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Editor's Note

As the weather turns colder, many of us in the northeastern U.S. start preparing for the snowy months ahead. Avid gardeners begin deer-proofing their landscapes, skiers dust off their equipment, and drivers contemplate the status of their all-weather tires. In this issue, learn a little more about the ramifications of road salt, a familiar winter weather staple.

This season, The IES Ecology Shop will be offering an array of unique holiday gifts, from etched gourds and salt lamps to squirrel-proof bird feeders. To make the most of your holiday shopping, take advantage of the coupon on page 3.

Looking for a floral fix? Drop by the Institute's greenhouse. Free and open to the public, it's bursting with 1,300 different plant species. The collection includes orchids, scented geraniums, kitchen herbs, succulents, and staghorn ferns.

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To Salt or Not To Salt?

Roadways & Parking Lots Threaten Freshwater

There are 2.6 million miles of paved roads in the United States, and new roads are being constructed daily. When parking lots and driveways are factored in, there is already enough blacktopped surface in the U.S. to cover the entire state of Ohio. Paved roads and parking spaces come in handy for our nation's drivers, but they also come with a serious unforeseen cost—the degradation of freshwater ecosystems.

In a recent Proceedings of the National Academy of Sciences paper, Dr. Sujay S. Kaushal, Dr. Peter M. Groffman, Dr. Gene E. Likens, and Ms. Victoria R. Kelly of the Institute of Ecosystem Studies, with colleagues, detail how roadway deicers are degrading the quality of northeastern waters, making them inhospitable to wildlife and compromising drinking water supplies. Their insights were made possible through long-term data recorded by the Institute of Ecosystem Studies, the Hubbard Brook Ecosystem Study, the Baltimore Ecosystem Study, the U.S. Geological Survey, and the City of Baltimore.

Most road salt is derived from sodium chloride (NaCl). By analyzing chloride concentration records in a range of northeastern waterways, from urban and suburban sources in New York's Hudson Valley and Maryland's Baltimore County, to rural streams in the White Mountains of New Hampshire, the researchers concluded that freshwater salinity has been increasing at an alarming rate over the past 30 years. In the Baltimore study area, there was a strong relationship between the amount of impervious surface (i.e. roads and parking lots) and salt concentration.

Dr. Kaushal, a Postdoctoral Associate at the Institute of Ecosystem Studies when the research was conducted, commented, "There is a direct connection between the construction of new roadways and parking lots and freshwater quality. In particular, we haven't paid attention to how rapid changes in human development and deicer use impact the watersheds that supply our region's drinking water." He added that, "We are hardening the watershed by feeding it a high salt diet that is detrimental to the health of aquatic ecosystems."

The changes observed were not subtle. By accumulating in ground water and aquifers, road salt was linked to year-round increases in freshwater salinity. In New York and Maryland,



A common solution to icy winter roads, road salt is harming our nation's freshwater ecosystems.

freshwater salinity reached levels equivalent to 25% of the concentration of seawater. In developed areas of Baltimore, chloride concentrations are already high enough to kill aquatic animals and alter wetland plant composition. Even in rural New Hampshire, where road density is lower, a number of streams were as saline as the tidal waters of the Hudson River estuary.

Dr. Groffman, a microbial ecologist at the Institute, noted, "Long-term records show that salinity concentrations are increasing, even in places where the amount of salt applied has not. Concentrations are high in the summer, not just in the winter when salt is applied to melt snow. This surprising and significant finding suggests that salt is accumulating in the environment. The salinity increases observed in rural areas, with minimal road coverage, indicate that the urban/suburban effect on stream chloride is prevalent over large land areas."

If salinity levels continue to rise in the northeastern U.S., the paper's authors warn that within the next century many freshwater sources will be toxic to aquatic life and unfit for human consumption. Reversing the problem involves minimizing both road construction and our dependence on salt-based deicers.

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The City As an Ecological Classroom: An Interview with Janie Gordon

The Baltimore Ecosystem Study (BES) is a collaborative of over 30 researchers, educators and policy makers working together to understand how urban ecosystems function. Led by Institute Distinguished Senior Scientist Dr. Steward T. A. Pickett, other IES staff members involved in the effort include: Microbial Ecologist Dr. Peter M. Groffman, Educator Dr. Alan R. Berkowitz, BES Education Coordinator Ms. Janie Gordon, BES Information Manager Mr. Jonathan Walsh, and Administrative Assistant Ms. Holly Beyar.

Of these staff members, Ms. Gordon is the only person headquartered in Baltimore. As BES's Education Coordinator, her position is essential to an array of educational programs—from teacher training workshops to after school enrichment programs for elementary and middle school students. Ms. Gordon's success stems from her familiarity with city schools and universities, extensive knowledge of partner organizations, love of education, and passion for the city she calls her home.

Recently, Ms. Gordon discussed her pathway to BES, the projects she is working on, and her vision for the future.

How did you become involved with BES?

A Baltimore resident since 1974, I've always been interested in programs that strive to improve the city. I learned about BES while working for the EnvironMentors Project. The Project paired high school students from city schools with scientist mentors, with the goal of producing a science project. We held lots of field trips and outings based on student enrichment. In an effort to

recruit new mentors, I attended the 2003 BES quarterly meeting, where I met Dr. Berkowitz. As luck would have it, my EnvironMentors position had ended when the BES Education Coordinator position became available.

What does your job as BES Education Coordinator entail?

My goal is to coordinate, facilitate, and maximize the educational impact of the research that BES is doing in the city. From an educational perspective, this involves working with teachers, school administrators, and students. We have a cadre of teachers in city high schools and middle schools that are using BES science to engage their students in ecological investigations. Working with them, I help develop lessons that support state and city standards while giving teachers a chance to engage students in local science that is relevant to their lives.

Tell me a little about KidsGrow.

A 12-year old program coordinated by the Parks & People Foundation, KidsGrow provides after-school enrichment for students in 2nd to 7th grade. Current participants hail from two urban schools in West Baltimore, an economically depressed section of the city. BES has been collaborating with KidsGrow for three years. Our goal is to develop an engaging ecology curriculum that lets students do hands-on investigations. We want students to be both knowledgeable of and excited about the ecology of their city.

What have been some KidsGrow highlights?

There have been several. The Leaf Pack Project was a wonderful integration of cultural and scientific themes. Students investigated stream ecology using field experiments that Dr. Wangari Maathai, a Nobel Peace

Prize Laureate, performed with her students in Kenya. In addition to getting students outdoors and teaching them scientific principles, the project exposed them to labs at the University of Maryland Baltimore County, where they analyzed stream animals. For most of the 3rd- 6th grade participants, this was their first trip to a college campus.

Black History Month was a great celebration of African American scientists. BES scientists, including IES ecologist and BES Project Director Dr. Steward T.A. Pickett, University of Missouri wildlife ecologist Dr. Charles H. Nilon, and USDA soil scientist Dr. Quinn Holifield, visited KidsGrow to talk with students about their work. The student interviews were priceless, with kids exploring questions such as “what were you like at my age” and “when did you know you wanted to be a scientist”?

Tell me about the Investigating Urban Ecosystems Program (IUE).

IUE workshops integrate BES research with classroom lessons and investigations, with the goal of providing middle and high school teachers with the resources they need to bring ecology to their students. When teachers are equipped and confident in their ability to teach a subject, students reap the benefits. Recent workshops have focused on urban schoolyard hydrology, earthworms, and watershed explorations.

Participating teachers interact with BES scientists and educators while engaging in outdoor investigations. Attendees come from schools in Baltimore City and Baltimore County. They leave the workshops with classroom lessons based on research that is happening in their own city. Our overall motivation is to nurture interest and reduce obstacles to teaching ecology in the classroom.



(L-R) BES Education Coordinator Ms. Janie Gordon and BES Intern Ms. Emily Reisner



KidsGrow students observing stream animals found during their Leaf Pack Project field studies.

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The City, *continued from page 2*

Who develops the lessons that you share with IUE teachers?

The units taught in the workshops are developed by BES Education Fellows. They are practicing teachers that are awarded fellowships to work on the units during the summer, in collaboration with a BES scientist, Dr. Berkowitz, and myself. Crafted with an eye toward education standards, the units strive to get students collecting and analyzing real data.

What is the High School Ecology Teaching Study?

If we are going to improve the way that ecology is taught in Baltimore schools, we need a snapshot of what is going on in science classrooms. How is ecology being taught? Do students have the opportunity to perform authentic investigations? Are teachers confident in their ability to teach the topic? By surveying teachers, the High School Ecology Teaching Study is giving us answers to these questions. Survey results will help guide future BES education efforts. Findings will also be shared with colleagues who are doing environmental education at city, state, and local levels.

What future projects are you looking forward to?

We have a new BES intern, Ms. Emily Reisner, and I am excited about the work she is doing. Following the aftermath of Hurricane Katrina, she compiled a series of lessons that explored the scientific, social, and demographic issues surrounding weather disasters. The social component, including race and poverty, is very salient to urban dwellers.

As a study, BES is broken into sub-disciplines. Working with scientists on the Social Demographic Team, one of our fellows has developed a Neighborhood Investigation unit. Students will explore their neighborhood via traditional mapping, historical photos, surveys of lots and housing stock, analysis of storm-water retention, and personal interviews. The goal is to document neighborhood change; what's good, what needs improvement, and how young people can help. ●

To Salt, *continued from page 1*

Dr. Likens concludes, "We are at a point where we can say, without a doubt, that road salt is a freshwater contaminant. Unfortunately, it is both cheap and unregulated. More thought needs to be given to the quantity of salt applied, the ecological costs of road salt pollution, and available alternatives, such as potassium acetate and urea." ●

G. Evelyn Hutchinson Chair in Ecology Awarded to Dr. Michael L. Pace

This November, the IES Board of Trustees selected Dr. Michael L. Pace as the next recipient of the endowed G. Evelyn Hutchinson Chair in Ecology. Established in 2000, the honor recognizes an IES scientist who has made very significant contributions to the field of ecology. It is named after eminent limnologist Dr. G. Evelyn Hutchinson, one of the most influential ecologists of the twentieth century.

Dr. Pace is the second beneficiary of the five-year honor. It was first presented to IES President and Director Dr. Gene E. Likens in 2000. In addition to serving as a staff ecologist, for the past five years Dr. Pace has been the Assistant Director of the Institute.

Dr. Paul G. Risser, Chair of the IES Board of Trustees, commented that, "Dr. Pace was selected based on both his outstanding work in the aquatic sciences and his leadership abilities. An expert in the ecology of lakes and other freshwater systems, Dr. Pace's research cuts across disciplines. His multidisciplinary thinking defines the type of scientist needed to address the world's complex environmental problems."



Dr. Michael L. Pace on the Hudson River, one of his research sites

Roy Gumpel

Dr. Clive G. Jones to Serve as a Blaise Pascal International Research Laureate

IES Ecologist Dr. Clive G. Jones has been selected to serve as a Blaise Pascal International Research Laureate. Awarded by the Foundation École Normale Supérieure, in Paris, France, Dr. Jones is one of five candidates selected in 2005. Blaise Pascal Chairs are honored for their international expertise in an exact or applied science. His term will begin in January 2006.

Funding will allow Dr. Jones to advance the application of ecosystem engineering through collaborating with French colleagues and sharing his findings with students in the Isle de France region. By the end of his two-year term, he will have given ten lectures and a public seminar.



(L-R) Dr. Clive G. Jones, seen here receiving his 25-year recognition from IES President and Director Dr. Gene E. Likens

Sarah Bakke

For an enjoyable shopping experience visit
THE ECOLOGY SHOP
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Newsletter

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Calendar

CONTINUING EDUCATION

The Continuing Education Program is now accepting winter registrations. For information, or to request a brochure, call 845-677-9643 or visit our website at www.ecostudies.org/cep.html. Winter semester programs include:

Gardening

- Feb. 18 (4 Sat.): **Basic Botany for Gardeners and Landscapers**
Mar. 7 (4 Tues.): **Plant Propagation**
Mar. 18 (1 Sat.): **Turfgrass Care**
April 1 (4 Sat.): **Plants for the Landscape: Woody Plants**
June 13 (2 Tues.): **Basic Cultural Techniques for Perennials**
June 15 (2 Thurs.): **Annuals with Style**

Landscape Design

- Jan 7 (4 Sat.): **Landscape History and Theory**

IES Ecology Field Programs for School Groups

Limited Openings

Engage students in hands-on science this winter and spring. Explore the woods, discover the ecology of maple sugaring, investigate the incredible world of plants in our greenhouse, and observe life in our pond and surrounding watershed. For information or to register, please call the Education Office at 845-677-7600 ext. 316 or visit www.ecostudies.org.

GREENHOUSE

The Greenhouse is a year-round tropical plant paradise and a site for controlled environmental research. Managed using integrated pest management, plants thrive in its pesticide-free environment! Open daily until 3:30pm with a free permit (see HOURS).

SPECIAL PUBLIC LECTURE!

On January 12th IES will present a special public lecture by world-renowned architect and designer William McDonough. A leader in the sustainable development movement, McDonough's accomplishments include building and designing the first solar-heated house, designing the first "green" office in the U.S. for the Environmental Defense Fund, and co-authoring the visionary text *Cradle to Cradle: Remaking the Way We Make Things*. Free and open to the public, the lecture will take place from 4pm to 5pm in the IES Auditorium.

THE ECOLOGY SHOP

Looking for a unique gift? The IES Ecology Shop features an assortment of nature and gardening gifts. Many items are fair-trade, recycled, or otherwise Earth-friendly, so you can feel good about your purchases. Senior citizens receive 10% off on Wednesdays.

VOLUNTEER EDUCATORS

There are opportunities for volunteer educators to participate in our Ecology Field Programs for schools. If you are interested in assisting the program leader with programs including Plant Power, Maple Sugaring, Watershed Studies, Fantastic Forests, or Water Wonders, please visit our website at www.ecostudies.org and click under "Get Involved" and "Volunteer". You can submit an on-line application.

Volunteers - Save the Date

The IES Volunteer Dinner and Awards ceremony will be held on April 27th, 2006.

HOURS

Winter Hours: October 1 - March 31
Internal roadways and trails closed during deer hunting season, and when snow covered.

Public attractions: Mon.-Sat., 9-4, Sun. 1-4; closed public holidays. The greenhouse closes at 3:30 daily.

The Ecology Shop: Mon.-Fri., 11-4, Sat. 9-4, Sun. 1-4. (Please note: *The shop is closed Mon.-Sat. from 1-1:30.*) **Free permits are required and are available at the Gifford House Visitor and Education Center until one hour before closing time.**

THE INSTITUTE'S ALDO LEOPOLD SOCIETY

Through their generous support of IES research, Aldo Leopold Society (ALS) members invest in ecological understanding. In addition to receiving benefits and discounts, ALS members are invited to special lectures, excursions, and science updates. To learn more, call the Development Office at 845-677-7600 ext. 120.

TO CONTACT IES ...

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... for education, general information, and The Ecology Shop:

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Box R, Millbrook, NY 12545
Tel: 845-677-5359 • Fax: 845-677-6455

The Ecology Shop: 845-677-7600 ext. 309

Street address: Gifford House Visitor and Education Center, 181 Sharon Tpke. (Rte. 44A), Millbrook, NY 12545

For information on current IES public events and attractions, visit the news corner at: www.ecostudies.org

For garden tips, visit: www.ecostudies.org/gardens.html.