

FALL 2014

UNC environment

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

VOLUME 13, ISSUE 2

WATER WAYS

HE IS LEADING A GRANT-SUPPORTED, INTERDISCIPLINARY EFFORT TO DEVELOP SUSTAINABLE WAYS TO MEET THE GROWING WATER NEEDS OF THE SOUTHEASTERN U.S.



Dr. Greg Characklis

When we think about issues of water scarcity in the United States, we traditionally think about the western states, which have long grappled with water shortages and supply/demand imbalances. But the southeastern U.S., with its soaring population and rapid economic expansion, is poised to face similar challenges in the not-too-distant future. Several recent, and historically severe, droughts have given us a glimpse into that unsettling future.

The time to plan for this inevitability is now, before things get to a critical level, says Dr. Greg Characklis, director of the UNC Institute for the Environment's Center for Watershed Science and Management. Characklis is leading an interdisciplinary, multi-institution project to develop innovative strategies to meet future water demands in the southeastern U.S. Characklis and his colleagues have been awarded a \$2.2 million grant from the National Science Foundation and the U.S. Department of Agriculture for this important work.

"Relative to a lot of places, we still have a significant amount of water, but the growth of the Southeast in general, and North Carolina in particular, has greatly increased water demand," Characklis, a professor of environmental sciences and engineering in UNC's Gillings School of Global Public Health, explained. "Unlike traditionally water-scarce regions such as the western U.S., our current regulatory framework and infrastructure have developed in a manner that assumes an almost inexhaustible supply of water. Now that we know this will not always be the case, we need to be proactive in coming up with new approaches to managing our water supply."

The NSF/USDA-funded project brings together experts in hydrology, economics and engineering to design comprehensive, sustainable water management strategies for regions transitioning from abundance to scarcity. Characklis and his colleagues will develop multidisciplinary models to analyze how climate change and land-use trends impact regional hydrology,

"Now is the time to start making these decisions, because if we wait...to address our water supply problems, the odds are we'll make poorer choices." —Dr. Greg Characklis

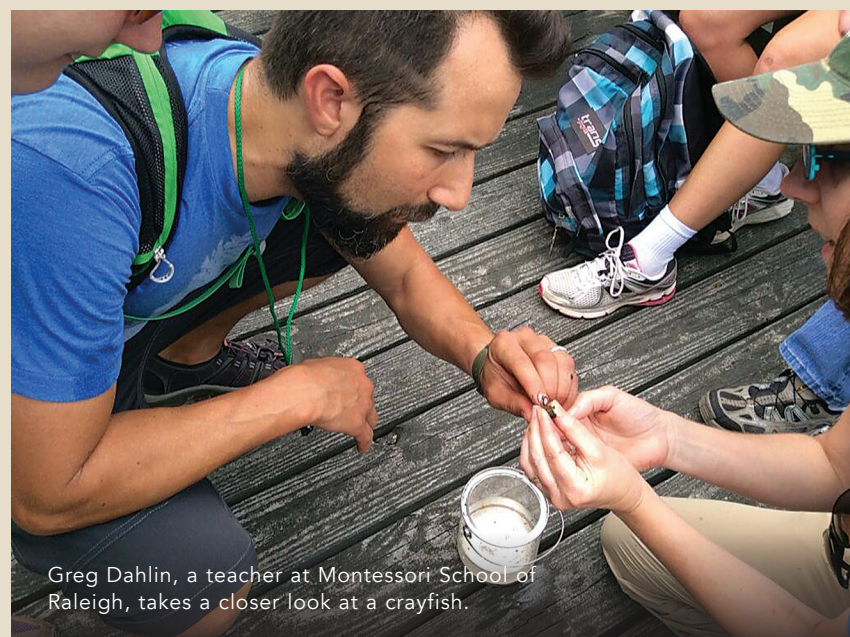
and how infrastructure and regulatory systems will need to adapt to meet the demands of a growing populace and expanding economy. The team will also work closely with utilities and local governments to help them make informed decisions on how best to accommodate growth while minimizing costs and environmental impact. Central to this work will be the development of more diversified water management "portfolios" that will coordinate

continued on page 7

GRANT FUNDS PROGRAM TO HELP ELEMENTARY TEACHERS GET KIDS OUTSIDE



Goose Creek State Park Ranger Nicole Crider shows fifth grade teachers the resin-filled heartwood of the longleaf pine.



Greg Dahlin, a teacher at Montessori School of Raleigh, takes a closer look at a crayfish.



Teachers explore the life in the marsh.

A group of fifth grade teachers in eastern North Carolina is learning creative ways to get their students outdoors for hands-on lessons about watershed science and local environmental issues, thanks to a year-long professional development program funded by the Eddie and Jo Allison Smith Family Foundation.

The grant has enabled the UNC Institute for the Environment (IE) and partners to develop the EGRET Fellows Program and offer it free to teachers in the Tar-Pamlico River Basin and Pamlico Sound region. (EGRET stands for "Exploring the Geographical Region and Ecosystems of the Tar-Pamlico Watershed.") This multi-faceted program gives teachers hands-on outdoor activities and lessons they can use to spark their students' interest in conservation and environmental stewardship – often literally in their own school's backyard – that are aligned with North Carolina's standards for fifth grade science, social studies, language arts and math.

"We know that teachers don't have a lot of time to take their students outside to learn, so we've developed a curriculum that enables them to integrate more concepts and requirements while outside," said IE Project Coordinator Michele Drostin, who worked with several partner organizations to create the EGRET curriculum and materials.

"The opportunity to talk and collaborate with other teachers has been especially valuable. I can't wait to see what else I learn and can use in my classroom." —Brittany Stewart

The EGRET Fellows Program kicked off in June with a three-day Summer Institute at Goose Creek State Park (near Washington, N.C.). Twenty-six teachers engaged in outdoor activities like hiking and kayaking as they learned about the watershed and ecosystems; how geography and the availability of natural resources affected human settlement in the region and how settlers, in turn, have affected the ecosystems and economy; and the unique plant and animal populations in the river and sound. Working with scientists, historians, park rangers and other environmental educators, the teachers gained confidence in using the outdoors to teach core concepts and practiced activities they can share with their students. They even discussed strategies for keeping students focused and on-task outside the physical confines of a classroom.

"The teachers were able to experience these ecosystems firsthand, so they now feel more comfortable and prepared to teach their students in a similarly experiential way," said IE Environmental Education Coordinator Sarah Yelton. "They returned home inspired and eager to incorporate aspects of what they'd learned into their lesson plans for the coming school year."

This fall and spring, the EGRET Fellows will reconvene for weekend retreats in the upper Tar-Pamlico Basin and near Pamlico Sound. Throughout the year, they'll participate in the EGRET program's online professional learn-

ing community to share resources and ideas and support each other as they as implement what they have learned into their own lessons. Through the program, teachers receive a wealth of new ideas and instructional resources including curriculum-related materials, as well as a small cash award to support field trips with their students.

Nancy Bray, director of A Time for Science Nature & Science Learning Center, and Goose Creek State Park Education Ranger Nicole Crider partnered with Drostin and Yelton to create and present the EGRET Fellows program, and remain available to host field trips or speak to the teachers' classes. For Bray, who was a classroom teacher in the past, the Summer Institute gave her a sense of "how valuable the partnering of the school systems and the nature and environmental centers in our state can be. We need to get kids outside and make it a pleasurable and valuable educational experience, and the EGRET program is an opportunity to accomplish just that."

Brittany Stewart, a fifth grade science and social studies teacher at Pactolus Elementary School in Greenville, signed up for the EGRET Program to learn new teaching techniques and strategies. "The program so far has been a great learning experience," said Stewart, who is already incorporating activities like creating science notebooks for journaling and sketching into her lesson plans. "The opportunity to talk to and collaborate with other teachers has been especially valuable. I can't wait to see what else I learn and can use in my classroom."

The Smith Family Foundation's two-year grant, which covers all food, lodging and materials, will enable another 26 teachers to participate in the EGRET Fellows program starting next summer. As a result of the Summer Institute, IE also received an anonymous \$10,000 donation to support more work for elementary school teachers through EGRET or similar programs.

▶ TO LEARN MORE ABOUT THE EGRET FELLOWS PROGRAM, VISIT ERP.UNC.EDU/EGRET.

MEET OUR WORK-STUDY STUDENTS!

Each year, several outstanding environmental majors work in the UNC Institute for the Environment offices in various capacities. We thought you might like to meet this year's extraordinary group of students:

COURTNEY FARGE



YEAR
SOPHOMORE

MAJOR
ENVIRONMENTAL STUDIES

MINORS
BUSINESS OR PSYCHOLOGY

WHY ENVIRONMENT?

"I have always been an outdoorsy person. I came to Carolina as a biology major intending to become a veterinarian, but I decided on a different path. I want to change the way people view and treat the environment, and so I chose to focus my education on learning to do so."

IE WORK STUDY DUTIES?

"I do everything from preparing asthma trigger kits used in training; to organizing evaluation responses from prior educational workshops; to helping set up materials needed for those training sessions and workshops. My favorite part about working here is that I am pushed by my bosses to become involved in these projects, and I know they value my input."

AFTER GRADUATION?

"I want to further my education with a master's degree, then perhaps join the Peace Corps and serve in South America or Africa."

CANDACE FOSTER



YEAR
SOPHOMORE

MAJOR
ENVIRONMENTAL SCIENCE

MINORS
—

WHY ENVIRONMENT?

"I have always loved nature, and had respect for the world around me. Taking AP Environmental Science in high school, I found that learning about the environment was engaging and I decided to explore this field in college."

BEST PART ABOUT THE MAJOR?

"The most rewarding experience I've had at UNC so far has been partaking in research for the IDEA (Increasing Diversity and Enhancing Academia) Program. Working under post-doc Jon Duncan and with fellow undergraduate and graduate students, I was able complete research that will have ramifications in Chapel Hill and the surrounding counties."

IE WORK STUDY DUTIES?

"I work under the grants manager of the UNC Institute for the Environment. With this job I am able to see the inner workings of grants, and now understand the arduous process of getting funding for research."

AFTER GRADUATION?

"I intend to pursue graduate school or do research in academia."

RACHEL MCMAHAN



YEAR
JUNIOR

MAJOR
ENVIRONMENTAL SCIENCE

MINOR
—

ENERGY & SUSTAINABILITY

WHY ENVIRONMENT?

"My interest stems from growing up in Marion, N.C., where I could explore nature and admire its beauty surrounding me. Later in school, I found that studying the environment, specifically issues of energy, water and sustainability, gave me a similar joy."

IE WORK STUDY DUTIES?

"As a communications assistant, I help the IE staff prepare for different events, update IE's online resources, and write short pieces. This work-study is extremely valuable because it gives me a chance to work with communications practitioners around environmental themes."

AFTER GRADUATION?

"My plans aren't certain, but I would like to work with companies planning their future sustainability efforts, get my hands into some community planning, or work to encourage people to see that there is a real need to reduce the amount of emissions and pollutants in our environment."

JOANNA MATANGA



YEAR
SENIOR

MAJOR
ENVIRONMENTAL SCIENCE

MINOR
—

MATH

WHY ENVIRONMENT?

"I am very passionate about water conservation and water infrastructure in parts of Earth where such a vital resource is not as easily available."

BEST PART ABOUT THE MAJOR?

"I value what we speak about in class. Things such as disease epidemics and how people are affected by how we treat the Earth we live on really intrigue me."

IE WORK STUDY DUTIES?

"I help my supervisors with various trainings: preparation, post-training evaluations, analysis, etc. I like the fact that I get to see what goes into preparing for trainings and how the ideas come together to become finished products."

AFTER GRADUATION?

"I would like to do research for the NIH and then study cardiovascular epidemiology at UNC. I would also like to incorporate water sanitation and health work."

CONGRATULATIONS TO THE CLASS OF 2014!



Environmental Studies and Sciences graduates congregate for a post-ceremony group photograph in the NC Botanical Gardens.



Dr. Greg Gangi and Dr. Larry Band enjoy refreshments and conversations with three former students turned UNC graduates, Nikki Curnes (left), her older sister, Laurie Curnes, and Aizhan Teregozhina.



Markus Wilhelm, founder and CEO of local company Strata Solar, delivers words of encouragement to graduates and their families.



Ty Fenton (right) joins fellow graduate, Wilton Burns (left) and her mother, Julia Burns, for a celebratory picture.



Marie Calderon congratulates her daughter, and now college graduate, Maritza Mendoza.



Taylor Price (left), Rachel Tove-White, Laura Grier and Gabriele Barron are all robed up and waiting for the graduation ceremony to begin.

PEOPLE NEWS

Research Associate **Jeanne Eichinger** retired in September after 11 years with the Institute and its predecessor, the Carolina Environmental Program. We wish Jeanne the best in her retirement.

Public Communications Specialist **Katie Hall** left IE in October 2014 to join UNC's Water Institute as Communications Associate. We wish Katie well in her new position, and will interact with her often in her new role.

IE Postdoctoral Research Associate **Taehee Hwang** left UNC over the summer to join Indiana University as an assistant professor in IU's Department of Geography.

IE Postdoctoral Research Associate **Yuri Kim** left UNC over the summer to pursue other interests.

Research Associate **Megan Mallard** joined the Institute as the second hire in our Translational Initiative. She is a graduate of NC State University, where she earned a Ph.D. in atmospheric science, and most recently served as a postdoctoral fellow at the U.S. Environmental Protection Agency. At IE, Mallard will focus on translational research across the Institute's centers, with an emphasis on hydrological and atmospheric science.

Senior Associate Director **Tony Reevy** is the recipient of a 2014 Richard C. Overton Research Fellowship from the Lexington Group in Transportation History, which was awarded in support of his research focusing on a photographer, Jack Delano. Reevy's work on Delano was also supported by UNC's University Research Council, and other donors. Reevy was also awarded the 2014 John H. White, Jr., Research Fellowship from the Railway and Locomotive Historical Society, in support of his research on the photographer/author team of Lucius Beebe and Charles Clegg.

As noted in the most recent Institute e-newsletter, UNC Professor of City and Regional Planning **Daniel Rodriguez** was awarded the Distinguished Professorship in Sustainable Community Design, and was also named director of IE's Center for Sustainable Community Design.

Catherine Seppanen has re-joined the Institute as a Research Associate in the Center for Environmental Modeling for Policy Development (CEMPD). For the last several years, she has been a temporary employee working with CEMPD.

UNC-Chapel Hill Professor of Geography **Conghe Song** is spending the fall 2014 semester with the Institute on research leave. Song's large, IE-administered National Science Foundation-funded project studying the impact of China's reforestation policy was profiled in the spring 2014 issue of UNC Environment.

Visiting Professor **David Tarboton** is spending an academic year with the UNC Institute for the Environment. A noted faculty member at Utah State University, Tarboton is a surface water hydrologist whose recent work emphasizes hydrologic information systems that integrate information from multiple sources to advance understanding in hydrology. During his time with the Institute, Tarboton will work closely with IE Director Larry Band and colleagues from UNC's Renaissance Computing Institute (RENCI) on the noted HydroShare project, which Tarboton leads.

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 EICHHAUJ
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
JIM PARROTT
WILLIAM A. PIZER

Faculty Advisory Committee

LAWRENCE E. BAND, Voigt 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

DOUGLAS MACLEAN, Professor, Philosophy

RACHEL NOBLE, Professor, 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, Professor, Geography
RICHARD WHISNANT, Professor, Public Law and Government, School of Government

PETER WHITE, Director, North Carolina Botanical Garden and Professor, Biology

UNC Environment Newsletter Staff

LAURA ERTEL, Writer/Editor
TONY REEVY, Senior Associate Director

UNC CREATIVE, Design

UNC INSTITUTE FOR THE ENVIRONMENT: 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 Benevides
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
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
Sara M. Broadnax
Richard L. Broadwell
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. Deuteran
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.

Water Ways, continued from page 1

existing supplies with water reuse, conservation and water pricing to help manage uncertainties associated with increasing demands and hydrologic behavior. This research also includes consideration of the financial instability that can result when utilities rely on many different sources of water, leading to highly variable costs and revenues that can be difficult to manage.

“The development pressures that we’re under here in North Carolina and especially the Triangle, closely mirror what’s occurring throughout the Southeast, so what we learn and implement here can be readily translatable to other areas throughout the region.” —Dr. Greg Characklis

The new grant builds on more than a decade of work by Characklis and team in North Carolina’s Research Triangle region, work that has included regional utilities, which have partnered with the team in the past to implement recommendations from earlier studies.

“The development pressures that we’re under here in North Carolina, and especially the Triangle, closely mirror what’s occurring throughout the Southeast, so what we learn and implement here can be readily translatable to other areas throughout the region,” Characklis noted.

Working with Characklis and the Center for Watershed Science and Management are other researchers from UNC-Chapel Hill’s Institute for the Environment (Larry Band, also a distinguished professor in the Department of Geography), College of Arts and Sciences’ Department of Economics (Andy Yates), and School of Government’s Environmental Finance Center (Jeff Hughes), as well as collaborators from Cornell University and the U.S. Forest Service.

Dr. Patrick Reed, a computational systems engineer at Cornell who specializes in translating data from complex computer models into easily understandable visual representations, has been working with the UNC team on projects in the Triangle for several years. “This project is really exciting because of the mix of hydrology, economics, finance, forestry and water planning expertise our team offers,” Reed said. “We have the breadth of expertise needed to frame the tradeoffs and vulnerabilities that the region’s water supply may face.”

Fortunately, most of the time we still have a fairly abundant water supply in North Carolina and the Southeast in general, but periods of significant water scarcity are now occurring, imposing significant adverse impacts, Characklis cautioned. “Now is the time to start making these decisions, because if we wait until we’re in the middle of a drought to begin to address our water supply problems, the odds are we’ll make poorer choices.”

SUPPLY AND DEMAND, AND FINANCIAL REALITIES

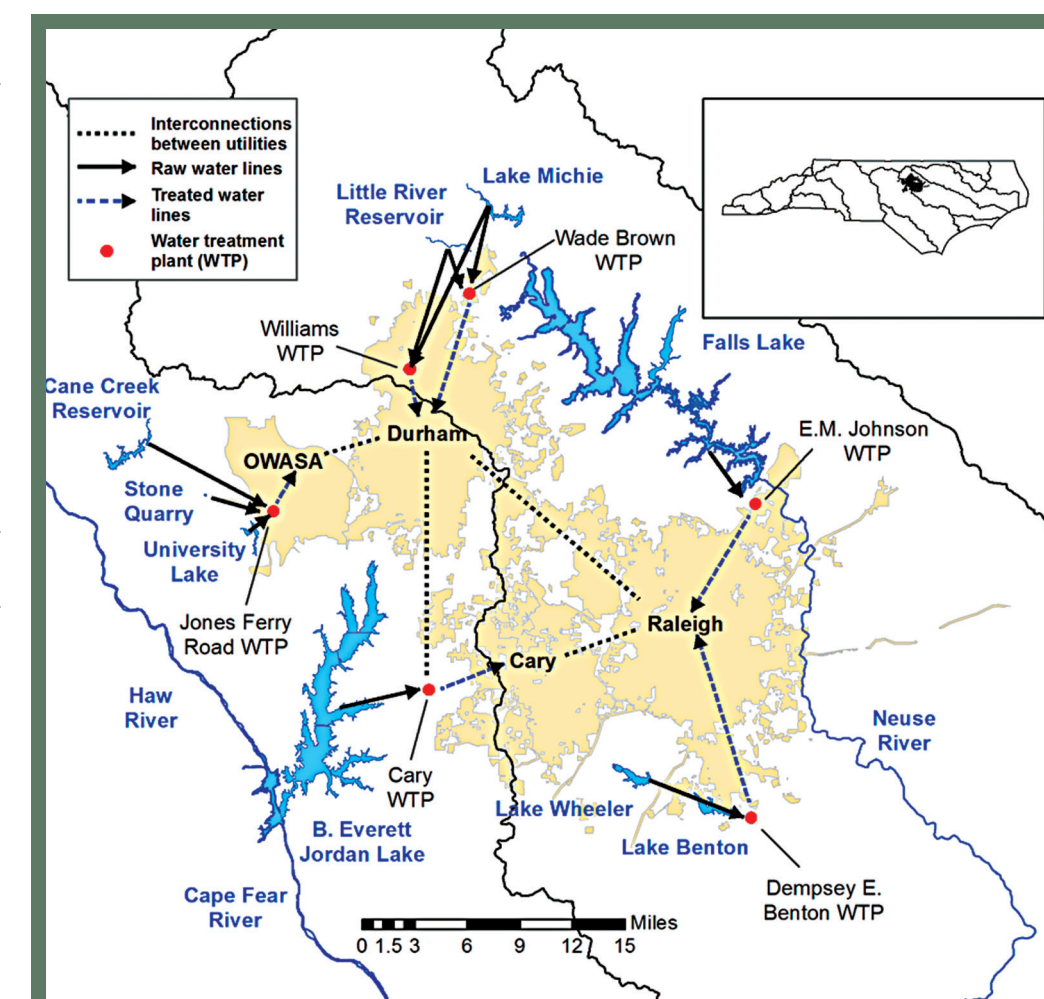
STATEGIES TO COMBAT WATER SCARCITY CAN FLOW FROM BOTH SIDES OF THIS ECONOMIC EQUATION

■ **ON THE SUPPLY-SIDE**, the cost and logistics involved with developing new sources of water, such as reservoirs, can be prohibitive; environmental and regulatory concerns present further obstacles. But in areas like the Triangle where multiple reservoirs are in use, communities can work together to make more efficient use of existing resources; for example, by using excess capacity in one municipality’s reservoir to overcome a shortage in another. Doing so, however, may require modification of regulatory rules governing water transfers, something that occurs commonly in the Western U.S. but less often in the East.

■ **ON THE DEMAND-SIDE**, conservation strategies can help reduce the rate at which demand is growing. Opportunities include improved technologies to decrease water use and incentives such as pricing. Building codes that require low-flow toilets and showerheads are one example of technical improvements, while increasing block pricing schemes, which provide a baseline level of water for very low prices, but charge much more as consumption levels rise (to water your lawn, for example), have also proven effective.

■ **FINANCIAL REALITIES**: Utilities have typically relied on one or two large sources to meet their demands, sources that are debt-financed and paid back at a constant rate over many years. As debt payments often dominate utility costs, setting prices to cover these costs has been straightforward. As

the water supply paradigm shifts away from sole reliance on a few sources, and begins to lean more heavily on approaches that can reduce revenues (conservation) and/or increase costs (transfers) in response to unpredictable droughts, utilities must likewise begin to develop more sophisticated financial strategies to manage this variability.



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.

© 2014 Institute for the Environment, UNC-Chapel Hill

UNC environment

UPCOMING EVENTS & INFO

December 2, 2014, 12:30pm at Toy Lounge in Dey Hall

Institute for the Environment Postdoctoral Research Associate Jordan Kern speaks at the last IE *Energy and Environment Lunch* of the Fall 2014 semester. Kern will discuss, "Water, Energy, Finance and the Environment: an Electric Power Perspective."

February 19-20, 2015 at UNC's William and Ida Friday Center for Continuing Education

2015 North Carolina Clean Tech Summit, presented by IE and the Center for Sustainable Enterprise, Kenan-Flagler Business School. The Summit provides a nonpartisan forum where business leaders, policymakers, entrepreneurs, educators, researchers and students convene to advance the development of the clean technology sector in North Carolina.

May 10, 2015, 1pm, Location TBD

Curriculum in Environment and Ecology Commencement, honoring graduates from Carolina's Environmental Science, Environmental Studies and Ecology degree programs.

WE'VE MOVED

In May, most of the Institute for the Environment faculty and staff moved to Suite 490, Europa Center, in Chapel Hill. The Europa Center is just off Highway 15-501 in eastern Chapel Hill, at 100 Europa Drive. Our campus box mailing address remains the same, and our educational faculty and staff are still located on the third floor of the Whitehead Building on the main UNC campus.