

WINTER 2016

UNC environment

NEWS FROM THE INSTITUTE FOR THE ENVIRONMENT AT THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

VOLUME 14, ISSUE 2

HILL DISTINGUISHED PROFESSORSHIPS ADVANCE COUPLE'S LONGSTANDING INTERESTS IN ENVIRONMENT, MARINE SCIENCES

HONOR WILL FURTHER RESEARCHER-EDUCATOR'S EFFORTS TO MONITOR, IMPROVE WATER QUALITY AND SAFEGUARD HUMAN HEALTH – AND TEACH UNC STUDENTS TO DO THE SAME



Research and teaching in synergy, a continuous feedback loop. That's what lies at the heart of a great university, UNC Marine Scientist Rachel Noble believes. Mary and (the late) George Watts Hill, Jr. always understood this, especially in the areas of environment, conservation and marine sciences. That's why Noble is so honored to have been appointed as **Mary and Watts Hill, Jr. Distinguished Professor of Marine Sciences** this summer.

Noble, who holds joint appointments with the UNC Institute for the Environment (IE) and the UNC Institute of Marine Sciences (IMS) as well as the Gillings School of Global Public Health, was recruited to UNC in 2001 to launch and direct IE's Morehead City Field Site.

"Mary and Watts Hill, Jr. were really unique in understanding the combined contributions of research and teaching, particularly at our field site," Noble says. "What I teach my students stems directly from my experiences as a researcher, and the research in turn is informed by the valuable feedback I get from these amazing students, post-docs and colleagues. It's that constant blend of research, teaching, mentoring and sharing that brings the best out of the university system, and the Hills innately understood that."

A far-reaching gift

The Hill family tree is filled with UNC alumni, and the Hills' extraordinary generosity to Carolina has spanned generations. Mary Hill and her late husband have been no exception, always generous with their time and

resources. Environmental causes, particularly those related to marine sciences, have been especially meaningful to the Hills. Mr. Hill, a state leader in civil rights, education and the environment, and a civic leader in Durham and Chapel Hill, was a founding member of the Board of Visitors for both the Carolina Environmental Program (IE's predecessor) and UNC's Marine

"The resources provided by Mary and Watts Hill Jr. give that little bit of extra freedom to develop something new and exciting that wouldn't otherwise be possible."

—Rachel Noble, newly appointed Mary and Watts Hill, Jr. Distinguished Professor

Sciences Program. Mrs. Hill still serves on IE's Board.

Shortly after Mr. Hill's death in 2002, fellow board members raised funds to commission the R/V Watts Hill, Jr., a research boat owned by IE and based at IMS. Each fall, the flat-bottom skiff is used by UNC students and faculty to conduct research at the Morehead City Field Site.

Then, in 2004, Mary Hill and her family made a suite of generous endowment gifts to UNC's environmental programs in her late husband's

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honor that will reverberate for years to come. The gift established two Mary and Watts Hill, Jr. Distinguished Professorships for outstanding faculty to hold joint appointments in IE and IMS or the Department of Marine Sciences, and to promote links between environment, marine sciences and policy. The gift also created an endowed fund that provides several paid internships each year for UNC undergraduate students to work on research projects at IE’s coastal field sites in Morehead City and Manteo, and an unrestricted endowment to support related projects.

Making our waters safer

In May 2015, the UNC Board of Trustees approved Noble’s appointment as Mary and Watts Hill, Jr. Distinguished Professor of Marine Sciences. The position became official on July 1. Brent McKee, jointly appointed

with IE and the Department of Marine Sciences, was the inaugural Hill Distinguished Professor.

Noble’s research focuses on microorganisms that can be dangerous to humans (pathogens) in water and seafood, including a subset of these microorganisms that cause human viruses, like the norovirus and adenovirus that often make the news. She studies all types of water: ocean, lake, estuary, stormwater, wastewater, and drinking water. That’s a big challenge, since these water sources are not at all uniform: each can contain different types of pathogens, and weather and other conditions can vary the pathogens within each source.

UNC undergraduate and graduate students work closely with Noble on her research, giving them firsthand opportunities to learn about natural systems. “In order to effectively measure the dangerous bacteria and viruses that could get into oysters, for instance, you need to understand how an oyster lives in an estuary, how sunlight and wind conditions vary and impact the organisms, and even how to shuck an oyster. We involve the students in as much of the natural system as we can, so they can understand the organisms living in those always-changing marine environments.”

Noble’s research team has developed a patented rapid E.coli test that can be used to test water. While most current tests require 18-24 hours to get a result, this new test yields results in less than two hours, making it a valuable tool to monitor and improve water quality and safeguard human health. This test is already being used in several states and Noble’s team is seeking approval of the test for other types of water. They have also developed a rapid test for Enterococcus bacteria.

Professorship is an honor, opportunity

Already an accomplished researcher and educator, Noble is excited about the new opportunities that this prestigious professorship will make possible. “We are constantly looking for new and better ways to protect public health through water quality. In addition to providing vital salary support, this professorship also yields valuable discretionary funds that will allow me to travel and interact with other researchers and colleagues. One example of this is a new stakeholder task force being initiated here in North Carolina to address important issues related to stormwater.”

For Noble, who – unlike most of her Carolina faculty colleagues – lives and works at the North Carolina coast rather than on UNC’s Chapel Hill campus, there’s an extra bit of gratitude for this special recognition. “There are wonderful advantages to being here at the coast, but to be able to do that and to be recognized by the Hills for what we do out here, that gives me an extra sense of appreciation.”

IE DIRECTOR NAMED TO AMERICAN GEOPHYSICAL UNION

UNC scientists’ work on water and the environment is making an impact in North Carolina and around the world.

University of North Carolina at Chapel Hill faculty member and director of the Institute for the Environment Lawrence E. Band was named to the prestigious American Geophysical Union (AGU) Class of 2015 Fellows. Band is among 60 individuals from around the world who were recognized at the AGU fall meeting Dec. 16 in San Francisco, Calif. Band is joined in this honor by only one other faculty member from UNC-Chapel Hill, Hans W. Pearl, a world-renowned scientist in the Institute for Marine Sciences. Just 0.1 percent of AGU members attain this honor in any given year.

“We couldn’t be more pleased to have two faculty from UNC receive this significant recognition this year,” said Vice Chancellor for Research Barbara Entwisle. “Dr. Band and Dr. Paerl are among the elite scientists in their fields and this acknowledgment is a testament to both the world-changing research enterprises they’ve built and the practical applications of their work.”

Fellows are selected for their exceptional contributions to Earth and space sciences by their peers and selections are vetted by a committee of Fellows.



SCIENTISTS SHOW HIGH SCHOOL SCIENCE TEACHERS HOW SATELLITE IMAGERY AND DATA INFORM WATER MANAGEMENT PRACTICES



In August, UNC Institute for the Environment's Environmental Resource Program (ERP) led its annual professional development workshop, **Seeing Water from Space: Using satellite and field data to evaluate our water resources**, for 21 North Carolina high school science teachers at the Carolina Center for Educational Excellence in Chapel Hill.

Funding for the two-day workshop came from a NASA New Investigator Program award to UNC Associate Professor of Geological Sciences Tamlin Pavelsky. The 2015 workshop is the last of three held under this three-year grant. The workshop included presentations by Pavelsky and other UNC geologists and local water resource managers as well as hands-on field activities like measuring the flow of Bolin Creek and touring the Falls Lake Dam. Participants learned about water resource challenges and management efforts in North Carolina, how scientists use satellite and field data to understand the dynamics and management of water resources regionally and globally, and how to incorporate the latest science into their own classrooms.

The workshop was developed by ERP Program Coordinator Michele Drostin and K-12 Science Education Manager Dana Haine, both of whom also developed a lesson in collaboration with Pavelsky, titled *Using Remote Sensing Data to Evaluate Water Resources in North Carolina*. This lesson is modeled with workshop participants and showcases how scientists use satellite imagery and field data to evaluate regional water resources and to understand land

use and hydrologic changes and the interrelationship between hydrologic and human systems. The lesson, which is aligned with N.C. Essential Standards and Next Generation Science Standards, has been tested in classrooms by North Carolina educators and is available at erp.unc.edu/water/projects-water/teachers/seeing-from-water-space/educator-resources-seeing-water-space/.

"The Seeing Water from Space workshop enables me to share the exciting research findings from my lab and the broader hydrology community with teachers who are training the next generation of college students and citizens – and helps teachers understand how scientists are studying Earth's water cycle," said Pavelsky, a rising star in the field of geology who was awarded a prestigious Presidential Early Career Award for Scientists and Engineers from the White House. "The participating teachers have been intellectually engaged and have great ideas on how to teach students about how the world works. Their ideas often inform my teaching at the college level as well."

Response from workshop participants also has been enthusiastic, with many sharing details of how they plan to incorporate workshop content into their instruction. "As always, UNC Institute for the Environment presented a quality teacher workshop connecting cutting-edge science, field work and the classroom," said one. Added another: "I learned so much and am passing it along to my students. Thank you for the great resources; the satellite images that you provided with the lesson are engaging and interesting."

TWO STRONG ERP PARTNERSHIPS RECOGNIZED WITH MAJOR AWARDS

In IE's summer e-newsletter, we announced that IE's Environmental Resource Program received the **2015 UNC Office of the Provost Engaged Scholarship Award for Partnerships** for its work with North Carolina organizations to communicate fish consumption advisories to local citizens who may eat fish caught in contaminated waterways. This project is part of ERP's efforts as the leader of the Research Translation Core for the National Institute of Environmental Health Sciences-funded UNC Superfund Research Program.

In July, ERP received another acknowledgement of its impact – this time from the international Water Environment Federation (WEF) for its video highlighting an innovative training project to reduce stormwater pollution by Chapel Hill restaurants. The project was developed by ERP in partnership with the Town of Chapel Hill's Stormwater Management Division.

The UNC/Chapel Hill video was selected from nearly 150 entries as a winner of the **2015 StormTV Project competition**, which recognizes innovative stormwater practices, programs, products and public outreach worldwide. You can view the creative and informative video, **Keep Restaurant**

Pollution and Profits from Going Down the Stormwater Drain, as well as other winning entries, at stormwater.wef.org/2015/07/wef-announces-2015-stormtv-project-winners/. ERP and Town staff accepted the award during the 2015 WEFTEC Stormwater Congress in Chicago in September.

The award-winning video highlights a multi-faceted training program designed to help the Town of Chapel Hill address reports of illicit discharges in restaurant storm drains by helping restaurant owners and employees understand the storm drain system, local watersheds and good housekeeping practices to prevent water pollution. Funding from the Wallace Genetic Foundation supported the video production. Since training began in Chapel Hill, restaurant employees have reduced the number of dumping violations, and several local businesses have improved washout areas to avoid sending wash water and organic matter into storm drains. These training materials now are being used nationwide to train restaurant workers about preventing pollution.



Left: ERP Director Kathleen Gray (center) accepted the award from UNC Chancellor Carol Folt and Provost James Dean, Jr.

Above: View the award-winning video at stormwater.wef.org/2015/07/wef-announces-2015-stormtv-project-winners.

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HELPING ALBEMARLE-PAMLICO COMMUNITIES MITIGATE IMPACTS OF SALTWATER AND FLOODING

A GROUP OF PROFESSORS FROM FOUR NORTH CAROLINA UNIVERSITIES ARE WORKING WITH LOCAL COMMUNITIES IN EASTERN NORTH CAROLINA TO MANAGE THE IMPACTS OF SALTWATER INTRUSION. THROUGHOUT THE STATE



North Carolina's Albemarle-Pamlico peninsula is comprised of a unique set of landscapes, including tidal marshes and swamp forests, and is home to a rich and diverse community of plants and wildlife. The region is also characterized by a low and flat topography, making it vulnerable to rising seawater and saltwater intrusion – the movement of saltwater from the coast to the coastal plain.

UNC Institute for the Environment researchers are partnering with colleagues at Duke, East Carolina and NC State universities to study and better understand the impacts that saltwater intrusion will have on the Albemarle-Pamlico peninsula's environment and economy. The five-year project is funded by the National Science Foundation's Coastal Science, Engineering and Education for Sustainability program.

Todd BenDor, an associate professor in the UNC Department of City and Regional Planning, is one of the principal investigators on the collaboration. "Our goal is to provide landowners, land managers and public officials with a set of tools and strategies so they can make better decisions about how to manage saltwater intrusion and flooding," he said.

Saltwater intrusion and increased and recurrent flooding have significant implications for the peninsula's natural resources and economic sector. Drinking water supplies could be affected as well owners and utilities struggle to provide potable water. Farmers and foresters could see changes in the types of crops and trees that thrive in soils with elevated salt levels. The fishing industry could also be adversely impacted as many of the ecosystem services provided by the plant life (e.g., providing a spawning habitat for fish and filtration of pollutants) disappear as species die off.

Marcelo Ardon, an assistant professor of biology at ECU and one of BenDor's co-investigators, believes the research will lead to a more sophisticated grasp of the problem of saltwater intrusion. "We need a better understanding of what determines the vulnerability of the landscape to saltwater intrusion, and what are the human and ecological consequences of increasing salinity."

An exciting aspect of the project is the wide-ranging expertise of the university researchers across varying disciplines, including hydrology, biogeochemistry, ecology and regional planning. Emily Bernhardt of Duke University and Ryan Emanuel of NC State University, along with Ardon and BenDor, round out the project's leadership team. Each will spearhead a specific component of the project.

In addition to these four universities working together to address a critical issue facing North Carolina, the project will also engage local citizens and require the collaboration of those communities most affected. BenDor is leading the project's engagement with community stakeholders, which is "absolutely essential," he said.

One challenge with a research project of this nature is that, in many areas of eastern North Carolina, the topic of climate change and sea level rise has become politicized. But involvement and support for this project by local community leaders is critical, and initial engagement efforts have been positive. Sampling and data collection is underway and engagement with local leaders will begin in earnest later this year. Project leaders believe the study can have a long-lasting impact by helping to guide decision-makers and assist in shaping the future of this special region.

IE'S TRANSLATIONAL INITIATIVE: BUILDING BRIDGES FOR A BETTER NORTH CAROLINA

Over the last two years, the Institute for the Environment has made an effort to take its research beyond campus through the Translational Initiative. Led by Translational Research Associate Steve Wall, the Institute has made great strides in promoting the important environmental research and programs underway at UNC-Chapel Hill.

"We are building bridges and opportunities for collaboration with other entities," says Wall. "The university has an important role to play in bringing different perspectives together and serving as neutral ground where environmental issues and concerns can be discussed in an academic setting."

Wall's efforts have resulted in media and legislative briefings, news stories and more than a dozen opinion editorials penned by UNC-Chapel Hill faculty whose research has an impact on communities across the state. The initiative also has increased interaction with local, state, and federal environmental agency officials.

While the primary focus of the initiative is to inform the public and policy leaders about the environmental research at Carolina, it also aims to educate and engage faculty, staff and students at UNC-Chapel Hill on environmental policy issues facing the state. One example of that work was a recent forum hosted by the Institute focused on North Carolina's clean energy policies. The event brought together energy industry leaders, state officials, and academic experts to discuss how recent policy actions could impact the growth of the state's solar industry.

"The Translational Initiative goes both ways," Wall says. "It is important that UNC faculty and staff are aware of the discussions by our state leaders in Raleigh—what are the big policy issues and big environmental topics that are of concern that might merit further research, that need real-world solutions."

Wall's work with the Translational Initiative is funded by the Wallace Genetic Foundation.

UNC INSTITUTE FOR THE ENVIRONMENT: HONOR ROLL 2014/2015

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TRANSFORMED IN THAILAND

RECENT GRADUATE SHARES PERSONAL IMPACT OF HER SEMESTER AT IE'S THAILAND FIELD SITE – AND HOW SCHOLARSHIP DONORS MADE THIS LIFE-CHANGING EXPERIENCE POSSIBLE



In spring 2014 – her last full semester at Carolina – Charlotte Brown spent a semester at UNC's Thailand Field Site, one of seven environment-focused educational field programs coordinated by IE in partnership with the Curriculum for the Environment & Ecology and the Study Abroad Office. Brown, who double-majored in Environmental Science and Economics with a focus in Energy & Sustainability, enjoyed exploring environment- and energy-related issues faced by this rapidly developing country and its neighbors.

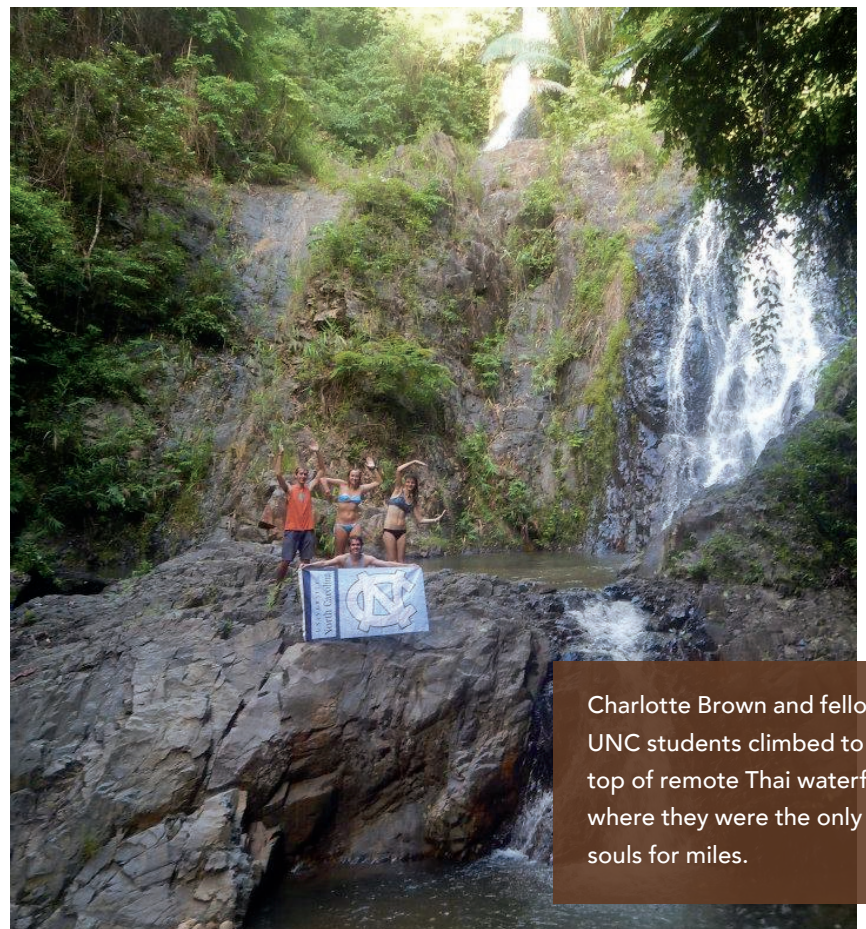
Brown, who graduated in 2014, spent a year as a research associate in the Geographic Information Science & Technology group at Oak Ridge National Laboratory and joined global energy storage and service provider Alevo this fall as a business analyst. Recently, she reflected on her field site experiences at King Mongkut's University of Technology Thonburi and throughout Southeast Asia, and on the power of financial aid and philanthropy.

"IE Associate Director for Education Greg Gangi pushed me to go to Thailand, and it takes my breath away when I think that I almost didn't go. Going to Thailand changed my life. I feel so lucky to have had an academic experience in a field of study that I am so passionate about, with people who I love dearly, in a country that will always have a huge place in my heart.

"For me, the field site experience was so much more than an academic endeavor. It was discovering life. I could have never predicted that I would feel such deep emotions for so many people who I was unable to speak a sentence with in the same language. Or that I could become part of a family of 12 fellow students who will be friends for life through the unbreakable bond that we now share.

"This experience gave me a hunger to live my life to the fullest, to find and utilize the opportunities in front of me: in academics, in relationships, in traveling and in everyday life. Countless moments throughout this experience shaped me into the person I am today. I gained confidence in myself to be at peace and seek happiness in any situation. I discovered that I wanted to be so much more as a person.

"I can't even imagine who I would be if I hadn't gone to Thailand, and I am overwhelmed with gratitude for the people who made this experience possible for me. In addition to my advisors, Greg Gangi and Thailand Field Site Director Rich Kamens, I am particularly grateful to Fred Clark and all of the others who made my attendance at UNC possible by providing the Covenant Scholarship, and to Tim Pate for his generous donations to the Pate Scholarship. You all have contributed to one of the most wonderful gifts I will ever receive."



Charlotte Brown and fellow UNC students climbed to the top of remote Thai waterfall, where they were the only souls for miles.



A motor-biking spin from Vietnam to Laos revealed the rich history and biodiversity of the region, while an expedition to Cambodia brought smiles with new friends.



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UNC environment

PEOPLE NEWS

IE's new event coordinator, **Kathleen Clabby**, began her post in November. She has extensive experience in event planning and most recently developed and coordinated arts programs for the Diocese of Raleigh Catholic Schools. She has vast training in the theater and earned her associate's degree in drama from the American Academy of Dramatic Arts, N.Y./C.A. and her bachelor's degree in theater arts from Charter Oak State College in Connecticut.

Linda D'Anna is a new lecturer and is based at the Outer Banks Field Site. She earned her Ph.D. in Ecology at UNC-Chapel Hill. Her dissertation focused on oyster management and restoration in North Carolina. D'Anna held a post doctoral fellowship at Vancouver Island University and most recently was a research associate at the Coastal Studies Institute.

Andrew George joined IE's Environmental Resource Program as a community engagement research associate. Prior to his post at IE, George worked with the School of Government at UNC-Chapel Hill as an instructor with the Master of Public Administration program, where he also directed several research projects. He has worked for more than 20 years with nonprofit organizations and local governments in North Carolina, across the Southeast, and nationally. George received a Ph.D. in environmental policy at UNC-Chapel Hill, where he was the Charles Alphonso Smith Dissertation Fellow, a Royster Society Fellow, an Interdisciplinary Research Fellow, a Future Faculty Fellow, and he received the UNC Tanner Award for teaching.

Post-Doctoral Research Associate **Laurence Lin** joined IE Director Larry Band's research team. Lin previously held a post-doctoral appointment at the University of Alabama. He earned his doctoral degree in biological sciences from Virginia Tech University. Lin is examining the impacts of land use and climate change on both forest and aquatic ecosystems using watershed models.

Chowdhury "Monir" Moniruzzaman started as a new post-doctoral research associate with IE's Center for Environmental Modeling for Policy Development. After graduating from SUNY Albany with a Ph.D. in atmospheric sciences, Moniruzzaman had post-doctoral appointments at the University of South Carolina and University of Virginia. Funded by the FAA's ASCENT Center of Excellence at IE, Moniruzzaman is investigating the impacts of aircraft emissions on air quality.

Senior Associate Director **Tony Reevy** released his fifth book "The Railroad Photography of Jack Delano" (Indiana University Press) in November. It is the first monograph featuring an annotated biography of this significant FSA/OWI photographer.

Emily Williams joined the Institute in July as director of communications. She brings more than 10-years experience in higher-ed communications. Prior to joining IE, Williams was the senior director of communications for the Division of Development and Alumni Relations at the University of Georgia. She earned her undergraduate degree in communications with a focus on video production and her graduate degree in organizational communications, both from Ohio University.

Board of Visitors: Under the helm of newly minted board chair Reginald Ronald Holley, the IE Board of Visitors has a new leadership team. Nancy Haines White was appointed vice chair, John Preyer is the new chair of the external relations committee and F. Bryan Brice, Jr., leads the nominating committee.

Chris Daggett was reelected to the board. Christopher Glenn Sawyer and Steve Levitas were named emeritus chairs.

James Y. Kerr II, joined the board as a new member. Kerr is the executive vice president, general counsel and chief compliance officer for Southern Company.

The board will meet again in April.

Registration Is Now Open!

Join us for the 3rd Annual NC Clean Tech Summit Feb. 18–19.

This year's event will feature a number of experts, stakeholders and industry leaders offering their perspectives on success stories from the clean tech industry and the challenges ahead. We also have expanded opportunities for networking and interaction between industry representatives and students. Learn more at ie.unc.edu/cleantech.