



M.G. Eliassen

## CARY HELPS LEAD EFFORT TO PROTECT FRESHWATER

by Lori M. Quillen

A grassroots network of scientists, information technology experts, and engineers is tuned in to the pulse of the planet's freshwater ecosystems. Using buoys outfitted with environmental sensors, the Global Lake Ecological Observatory Network (GLEON) is working to understand the ecology of lakes and reservoirs, many of which are struggling under the pressures of growing human populations and competing demands.

Kathleen Weathers, a senior scientist at the Cary Institute, has been involved with GLEON since its inception in 2006. Weathers comments, "From development to fisheries, society puts significant pressure on freshwaters. Yet we depend on lakes and reservoirs for drinking water, recreation, and other services. GLEON is working across disciplines and continents to advance a better understanding of how these ecosystems function, so we can preserve and protect them now and for future generations."

Weathers chaired GLEON's 13th meeting, which was hosted in New Hampshire this fall by the Lake Sunapee Protective Association (LSPA) and the Cary Institute. More than a hundred scientists from twenty-four countries attended the event, which received coverage in the *Boston Globe*

and on New Hampshire Public Radio. Past GLEON meetings have been held in Israel, Brazil, and China.

Weathers, who is also co-chair of GLEON, comments, "It was inspiring to see such an engaged group of scientists and citizens working together to address challenges in lake and reservoir management, particularly maintaining water quality in the face of accelerating development."

Lake Sunapee is home to one of several dozen monitoring buoys at the heart of the GLEON network. Others are deployed across the globe, at sites including Sweden, France, Ireland, South Korea, Brazil, Israel, and Australia. These high-tech instruments record and transmit data, 24/7, about lake and reservoir conditions, such as temperature and oxygen levels. This information helps scientists and managers respond to extreme weather, development, and introduced species.

In response to the question "What should every citizen know about GLEON?" Weathers replies, "Long term and high-frequency monitoring are critical to protecting freshwater. GLEON is a network of more than 300 scientists and citizens tuned in to data generated by a global network of buoys. And GLEON data are

"From development to fisheries, society puts significant pressure on freshwaters."

a window into how events such as hurricanes and typhoons impact lake food webs and water quality."

Through generous funding from the National Science Foundation, this year Weathers will be developing a graduate training program that builds on the GLEON network. The five-year project will help train the next generation of scientists in the leadership, research, and communication skills needed to preserve and protect freshwater in the face of mounting pressure from population growth and climate change.

Weathers comments, "Our experience with GLEON has shown us that scientific advances require not only creative use of technology and the application of new data analysis techniques but, perhaps more importantly, scientists trained to collaborate and to communicate their findings broadly with the scientific community and the public."

To learn more about GLEON, visit [www.gleon.org](http://www.gleon.org)

## HIGHLIGHTS

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## ECOFOCUS

*Ecofocus* is published by the Cary Institute of Ecosystem Studies. Our scientists are leading efforts to understand human impacts on air and water quality, climate change, invasive species, and the ecological dimensions of infectious disease. As an independent, not-for-profit organization, the Cary Institute produces unbiased research that leads to more effective management and policy decisions.

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## FROM OUR PRESIDENT



John Halpern

Cary Institute scientists continue to transmit the best findings of their scientific efforts to help inform the policy process.

Dear Friends of the Cary Institute:

Happy New Year!

This January marked the debut of *Earth Wise*, a collaboration that Cary Institute has embarked on with WAMC Northeast Public Radio. I will be acting as narrator of the two-minute segments, which seek to engage and educate radio listeners about leading environmental issues. Learn more on page 4.

Our scientists continue to inform the policy process. This fall, Dave Strayer spent a day in Albany testifying before the State Senate on invasive species. His thoughtful words were adapted into an *Ecofocus* column that I highly recommend ([www.caryinstitute.org/testimony.html](http://www.caryinstitute.org/testimony.html)). We also held a Science and Management Forum focusing on climate change in the Hudson River Valley; the well-attended event drew a large number of regional decision makers.

Community response to our Friday evening programs is inspiring. Many of you attended the memorable Science and Music event that paired Cary's Emma Rosi-Marshall with cellist Rhonda Rider, in a portrayal of the Grand Canyon ecosystem. And Mike Clark, of the Greater Yellowstone Coalition, gave an inspiring talk about preserving the great open spaces of the West. See page 7 for upcoming events, including a talk by Frances Moore

Lappé. And remember, you can view video of past events online ([www.caryinstitute.org/events\\_multimedia.html](http://www.caryinstitute.org/events_multimedia.html)).

Interested in seeing 2011 in review? Our Annual Report is available online ([www.caryinstitute.org/annual\\_report.html](http://www.caryinstitute.org/annual_report.html)). In it you will find essays about our research and a snapshot of our scientific contributions. It pleases me to report that our scientists continue to lead the field of ecology, with more than 100 publications in some of the most prestigious journals. Our output is wide ranging—from the molecular level to global ecology—all illuminating the way to a healthier environment.

As always, a special thanks to our supporters. Together we are working to advance the science that is essential to managing the world we live in, now and for future generations.

Dr. William H. Schlesinger, President

## EDUCATION

## AN INTERVIEW WITH STEWARD PICKETT

### *Urban Ecology Visionary*

by Lori M. Quillen

Steward Pickett's roots are in plant ecology. From abandoned agricultural fields in New Jersey to the South African savannah, his work explores vegetation dynamics. Since 1997, his primary field site has been a city. As director of the Baltimore Ecosystem Study, he leads an ambitious, multi-partner effort looking at how urban areas function as ecosystems.

**What is urban ecology?** It's like ecology, except that it includes people, the resources they use and dispose of, and the things they build. The interplay between the built and natural components makes it exciting. As a researcher, there is joy in discovering what makes the urban environment tick; historically speaking, it's been neglected by ecologists. Also, urban ecology has a role to play in improving human well being.

**What is a Long-Term Ecological Research (LTER) program?** Twenty-six LTERs are funded by the National Science Foundation, which recognized that to understand ecosystems, it's essential to have long running studies, on the order of 50 years or more. The Baltimore Ecosystem Study is one of two LTERs in an urban area.

**Why Baltimore?** There are 6,000 acres of parkland; these big green spaces are perfect monitoring sites. Also, Baltimore is on a clearly defined watershed—what happens there impacts streams, rivers, drinking water, and the Chesapeake Bay. The city's vitality was also attractive. There is government and community engagement about the environment, and the intellectual capital needed for a venture that includes social scientists, geographers, designers, lawyers, and historians, among others.

**What are three things that everyone should know about urban ecosystems?** First, they contain



Steward Pickett/Jonathan Walsh

four key components: 1) the physical environment, including soil, air, and water; 2) non-human life, ranging from microbes to birds; 3) people, their institutions, and conventions; and 4) the built environment, such as roads and buildings.

Second, processes we associate with natural areas go on in cities. Plants grow, organic matter decomposes, and water transports nutrients and contaminants. Streams harbor invertebrates and fish, air carries particles and gasses, some of which affect human health, and animal diseases are spread to humans.

Lastly, urban ecology can help reveal and remedy unintended consequences of management decisions, human values, and economic constraints. Simply put, our insights can improve the lives of urban dwellers and the environments affected by urban waste streams.

**As President of the Ecological Society of America (ESA), what is your goal?** I feel a responsibility to promote research, the next generation of ecologists, and connections with

the larger world. I'm excited about Earth Stewardship, an initiative started by former ESA presidents Mary Power and Terry Chapin. It calls on ecologists to improve the knowledge available for caring for Earth's ecosystems, and collaborate with other specialists to communicate and apply that knowledge.

**What would be different about cities if they embraced ecology?**

They could improve their capacity to contribute to sustainability. Given that more than half of humanity lives in urban areas, cities must be a part of the solution to the pollution and resource depletion problems facing our planet. Cities have efficiencies and creative capacities that should be able to help in this goal.

**What is one thing everyone can do?**

Remember that the ecosystem sustains you, even if you live in a city. And our actions, for better or worse, are felt downstream and downwind. Be a voice for efficiency—recycle, support public transportation, let decision makers know that ecosystem concepts have a place in development.

# SPOTLIGHTS

## CARY AND WAMC DEBUT NEW RADIO SHOW

The Cary Institute and WAMC Northeast Public Radio have launched a new radio show called *Earth Wise: A look at our changing environment*. The two-minute segments will air Monday through Friday at 11:10 a.m. and 4:04 p.m. The effort was undertaken to increase the environmental literacy of radio listeners.



With Earth as its subject, *Earth Wise* content will be globally relevant. New topics will be

featured daily, with coverage on climate change, energy, sustainable living, agriculture, and threats to air, water, and wildlife. Segments will also highlight how individuals can make a difference.

Using accessible language, and drawing on commentary from national experts, Cary President William Schlesinger will guide *Earth Wise* listeners through the science of leading environmental concerns. "Our goal is to inspire listeners to make informed decisions," notes Schlesinger, adding, "each listener has the capacity to be a positive change in the world."

"All of us at WAMC are incredibly happy with *Earth Wise*," says WAMC President and CEO Alan Chartock. "Our listeners asked for more environmental programming and now they've got it. Dr. Schlesinger is a brilliant scientist with a voice made for radio. Cary Institute is the gold standard for environmental research; we are grateful to them for making this happen."

Listen online at [earthwiserradio.org](http://earthwiserradio.org), keep updated on Twitter @earthwiserradio, or join the conversation at [Facebook.com/EarthWiseRadio](https://www.facebook.com/EarthWiseRadio).

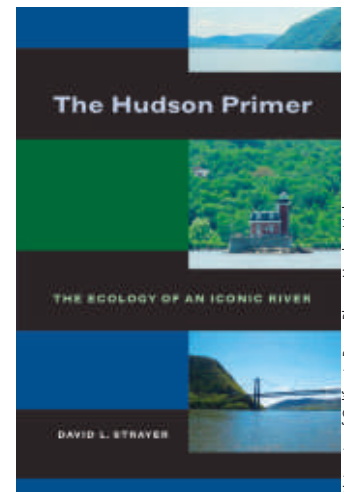
### THE NEWSLETTER IS AVAILABLE ONLINE

The Cary Institute's newsletter is available on our website at [www.caryinstitute.org/newsletter.html](http://www.caryinstitute.org/newsletter.html). If you would prefer to read the newsletter online instead of receiving a printed copy by mail please notify us at [freemanp@caryinstitute.org](mailto:freemanp@caryinstitute.org).

## STRAYER AUTHORS PRIMER ON HUDSON RIVER ECOLOGY

As a main artery to Manhattan, the Hudson River is one of the most travelled and researched rivers in the world. Cary Institute scientists have been investigating the river's ecology for almost 30 years. This winter, Senior Scientist Dave Strayer released *The Hudson Primer: The Ecology of an Iconic River*. Published by the University of California Press, the book distills a large body of scientific information—from Cary Institute and beyond—into an accessible and intimate view of the Hudson River estuary.

From the geology of the Hudson River basin and the movement of water to resident plants and animals, Strayer communicates the conditions that make the Hudson unique. Wetlands, restoration, invasive species, and pollution are among the topics covered. Copies of the book are available online at [www.ucpress.edu](http://www.ucpress.edu).



University of California Press. Photos Heather Malcom

## ARTIST IN RESIDENCE LYNNE CHERRY

Award-winning author, illustrator, and filmmaker Lynne Cherry is spending a year at the Cary Institute as Artist/Writer-in-Residence. During her stay she will interact with research staff, investigate the Cary Institute's 2,000-acre campus, and gain inspiration for her next environment-inspired offering.



Doug Grenth

Cherry is the author and/or illustrator of more than 30 books that capture the imagination and encourage respect for nature. Her best-seller *The Great Kapok Tree* is used in schools to teach about the rainforest. Similarly, her book *A River Ran Wild* has been built into 4th and 5th grade curriculums, where it informs lessons on watershed cleanup and restoration.

Her most recent offerings include a book on global warming, *How We Know What We Know about Our Changing Climate*, and a video series, *Young Voices for the Planet*, which focuses on how students are taking environmental action.

Cherry has held previous Artist-in-Residence positions at the Smithsonian, Cornell University, Woods Hole Oceanographic Institute, and Princeton University. For more information about the Cary Institute's Artist/Writer-in-Residence Program, visit: [www.caryinstitute.org/resident\\_artist.html](http://www.caryinstitute.org/resident_artist.html).

# WHERE WE WORK

## TEACHING ECOLOGY AND EVOLUTION THROUGH MUD WORMS

by Celia E. Cuomo, Cary Educator



B. K. Frogma

Ecology and evolution are often taught as independent topics in middle and high schools, though the two are intertwined in nature. Thanks to a recent grant, the Cary Institute's Changing Hudson Project curriculum will be expanded to include a unit that demonstrates the connections.

Lessons in "Ecology and Evolution: Toxins in the Hudson" will highlight a fascinating local story about the rapid evolution of cadmium resistance in mud worms as a response to a toxic environment. Foundry Cove, located at the edge of the Hudson River about fifty miles north of New York City, earned the dubious title of "the most cadmium polluted site in the world" during the 1980s due to toxic discharge from a former battery factory.

Using field and laboratory experiments, as well as DNA analysis, researchers found that mud worms living in Foundry Cove had evolved resistance to cadmium in just thirty years. And in the 1990s, when cadmium levels were reduced after a Superfund cleanup, the worms responded by losing their resistance.

We are excited to incorporate this dynamic example of evolution in our new curriculum, which will be available online later this winter. Interested in using Changing Hudson Project lessons in your classroom? Visit [www.caryinstitute.org/chp.html](http://www.caryinstitute.org/chp.html) or join us for a workshop on Saturday, February 18th. We are offering \$50 gift cards for the first 20 teachers who sign up. Contact the Mid-Hudson Teacher Center at [www.mhtc.dcboces.org](http://www.mhtc.dcboces.org).

## FIELD NOTES

### WHERE DID ALL THE ACORNS GO?

For several years, oaks in the Northeast were prolific acorn producers. The 2010 crop was record-breaking—many will recall getting hit with acorn rain or slipping on acorns underfoot. This fall, however, acorns were scarce.

While this sounds like good news for the accident-prone, it has ramifications for wildlife and human health. Squirrels aren't the only animals that depend on acorns for their winter larders. The calorie-rich nuts are a staple for an array of forest animals, from chipmunks and mice to deer and black bears.

With acorns at the lowest level seen in 20 years, we can expect more collisions with deer as they leave the forest in search of food. Bears will be more apt to raid our garbage cans. And, as Cary Institute's Richard Ostfeld recently discussed in the

*New York Times*, spring of 2012 will be one of the worst years for Lyme disease in the Northeast.

That's because, this winter, in the absence of acorns, mouse populations will crash. Ostfeld predicts declines could be as steep as 90%. And come May, the tiny nymphal ticks that normally feed on rodents will search for new hosts, increasing our risk of being bitten and infected with Lyme.

Ground-nesting birds will also take a toll as forest predators like hawks and weasels search for alternatives to once-abundant mouse prey.

When it comes to acorns, it has always been feast or famine. But paying attention to cycles in acorn production can provide us with valuable information about the world we live in.



Bigstock Photo



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# SUPPORTERS' CORNER

## FALL LUNCHEON ON THE GROUNDS OF CARY INSTITUTE

Seventy-five supporters and perfect weather made our first Fall Luncheon on the Grounds a resounding success. Co-chairs Barclay Collins and Felicitas Thorne welcomed guests to a sumptuous lunch under a tent in a remote corner of Cary Institute's 2,000-acre campus. Freshwater ecologist Dave Strayer provided a lively finale with his talk, "Invasive Species: Kill 'em, or Learn to Love 'em." Our 2nd Fall Luncheon is slated for September 16th, 2012.



Vicki Doyle



Vicki Doyle



Vicki Doyle



Vicki Doyle

## ALDO LEOPOLD SOCIETY AUTUMN CELEBRATION 2011

Susan Babcock and Ralph Schmidt hosted this year's event to thank members for raising critical operating funds for the Cary Institute. Before Cary President Bill Schlesinger gave his annual update, ecologist Clive Jones and guests investigated the work of resident beavers—nature's engineers—two of which swam across the pond, as if on cue.



Vicki Doyle



Vicki Doyle

# CALENDAR

## Upcoming Public Programs

Our Public Programs are a great way to expand your ecological understanding while learning about issues facing the environment. Lectures are held in our auditorium, located at 2801 Sharon Tpk., (Rte. 44) in Millbrook, NY. Registration is required for outdoor events. Call (845) 677-7600 x 121 or e-mail [freemanp@caryinstitute.org](mailto:freemanp@caryinstitute.org).

Sunday, February 5th at 1:00 p.m.

### Winter Ecology Walk

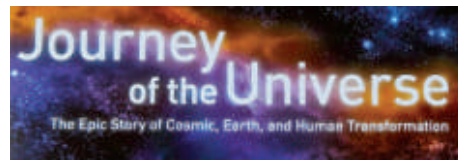
Join Cary Institute educators for a walk along snow-covered trails and an afternoon of family-friendly exploration. Discover animal tracks, plant adaptations, cold-weather insects, ice bell formations, and the wonders of winter survival. The walk will begin in our auditorium parking lot, located at 2801 Sharon Turnpike (Rte. 44) in Millbrook, N.Y. In the event of severe weather, the program will be cancelled. Register online at [carywinterecologywalk.eventbrite.com](http://carywinterecologywalk.eventbrite.com).

Friday, February 10 at 7:00 p.m.

### Journey of the Universe:

#### The Epic Story of Transformation

A 60-minute documentary about the origins of the universe and our profound role in the web of life. Followed by a Q & A with producer and writer Mary Evelyn Tucker, a Senior Lecturer in Religion and the Environment at Yale University. Doors open at 6:30 p.m.



Friday, March 23 at 7:00 p.m.

### EcoMind: Changing the Way We Think to Create the World We Want

Frances Moore Lappé, author of *Diet for a Small Planet* and founder of Food First: The Institute for Food and Development Policy, will talk about her new book *EcoMind: Changing the Way We Think to Create the World We Want*. Doors open at 6:30 p.m.

## Scientific Seminar Series

Free and open to the public, our scientific seminars are held on Thursdays at 11 a.m. in the Cary Institute's auditorium. A sampling of offerings is below; a complete list is available online at [www.caryinstitute.org](http://www.caryinstitute.org).

Jan. 26: Spatial Complexity in River-Riparian Food Webs. Dr. Colden Baxter, Idaho State University

Feb. 2: Inland Waters and the Carbon Cycle in the Amazon Basin. Dr. John Melack, University of California, Santa Barbara

Feb. 9: Paradigms Lost? Climate, Nutrient Limitation, and Carbon Storage in Lowland Tropical Forests. Dr. Alan Townsend, University of Colorado

Feb. 16: Arthropod Behavioral Influences on Vector-Borne Pathogen Transmission and Diversity. Dr. Maria Diuk-Wasser, Yale University

**For a complete listing of upcoming events, programs, and videos of past programs visit our website at [www.caryinstitute.org/events.html](http://www.caryinstitute.org/events.html).**

## Ways to Support the Cary Institute

Supporters receive an *Ecofocus* subscription and e-mail notification of lectures and events.

**Aldo Leopold Society Members** are a special part of the Cary Institute family.

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Questions or comments?  
Please call  
(845) 677-7600 x203



## RESEARCH EXPERIENCES FOR UNDERGRADUATES

MAY 29 – AUGUST 17, 2012

The Cary Institute of Ecosystem Studies' Research Experiences for Undergraduates (REU) program is now entering its 25th year. The summer program provides ten undergraduate students with the opportunity to become a part of an established ecological research community in Millbrook, N.Y.

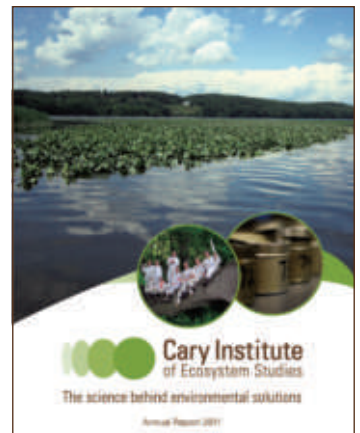
As part of the REU program, students work closely with Cary Institute scientists to design and complete research projects, exchange ideas with a diverse group of students, and learn to translate science to the general public. Students in the program will see how ecology research has an impact on our society.

For more information and application details, call Patti Zolnik at (845) 677-7600 x 326, or [zolnikp@caryinstitute.org](mailto:zolnikp@caryinstitute.org). Apply online by February 5, 2012 at [www.caryinstitute.org/reu.html](http://www.caryinstitute.org/reu.html).



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## Annual Report 2011



The Cary Institute's 2011 Annual Report is now available online. The report can be downloaded at [www.caryinstitute.org/annual\\_report.html](http://www.caryinstitute.org/annual_report.html).



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