curriculum frameworks.

Cornelia Tutschka

Funding realities mean that many students are unable to do hands-on research in the river, but the streams and creeks that form the river's watershed make perfect outdoor laboratories. These small-scale systems, such as Wappinger Creek (as seen above), can illuminate processes that are taking place in the river ecosystem. A number of lessons can also be performed using schoolyard study ponds and indoor tanks.

The Changing Hudson Project is made possible through grant support from the New York State Department of Environmental Conservation, the Hudson River Estuary Grants Program, and the Berkshire Taconic Community Foundation. Educators can access lesson plans and background readings by visiting the Changing Hudson Project website at www.ecostudies.org/chp.html.

"Students are closer to doing real science because they are using real data."

A Call for Science Teachers!

Educators who are interested in participating in the Changing Hudson Project are encouraged to attend introductory evening workshops. To learn more, please contact Cornelia Tutschka at (845) 677-7600 x233 or e-mail tutschkac@ecostudies.org.

SPOTLIGHTS

WEATHERS AWARDED COLUMBIA UNIVERSITY FELLOWSHIP


M.G. Eliassen

IES Senior Scientist Dr. Kathleen Weathers was recently selected as a Marie Tharp Fellow by the Earth Institute at Columbia University. The distinction recognizes her contributions to the study of the natural world. For more than two decades, Weathers has been investigating how fog—a source of water, nutrients, and pollutants—influences ecosystem function.

Weathers is one of four fellows selected for the 2007–2008 term. During her fellowship, she will be collaborating with faculty in Columbia's Department of Ecology, Evolution and Environmental Biology and with researchers at the Lamont-Doherty Earth Observatory. The opportunity will enrich both her research program and her professional commitment to the creation and maintenance of a diverse ecological profession.

"Opportunities to collaborate are essential to advancing science," Weathers commented. "I look forward to sharing ideas with colleagues at the Earth Institute. Given the breadth of expertise the organization encompasses, I am sure it will be an intellectually rewarding experience."

Named in honor of Marie Tharp, a co-creator of the first map of the ocean floor, the National Science Foundation-funded fellowship was created to acknowledge and advance outstanding female scientists.

CONFERENCE FOCUSES ON BIOFUELS

Based on renewable resources such as corn, biofuels have been touted as an alternative to non-renewable fossil fuels. But is a landscape awash in a monoculture of genetically modified crops really a boon for the future? What will the lack of diversity and increase in agrochemicals mean for the health of the natural environment? And how will it impact food systems? It is estimated that the grain needed to fill a standard SUV tank with ethanol could feed a person for an entire year. Will biofuels ever be sustainable?

This November, the Institute of Ecosystem Studies will host an invitation-only conference exploring the sustainability of biofuel production. Attention will be given to biofuels created using both agricultural crops and managed natural ecosystems. Biofuels based on native plant material offer an attractive alternative to corn-based ethanol. Instead of planting a sea of corn, this technique relies on the harvest of managed existing ecosystems. During their growing period, the plants in these systems provide valuable ecosystem services, such as carbon sequestration and water purification.

Conference proceedings will be used to provide recommendations to the National Science Foundation on methods of fostering sustainable biofuels. They will also be communicated to decision makers and public audiences that need to understand both the promise and the limitations of current biofuel models.

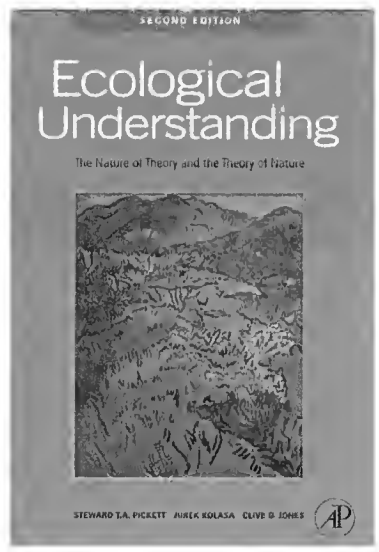
ECOLOGICAL UNDERSTANDING SECOND EDITION RELEASED

Ecological Understanding: The Nature of Theory and the Theory of Nature
Second Edition, Elsevier
by Steward Pickett, Jurek Kolasa, and Clive Jones

When discussing the philosophy of science as it relates to ecology, few books step outside of the realm of Karl Popper and Thomas Kuhn. Originally released in 1994, Ecological Understanding was the first book to integrate ecology within the context of contemporary philosophy of science.

A number of unique lessons can be gleaned from modern philosophy of science. Unlike older models, which focus on logic and individual truth as pathways to objectivity, modern philosophy acknowledges that social issues color perception. In this view, true objectivity arises from a diverse community that functions in an open way.

Written for ecologists by ecologists, the book is useful to researchers who are grappling with interdisciplinary problems that require integration and synthesis. While the classic examples from the first edition are retained, the second edition contains illustrative diagrams, additional examples, and an accessible writing style.



"This book is a fresh breeze that is destined to help move philosophy of ecology out of the doldrums of neglect and reliance on outdated philosophical ideas."

Gregory Cooper,
Ecology

NOTES FROM THE FIELD

Dr. Gary Lovett, IES Ecosystem Ecologist

ENVIRONMENTAL MONITORING: WHO NEEDS IT?

I have spent many years unraveling how invasive species and air pollution influence forest ecosystems. This research has taken me deep within New York's Catskill Forest and New Hampshire's White Mountains—places of amazing natural beauty. Lately, however, I've found myself pounding the pavement in Washington, D.C.

Long-term monitoring data are essential to understanding our forests. Without this information, we are unable to assess how changes in things like air quality impact forest growth or adjacent streams and lakes. Unfortunately, our nation's long-term monitoring programs are under the constant threat of losing their funding.

Monitoring programs are quiet efforts in good science. Their low profile makes them easy targets for bureaucrats struggling to cope with reduced budgets, or for politicians who may not want to know the answers that these data provide.

In addition to air and water quality, there are programs that track trends in climate, forest productivity, atmospheric carbon dioxide, and many other variables. This information provides a foundation for creating sound resource-management policies.

Working with colleagues at the Northeastern Ecosystem Research Cooperative and the Ecological Society of America, I have made it a priority to educate decision makers about the importance of sustained investment in long-term monitoring programs. Because ecosystems change slowly, long-term data are needed to observe trends, identify problems, and assess policies. The resources that we depend on, and often take for granted, are at stake.

Nadine Lynn

IES Ecologist Dr. Gary Lovett (right) and Dr. Charlie Driscoll of Syracuse University (left) working to educate policy makers on Capitol Hill.

A GOOD LAWN IS A SMALL LAWN

Brad Roeller
IES Grounds Manager

The great American lawn is about as far from a natural ecosystem as one can get. These artificial landscapes require an inordinate amount of resources to keep them in the green and manicured condition Americans have come to expect.

Eighty percent of U.S. households have lawns that average about 1/5 of an acre in size. More than $10.4 billion is spent annually on lawn products; billions more are paid to commercial lawn care businesses. The petrochemical industry produces tons of pesticides to maintain lawns free of pests, diseases, and weeds.

All of the 32 popular lawn pesticides pose risks to our water supplies, aquatic organisms, and nontarget insects. According to the Environmental Protection Agency, over half are listed as carcinogens and one in five is a reproductive toxin. Almost half of the lawn pesticides sold in the U.S. have been banned or restricted by European countries.

Making a conscientious effort to minimize the amount of lawn in one's landscape is a wise decision. If you reduce the size of your lawn, you can trade in your noisy, carbon-emitting gas mower for a human-powered push mower. It's a win-win situation: doing something for the environment and getting some exercise at the same time.

Choosing a lower-maintenance grass seed can also make your lawn a little easier on the environment. While Grade-A Kentucky bluegrass produces a thick weed-free carpet, to remain lush it requires fertilizer, lime, pesticides, and a copious amount of water. I learned this lesson the hard way by running the Gifford House well dry irrigating this water-hungry turf.

With water restrictions becoming more and more frequent, tall turf-type fescues are a much better choice. Not only does this type of turf have significantly lower water and fertility needs compared to Kentucky bluegrass, it also stands up extremely well to foot traffic.

When shopping for grass seed, it is easy to get confused by the plethora of brands and mixes stocked on the shelves. See what your local stores carry, but before making a purchase visit the National Turfgrass Evaluation Program website (www.ntep.org) to see how your selection scored in rigorous regional tests.

Remember, the best lawn is a small lawn! For more information on green lawn care, visit: www.ecostudies.org/gardens_&_grounds.html and look under "Successful Lawn Care."

DEVELOPMENT

DEVELOPMENT OFFICE CORNER

Dear Friends,

In five short months, the Institute's new president, Dr. William H. Schlesinger, is beginning to leave his mark. An expert in climate change, Dr. Schlesinger comes to IES after serving as the Dean of Duke University's Nicholas School of the Environment and Earth Sciences. He is deeply committed to strengthening our ties with policy makers and resource managers.

Many Aldo Leopold Society members have had the opportunity to welcome Dr. Schlesinger at receptions hosted this summer. His experience and enthusiasm will help lead IES into the future.

At the top of Dr. Schlesinger's agenda is ensuring that the Institute is fiscally sound. While we are rich in intellectual capital, monetary resources are crucial to maintaining our world-class programs and increasing our outreach capacity. Now, more than ever, we need to be sure that decision makers are equipped with unbiased information about the ecosystems that support life.

Help us shape the environment that is left for the next generation; consider joining the Aldo Leopold Society. Already a member? Give the gift of membership to a friend or loved one. I can be reached at (845) 677-7600 x120 or salsbergd@ecostudies.org.

All the best,

Diana Salsberg
IES Development Officer

Diana Salsberg & Donna Rutlin

AN ADVENTURE TO REMEMBER: THE GALAPAGOS

In May 2007, IES sponsored a trip to the Galapagos Islands to honor the founding President and Director Dr. Gene E. Likens for twenty-four years at the helm. Hosted by Lindblad Expeditions and held aboard the *Islander*, the trip was a fascinating journey for forty participating guests. Each day passengers explored one of the islands (eight in all) with an experienced staff of naturalists, enhanced by the expertise of the IES scientists in attendance. The islands that inspired Charles Darwin's groundbreaking theory of evolution provided a truly unique adventure of a lifetime. Buoyed by the success of this inaugural trip, which was a collaborative fund-raising effort, the Institute is organizing another expedition for the fall of 2008. Those interested in a memorable adventure to the Panama Canal and Costa Rica should contact Claudia Rosen to be added to the event distribution list. She can be reached at (845) 677-7600 x171 or by e-mailing rosenc@ecostudies.org.

Thanks to IES Trustee and ALS Member Zibby Tozer for hosting *Cocktails in the Conservatory*. The well-attended event helped welcome IES' new President, Dr. William H. Schlesinger, into the community.

CALENDAR

Public Education Programs

Our family-friendly public education programs immerse participants in ecological exploration. The full winter schedule will be available on-line shortly. For additional information, visit www.ecostudies.org/public.html.

Life in the Fall: An Interpretive Hike

November 11, 1 p.m. to 3 p.m.

Join IES educators for a hike investigating the ecological changes that take place during the fall in forests and streams on the IES campus. This leisurely hike will begin at the Carriage House, located at 181 Sharon Turnpike in Millbrook, NY. Interested in learning more? Contact Kim Notin at (845) 677-7600 ext. 303 or notink@ecostudies.org.

Free Friday Scientific Seminars

Seminars are held at 11 a.m. in the IES auditorium from September until early May. For more information, including directions, visit www.ecostudies.org/friday.html

October 19: Inducible defenses provided by fungal endophytes: ecological and molecular approaches, Dr. T.J. Sullivan, Hope College

October 26: Linking landscape characteristics, stream flow, and the dynamics of dissolved organic matter in forested streams, Dr. Paul Frost, Trent University

November 2: The interface between ecology and economics: A review of the literature, Dr. Ann Davis, Marist College

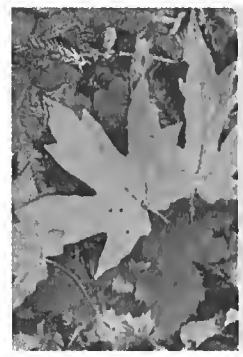
November 9: Moving students to the inner circle: Authentic settings for learning science, Dr. Barbara Crawford, Cornell University

November 16: The reorganization of carbon cycling and trophic dynamics in ecosystems exposed to elevated CO_2, Dr. Evan DeLucia, University of Illinois

November 30: Biodiversity loss and the rise of pathogenic microbes, Dr. Richard Ostfeld, Institute of Ecosystem Studies

December 7: Beneath two miles of Antarctic ice: Are subglacial lakes museums or ecosystems?, Dr. Robin Bell, Lamont-Doherty Earth Observatory of Columbia University

Don't miss out on an ecological adventure!
Join the IES event e-mail distribution list to stay informed about our latest offerings. Send your e-mail address to freemanp@ecostudies.org



EcoFocus Online

IES scientists write a bi-weekly column in the Poughkeepsie Journal called Ecofocus. Past articles are available at: www.ecostudies.org/ecofocus.html

Ways to Support the Institute

The Institute offers two membership levels. **General members** receive an *Ecofocus* subscription, notification when IES holds open lectures and events, and enrollment in a reciprocal admission program. **Aldo Leopold Society Members** are a special part of the IES family. Exclusive Aldo privileges include access to invitation-only lectures, galas, science updates, and dinner parties.

General Membership

- ❑ $50 Individual
- ❑ $60 Family
- ❑ $100 Sponsor
- ❑ $250 Club/School

Aldo Leopold Society Membership

For those who want to invest in understanding the natural world.

- ❑ $250 Member
- ❑ $1,000 Patron
- ❑ $2,500 Benefactor
- ❑ $5,000 Leader
- ❑ $10,000 Director
- ❑ $25,000 Founder's Circle

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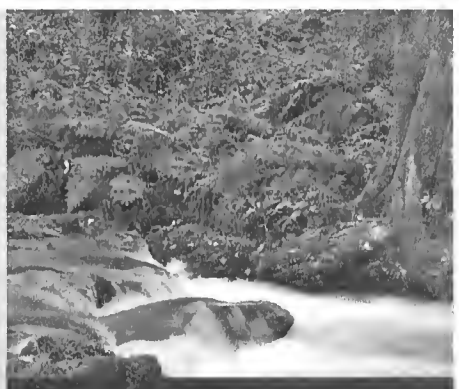

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For research, graduate opportunities, administration, library, volunteer opportunities, and general information:

IES Plant Science Building/IES Auditorium
Box AB (65 Sharon Turnpike)
Millbrook, NY 12545
Tel: (845) 677-5343 • Fax: (845) 677-5976

For school programs, ecology day camp, REU/RET inquiries, and the Gifford Garden:

IES Education Office/Gifford Garden
Box R (181 Sharon Turnpike)
Millbrook, NY 12545
Tel: (845) 677-5359 • Fax: (845) 677-6455

For those interested in visiting our tropical greenhouse:

IES Greenhouse
4799 Route 82
Salt Point, NY 12578
Tel: (845) 677-5354

THE FERN GLEN IN THE FALL

The Institute of Ecosystem Studies' Fern Glen is open to the public. Situated on the banks of Wappinger Creek, near a picturesque stone bridge, the Fern Glen is home to an array of native plants. While many people might associate a Fern Glen with the spring, the site is still vibrant in the fall. Sharp-lobed hepatica and jack-in-the-pulpit seeds color the landscape, and avian life bustles. Meander awhile and you are sure to spot white-throated sparrows, kinglets, and red-breasted nuthatches. The IES grounds are open to the public through October 31 (Mon-Sat, 9 a.m. to 6 p.m.; Sun, 11 a.m. to 6 p.m.). Be sure to plan a visit before we close for the winter season. For more information, visit www.ecostudies.org.

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