



Environmental Sciences at the University of Virginia

2011–12 Annual Report



THE DEPARTMENT OF ENVIRONMENTAL SCIENCES

Established in 1969, the University of Virginia's Department of Environmental Sciences was one of the first departments in the nation to look at fundamental environmental processes from a multidisciplinary perspective and the first to offer undergraduate, master's, and doctoral degrees in environmental sciences. Today, the faculty includes winners of the prestigious Tyler and Hutchinson awards as well as five professors who are among the most highly cited researchers in their fields.

Departmental field stations and facilities include the Anheuser-Busch Coastal Research Center in Oyster, Virginia, home of the National Science Foundation-sponsored Virginia Coast Reserve Long-Term Ecological Research program, the Virginia Forest Research Facility in Fluvanna County, and the Blandy Experimental Farm near Front Royal, Virginia.

From the Chair



It has always been a source of great satisfaction for me to be a member of a department where teaching and mentoring students are taken so seriously—and are done so well. Not only do we work closely with students in the classroom, but we also welcome them into our laboratories and take them with us into the field. The environmental sciences are by their very nature collaborative—and it is important for us to convey to students the sense of accomplishment that comes from working together as a team and the excitement that comes from using the tools of science to increase our understanding of the natural world.

The department's dedication to teaching has been recognized in a variety of ways this year. Howie Epstein was one of nine faculty members to receive the 2012 All-University Teaching Award, while Bob Swap won the Excellence in Teaching Abroad Award. Steve Macko was singled out for thanks by our students, who presented him with the Environmental Sciences Organization Award for his assistance to undergraduate majors.

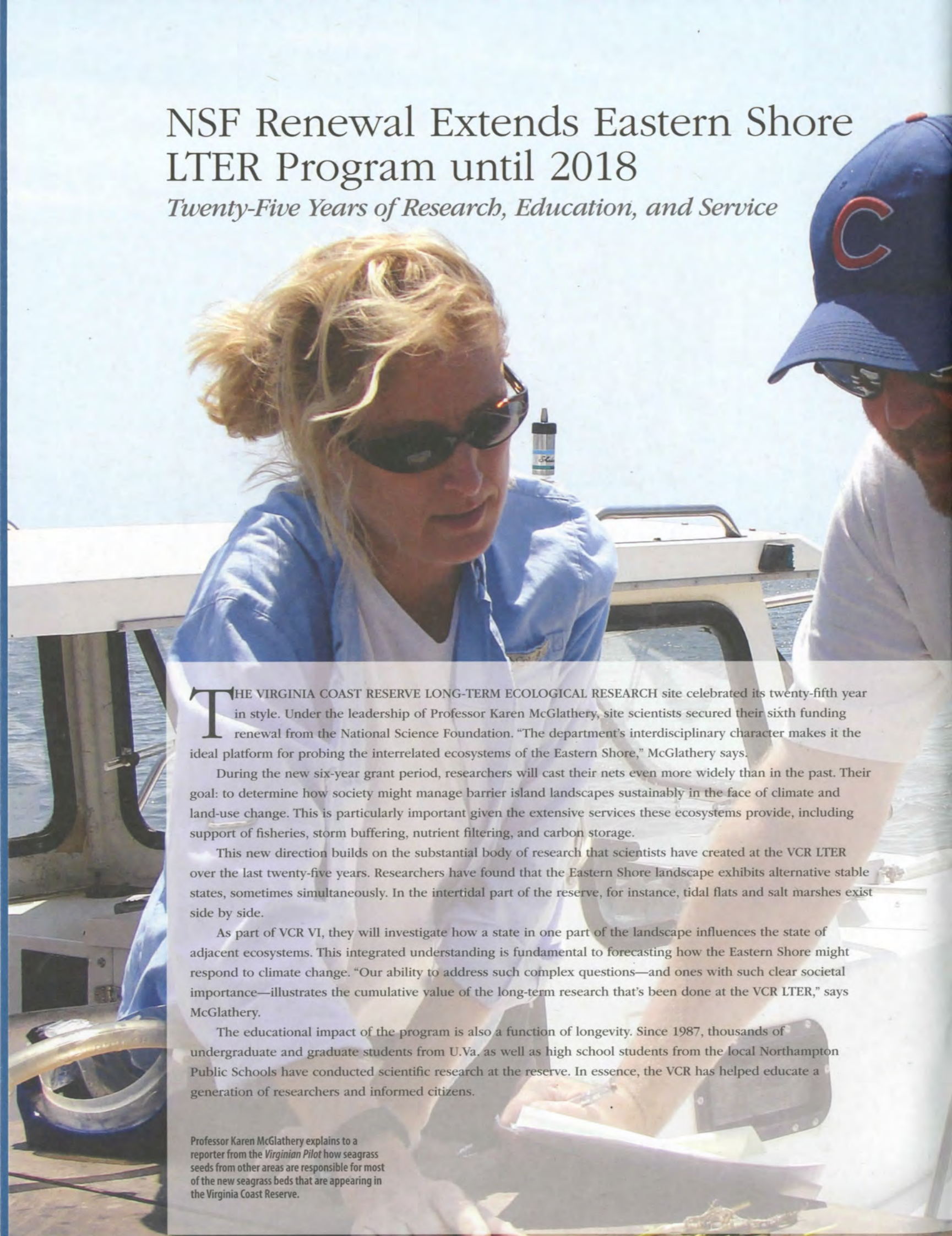
In addition, both Matt Reidenbach and Stephan DeWekker this year received CAREER Awards from the National Science Foundation. Although often seen as research grants, they honor “junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research.” That’s a good description of what we all aspire to as a department.

Our work as educators is critical because the next generation will confront difficult choices as the pace of environmental change accelerates. We are determined that our graduates be prepared to play a constructive role in these decisions, as scientifically literate citizens and, in many cases, as researchers.

Patricia Wiberg, Chair

NSF Renewal Extends Eastern Shore LTER Program until 2018

Twenty-Five Years of Research, Education, and Service



THE VIRGINIA COAST RESERVE LONG-TERM ECOLOGICAL RESEARCH site celebrated its twenty-fifth year in style. Under the leadership of Professor Karen McGlathery, site scientists secured their sixth funding renewal from the National Science Foundation. “The department’s interdisciplinary character makes it the ideal platform for probing the interrelated ecosystems of the Eastern Shore,” McGlathery says.

During the new six-year grant period, researchers will cast their nets even more widely than in the past. Their goal: to determine how society might manage barrier island landscapes sustainably in the face of climate and land-use change. This is particularly important given the extensive services these ecosystems provide, including support of fisheries, storm buffering, nutrient filtering, and carbon storage.

This new direction builds on the substantial body of research that scientists have created at the VCR LTER over the last twenty-five years. Researchers have found that the Eastern Shore landscape exhibits alternative stable states, sometimes simultaneously. In the intertidal part of the reserve, for instance, tidal flats and salt marshes exist side by side.

As part of VCR VI, they will investigate how a state in one part of the landscape influences the state of adjacent ecosystems. This integrated understanding is fundamental to forecasting how the Eastern Shore might respond to climate change. “Our ability to address such complex questions—and ones with such clear societal importance—illustrates the cumulative value of the long-term research that’s been done at the VCR LTER,” says McGlathery.

The educational impact of the program is also a function of longevity. Since 1987, thousands of undergraduate and graduate students from U.Va. as well as high school students from the local Northampton Public Schools have conducted scientific research at the reserve. In essence, the VCR has helped educate a generation of researchers and informed citizens.

Professor Karen McGlathery explains to a reporter from the *Virginian Pilot* how seagrass seeds from other areas are responsible for most of the new seagrass beds that are appearing in the Virginia Coast Reserve.

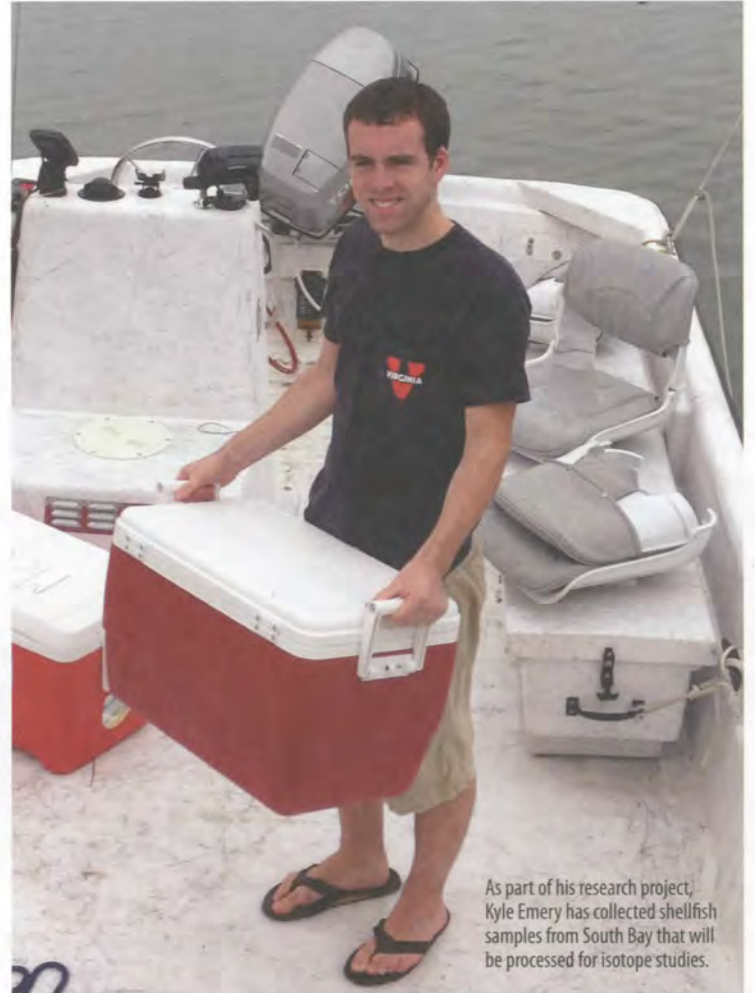
Kyle Emery

Living His Dream

As a teenager growing up near the New Jersey shore, Kyle Emery divided his time between his two passions—science and the sea. As an undergraduate in the Department of Environmental Sciences, he combined them.

During the summer before his fourth year, Kyle worked at the VCR LTER site with graduate student Jill Greiner. They spent their mornings at South Bay and Hog Island Bay collecting sediment cores and seagrass samples and their afternoons processing them on-site at the Anheuser-Busch Coastal Research Center (ABCRC). They analyzed the capacity of the seagrass beds to serve as a carbon sink, focusing specifically on how the age and density of a seagrass bed influences the amount of carbon that accumulates in the sediment.

“I’ve always been a hands-on person,” Emery says. “At the end of the day, it was really satisfying to see the results of the morning’s research.” Emery is continuing this hands-on approach to science. As newly minted master’s degree student, he is back at the ABCRC, working with Professor Mike Pace to compare nutritional sources for shellfish aquaculture.



As part of his research project, Kyle Emery has collected shellfish samples from South Bay that will be processed for isotope studies.

Gavin Bruno

A Change of Direction

The VCR LTER program is not simply a resource for scientists from around the world. It also serves the inhabitants of the Eastern Shore through initiatives like the Schoolyard LTER. As Gavin Bruno can attest, these programs can change your life.

With funding from the NSF and The Nature Conservancy, Bruno spent the summer before his senior year at Northampton High School working closely with U.Va. graduate students Luke Cole and Laura Reynolds at the Anheuser-Busch Coastal Research Center.

The experience inspired him to think about his future in a new way. “I had never given applying to U.Va. or majoring in environmental science much thought before,” he says, but that’s exactly what he did.

As an undergraduate major, Bruno worked with Karen McGlathery and other researchers to master a wide range of field and laboratory techniques. He also attended the LTER All-Scientists Meeting.

Bruno’s goal now is to build his résumé on the terrestrial side of environmental sciences, with the goal of becoming an environmental consultant. “I think it would be interesting helping people make better decisions about the environment,” he says.



Gavin Bruno (right) was part of a team led by Professor Karen McGlathery (second from right) conducting the annual VCR LTER seagrass sampling last July.

Undergraduate Students

Students become environmental sciences majors for different reasons. Some plan to attend graduate school and become researchers. Others see the major as a first step toward a professional degree or as a fundamental element in a twenty-first-century liberal education. Although rigorous, the undergraduate program in environmental sciences is designed to be flexible enough to accommodate these different interests and career goals.

Bernice O'Brien

Dedicating Herself to Increasing Environmental Awareness



Bernice O'Brien holds an underwater camera (shaped like a fish) that she used to examine eelgrass beds off Mt. Desert Island, Maine.

Growing up in the rolling countryside near Lexington, Virginia, Bernice O'Brien always enjoyed being outside—but as she grew older she felt the environment she loved was being taken for granted. “With more and more people moving to Rockbridge County, I became concerned about the effect of development on water quality,” she says.

When she enrolled at the University, O'Brien saw an opportunity to explore the connection between the environment and public policy more fully.

O'Brien became an Environmental Thought and Policy major, taking courses in subjects ranging from environmental economics to urban planning. She also began working with Professor Dave Smith to troubleshoot the U.Va. Bay Game, a large-scale participatory simulation based on the Chesapeake Bay watershed. The game allows players to take the roles of stakeholders, such as farmers, developers, watermen, and local policymakers. “In the course of playing the game, you understand how stakeholder choices intersect and how they affect the health of the watershed,” she says. O'Brien is consulting

with the game's computer scientists to ensure that the underlying computer models accurately translate even the most extreme player choices into accurate ecological outcomes.

Initially, O'Brien was not drawn to research, but after taking the department's January term ecology course in Belize and its intensive marine biology course in the Bahamas, she opted to double major in environmental sciences. “My experiences in Belize and the Bahamas showed me that research requires creative problem solving,” she says. Inspired, O'Brien secured an NSF-sponsored Research Experience for Undergraduates grant during summer 2012 to work at the Mt. Desert Island Biological Laboratory in Maine. She conducted water quality monitoring for the state of Maine and studied eelgrass restoration. “Our focus was to understand the science needed to make restoration there as successful as possible,” she says.

Although attracted to policy and research, O'Brien has decided the best way she can encourage an appreciation for the environment is through teaching. She is now enrolled in the five-year dual-degree program offered by U.Va.'s Curry School of Education, which combines a bachelor's of science with a master's of education.

Angang Li

Taking Multiple Perspectives on Environmental Sciences

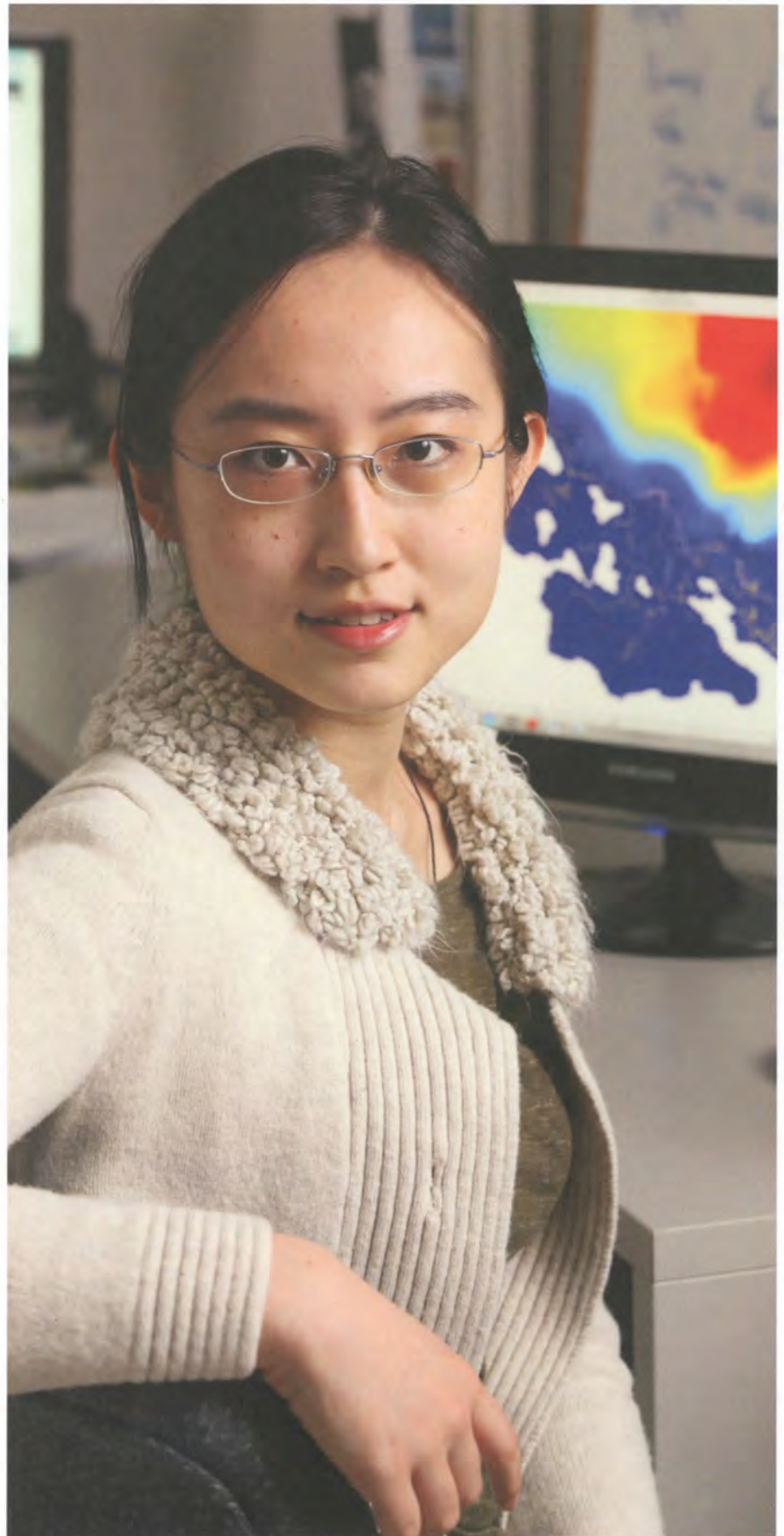
Angang Li is determined to make the most of her experience at U.Va. In addition to her major in environmental sciences, she is majoring in economics and minoring in mathematics. The reason for Li's full program—which occasionally requires an overload—is straightforward: She genuinely loves learning.

Li's interest in science is long-standing. Even before she arrived in Charlottesville from Beijing in 2009, she was named a College Science Scholar, a program for exceptional students in the sciences. She freely admits, however, that she had no idea of becoming an environmental sciences major, knowing only that she was interested in the sciences and wanted a field with real-world applications. "When I came here, I took a number of different courses," she says. "I wanted to be careful about my choice." After taking introductory classes in geology and hydrology, she chose environmental sciences because it was both interdisciplinary and analytic. "I also like it because it is practical and closely related to our lives," she says.

In her third year, she began working with Assistant Professor Matt Reidenbach, who studies the hydrodynamics of coral reefs. Flow dynamics are vital to these reef communities because they control essential processes such as particle capture by benthic organisms, the uptake of dissolved nutrients, and larval dispersal, as well as sediment deposition and removal.

During this past summer, Li familiarized herself with Delft3D software, which models three-dimensional hydrodynamics and sediment transport. The package is enabling her to develop numerical models of water flow and sea temperature for the Bocas del Toro coral reefs off the Caribbean coast of Panama. "One reason that this is important," she says, "is that coral are dying as sea temperatures rise. My objective is to see how the heating of the background environment affects sea temperature at these reefs."

Although she hopes to pursue graduate study in hydrology, her study of economics is helping her see the environment from a larger perspective. "The economy and the environment are interrelated," she says. "Decisions about one field affect the other."



Angang Li is using computer modeling to study the effects of water flow and sea temperatures on a coral reef off the Panamanian coast.

Graduate Students

There is no other element that more effectively multiplies the intellectual resources of a science department than a vigorous graduate program. Graduate students enable faculty members to pursue a more ambitious research agenda while serving as mentors and models for undergraduates. As they gain in knowledge and confidence, they begin contributing their own intellectual capital to the department.



Graduate student David Hondula is working to determine areas of cities where inhabitants are likely to be vulnerable to heat waves.

David Hondula

Helping Cities Better Allocate Resources during Heat Waves

As an undergraduate at U.Va., David Hondula was one of those students who know from the start of their college careers what they want to do. In his first semester, just a month into Professor Bruce Hayden's Atmosphere and Weather class, he declared himself an environmental sciences major. "It's been a great choice," he says. "The faculty of this department have helped me make the most of it."

Hondula's enthusiasm for the department influenced his decision to apply here for graduate study. He already knew whom he wanted as an advisor. "I've known about Professor Bob Davis's research since early in my undergraduate career," Hondula says, "I like the scale at which he approaches weather and climate." Davis focuses on phenomena with a horizontal dimension of tens to thousands of kilometers.

For his master's project, Hondula reexamined a new air mass classification system that one of Davis's colleagues had developed. It consists of six types of air masses plus a seventh transitional state. Using it to examine recent data, a third researcher had concluded that there was a higher incidence of one of the categories—moist tropical air—over the United States and a lower incidence of transitional days, a conclusion consistent with a period of climate change. Hondula analyzed day-to-day weather station data to investigate physical processes responsible for a decline in the number of those transitional days.

After completing his analysis, Hondula was ready for an applied project for his doctoral dissertation—and here too Davis's work provided the inspiration. Davis has traced the effects of heat waves—measured as apparent temperature—

on mortality rates in selected cities around the United States. Hondula is hoping to take a more granular, neighborhood-by-neighborhood approach.

In seven U.S. cities, Hondula is correlating data from a variety of sources—mortality statistics by zip code, thermal imaging from satellites, economic and demographic census data, and building types inferred from zoning regulations—to determine vulnerable neighborhoods. "Our goal is to give cities the information they need to identify where to focus their efforts to protect citizens," he says. "This is one way that climatology can improve daily life."



Rosemary Malfi *Conveying Her Enthusiasm for Discovery*

As an undergraduate at Bryn Mawr College, the all-women liberal arts college near Philadelphia, Rosemary Malfi had an experience that became the pattern for her professional aspirations. She undertook a research project in an applied ecology laboratory.

Among other things, this experience opened her eyes to the satisfaction of studying bees and other pollinators. Now as a graduate student at U.Va., Malfi is examining factors that influence bumblebee population dynamics. It also helped determine her career goal: she would like to teach ecology herself at a small liberal arts college.

Malfi chose U.Va. for graduate study because of the opportunity to work with Research Associate Professor Tai Roulston, curator of the State Arboretum of Virginia at the department's Blandy Experimental Farm. Roulston is one of the nation's foremost experts on plant-pollinator interactions. With his guidance, Malfi is assessing how the availability and diversity of floral resources and the presence of parasites influence bumblebee populations. "More broadly, the goal of my research is to understand the risks that bumblebees encounter, and how these risks vary across species," she says.

Malfi is investigating how species of bumblebees with relatively specialized diets fare in comparison with

those with a more forgiving palette. She is also studying the bumblebee parasite *Nosema bombi*, which has been implicated in the decline of certain bumblebee species in the United States. "Tai's guidance has been invaluable," Malfi says. "He has a tremendous mind for experimental design, while helping me keep the larger questions firmly in mind."

At Blandy, Malfi is mentoring students herself. After graduating from Bryn Mawr, Malfi spent two years as a laboratory manager at the Academy of Natural Sciences in Philadelphia. One of her responsibilities was to serve as the coordinator for the National Science Foundation's Research Experience for Undergraduates (REU) program at the academy.

At Blandy, she has continued her commitment to the REU program, involving undergraduates in her research. For instance, with Jessica Orozco, an REU student from San Francisco State University, she determined that specialized feeders were less frequent in sites with lower floral diversity and abundance. She also leads an annual seminar on research ethics for REU students. "I hadn't realized I would enjoy teaching as much as I did," Malfi says. "It helped confirm my decision to become a professor."

Rosemary Malfi (left) mentored U.Va. undergraduate Staige Davis, who received an REU fellowship and conducted her research on bumblebee parasites.

Rosemary Malfi (left) mentored U.Va. undergraduate Staige Davis, who received an REU fellowship and conducted her research on bumblebee parasites.

Postdoctoral Students



In Chile's harsh Atacama Desert, postgraduate fellow Dan Hobley found a landscape that sheds light on features found on Mars.

Daniel Hobley *In Search of Lost Water*

Flowing water is the most evanescent of substances, yet its effect on landscapes can be both dramatic and definitive. Daniel Hobley is using evidence gleaned from the landscapes it has left behind—both on Mars as well as on Earth—to re-create these ancient flows.

On Earth, his researches have ironically taken him to some of the driest places on the planet. These are places where water changes the landscape slowly if at all and the evidence of change over tens of thousands of years is relatively complete.

For his doctoral dissertation, Hobley traveled to the Ladakh Plateau in northern India, a high-altitude desert in the shadow of the Himalayas. The last local glacial maximum in Ladakh was 100,000 years ago. This makes it a perfect laboratory for studying how the glacial modifications of the landscape determine the long-term characteristics of its river systems. He found that it would take more than 500,000 years for the landscape to recover and for rivers to return to a more normal pattern of flow, far more time than previously estimated. "I'm interested in how rivers work," Hobley says. "I use the landscape to test different models of how they erode their banks."

Hobley's experience tracing river flows in cold, dry, glaciated landscapes on Earth set the stage for him to study

an even colder, drier place—Mars. As a postdoctoral fellow with Professor Alan Howard, Hobley is studying evidence of relatively recent water flows on Mars, at a time when the surface temperature on Mars was well below freezing. "Once you appreciate the difference in boundary conditions and data limitations, you can begin to extrapolate from your knowledge of terrestrial processes," he says.

Hobley is using satellite imagery and computer models to determine the origins of a series of small river valleys in the Martian mid-latitudes that, startlingly, flow uphill. Applying his knowledge of water flow under glaciers on Earth, Hobley suggests that these valleys were formed under glacierlike ice caps. These caps created enough pressure on the underlying water to force it up and across drainage divides.

Hobley's interest in understanding the impact of water on Martian terrain has taken him back to Earth. This past summer, he traveled to the Atacama Desert in Chile, where he has identified a set of alluvial fans that serve as an analog to many found within Martian craters. "For the time being, at least, being on Earth is the safest way to study the Martian landscape close up," he says.

Postdoctoral fellowships can fulfill a variety of purposes. They can provide young researchers the occasion to deepen their understanding of their chosen field or they can present an opportunity for them to apply their expertise in new ways. In either case, a postdoctoral fellowship is excellent preparation for a career as a researcher, in which the ability to master new technologies or conduct interdisciplinary research is critical for success.

Laura Reynolds

Taking the Guesswork out of Seagrass Restoration

Seagrasses are in their way the perfect field of study for Laura Reynolds. They bring together a series of questions that she finds fascinating: How do ecological systems work? How does human activity change the environment? What can we do to restore it?

Laura first became interested in seagrasses as a master's degree student. Working with Professor Jay Zieman, she quantified the influence that bacteria living in the gills of lucinid clams had on the health and productivity of seagrass beds. The bacteria remove sulfides, which are toxic to seagrass. "A lot of the pieces of the puzzle were already known," she says. "I wanted to see how they all fit together in a measurable way."

After completing her master's degree, Reynolds moved to San Francisco. There she became a lab manager for a researcher involved in determining restoration techniques for seagrass beds damaged in replacing the eastern span of the San Francisco–Oakland Bay Bridge. "This is a classic case of working to restore the environment after it's been altered by human activity," she says.

Reynolds timed her return to Charlottesville for her doctorate perfectly: seagrass restoration was just under way at the Virginia Coast Reserve Long-Term Ecological Research site. The combination of disease and hurricane activity in the 1930s devastated the seagrass beds in the lagoons behind the barrier islands—and destroyed the shellfish industry they supported. Encouraged by the discovery of naturally occurring patches of seagrass, scientists led by the Virginia Institute of Marine Science initiated a large-scale seagrass restoration experiment.

Reynolds used genetics to show that the new beds were formed by seagrass fragments that had drifted with the current from more northern beds. Working with Zieman and Professor Karen McGlathery, Reynolds determined that genetic diversity leads to faster restoration, and that the technique pioneered in the region—broadcasting genetically diverse seed—is more successful than traditional transplantation.

Reynolds has now secured a postdoctoral fellowship at the Institute of Coastal and Marine Science at Rutgers University but is spending some of her time at the VCR LTER site. Her new goal is to take lessons learned from restoration in the relatively pristine lagoons of Virginia's Eastern Shore and determine if they can be modified for more polluted bodies like Barnegat Bay in New Jersey.

"I feel that the professional preparation I received in the department has equipped me to go my own way as a scientist," she says. "At the same time, I know I can continue to count on the relationships I formed here."



Laura Reynolds has shown that genetic diversity is a critical factor in restoring seagrass to Eastern Shore bays.

Alumni Researchers

A critical element of Thomas Jefferson's educational design for the University was his emphasis on faculty members as both mentors and models. The number of our graduates who go on to careers as researchers in environmental sciences attests to our success in fulfilling this role.



Brian Silliman is investigating how alligators hunting blue crabs in marsh creeks in Georgia indirectly affect marsh grasses.

Brian Silliman

Taking a Fresh Look at the Food Web

As an associate professor of biology and director of the Sea Horse Key Marine Laboratory at the University of Florida, Brian Silliman has already made significant contributions to our understanding of marine plant communities, especially those found in salt marshes and rocky intertidal habitats. It is an interest he can trace to his undergraduate days at U.Va.

An NSF-sponsored Research Experience for Undergraduates grant brought him to the Virginia Coast Reserve Long-Term Ecological Research site at the end of his third year. "I grew to love the abundance of organisms and the vastness of the seascape," he says. "You have the sensation that there are no limits."

But Silliman knows that the health of those marsh plants is precarious, depending on the delicate interaction between grazers that control their growth and nutrients that promote it. As a master's degree student working with Professor Jay Zieman, Silliman helped clarify this relationship. At the time, theory held that the availability of bottom-up forces like porewater ammonium and oxygen availability were the primary regulators of cordgrass productivity. Through experiments, Silliman and Zieman challenged this established view and determined that snails grazing on the grass dampened their growth significantly.

This understanding drove Silliman to understand the food web that extends out from the cordgrass-snail interaction. Changes at any point can upset the delicate balance needed to preserve salt marshes and safeguard the valuable ecosystem services they provide. For instance, blue crabs are major predators of marsh snails and control their densities across the marsh landscape. If you take away the blue crabs, the cordgrass begins to die off as the number of snails increases, and marshes are overwhelmed by grazers that can transform these highly productive systems into mudflats.

Increasingly these changes are driven by man's activities. "Man has altered marshes and intertidal zones for centuries, but the pressure we're placing on marshes in large and small ways is now unprecedented," he says. Silliman believes that large-scale marsh die-back in southeast estuaries is in large ways

driven by the interplay between the overharvesting of blue crabs and increasing drought stress, both of which intensify the grazing impact of snails on marsh grasses.

Although the basic principle of balance between top-down and bottom-up factors holds in other areas of the world, Silliman has found that the comparative influence varies from place to place—and is complicated by such factors as the arrival of invasive species and outflow from rivers. He has extended his work to Argentina, Chile and Brazil and has incorporated other coastline ecosystems in his work.

Silliman credits the Environmental Sciences Department at U.Va. with giving him the foundation to pursue this expanding research agenda. "Their emphasis is fundamentally integrative and interdisciplinary," he says. "My exposure to hydrology, geochemistry, and atmospheric science in addition to ecology has given me a more versatile approach to generating and answering ecological questions."

Temilola Fatoyinbo-Agueh

*Winner of a Presidential Early Career Award
for Scientists and Engineers*

The Presidential Early Career Award for Scientists and Engineers (PECASE) is the highest honor bestowed by the U.S. government on scientists and engineers beginning their careers. Alumna Temilola Fatoyinbo-Agueh, a scientist at NASA Goddard Space Flight Center, won the award for 2011. Her path to the presentation at the White House began with a series of fortunate encounters with department faculty during her last year as an undergraduate at U.Va.

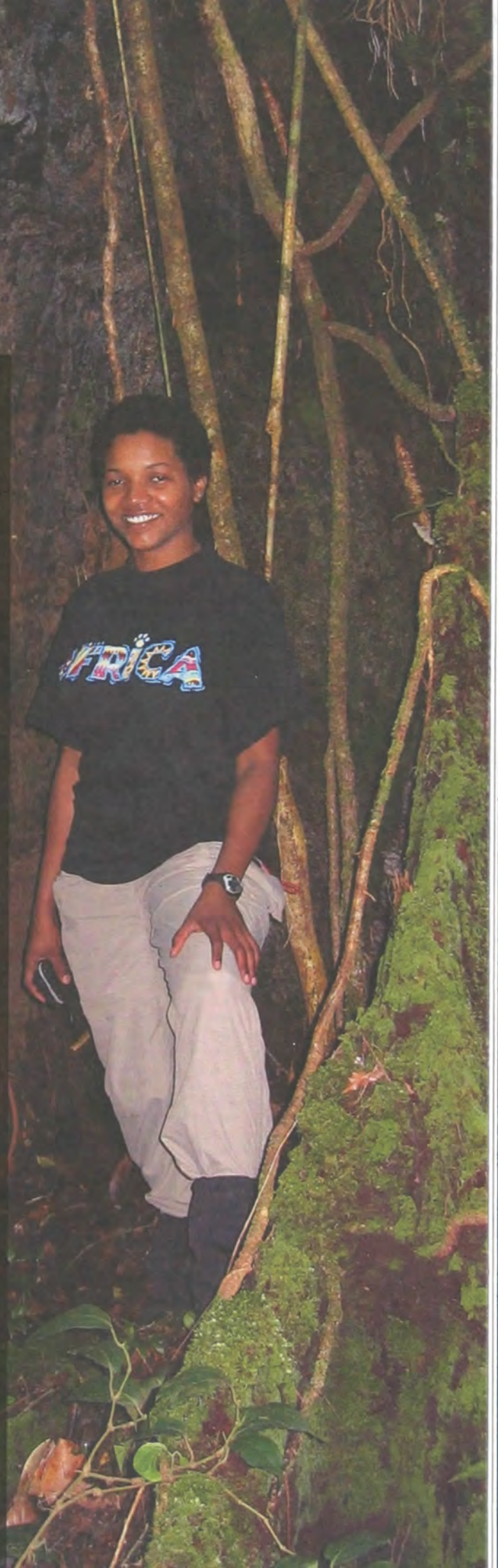
Fatoyinbo was a biology major, having come to the University intent on becoming a physician. As time went on, she found herself increasingly drawn to fieldwork, so she decided to take the two-week Marine Biology and Coral Reef Ecology course that Professor Dave Smith and biology Professor Fred Diehl offer in the Bahamas. "The program was physically and mentally demanding," she recalls, "but the sense of discovery that came as I really began to see and understand the environment around me was thrilling." During her fourth year, she took Forest Ecology from Professor Hank Shugart, which she found equally absorbing.

As a graduate student in the department, Fatoyinbo was consequently torn between marine science and forest ecology. She reconciled her interests by writing her dissertation about the carbon-sequestering capacity of mangroves, which she describes as "a forest that grows in the ocean." From Shugart, she learned remote sensing and forest modeling, two tools that were crucial to her research. Citing the department's collegial atmosphere, Fatoyinbo also credits the faculty members and graduate students like Bob Swap, Jordan Barr, Amanda Armstrong, and Jose Fuentes for their advice and encouragement.

Fatoyinbo's PECASE-winning work is an extension of her dissertation. It involved developing a new airborne sensor for measuring the area, height, and biomass of forests. She and a colleague created three new kinds of mangrove maps: continental maps that show how much land the mangroves cover, a three-dimensional map of the height of forest canopies across the continent, and biomass maps that allow researchers to assess how much carbon the forests store.

Growing up in the West African country of Benin, Fatoyinbo knows full well the importance of mangroves. "The decline of these forests threatens much of Africa's coastal food supply and economy," she says. "It also has implications for everything from climate change to biodiversity, so it's important to us all."

As a graduate student in the department, Temilola Fatoyinbo-Agueh mastered fundamental techniques that led to her award-winning research.



Awards, Appointments, and Publications

UNDERGRADUATE STUDENTS

The department recognizes fourth-year students who have done outstanding work in each of the environmental sciences. This year, the Mahlon G. Kelly Prize in ecology went to **Adrianna C. Foster**, and the Michael Garstang Atmospheric Sciences Award went to **Michael V. Saha**. **Noaa A. Spiekermann** won the Hydrology Award, and **Hilary C. Wayland** received the Wilbur A. Nelson Award in geosciences. Ms. Wayland was also recognized for making the best undergraduate student presentation at the department's Environmental Sciences Student Research Symposium.

The Departmental Interdisciplinary Award for the undergraduate major who has excelled in interdisciplinary environmental sciences research was presented to **Alexandria G. Hounshell**.

The Wallace-Poole Prize is awarded each year to the graduating student majoring in environmental sciences who has at least a 3.8 GPA and who is judged to be the most outstanding student in the class. This year's Wallace-Poole Prize went to **Sarah Michelle Kim**. She graduated with a double major—a B.S. in biology and a B.A. in environmental sciences.

The department participates in the College's distinguished majors program designed for highly qualified students with an overall GPA of 3.4 or above. **Abby M. Credicott**, **Adrianna C. Foster**, **Alexandria G. Hounshell**, and **Carol Yang** were selected distinguished majors by the department.

Established by the Thomas Jefferson Chapter of Trout Unlimited, the Trout Unlimited Award is for "significant contributions to research concerning cold-water fisheries or related ecosystems." This year's recipient was **Carol Yang** for her work on lakes in northern Michigan and Wisconsin.

Timothy G. Allan was this year's winner of the Joseph K. Roberts Award, given to a student who presents the most meritorious research paper at a national meeting. He was also singled out for the best undergraduate student poster at the department's Environmental Sciences Student Research Symposium.

Olivia Hutton was a finalist in the Physical and Environmental Sciences category at the University's Second Annual Presidential Research Poster Competition.

Michael S. Mason was this year's recipient of the Richard Scott Mitchell Scholarship, which provides \$1,800 to a student who has focused on geoscience and has completed Fundamentals of Geology and two other advanced courses in geoscience, preferably including mineralogy or petrology. Mr. Mason will be applying the scholarship toward graduate school tuition at Auburn University.

The Bloomer Scholarship provides a \$1,800 award to an outstanding undergraduate environmental sciences major with a focus on geology. This year's winner was **Matthew F. Mann**.

Carlos F. Disla, Jr., received the Chair's Award, which recognizes an individual who has performed extraordinary service to the department. Mr. Disla was president of the Environmental Sciences Organization.

GRADUATE STUDENTS

David A. Seekel won the Maury Environmental Sciences Prize. Established by Dr. F. Gordon Tice in 1992, it is the department's premier award.

The department offers a series of awards honoring outstanding graduate students in each specialty of environmental sciences. This year, **Jonathan A. Walter** earned the Graduate Award in Ecology, **Jonathan B. Stocking** won the Graduate Award in Hydrology, **Heather M. Sullivan** won the Arthur A. Pegau Award in Geoscience, and **Weijie Wang** won the Graduate Award in Atmospheric Sciences. **Jennie E. Rheuban** received the Ellison-Edmundson Award for Interdisciplinary Studies.

Jill T. Greiner received the Thomas Jefferson Conservation Award, which supports basic research related to the conservation of the earth's resources.

Matthew H. Long was honored for making the best graduate student presentation at this year's Environmental Sciences Student Research Symposium, while **Abinash Bhattachan** received an award for the best graduate student poster. Mr. Bhattachan also received the Graduate Student Research Publication Award for a manuscript accepted by a peer-reviewed journal as first and corresponding author.

This year, **Dana J. Gulbransen**, **Yo Matsubara**, and **David A. Seekell** won Moore Research Awards. Based on merit, this award was initiated to help sponsor the dissertation and thesis work of environmental sciences graduate students. **Alia N. Al-Haj**, **Kyle F. Davis**, **Jessica A. Gephart**, **Ariela I. Haber**, **Ethan K. Heil**, **Jennie E. Rheuban**, **Andrew L. Robison**, and **Jonathan B. Stocking** received Exploratory Research Awards. These awards are meant to support preliminary research leading to a thesis or dissertation proposal.

Six graduate students won awards at the 12th Annual Robert J. Huskey Research Exhibition, open to all students in the Graduate School of Arts & Sciences. In the oral presentation competition, **Jennie E. Rheuban** placed third in the biological and biomedical sciences category, while **Abinash Bhattachan** placed third in the physical science and mathematics category. In the poster competition, **Stesha L. Dunker** and **Jill T. Greiner** each placed first in the physical science and mathematics category, while **Jeffrey W. Atkins** placed third. **Kelly L. Hondula** placed second in the biological and biomedical sciences category.

At the University's Second Annual Presidential Research Poster Competition, **Laura Reynolds** was first among graduate students in the physical and environmental sciences category, while **Daniel Hobley** was first among postdoctoral fellows.

Stesha L. Dunker won first place in Ph.D. oral presentations at the Fourth Annual Forest Resources and Environmental Conservation Expo, which is held at Virginia Tech.

Abinash Bhattachan won the department's Fred Holmsley Moore Teaching Award. An endowment set up by Fred H. Moore funds this award, along with matching donations from Mobil Oil Company. In addition, Mr. Bhattachan received the Graduate Teaching Assistant Award from the University's Teaching Resource Center.

Rosemary L. Malfi received the Graduate Student Association Award, which recognizes members of the department who, through their efforts, have been particularly helpful to the graduate student body.

FACULTY

We are proud to have five faculty members—**Jack Cosby**, **James Galloway**, **Michael Pace**, **William Ruddiman**, and **Hank Shugart**—designated highly cited researchers by the Institute for Scientific Information. Highly cited researchers constitute less than one-half of 1 percent of all publishing scientists.

Linda Blum was elected secretary of the Coastal and Estuarine Research Federation. She serves on the National Research Council's U.S. Army Corps of Engineers Water Resources Science, Engineering, and Planning Committee.

Stephan De Wekker was awarded an NSF CAREER grant. He is associate editor of the *Journal of Applied Meteorology and Climatology*.

Paolo D'Odorico, the Ernest H. Ern Professor of Environmental Sciences, held a Guggenheim Fellowship to study the globalization of water resources and its effects on societal and environmental resilience. He was also a Fulbright Distinguished Lecturer. He is an editor of *Geophysical Research Letters*.

Howard E. Epstein is associate editor of *Plant Ecology and Ecosphere*. He received a 2012 All-University Teaching Award for excellence in teaching and serves as a faculty advising fellow. In addition, he serves on both the Promotion and Tenure Committee and the Committee on Budget and Personnel Policy for the College and Graduate School of Arts & Sciences. He also codirects the College Science Scholars program and is a member of the vice president for research's internal review committee.

Amato T. Evan received the department's Maury-Tice Prize for research excellence. He is also a contributor to the Intergovernmental Panel on Climate Change's Working Group 1, which assesses the physical scientific aspects of the climate system and climate change.

James N. Galloway, the Sidman P. Poole Professor of Environmental Sciences, is a trustee of the Marine Biological Laboratory at Woods Hole, Massachusetts. Professor Galloway continues to serve as a member of the EPA Science Advisory Board, the board of trustees of the Bermuda Biological Station, and the International Nitrogen Initiative Steering Committee. He is also a lead author for the Intergovernmental Panel on Climate Change's Working Group 1 and a convening lead author for the United States Global Change Research Program's National Climate Assessment.

Bruce Hayden is chair of the national Long Term Ecological Research (LTER) Network's Climate Committee.

Janet S. Herman was elected president of the Karst Waters Institute. She also serves as a councilor of the Geological Society of America. Councilors set direction and policy for the society, oversee the society's journal publications and meeting plans, and watch over fiscal activities. At the University, Professor Herman serves as a faculty advising fellow. She also serves on the Committee on Educational Policy and Curriculum for the College and Graduate School of Arts & Sciences.

Alan D. Howard serves as vice-chair of the Earth and Planetary Surface Processes Focus Group of the American Geophysical Union.

William Keene has an Intergovernmental Personnel Act rotator position with the National Science Foundation as director of the atmospheric chemistry program. In addition, Keene serves as the department's representative to the U.Va. Faculty Senate.

Deborah Lawrence is an advisor to the U.S. Agency for International Development on SilvaCarbon, the U.S. contribution to the GEO Forest Carbon Tracking task. She serves the College and Graduate School of Arts & Sciences as a member of the committee charged with hiring ten new faculty members under a grant from the Andrew W. Mellon Foundation.

Manuel Lerdau was a 2012 climate science fellow of the American Association for the Advancement of Science. Professor Lerdau is a member of the board of directors of the University of Virginia Press and serves as an associate editor of *Oecologia*. He also is a reviewer for student projects submitted to the University's Jefferson Public Citizens program.

Stephen A. Macko serves as an associate editor of *Amino Acids and Science of the Total Environment*. He is a member of the editorial board of *Journal of Environmental and Analytical Toxicology* and the education member of the editorial advisory board of *Eos, Transactions of the American Geophysical Union*. In addition, Professor Macko is a member of the Program Committee of the American Geophysical Union as well as the Committee on Education of the European Geoscience Union, in which he is a convener of its Geosciences Information for Teachers workshop. At the University, Professor Macko serves on the Summer Session Advisory Committee and as a judge for the Double Hoo Award, which funds research by pairs of graduate and undergraduate students. This year, Professor Macko received the Environmental Sciences Organization Award, which is given to a member of the department who has been particularly helpful to undergraduate majors.

Karen J. McGlathery serves as the lead principal investigator of the Virginia Coast Reserve Long Term Ecological Research (LTER) program. She sits on the U.S. LTER Network Science Council and is associate editor of *Ecosystems*. She is a member of the Science and Engineering Research Council of the Office of the Vice President for Research and the President's Advisory Committee on the Sustainability Institute.

Aaron L. Mills is a member of the Faculty of Arts & Sciences Steering Committee.

Jennie Moody is a member of the Board on Oceans, Atmosphere and Climate of the Association of Public and Land-grant Universities' Commission on Food, Environment and Renewable Resources. She is also the University of Virginia's representative to the University Corporation for Atmospheric Research.

Michael Pace is associate editor of *Ecosystems and Limnology and Oceanography e-Lectures*.

Arnico Panday is a member of the International Advisory Board of the Patan Academy of Health Sciences in Lalitpur, Nepal.

John Porter is a member of the U.S. Long Term Ecological Research Network Information Management Committee.

G. Carleton Ray is a member of the board of trustees of the Bahamas National Trust and a longtime member of the editorial board of *Aquatic Conservation: Marine and Freshwater Ecosystems*.

Matthew Reidenbach was awarded an NSF CAREER grant. He received funding from the University's Mead Endowment to take three undergraduate students to Panama to conduct research on the health and functioning of marine organisms. He is also a fellow of the University's Brown College.

William Ruddiman was the recipient of the 2012 American Quaternary Association Distinguished Career Award.

Todd Scanlon is an associate editor of *Water Resources Research*.

Herman H. Shugart, the W. W. Corcoran Professor of Environmental Sciences, is associate editor of *Research Letters in Ecology* and a member of the editorial boards of the *Eurasian Journal of Forest Research*, the *International Journal of Ecology*, and the *International Journal of Environmental Protection*. He served on the National Research Council's Committee on Assessing the Impacts of Climate Change on Social and Political Stresses and is a member of MEDEA, the special advisory committee to the Defense Intelligence Agency on the environment. In addition, Professor Shugart is a member of NASA's Advisory Council's Earth Science Subcommittee and is the chief scientist for the Northern Eurasian Earth Science Partnership Initiative. At the University, he serves as a member of the U.Va. Energy Sustainability Leadership Group and the Morven Advisory Committee. He is also a member of the Curriculum Committee of the College and Graduate School of Arts & Sciences. In addition, Professor Shugart is a member of the Committee for Historically Black Colleges and Universities, which reports to the Office of the Vice President for Diversity and Equity.

David E. Smith is president of the Association of Ecosystem Research Centers. He serves the University as a member of the Executive Leadership Network, the Facilities Management Advisory Board, the Process Simplification Advisory Committee, and the Committee on Undergraduate Admission.

Robert J. Swap was awarded the University's 2012 Excellence in Education Award, which recognizes leadership in developing study-abroad programs, fostering of study abroad, and/or teaching of study-abroad courses.

Vivian Thomson is director of the University of Virginia's Panama Initiative as well as the Environmental Thought and Practice interdisciplinary major.

Patricia Wiberg is chair of the department. She serves on the National Research Council's Committee on New Research Opportunities in the Earth Sciences. In addition, she is a working group chair of the National Science Foundation's Community Surface Dynamics Modeling System (CSDMS) and a member of the CSDMS Executive Committee.

PEER-REVIEWED PAPERS, BOOK CHAPTERS, AND BOOKS

(Summer 2011 through Spring 2012)

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Carr, J. A., **P. D'Odorico**, **K. J. McGlathery**, and **P. L. Wiberg**. 2012. Stability and resilience of seagrass meadows to seasonal and interannual dynamics and environmental stress. *Journal of Geophysical Research* 117: G01007. doi:10.1029/2011JG001744.

Carr, J. A., **P. D'Odorico**, F. Laio, and L. Ridolfi. 2012. On the temporal variability of the virtual water network. *Geophysical Research Letters*. In press. doi:10.1029/2012GL051247.

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 students and faculty of the Department of
 Environmental Sciences.

ENVIRONMENTAL SCIENCES
University of Virginia
291 McCormick Road
P.O. Box 400123
Charlottesville, VA 22904-4123



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