

SPRING 2015

UNC environment

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

VOLUME 14, ISSUE 1

UNDERSTANDING CLIMATE CHANGE IMPACTS ON WILDFIRES

UNC ENVIRONMENTAL MODELERS ARE HELPING FOREST SERVICE PREDICT FUTURE FIRES, ESPECIALLY IN THE SOUTHEAST, WHICH HAS ITS OWN UNIQUE CHALLENGES



PHOTO BY CLINT WRIGHT, USDA FOREST SERVICE

Mention wildfires, and people's thoughts often jump to the western U.S. But in reality, fires play a major role in North Carolina and throughout the Southeast, where prescribed burning for forest management and other human-caused fires are common, and where rapid population growth and development present new challenges for former wildlands. Last year alone, dozens of brush fires were reported in western North Carolina. In addition to causing physical damage and loss of property, these fires also have significant implications for air quality, public safety and human and environmental health.

What's more, a growing body of research suggests that climate change may be correlated to more and larger wildfires around the globe. For all these reasons, the need to better understand the connection between climate change and wildfires is increasingly urgent – and environmental modeling experts at the UNC Institute for the Environment (IE) are an important part of regional efforts to understand this connection.

For years, Research Scientist Uma Shankar and her colleagues at IE's Center for Environmental Modeling for Policy Development (CEMPD) have been helping the U.S. Forest Service and other government agencies develop highly complex computer models to assess and predict the likely frequency and location of wildfires.

IMPACTS ON HUMAN AND ENVIRONMENTAL HEALTH

“When trees and other debris burn in a wildfire, the carbon particles produced have consequences for both human health and climate change,” explained Shankar, an air quality modeling expert with more than 25 years of experience. “In addition to health concerns from smoke inhalation and long-term exposure, carbon soot released from wildfires can (like greenhouse gasses) block incoming sun rays at the top of the atmosphere and thus contribute to climate warming.”

In 2005, Shankar received a Science to Achieve Results grant from the U.S. Environmental Protection Agency to launch this work, and over the last nine years she and fellow CEMPD modelers with expertise in meteorology and ecology have continued to refine and improve the modeling approach to study various aspects of this climate change-fire-air quality cycle in the Southeastern U.S.

Through the U.S. Bureau of Land Management's Joint Fire Science Program (JFSP), Shankar helped a team of U.S. Forest Service scientists conduct an extensive review of available and ideal modeling methods for these investigations. They published their results in the online journal *Earth's Future* in 2013. While working on the EPA project, Shankar also got to know Jeff

continued on page 7

“When trees and other debris burn in a wildfire, the carbon particles produced have consequences for both human health and climate change.” —Uma Shankar

IE OUTREACH

NEW GRANT EXPANDS N.C. CHILDHOOD LEAD POISONING PREVENTION EFFORTS

UNC Institute for the Environment is a key partner with the N.C. Department of Health and Human Services (DHHS) on several initiatives to increase local and state agencies' capacity to improve the health of North Carolinians. Chief among these: the North Carolina Childhood Lead Poisoning Prevention Program (NC CLPPP), a statewide partnership led by DHHS that has, for more than 20 years, brought together public health, housing and community organizations and academic institutions like UNC to develop resources and build capacity to reduce the burden of childhood lead poisoning.

In January 2015 IE's Environmental Resource Program (ERP) began working with DHHS on a new grant from the Centers for Disease Control to enhance efforts to remedy health issues associated with childhood lead exposure throughout North Carolina, with a special focus on Durham and Chatham Counties, where health and housing agencies are poised to intervene with families in vulnerable communities. Under this new grant, ERP is managing the education and outreach portion of NC CLPPP, training environmental health specialists, nurses, health educators and lay health advisors to prevent lead poisoning, particularly in children under age six living in high-risk situations. Lead poisoning, often from exposure to lead-based paint in homes built before 1978, has been linked to reduced IQ, learning disabilities and other health problems.

ERP Community Outreach and Education Manager Neasha Graves and Research Associate Megan Hughes lead UNC's efforts to advance environmental health literacy in this important area. "We use a 'train-the-trainer model,' providing health professionals who are actually working with families with information and tools to understand the sources and health effects of lead poisoning as well as solutions they can share with parents of at-risk children," said Graves. "We are excited to continue our partnership with DHHS on such an important health issue for our state."

Under this new grant, ERP staff continue to coordinate quarterly statewide Healthy Homes Outreach Task Force meetings, where specialists from state and local health and housing agencies discuss best-practice strategies to address home-related health threats such as lead, asbestos and mold. At the spring 2014 meeting, for instance, Dr. Ken Rudo, the state toxicologist with DHHS, discussed statewide trends in lead, arsenic and cadmium and the associated public health implications.

"Working with ERP over the past eight years has enabled NC CLPPP to develop a truly 'community-based' component," said DHHS Program Manager Edward Norman, who heads this partnership. "The ERP's extensive contact with nonprofit organizations in the environmental and housing communities has brought many new ideas and faces together to reduce childhood lead poisoning, an entirely preventable disease."

COURSE TEACHES EMERGING SCIENTISTS TO COMMUNICATE WITH DIVERSE AUDIENCES



Samantha Tulenko (Right), a graduate student in the Department of Environmental Sciences and Engineering, puts her communication training into practice sharing science with visitors at the UNC Science Expo on April 11.

A big challenge for many scientists – and an important skill for professional success – is being able to clearly and effectively communicate their research to people who do not have the same depth of scientific knowledge. While most graduate programs focus solely on the science itself, an innovative new graduate seminar at UNC is teaching early-career scientists how to communicate their research to non-scientists.

During the spring 2014 semester, students in Environmental Sciences and Engineering and Marine Sciences took part in ENVR 890: Communicating Science to Diverse Audiences. The weekly seminar was designed and co-taught by faculty and staff from IE's ERP, which specializes in connecting UNC's environmental community with North Carolina communities, educators, policymakers and businesses that can benefit from this research.

Through a variety of hands-on activities and interaction with expert communicators, students developed their skills in effectively communicating their research and translating findings for non-academic audiences. The

semester-long seminar, which included some co-teaching with Duke's Superfund Research Program, culminated in final projects where each student communicated their own research to a target audience via a website, video, blog, op-ed article or lesson plan for teachers.

"It is vitally important that our students leave their graduate program able to talk and write about their science in a way that helps all people understand its importance and its relevance to real life," explained ERP Environmental Education Coordinator Sarah Yelton, who co-taught the course with ERP Director Kathleen Gray and K-12 Science Education Manager Dana Haine.

The two-credit communication course for scientists was the first of its kind at UNC, and participating students said they were clamoring for this type of training. Several have already put the tools and tips to work writing for national magazines and giving public lectures. The course will be offered again during the 2015-2016 academic year.

RESEARCH CAPSTONE COURSE FOCUSES ON AMERICAN CHESTNUT TREE BLIGHT

By Rachel McMahan '16

Partnering specialized organizations with each other to accomplish a unified goal often affords great positive change. Now, the once mighty American chestnut tree and the mined lands of Appalachia are experiencing restoration as a result of innovative collaboration between academia and the public sector.

Appalachian ecosystems suffered from the rapid disappearance of the American chestnut after the introduction of an invasive Asian fungus in the late 1800s. After losing perhaps billions of trees, the species was nearly extirpated from this landscape by 1950. These same Appalachian ecosystems also have suffered repercussions from the coal-mining industry.

After witnessing the degradation of these forests and species, The American Chestnut Foundation, Green Forest Works and the U.S. Department of the Interior's Office of Surface Mining combined their efforts in order to improve Appalachian ecosystems.

As a result of a generous gift from Brad Stanback and Shelli Lodge Stanback, the UNC Institute for the Environment was able to contribute to the partnership's endeavor to restore these degraded lands, and the blighted American chestnut.

"Having UNC students learn about the American chestnut through the Institute for the Environment will pay dividends later," Mr. Stanback said.

With support from this generous donation, IE organized an event to share the three organizations' progress with students and faculty. In addition, IE created a Capstone course for students interested in this important work. (See related article about Capstones on page 4.)

Dr. Geoffrey Bell, a lecturer for the Curriculum for the Environment and Ecology, led this Capstone. During the spring 2015 semester, Capstone students conducted original research examining soil development on coal-mined lands in Appalachia. The group traveled to Robinson Forest in Kentucky during spring break and measured basic characteristics of the soil such as nutrient levels, organic content, and pH.

The focus of their research was to determine whether "mine spoil"—the rock and remaining earth that is spread after a site has been mined—is returning back to the soil's natural state. Ultimately, researchers want to determine whether this soil could support tree growth.

Beyond gathering data in Robinson Forest, the Capstone students planted American chestnuts. For the trip, the group had a goal of offsetting its carbon footprint by planting as many trees as it took to make their journey carbon neutral.

Jen Richter, a senior Environmental Studies major on the ecology track, took the course because she was excited to be in a class geared toward making progress.

"It's something I can see grow; I didn't want to look back when I'm older on just another spring break I don't remember," Richter said.

Growing up in Western North Carolina, the forests Richter knew had no American chestnuts, but she hopes to change that.



"I'm excited about being 40 years old and seeing the mine lands being restored to Appalachian conditions," she said. "Hopefully, my grandkids will be able to see a forest that my grandparents experienced."

In the future, Bell sees potential to transform this Capstone into a reoccurring course centered on restoration projects and service learning. A sustained project with American chestnut blight and Appalachian forest restoration could be a vehicle for the type of dividends the Stanbacks had in mind in making a gift to support this type of work at Carolina.

IE's faculty and staff are proud of its role in this collaboration between university students, The American Chestnut Foundation, Green Forest Works and the U.S. Department of the Interior, and plan to provide similar opportunities for hands-on learning and ecological restoration in the future.

UNC LAUNCHES DUAL DEGREE IN ENVIRONMENT & SCIENCE COMMUNICATION

Through a unique partnership between the UNC School of Journalism & Mass Communication and the Curriculum for Environment & Ecology (CEE) in the College of Arts & Sciences, UNC students can now earn a B.A. in Environmental Studies and an M.A. in Mass Communication in as little as five years.

The new dual degree program is designed to give UNC students a broad understanding of the most critical environmental issues of our day and the skills to craft messages that inspire others. Studying with top environmental scientists and award-winning communicators, in the classroom and in the field, students learn how to make science accessible and exciting to the public and gain skills in public relations, social media marketing, photography, broadcast journalism,

continued on page 7



Jaye Cable



Heidi Hennink-Kaminski

CAN WE HAVE OUR OYSTERS AND EAT THEM TOO?

UNDERGRADUATE RESEARCHERS STUDY WHETHER HARVESTING OYSTERS HELPS OR HURTS COASTAL ECOSYSTEMS

By Mary Lide Parker, Communications Specialist, UNC Office of Research Communications

This article originally ran in Endeavors Magazine (endeavors.unc.edu). Expanded and reprinted with permission from UNC Research.

Oysters may be one of North Carolina’s most important organisms – and not just because they contribute millions of dollars each year to the state’s economy. Oysters filter water, their shells and the reefs that they build provide habitats for other organisms, and they can even help slow the process of coastal erosion. But can oysters do all those things even when they’re regularly being harvested for food?

Fifteen Carolina undergraduate students participating in the UNC Morehead City Field Site at the UNC Institute of Marine Sciences (IMS), a collaboration between IMS, the Institute for the Environment, the Curriculum in Environment and Ecology and the Study Abroad Office, wanted to find out. “Oyster reefs provide vital services that benefit many species, including humans,” said Jenny Hughes, one of the students in the fall-semester program, which

culminated in this group Capstone project. “Our goal was to measure possible differences in a few of these services in areas open and closed to shellfishing.”

Now in its eleventh year, the Morehead City Field Site, directed by IMS/IE faculty member Rachel Noble, educates undergraduates from UNC-Chapel Hill during an entire fall semester at IMS. While there, they take classes and field trips, meet community leaders and conduct in-depth, field-based independent research projects as well as a team project, referred to as “the Capstone.” “The students who come here – many of them end up going on to graduate school and becoming scientists,” said Mike Piehler, also a professor at IMS, as well as the UNC Coastal Studies Institute. “And if you’re going to become a scientist, the first thing you need to do is experience the process.”

From the outside, coastal research often looks picturesque – beaches and boat rides. Who wouldn’t enjoy that? “It can be physically challenging, and there are some people who absolutely hate it,” Piehler says. “We slog around in the mud a lot, and if you’re not going to like that, that’s important to know.”



WHAT IS THE CAPSTONE?

The Capstone is an integrated, team-based learning experience that all undergraduate Environmental Science and Environmental Studies majors at UNC are required to complete prior to graduation – often accomplished during a semester at one of the field sites. Students work as a team to conduct field and classroom work, data analysis and synthesis on a topic that is broad in scope, such as oyster reef ecosystem services. A hallmark of the Capstone is self-organization: Each student team identifies its own specific objectives and determines how to effectively achieve those objectives. The Capstone culminates in a public presentation at the end of the semester where the students present their findings to faculty and community stakeholders.

UNC INSTITUTE for the ENVIRONMENT

Board of Visitors

CHRISTOPHER G. SAWYER, Chair
REGINALD R. HOLLEY, Vice Chair
RYE BARCOTT
PHILIP BLUMENTHAL
CARI BOYCE
KIRK J. BRADLEY
F. BRYAN BRICE
BETSY CHAFFIN
WILLIAM CLARKE
ANN COLLEY
CHRISTOPHER J. DAGGETT
THOMAS F. DARDEN
WILLIAM E. EASTERLING III
BILL EICHBAUM
CONOR FARESE
JEFFREY R. GARWOOD
CHARLES T. HAGAN III
MARY LAMBERTON HILL
WILLIAM E. HOLLAN, JR.
R. MICHAEL LEONARD
STEVE LEVITAS
THE HONORABLE CHUCK MCGRADY

TODD MILLER
WILLIAM A. PIZER
JOHN PREYER
DOUGLAS N. RADER
J. ADAM RIGGSBEE
DAVID H. RUFFIN
FRANCES SEYMOUR
THOMAS F. VALONE
NANCY HANES WHITE
CATHY WILHELM
RHEM WOOTEN
LAWRENCE E. BAND, Director, ex-officio

Faculty Advisory Committee

LAWRENCE E. BAND,
Voit Gilmore Distinguished Professor,
Geography and Director, Institute for the
Environment (ex-officio)
RICHARD “PETE” ANDREWS,
Professor, Public Policy, Environmental Sciences
and Engineering

JAYE CABLE, Professor,
Marine Sciences, Chair and Adjunct Professor,
Curriculum for the Environment and Ecology

GREG CHARACKLIS,
Professor, Environmental Sciences and
Engineering and Director, Center for Watershed
Science and Management

MICHAEL EMCH,
Professor and Chair, Geography

JACQUELINE MACDONALD GIBSON,
Associate Professor, Environmental Sciences
and Engineering

CAROL HEE,
Director, Center for Sustainable Enterprise and
Clinical Associate Professor of Strategy and
Entrepreneurship, Kenan-Flagler Business School

DONALD HORNSTEIN,
Aubrey L. Brooks Professor, School of Law

PAMELA JAGGER,
Assistant Professor, Public Policy

DOUGLAS MACLEAN,
Professor, Philosophy

RACHEL NOBLE,
Hill Distinguished Professor of Marine Sciences,
Institute of Marine Sciences and Institute for the
Environment, Director, Morehead City Field Site

TAMLIN PAVELSKY,
Assistant Professor, Geological Sciences

ROBERT PEET,
Professor, Biology

DANIEL RODRIGUEZ,
Distinguished Professor of Sustainable
Community Design, City and Regional
Planning and Director, Center for Sustainable
Community Design

CONGHE SONG,
Assistant Professor, Public Policy

DANIELLE SPURLOCK,
Instructor, City and Regional Planning

RICHARD WHISNANT,
Professor, Public Law and Government,
School of Government

PETER WHITE,
Professor, Biology

UNC Environment Newsletter Staff

LAURA ERTEL,
Writer/Editor

TONY REEVY,
Senior Associate Director

UNC CREATIVE,
Design

Each fall, the students have to deal with several challenges – primarily a short time frame in which to conduct their field work. “They’re dealing with processes that vary throughout the year, and they’re just making an autumn measurement,” Piehler says. “You just get a little snapshot if you only look at one season.”

But even with a limited time frame, the students gathered findings that contribute to the wealth of coastal knowledge produced by IMS. Local officials and community members often attend the students’ presentations at the end of the semester. “We like to see what’s going on in the research community because those are all things that are important for regulators to look at,” said Steve Murphy, a supervisor at the N.C. Division of Marine Fisheries. “This has a lot of similarities to what we do – opening and closing waters to fishing. These projects really lend a lot to that.”

The students took pride in designing and organizing the project on their own. “Most of the experimental design was ours,” Hughes said. “All of the research into the literature was ours. We had guidance in the lab from experienced technicians, but we did the work ourselves. It’s not something I had thought about going into before. It opened doors to experiences I wouldn’t have had otherwise.”

Historical evidence has shown that harvesting oysters can be detrimental to an oyster reef’s functionality. But in this study, the students found a high level of function in reefs that were both open and closed to fishing.

Imagine picking apples from a tree – you want to pick the apples and enjoy them without diminishing the other services the tree provides, like providing oxygen and shade. There may be a similar phenomenon, to an extent, with oyster reefs. “This study offers support for the idea that oyster fishing may not always decrease the services that oysters provide to ecosystems,” Piehler said.

On the surface, the Capstone class seems to act as a filter – to separate the hard-core marine scientists from the land-loving scientists. But it’s much more than that.

Even for the students who decide that slogging through mud is not their preferred method of data collection, Piehler said the semester-long experience is still highly valuable. “Identifying the problem, developing and executing a plan to solve it, generating data and converting it into information – that is the nature of many people’s jobs. Anyone can come up with a number, but saying what it means is the real challenge.”

“They come here with fresh eyes, and ask questions about things we take for granted. We are just so fortunate to have great groups of undergraduate students here year after year after year.”

This fall, students at IE’s Outer Banks Field Site (OBXFS) in Manteo, a collaboration between IE, the UNC Coastal Studies Institute (CSI), the Curriculum in Environment and Ecology and the Study Abroad Office, did a parallel Capstone, noted OBXFS Associate Director Lindsay Dubbs, a faculty member with IE and CSI. The student team researched the ecosystem services provided by an oyster aquaculture facility from a natural science perspective as well as a social science perspective that included environmental economics, public policy analysis and sociology. They compared laws and permitting for oyster aquaculture operations in North Carolina and surrounding states, and designed and administered a survey to gauge the public’s knowledge, attitudes and opinions about oysters, oyster aquaculture and ecosystem services and the value they place on them.



“Each year during the Capstone I see several students emerge as thought-leaders, organizers and motivators who go on to graduate programs based on the abilities they demonstrate through this group project. It is exciting to see their development.”

—Rachel Noble
Director, Morehead City Field Site

MIKE PIEHLER is an associate professor at the UNC Institute of Marine Sciences and program head of estuarine ecology and human health at the UNC Coastal Studies Institute. He is also the director of graduate studies for the UNC Curriculum for the Environment and Ecology.

JENNY HUGHES is a junior at UNC–Chapel Hill, majoring in environmental sciences with a double minor in biology and marine sciences.

STEVE MURPHY is the assistant section chief of shellfish sanitation and recreational water quality at the N.C. Division of Marine Fisheries.

RACHEL NOBLE is the director of IE’s Morehead City Field Site and UNC professor of marine sciences.

LINDSAY DUBBS is the associate director of IE’s Outer Banks Field Site and UNC research assistant professor, OBXFS is directed by Andy Keeler.

“The Capstone allows students to apply concepts and skills learned in the classroom to a real-world question or issue, which highlights the complexity of designing experiments and putting the resultant information into a context that is useful and understandable to the community and policymakers.

Although the Outer Banks Field Site’s focus is on environmental decision-making and most students who come here don’t expect to be designing and carrying out experiments themselves in their future careers, they will likely use natural and social science research to help them make well-informed decisions. Thus, the Capstone provides them with a valuable behind-the-scenes glimpse of how that data is collected, analyzed and reported, and the tools to ask informed questions and harvest information that will lead to those decisions.”

—Lindsay Dubbs
Associate Director, Outer Banks Field Site

UNC INSTITUTE FOR THE ENVIRONMENT: FINAL HONOR ROLL 2013/2014

THE INSTITUTE THANKS THESE DONORS FOR THEIR GENEROUS SUPPORT:

Old Well Society Members

(gifts of \$7,500 or more)

Brian Bednar
Philip Blumenthal
Kirk and Deanne Bradley
Jeff Garwood
Robin M. Hanes
G. Timothy Pate and Jessica Pate
David Ruffin
The Smith Family
(Eddie and Jo Allison Smith;
Chris and Ann Smith)
Nancy Hanes White

Sustainability Circle Members

(gifts of \$5,000 to \$7,499)

John Bell
Betsy Steele Carr and
G. Watts Carr III
William T. Ellis
Bill and Ellen Kealy
M. Rhem Wooten

Director's Circle Members

(gifts of \$2,500 to \$4,999)

Inman Allen
Charles W. Causey
The Honorable Pricey
Taylor Harrison
William E. Hollan
Stephen E. Ihnot
David N. and Gladys Hau
McNelis
Ken Mountcastle
John Preyer
J. Adam Riggsbee
Thomas F. Valone

Friends of the Institute Society Members

(gifts of \$1,000 to \$2,499)

Aerin Benavides
Bryan Brice and
Carson Holding Brice
Edie Cecil
Betsy and Jim Chaffin
Elizabeth M. Corrigan
Chris Daggett
Tom and Jody Darden

Bill Easterling
Chip Hagan
John C. Hoyle
Steve and Betsy Levitas
Diane B. Linfors
Todd L. Miller
Joan Murray
Billy Pizer
Chris and Julie Sawyer
C. Austin Stephens

Other Individuals

(gifts of less than \$1,000)

Pete and Hannah Andrews
Swathi R. Ayyagari
Larry Band and Vicky Kline-Band
Glenn A. Barfield
Karen E. Beam
Peggy Birkemeier
Wilbert W. Blackman
John S. Boreyko
Marta R. Bowen
Kathy S. Bowerman
Andrew J. Bowers
Jean K. Braxton
Richard L. Broadwell
Sara M. Broadnax
Sumner Brown
Craig R. Carter
Shirley T. Church
Mary M. Clark
Vella B. Clark
Billy Clarke
Pamela C. Cleland
Rosalie N. Clinton
Anne S. Cole
Robert A. Cowan
Elizabeth J. Darden
Brian R. Deuterman
Kathryn J. Doster
Lisa A. DuBois
Robert P. Dunn
Michael W. Edwards
Bill Eichbaum
Nancy Embry
Ann S. Engel
Laura Ertel
G. L. Featherstone
Lynne H. Friedhelm
Greg and Emily Gangi
Albert W. Gard III and
Carolyn W. Gard
David Giles
Gary C. Gischel
Rachel R. Goldstein
Camille T. Green

Laura B. Grier
Mary C. Griffin
Richard S. Griggs
Dale G. Hammer
Dylan J. Hunter
Ralph R. Joly
Stephen L. Keith
Kathleen G. Keller
Alexa N. Kleystuber
Jenna Koester
Charles G. Lampley
Nguyen Huynh An M. Le
Benjamin A. Leder
Jo Ann Levo
John B. Lyman
Peter Lynch
Betsy J. Malpass
Evelyn J. Manning
Jay Margolis
Barbara D. Martin
Kevin B. McGhee
David F. McGinnis
Bernard A. McLean
William A. Mills
Richard W. Molten
William K. Morgan
Robert P. Morris
Henry W. Needham
Maura V. Neligan
William V. Nutt
Robert E. O'Connor
Stephanie H. O'Daly
Carol J. Ogburn
Julia A. Olson
Kathleen A. Ong
Brian L. Palmer
Jim Parrott
Amy R. Perlmutter
Pamela H. Pogue
A. G. Powell
Taylor D. Price
James E. Pugh
John M. Pye
Ellen J. Quinlan
Kimberly J. Ray
Tony Reeve and Caroline Weaver
Chuck Roe and
Charlotte Jones-Roe
Herbert H. Rogers
Richard L. and Amy D. Rosemond
Diana E. Roycroft
Karen L. Rust
Thomas G. Safford
Winn P. Sams
Caitlin P. Sanders
Benjamin P. Scandella
Judy Newton Scurry and
William Cooper Scurry

John G. Shaw
Martha D. Sheaff
Martin A. Shelton
Catherine A. Shields
Linda Shimp
Matthew C. Simon
Kathryn Sinopoli
Jessica L. Smith
Robert B. Smythe
Brent A. Sowul
Charles W. Stanfield
Jeffrey L. Stock
J. M. Strother
James T. Tanner
John C. Triplett
Carolyn J. Tyson
Cheryl A. Viglione
Randall G. Waite
James K. Ward
Gary W. Whalen
Michael S. Wilkins
Kenie M. Wrenn
Robert S. Wright
J. D. Yount

Corporations and Foundations

Birdseye Partners LLC
Blumenthal Foundation
Burroughs Wellcome Fund
Cary Institute of Ecosystem Studies
Geraldine R. Dodge Foundation
Duke Energy Foundation
Fifth Third Bank
Foundation for the Carolinas
Ella Ann L. and Frank B. Holding
Foundation
Inman Foundation
Lee-Moore Oil Company
The Longmire Group LLC
NESCAUM
North Carolina State University
Julian Price Family Foundation
Riverbank Consultants LLC
Schwab Fund for Charitable
Giving
Eddie and Jo Allison Smith Family
Foundation, Inc.
Strata Solar LLC
Triangle Community Foundation
University of Georgia
Wallace Genetic Foundation
WasteZero, Inc.

Understanding climate change impacts on wildfires, continued from page 1

Prestemon, a research forester at the U.S. Forest Service. Knowing CEMPD's international reputation for expertise in air quality modeling, Prestemon asked Shankar and her colleagues to help the agency build statistical models to project how forest conditions in the Southeast might change over the next five decades due to climate change, criminal and non-criminal activity, population growth and socioeconomic development. Additional funding from the JFSP is also enabling CEMPD and the Forest Service to extend this research in directions articulated in the *Earth's Future* article to examine the impacts of climate change in the Southeast on vegetation and fuel loads (dead wood, leaves and other debris that burns easily and fuels a forest fire), weather, fire activity and air quality.

FOCUS ON SOUTHEAST

Looking at these issues regionally is critically important, Shankar noted. "Climate change has become increasingly recognized as a driver of fires everywhere, and the Southeast is no exception. But every region has its own unique trends and characteristics, so we must factor those regional differences into our models to improve projections in any given area; one region may not have the same future as another."

Because climate models look at the global picture, most don't account for details in the regional differences, she said. "Our goal is to 'downscale' those global models to obtain a better idea of climate change impacts at the regional level. For example, models project the Southeast to be cooler in future years than elsewhere else in the U.S. Also, the Southeast is unique in its close proximity of wildlands to populated areas, and there's more variability in the forest materials that fuel wildfires here, so we're likely to get different burn characteristics here than in the west."

Prestemon, the project leader for the Forest Service Economics and Policy research unit, said his agency is interested in how public land management agencies and private forestland owners can best adapt to and mitigate some of the negative effects of climate change, including understanding how climate change, along with changes in society, have consequences for overall wildfire activity and other disturbances.

"In this collaborative relationship with the UNC Institute for the Environment, the Forest Service contributes its time, funds and expertise in wildfire science and projections of how society may evolve; UNC contributes deep knowledge and experience in atmospheric sciences and air quality modeling. The results can be used by managers and policymakers to develop more effective strategies for dealing with changes in wildfires and resulting air quality impacts, and the collaboration will serve as a model for others in the U.S. and abroad to develop greater understanding about ways that climate change could affect humans and nature."

PARTICLE(ULARLY) INTERESTING

Research Scientist Uma Shankar began her environmental modeling career in Research Triangle Park, where she helped the EPA develop its prototype atmospheric particulate model and was one of the developers of the EPA's first publicly available community modeling and analysis software system (CMAS), now used to inform air quality issues worldwide. In 2003, the modeling group – and Shankar – joined UNC's Carolina Environmental Program (now IE) to become the Center for Environmental Modeling for Policy Development, which still supports and maintains CMAS under an EPA contract, and trains modelers around the world to use the system effectively.



PHOTO BY LISA CARL

Uma Shankar

Long interested in atmospheric particulate matter, Shankar became particularly fascinated with carbonaceous particles and their effect on air pollution, health and climate. "I'm very interested in feedbacks in the climate system, and with climate change, especially a warming atmosphere, seemingly implicated in the increasing wildfire occurrence, I wanted to study that particular cycle."

Returning to UNC, where she earned one of her master's degrees and is now pursuing a Ph.D. in environmental science, has been very beneficial, Shankar said. "The Institute brings a lot of visibility to what we do and allows us as atmospheric modelers to interact and collaborate with IE colleagues working in sustainability, energy and environment, terrestrial ecosystems, hydrology and other fields."

CEMPD Director Adel Hanna noted that Shankar "has a proven record of success in leading projects on air quality and climate. Uma's work shows a depth of knowledge related to modeling aspects of particulate matter and global climate, and is recognized by leading peers in the field."

UNC launches dual degree in Environment & Science Communication, continued from page 3

writing or graphic design to prepare for careers in nonprofits, eco-conscious businesses or media organizations.

"The Environment & Science Communication dual degree program is an excellent example of how we can work together to provide an excellent liberal arts education and the professional skills to join the job market," said CEE Chair Jaye Cable. "We are excited about the possibilities for our students in the energy and clean tech sector upon graduation. The program also collaborates with Honors Carolina to bring some of the best and brightest minds to UNC and opens doors for real-world experiences in Europe, Thailand, the Galapagos and throughout North Carolina."

Heidi Hennink-Kaminski, senior associate dean of graduate studies at the journalism school, agreed. "This program prepares people to be effective communicators for organizations such as Duke Energy and Strata Solar, or media

outlets such as Discovery Channel and National Geographic. It's been invigorating to work with folks at CEE to develop this unique interdisciplinary opportunity."

In January 2015, UNC junior Rachel McMahan became the first undergraduate to enroll in the program. "I'm learning to synthesize data about environmental topics and then tell great stories that lead to better decision-making," said McMahan, who also does public affairs work with IE and authored an article on page 3 of this newsletter. "I intend to work in public relations to promote a culture that values efficient, alternative energy sources while reducing the impact on the natural environment."

Interest was also high at an information session held in late February to introduce potential students to this exciting new interdisciplinary program.

To learn more about the Environment & Science Communication dual degree program, visit esc.web.unc.edu.

UNC INSTITUTE for the ENVIRONMENT
The University of North Carolina at Chapel Hill
Campus Box 1105
Chapel Hill, NC 27599-1105

Non Profit
Organization
US POSTAGE PAID
Chapel Hill, NC
Permit Number 177

ADDRESS SERVICE REQUESTED



FSC logo will go here

 This newsletter was printed with vegetable-based inks on 100% recycled, 100% post-consumer waste paper, which was processed chlorine-free and manufactured with Green-e® certified biogas energy and wind power. No state funds were used to print this document.
© 2015 Institute for the Environment, UNC-Chapel Hill

UNC environment

.....
UPCOMING EVENTS & INFO
.....

October 5–7, 2015, UNC’s William and Ida Friday Center for Continuing Education, Chapel Hill, N.C.
Annual Community Modeling and Analysis System (CMAS) Conference

.....
PEOPLE NEWS
.....

IE Research Associate Professor **Sarav Arunachalam** presented an invited talk at the National Academies’ Board on Atmospheric Sciences and Climate on “Frontiers and Challenges in Atmospheric Dispersion Modeling” in Washington, D.C., in December 2014.

IE Director of Development **John Bell** left the Institute for new opportunities in April 2015.

Postdoctoral Research Associate **Jon Duncan** has been appointed a Research Assistant Professor in the Institute. Congratulations, Jon!

Postdoctoral Research Associate **Jordan Kern** has been appointed a Research Assistant Professor in the Institute. Congratulations, Jordan!

Margaret Ledyard-Marks joined IE in February 2015 as Proposal Coordinator and Technical Editor.

Brian Miles, who recently graduated from UNC with a doctorate in geography, joined IE as a Research Associate in November 2014.

Institute for Marine Sciences (IMS) **Professor Rachel Noble** has been named the Mary and Watts Hill, Jr., Distinguished Professor of Marine Sciences, a signal honor. Rachel is a joint faculty member in the Institute for the Environment, and holds appointments in other UNC departments and curricula. She heads the Morehead City Field Site, a collaborative program of the Institute, the Curriculum in Environment and Ecology, the Study Abroad office and IMS. Congratulations, Rachel!

IE Senior Associate Director and Lecturer **Tony Reeve’s** second full book of poetry, *Passage*, was published by Iris Press (Oak Ridge, Tennessee) in April 2015.

Emily Williams will join the Institute as Communications Director in July 2015. She comes to UNC from the University of Georgia.