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DUKE RESEARCHER ACHIEVES ‘acade\n\n\n‘academic TRIFECTA’

Photos by Les Todd, Duke Photography
As a kid hanging out at the Del Mar Racetrack in suburban San Diego in the 1970s, it’s a safe bet Marty Smith never imagined his fascination with racing odds would lead to a career in environmental economics.

After all, back then his world revolved primarily around the racetrack. His father, a former Los Angeles Times sportswriter, was marketing director at Del Mar; his mother was a secretary there; and from the age of 10 or 11, Smith spent hours happily pouring over the daily tip sheets and calculating the odds of not only which horse should win each race, but why.

“I taught myself statistics by reading racing forms and the backs of baseball cards,” he says, “and worked as a data analyst at the track during summers when I got older.” Racing, it seemed, was in his blood.

The environment? Smith was certainly aware of it, just not as connected to it. “Growing up in Southern California, you can’t ignore the ocean—it’s right there,” he says. “We lived in a town called Encinitas, where the beach and tidepools and fishing are part of everyday life. I knew about the environmental movement. And I cared about it; I wanted to make the world a better place. I just wasn’t as into it as some people.”

Fast forward to 2010.

Smith, now 40, is an associate professor at the Nicholas School of the Environment. At a point in his career when many young researchers would be thrilled to publish three major papers in top-tier journals over the course of a decade, Smith has achieved that academic trifecta in less than a year, publishing two papers in Science and one in the Proceedings of the National Academy of Sciences (PNAS), all three as lead author.

His papers in Science yielded new insights on the role foreign aid for sustainable fisheries could play in boosting global food security, and proposed practical solutions to shortcomings in the Food and Drug Administration (FDA) approval process for transgenic salmon. His PNAS paper shed light on often-overlooked economic and social factors that shape fishermen’s response to the creation of marine reserves.

Each paper appeared at a time when its topic was in the policy spotlight. Each sparked broad interest among stakeholders on all sides of the issues and extensive media coverage for Smith and the school.

Mere coincidence? Not by a long shot. Smith’s insightful, well-timed publications, much like his own transformation from racetrack numbers cruncher to widely cited fisheries economist, didn’t just happen.

One lesson he learned during his days at Del Mar, after all, is there’s no such thing as pure luck. You do your research, calculate the odds, and get to the window in time to place your bet. And sometimes, the smart money’s on the dark horse.

A PRACTICAL ENVIRONMENTALIST

After high school, Smith’s aptitude for statistical analysis and his interest in the social sciences, particularly applied economics, led him to Stanford University where he majored in public policy with a concentration in environmental policy. “I wasn’t a typical environmentalist, at least not in my mind. I’d always been interested in social causes—I took part in student protests during the first Gulf War and was involved in the campus environmental movement—but my activism had more of a practical bent,” he says. “I went around to dorms and gave talks about water and energy efficiency, and sold compact fluorescent light bulbs to students for a dollar each to encourage them to conserve.”

If others found it odd that the kid from Encinitas was as likely to cite free-market economist Milton Friedman or rational-expectations advocate Robert Lucas as he was to quote Rachel Carson, it didn’t faze Smith. “It just seemed natural to me,” he says, “to apply tools from social sciences to environmental problems.”

By senior year, after completing a summer internship at the United Nations Environment Programme in
Washington, D.C., Smith set his sights on landing “a do-gooder job” where he could put his statistical prowess and economic savvy to use for the general good.

Luckily, it didn’t pan out.

“I graduated in the recession of 1992; no one was hiring do-gooders,” he explains wryly. “So I took a job doing data analysis for a litigation support firm.”

The company provided expert testimony for some of the nation’s biggest corporations, including S&P 500 firms. Cases sometimes involved billions of dollars in potential settlements.

“I got to work on cases involving pesticides, groundwater contamination, securities fraud, deregulation of utilities and a variety of other important issues I had studied in class, but not in such detail or from that point of view,” he says. “I had access to amazing datasets, and learned how to program databases, present quantitative findings, and write analytical reports—skills that aren’t particularly taught in economics classes.

“It wasn’t what I had imagined myself doing, but in hindsight, it turned out to be some of the most useful professional experience I ever had.”

After three years, he decided it was time to return to school for a PhD. “I still wanted to do something for the general good,” he explains, “but I now had a clearer understanding of what that meant.”

He enrolled at the University of California at Davis to study agricultural and resource economics with a focus on econometrics. It is a field in which researchers use advanced mathematical and statistical methods to design complex models that can test economic theories using observational real-world data. Part quantitative, part qualitative and eminently practical, it was an ideal match for Smith’s skills and interests.

He graduated in 2001 and joined the Nicholas School faculty later that year as assistant professor of environmental economics, later adding a secondary appointment in Duke’s Department of Economics.

In 2008, with more than 25 peer-reviewed papers and dozens of abstracts, editorials, reviews, book chapters and presentations to his credit—as well as five courses he was teaching or helping teach—he was promoted to associate professor. His work pace, at times, seemed relentless. But it didn’t compare to what was awaiting him in 2010.

WHO NEEDS SLEEP?

“Parts of 2010 and the months leading up to it are a blur,” Smith admits, laughing. “I had all these pokers in the fire—issues I’d been thinking about, and models I’d been working on for some time—and suddenly, they were all hot.”

The first of his three high-profile papers that year was published in Science on Feb. 11, though Smith wrote it while on sabbatical the previous semester. It examined the role foreign aid for sustainable fisheries could play in boosting global food security. The challenge, Smith says, was to synthesize a wealth of complicated and potentially confusing data on global markets, international aid and sustainability into a concise two-page article that policymakers would find useful and intelligible.

“There were 20 authors, each with a different expertise,” he says. “It took four months to write, and I did almost nothing else during that time.”

Lack of governance, the paper reasoned, threatens global seafood supplies and the security of more than 3 billion people who rely on fish for protein or livelihoods. In an ideal world, each country governs its own resources well and the seafood trade contributes to worldwide economic growth and food security. But that’s not the world we live in. Many imports come from countries that aren’t positioned to manage resources sustainably.

Writing on behalf of his co-authors, who included fellow Nicholas School faculty member Larry Crowder, Smith succinctly parsed the pros and cons of three possible solutions.

Import bans and tariffs could be used to punish countries that don’t meet sustainability standards, but “these are rather blunt instruments,” he argued, “and could end up hurting people who are the most vulnerable.”

Private incentives, such as eco-labeling, could raise the price of seafood and help pay for sustainable practices, but they also might backfire, causing consumers to buy less expensive options and putting foods with high nutritional value out of reach of the poorest of the poor.

A third option—earmarking more foreign aid to developing countries to
support sustainable fisheries practices, management and verification—would allow developed countries to foster food security and ecosystem health and strengthen seafood trade, without causing short-term hardships to consumers or producers.

“It offers clear advantages, though it’s not a popular idea in some policy circles” Smith says, “We don’t suggest it should replace other aid that contributes to food security, but it should be part of the mix.”

His second paper appeared in PNAS two week later. It delved into the divisive issue of marine protected reserves. Concern about dwindling fish stocks has led many scientists and conservationists to call for more no-take marine reserves in the world’s oceans. Many fishermen, however, fear the economic effects of losing access to these former fishing grounds. Smith’s analysis showed that policymakers hoping to build consensus need to address the full impacts reserves can have on fishermen, including opportunity costs, which are typically ignored.

An opportunity cost of a decision is based on the value of what’s given up to pursue it. “When a fisherman goes fishing, he forfeits the opportunity to earn income through other activities—this is his opportunity cost,” Smith explains.

Using a specially designed bioeconomic model of a limited-entry fishery, Smith and his team showed that if opportunity costs are high—that is, if there are good opportunities to earn income elsewhere—fishermen are less likely to oppose a reserve’s creation. This is especially true if they perceive long-term benefits, such as future “spillover” that would increase harvestable fish stocks in waters outside the reserve’s boundaries and boost the value of fishermen’s catch shares.

The model, which Smith developed over five years, also showed how fishermen’s responses can be affected by a variety of other factors, such as distance from port, fuel costs and market prices for fish. Intangible social factors, such as a love of the fishing lifestyle or perceived costs of a reserve on a fisherman’s community, were examined, too.

“Advocates for marine reserves often treat fishermen’s assertions about the costs with the same skepticism that fishermen view the stated benefits,” he says. “Our model shows that identifying all the costs and benefits is essential if policymakers want to build consensus and make sound decisions about where to site a marine reserve. This is especially relevant when policies are set through public stakeholder meetings that may be dominated by extreme rather than moderate representatives from all sides.”

The third leg of Smith’s scholarly Triple Crown was published in Science on Nov. 18. Written with fellow Duke faculty member Jonathan Wiener and two Norwegian colleagues, it identified flaws in the FDA approval process for transgenic farmed salmon, and suggested ways to correct them.

“That one actually came together fairly quickly,” Smith says. “In September, I sent a three-sentence e-mail to the editors at Science asking if they’d be interested in a paper. They said yes. We wrote it in a race against the clock to get it into print before the FDA period for public comment ended in November.”

The problem, Smith and his colleagues argued, was that the process FDA was using to review the salmon evaluated its safety only by comparing it to an equivalent portion of nonmodified salmon, and screening for toxins and allergens. It ignored potential health and environmental effects—good and bad—that might stem from the transgenic fish’s faster growth and less need for feed, even though these market im-

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pacts could dwarf any small differences in nutritional content.

A solution? FDA statutes should be broadened so the FDA can evaluate the salmon’s safety compared to other protein sources it might replace, such as beef, and assess whether society is better off overall with the fish on the market than without it. This would allow FDA to weigh public health impacts if increased production of the salmon leads to lower retail prices and wider consumption.

It would also allow assessment of potential ecological impacts such as pollution from farmed salmon waste or the escape of transgenic fish into the wild.

“This review process sets a precedent for future cases involving other transgenic animals intended for human consumption,” Smith says. “Our aim isn’t to advocate one way or the other about the salmon’s safety, but rather to show that it’s essential to establish a process that reviews the full portfolio of impacts to ensure FDA decisions serve society’s best interests.”

In recognition of his work in 2010, Smith won the prestigious Quality of Research Discovery Award from the Agricultural and Applied Economics Association.

“The joy of reading Marty’s work is to see the lucid explanation of a concept into policy areas where its full effects have not been considered,” says fellow fisheries economist Lee G. Anderson, Maxwell P. and Mildred H. Harrington Professor of marine science and policy at the University of Delaware.

Providing robust empirical analyses of issues such as opportunity costs or the ramifications of introducing transgenic farmed salmon “raises the concept above the abstract ... and provides a
broader basis for decision making,” Anderson says. “The reasons Marty’s papers got so much attention is that they added a new dimension to the discussion. This is great applied economic analysis.”

THE NEXT BIG CHALLENGES

With 2010 behind him, Smith is setting a slightly slower pace these days, at least on the homefront.

He has time, once again, to cook spicy Asian seafood and vegetarian dishes—his favorite—for his wife, Kathleen DuVal, a history professor at the University of North Carolina at Chapel Hill, their two sons, Quentin, 6, and Calvin, 3, and the steady stream of PhD students who frequent the family’s home near Duke’s East Campus.

“My PhD students are outstanding,” he says proudly. “My first student, Junjie Zhang, is now an assistant professor in the School of International Relations and Pacific Studies at the University of California at San Diego, which is kind of a cool tie-in to my own history since I took my first calculus class at UCSD when I was in high school. My second student, Ling Huang, is a postdoctoral fellow at the University of British Columbia Fisheries Centre. And my third student, Sathy Gopalakrishnan, just accepted a position as assistant professor in the Department of Agricultural, Environmental and Development Economics at Ohio State.”

With a little more time on his hands, Smith’s also picking up his acoustic steel-string guitar again and reacquainting himself with the self-taught repertoire of Bob Dylan songs he aims, one day, to master.

“I can barely read music—I play by ear and I like it that way because it’s a stark contrast to the analytical work I do,” he says. “It’s the same with cooking: I cook to taste, I don’t like to measure.”

In the office, however, Smith’s already taking measure of his next big challenges: How to manage whole ecosystems and not just individual fish stocks, and how to generate value from fisheries that are overfished or being rebuilt.

Many policymakers and economists believe marine reserves and catch shares are the answers. “But the reality,” he says, “is that these extremely simplistic solutions only deal with a subset of a much larger problem.”

There are two types of overfishing, he explains. There’s recruitment overfishing, in which too many fish are caught one year, depleting future stocks. And then there’s growth overfishing, where fish are caught when they’re still too small, reducing the weight of fisherman’s landings and yielding smaller profits.

Growth overfishing is by far the more common of the two, but it receives far less attention. Policy approaches like marine reserves or catch shares aren’t designed to address it, perhaps because it’s perceived as more of a problem for the fishermen than the fish.

“I’m not saying we need to discard these approaches, but we need to make them better,” Smith says with the confidence of a seasoned odds cruncher who’s honed in on his next big long shot.

“It’s not politically correct to criticize catch shares or marine protected reserves right now, but that’s where the science needs to go.”

Tim Lucas is the Nicholas School’s national media relations and marketing specialist.
Critically acclaimed American author Barbara Kingsolver is the 2011 recipient of The Duke LEAF Award for Lifetime Environmental Achievement in the Fine Arts. The Nicholas School will present the award to Kingsolver on April 9 on Duke's campus.

Kingsolver is the author of seven works of fiction as well as books of poetry, essays, and creative nonfiction. Her bestsellers include The Lacuna (winner of the 2010 Orange Prize for Fiction), The Poisonwood Bible, Animal Dreams, and The Bean Trees, and the nonfiction narrative Animal, Vegetable, Miracle: A Year of Food Life.

The award was established in 2009 to honor artists whose works have lifted the human spirit by conveying our profound spiritual and material connection to the Earth, thereby inspiring others to help forge a more sustainable life for all. Actor Robert Redford received the inaugural award.

The LEAF Award is the signature program of the Duke Art and the Environment Initiative, launched by Dean William L. Chameides in 2009 to forge stronger connections between the arts, environmental sciences and policy.

“Barbara Kingsolver’s work occupies a unique and important place in the world of literature,” says Chameides. “Her ability to interweave themes of human struggle and the search for meaning with the larger, timeless drama of life and death in the natural world, remind us that we are but one facet of a complex, and extraordinary planetary system, a system whose trajectory will ultimately determine our own fate and thus one which we must value and steward.”

It was in recognition of this, Chameides says, and for Kingsolver’s significant nonfiction contributions with environmental themes, that the executive committee of the school’s Board of Visitors selected her for the LEAF award. The committee also cited Kingsolver for her strong long-term support and advocacy for the environment.

Kingsolver’s husband and Animal, Vegetable, Miracle co-author, Steven L. Hopp, who teaches environmental studies at Emory and Henry College, will accompany her to Durham and give a talk to members of the Duke community. On April 8, Hopp will discuss “Farm to Fork: the benefits of sustainable eating” at The Refectory in Duke Divinity School along with the café’s creator and owner Laura Hall.

NEW AWARD HONORS BEST ENVIRONMENTAL FILM AT FULL FRAME DOCUMENTARY FESTIVAL

As part of its Duke Art and the Environment Initiative, the Nicholas School is sponsoring a new award in 2011 to recognize the best environmentally themed film at the Full Frame Documentary Film Festival, an annual international event dedicated to the theatrical exhibition of nonfiction cinema.

The Nicholas School of the Environment Film Award will carry a $5,000 cash prize. It will be presented annually to the film that best depicts “the challenges we face in reconciling the human drive to improve living standards and the imperative to preserve the natural environments that sustain us and the cultural heritages that define us,” says Dean William L. Chameides.

This year’s festival will take place April 14–17 in downtown Durham.

“Documentary film is a powerful medium for communicating our profound connection to the Earth in both informative and entertaining ways, as witnessed by films as diverse as Waste Land, an award winner at last year’s festival, The Cove and Up the Yangtze,” Chameides says. “We hope our award will help encourage other filmmakers to follow in their footsteps.”

Deirdre Haj, Full Frame executive director, says, “We are pleased to welcome the Nicholas School to Full Frame. Their award will support worthy films like those we highlighted last summer in our sustainability series, and further the public’s understanding of how the environment affects all of our lives.”

The festival is a program of Duke’s Center for Documentary Studies.
HOTTER NIGHTS Threaten Food Security—Rice At Risk

Production of rice, the world’s most important crop for ensuring global food security and addressing poverty, will be thwarted as temperatures increase in rice-growing areas with continued climate change, according to a study by an international team of scientists.

The research team, which included Duke researcher Jeffrey R. Vincent, found evidence that the projected temperature increases will slow the growth of rice production in Asia. Rising temperatures during the past 25 years have already cut the yield growth rate by 10 percent to 20 percent in several locations.

Published in the Proceedings of the National Academy of Sciences (August 2010), the report analyzed six years of data from 227 irrigated rice farms in six major rice-growing countries in Asia that produce more than 90 percent of the world’s rice.

“We found that as the daily minimum temperature increases, or as nights get hotter, rice yields drop,” says Jarrod Welch, lead author of the report and graduate student of economics at the University of California at San Diego.

Vincent, who is Clarence F. Korstian Professor of Forest Economics and Management at the Nicholas School, was corresponding author of the study, which is the first to assess the impact of both daily maximum and minimum temperatures on irrigated rice production in farmer-managed rice fields in tropical and subtropical regions of Asia.

The study used data collected in farmers’ fields, under real-world conditions. This is an important addition to what scientists already know from controlled experiments, Welch and Vincent stress, because—since farmers can be expected to adapt to changing conditions associated with global warming—their real-world circumstances and outcomes might differ from those in controlled experimental settings.

Around three billion people eat rice every day, and more than 60 percent of the world’s one billion poorest and undernourished people who live in Asia depend on rice as their staple food. A decline in rice production will mean more people will slip into poverty and hunger, the researchers say.

Up to a point, higher daytime temperatures can increase rice yield, but future yield losses caused by higher nighttime temperatures will likely outweigh any such gains because temperatures are rising faster at night, the study found. And if daytime temperatures get too high, they too start to restrict rice yields, causing an additional loss in production.

Welch and Vincent’s coauthors were Maximilian Auffhammer of the University of California at Berkeley; Piedad Moya and Achim Dobermann of the International Rice Research Institute; and David Dawe of the Food and Agriculture Organization of the United Nations.

New Monitoring Methods More Accurately Measure Coal Ash Impacts

As the Environmental Protection Agency weighs whether to define coal ash as hazardous waste, a study by Duke University researchers identifies new monitoring protocols and insights that can help investigators more accurately measure and predict coal ash contaminants’ ecological impacts.

“The take-away lesson is we need to change how and where we look for coal ash contaminants,” says Avner Vengosh, professor of geochemistry and water quality at the Nicholas School. “Risks to water quality and aquatic life don’t end with surface water contamination, but much of our current monitoring does.”

The study, published online in the journal Environmental Science and Technology (November 2010), documents contaminant levels in aquatic ecosystems over an 18-month period following a massive coal sludge spill in 2008 at a Tennessee Valley Authority power plant in Kingston, Tenn.

By analyzing more than 220 water samples collected over an 18-month period, the Duke team found that high concentrations of arsenic from the TVA coal ash remained in pore water—water trapped within river-bottom sediment—long after contaminant levels in surface waters dropped back below safe thresholds. Samples extracted from 10 centimeters to half a meter below the surface of sediment in downstream rivers contained arsenic levels of up to 2,000 parts per billion—well above the Environmental Protection Agency’s thresholds of 10 parts per billion for safe drinking water and 150 parts per billion for protection of aquatic life.

“It’s like cleaning your house,” Vengosh says of the finding. “Everything may look clean, but if you look under the rugs, that’s where you find the dirt.”

The potential impacts of pore water contamination extend far beyond the river bottom, he explains, because “this is where the biological food chain begins, so any bioaccumulation of toxins will start here.”

Laura Ruhl, a PhD student in Vengosh’s lab, is lead author of the study, which was funded by the National Science Foundation. Vengosh is corresponding author. Coauthors are Gary S. Dwyer, senior research scientist; Heileen Hsu-Kim, assistant professor of environmental engineering; and Amrika Deonarine, a PhD student in Hsu-Kim’s lab.
New Map Charts Diversity, Distribution and Abundance of Ocean Life

A new map developed by Duke University researchers, in partnership with the Census of Marine Life and National Geographic Maps, provides the most detailed overview yet of life in the world’s oceans.

The two-sided, poster-sized map, available online at comlmaps.org/oceanlifemap, is based on 10 years of data from the international Census of Marine Life and other scholarly sources.

The map took more than two years to plan, develop and design, and includes new data previously not available in any one document, says Patrick Halpin, associate professor of marine geospatial ecology at the Nicholas School.

“The value of this map is that it lets us see patterns of species diversity and migration in a new light, and provides a clearer picture of biological abundance, which is very hard to measure,” he says. “We see connections that couldn’t be documented before.” The hope, he says, is that the map will attract greater public attention to the census and its discoveries.

Among other things, the map identifies the regions that are home to the world’s greatest concentrations of marine biodiversity and abundance; the long-distance migration paths of key predators; the regions that have experienced the greatest impacts from human activities; and the locations of coral reefs, hydrothermal vents, seeps, seamounts and other geological features that act as “islands of high diversity and abundance,” says Halpin, whose team at Duke’s Marine Geospatial Ecology Laboratory created the document with input from census leaders.

Each side of the color-coded map illustrates a different set of related topics or themes. On the side titled “Diversity, Distribution, Abundance,” the main image tracks the long-distance migrations of 11 taxonomic groups of ecologically important predators, including sharks, sea turtles, seabirds and tuna. A smaller panel maps vertical movement in the water column—how fish and zooplankton migrate up and down, from sunlit surface waters to the murky depths, in response to changing diurnal and seasonal stimuli.

On the side of the map titled “Past, Present and Future,” the main image shows which regions of the world’s oceans are home to the greatest biodiversity of species, and which have experienced the greatest human impacts. Marine hot spots appear around the Philippines, Japan, China, Indonesia, Australia, India and Sri Lanka, South Africa, the Caribbean and the Gulf of Mexico. Biodiversity and high human impacts collide in coastal areas such as the Western Pacific and North Atlantic. A smaller map charts the abundance of seafloor life of the world’s oceans—the quantity of animals, measured as biomass, found in each region regardless of the number of species.

“While the greatest biodiversity is found in the warm waters of the tropics, the greatest abundance of life appears in high latitudes in the polar regions,” Halpin says. “So diversity and abundance have almost exactly opposite trends.”

Halpin and his team, Nicholas School research associates Jesse Cleary and Ben Donnelly, used geographical information systems technology to bring together key findings from the wealth of census and related data archived at the Ocean Biogeographic Information System (www.iobis.org), the world’s largest, publicly accessible marine species database. With more than 2,700 census contributors and thousands of related publications to draw from, they had to make tough choices.

Most of the data included on the new map would have been impossible to document 10 or 15 years ago, Halpin explains. Recent advances in satellite telemetry tracking devices, sonar, underwater cameras and microphones, autonomous reef monitoring structures, DNA barcoding to identify species, and other technologies have made it possible.
A sleek new look awaited visitors who entered the Gross Chemistry Laboratory this fall. The first floor of the building had been transformed into The Energy Hub, Duke University’s newest center for energy initiatives.

“We envision The Energy Hub serving as a crossroads for energy education, research, learning opportunities and outreach for students across campus,” says Lincoln Pratson, director of The Energy Hub and chair of the Nicholas School’s Energy and Environment track, one of eight Master of Environmental Management (MEM) degree concentrations offered at the school.

Funded by the Provost’s Office, the new $1.5 million hub will provide a place for faculty, PhDs, post-docs, and research associates across the university to engage with students interested in the energy field, and vice versa.

For resourceful students who tap into The Energy Hub’s resources, the only limitation is “imagination,” Pratson says. The Energy Hub’s focal point is a central gathering area, equipped to accommodate large or small groups and foster research and outreach collaborations, or possibly even business startups. Other major elements of the hub include classrooms, a teaching lab that will have prototype technology for different energy systems, two conference rooms and a faculty staging area.

Future resources may include an annual speaker series, workshops and an energy literature library and web database. An understanding of sustainable energy systems, renewable energy and energy efficiency-improving technologies is becoming increasingly important in the public and private sector, says Pratson, professor of energy and the environment in the Division of Earth and Ocean Sciences. Interest in the Energy and the Environment concentration has surged recently, he notes. It is now the Nicholas School’s fastest growing and largest MEM concentration.

Since last summer, Pratson has been working with Provost Peter Lange, Nicholas School Dean William Chameides and other university administrators to develop and finance a broader, universitywide energy initiative that would span all relevant disciplines and build upon Duke’s strength in interdisciplinary studies.

“We wanted to provide a cross-school educational initiative in energy and the environment,” he says. “Energy is too big a topic to be owned by any one school.”

Gross Chemistry’s central location between the Nicholas School, Fuqua School of Business, Duke School of Law, Sanford School of Public Policy, and other graduate programs made the building a particularly attractive location for the interdisciplinary hub.

To oversee the Energy Hub’s daily operations and programming, Pratson has hired Kathleen Moore MEM’09 as hub administrator. Moore is planning the Energy Hub’s official launch in April: a conference highlighting cross-campus faculty, staff and student research in any energy-related sector.

“We want this event to showcase what students and faculty are doing, and help these individuals come together and realize they’re not alone,” she says.

Final Energy Hub construction, including administrative and faculty offices, should be finished in time for the launch, Moore says. In addition, she is organizing an online Energy Hub classroom reservation system and a large computer display/energy screen slideshow displaying real-time data on campus energy usage.

Also under construction in Gross Chemistry is space for the Nicholas Institute’s Corporate Sustainability Initiative, directed by Jay Golden, and the Pratt School’s Entrepreneurship and Innovation initiative, led by university trustee Kimberly Jenkins. Moore anticipates both centers will be operational by fall.

Tawnee Milko MEM’12 is the Nicholas School’s 2010–2011 student communications assistant.
After a regional conflict, the management of natural resources is often in disarray. How can conflict-torn communities best recover?

**ERIKA WEINTHAL**

Nicholas School Associate Professor of Environmental Policy

Environmental recovery includes such issues as re-establishing the water supply and its distribution. In the aftermath of a conflict, obtaining clean, plentiful water is a daily struggle for those left behind. Urban water supply and sanitation systems are often ill-equipped to accommodate a mass influx of refugees. And the risks of dying from exposure to infectious disease linger for years owing to the lack of access to clean water and proper sanitation.

In war-ravaged countries, ranging from Sudan to Liberia to Afghanistan, the re-establishment of the water supply and its management have been vital for post-conflict peace-building and economic recovery.

Yet it turns out that with few exceptions (most notably, the Jordan-Israel Peace Treaty), water resources are rarely incorporated into peace agreements. Instead, the task of making sure that fresh water is not only available but can also be widely distributed is most often left to humanitarian organizations and international financial institutions. Peace-building activities tend to follow a now-traditional post-war script of reducing arms, disbanding the military and eventually holding elections. As a result, political concerns have taken precedence over basic environmental and natural resource management.

The challenge then is in determining how to insert environmental recovery into the post-war peace-building mission. For war-torn communities, the management of the water supply and its distribution cannot wait for political or economic stability because that stability is dependent upon this vital resource.

But the reality of improving water supply and infrastructure in post-conflict settings is extremely complicated; even the best-intended humanitarian efforts may end up undermining economic recovery in the absence of coordination with the local population.

For example, consider Afghanistan in the years after the Soviet-Afghanistan war. During the war Soviet troops destroyed much of Afghanistan’s traditional, community-based irrigation systems (the *karez*) as a means to decimate the economy. By the 2000s, the management of the water supply was in disarray, water experts had fled or been killed, and data regarding the quality of water resources was missing. Humanitarian efforts to provide an emergency water supply through deep well drilling undercut the *karez* system further, making the situation even worse.

Therefore, for water management to effectively play a role in the rebuilding of states at war’s end, political efforts must be matched by efforts both to fully understand prior ways that water has been distributed and to incorporate the public in decisions regarding natural resources.

In the end, environmental recovery is a significant part of any post-war peace-building effort. Issues such as water management can serve as a platform for cooperation and the consolidation of peace by helping to build confidence and restore trust among previously warring parties.
STATISTICALLY speaking

How so?
The year 2010 saw its share of record-breaking deluges with the wettest regions including most of Central America, much of India, southwestern China, eastern Asia, Borneo, and parts of Australia. Here are just some of the year’s most extreme events:

- The worst flooding in Pakistan since 1929;
- Germany’s wettest August since 1901;
- The worst flooding in southwestern France since 1827;
- The worst flooding in Israel, Egypt and Kenya in more than a decade;
- Mexico’s wettest July since 1941;
- Australia’s wettest spring since record-keeping began in 1900, and its third wettest year on record.

2011 Off to an Inauspicious Start with Massive Floods

Australia – As 2011 took off, Australia’s wet December—as news images have shown in graphic detail—engulfed large parts of Queensland, wreaking havoc for thousands of Australians.

Brazil – While nothing’s strange about flooding in Brazil’s summer rainy season, the intensity of this year’s storms is above the norm. Climatempo’s Fabiana Weykamp calls the amount of rainfall in some places “absurd.”

Africa – Floodwaters have also hit several countries across southern Africa including Zimbabwe, South Africa, Botswana and Zambia.

Statistics courtesy of Dean William L. Chameides’ blog, The Green Grok, thegreengrok.com

Nicholas School Mourns Loss of Recent Graduate Chris Beauvais

Recent Duke University graduate Chris Beauvais MEM/MF’10 died on Saturday, Feb. 19, from injuries sustained in a motorcycle accident.

Nicholas School Dean William L. Chameides says, “Our thoughts and deepest sympathies go out to Chris’ parents, Daniel and Susan Beauvais of Kitty Hawk, N.C., and to all who join us in mourning his untimely passing and celebrating his remarkable gifts.”

Beauvais graduated in December 2010 with dual Master of Environmental Management (MEM) and Master of Forestry (MF) degrees from Duke’s Nicholas School. He was chair and treasurer of the Duke Chapter of the Society of American Foresters and chapter president of the Student Association for Fire Ecology. His Master’s Project, “An Analysis of Post-clearcut Coast Woody Debris in Intensively Managed Forests,” was completed under the direction of Daniel D. Richter, professor of soils and forest ecology.

Following graduation, Beauvais started his own consulting firm on sustainable forest resource management and biomass energy, and already had laid the foundation for it becoming a vital and successful business.

He previously earned a Bachelor of Arts degree in environmental studies and experiential education from Brevard College, and graduated from William G. Enloe Magnet High School in Raleigh.

An avid outdoors enthusiast, Beauvais completed the 2,000-mile Appalachian Trail, which he considered one of the major accomplishments of his life.
Should We Roll Back Environmental Regulations?

by William L. Chameides

2010 marked the U.S. Environmental Protection Agency’s 40th year. But lots of folks are not celebrating; they’re attacking.

In its 40 years, the EPA has accomplished a lot. Under the auspices of the Clean Water and Clean Air Acts, the EPA has overseen a stunning improvement in the quality of our water and air, and in the process saved lives and improved our quality of life and, as detailed below, boosted our economic vitality.

Despite this progress, EPA finds itself under a concerted attack these days. One former Speaker of the House has gone so far as to call for the dissolution of the agency. While in 2008 and early 2009 there appeared to be a general consensus that the lack of adequate regulations had plunged us into economic hot water, in 2011 the word “regulation” has suddenly become a dirty word: shorthand for big, bad government.

Toward that end congressional leaders have compiled wish lists of regulations (many from EPA) that industry would like stricken from the federal code. Even the President has talked of rolling back regulations. Op-eds abound deploring overregulation by EPA and foretelling of dire consequences if EPA goes ahead with new standards and regulations on known toxicants like mercury, coal ash and the like. Do we need these new regulations? Before you answer, perhaps you should ask the folks in Kingston, Tenn., where more than a billion gallons of toxic sludge spilled into their backyards, or consider that all 50 states in the United States have issued advisories against the consumption of fish because of mercury contamination in selected lakes and rivers and 35 have statewide advisories.

And there is of course, the chorus of climate skeptics characterizing EPA’s development of new rules and regulations for the emission of heat-trapping greenhouse gases as an unconstitutional “power grab.” Such characterizations conveniently ignore the fact that the Supreme Court ruled in 2007 that EPA has a responsibility to regulate such emissions under the Clean Air Act.

So what’s at the heart of these attacks? It’s “the economy stupid.” The same old argument you’ve heard before that economic vitality and environmental health are incompatible. We need jobs, we need economic growth, the argument goes, and so we are going to have to sacrifice the environment, and more specifically the EPA.

But that argument has long since been discredited. Many economists will tell you that the choice between economics or the environment is a false choice. The services we get from the environment, like clean water, food and fiber, are fundamental to our well-being, including our economic well-being. We sacrifice them at our long-term economic peril.

A case in point: The economic benefits of EPA’s enforcement of the Clean Air Act this past year alone are estimated at about $1.3 trillion. How can that be? Because less pollution means a healthier citizenry and that makes for a more productive workforce. Less pollution also means healthier ecosystems that yield cleaner water for drinking and more productive farms and forests. History has shown that these benefits far outweigh the costs of compliance. And in a free market system like ours, once the government sets the environmental ground rules for companies to compete, entrepreneurs quickly innovate to lower the costs of compliance even more.

We live in hard economic times. Some would use this as an opportunity to turn the clock back, to roll back the environmental gains EPA has reaped for all Americans over the past four decades. So yes, “it’s the economy, stupid.” But I think Americans are a lot smarter than these folks give us credit for. Happy 40th, EPA.

William L. Chameides is dean of the Nicholas School and Nicholas Professor of the Environment.
IN SEPTEMBER 2009, as historic flooding swamped the Southeast for the third straight day, Wenhong Li sat transfixed at her computer in her new office at Duke University, reading online news reports of the widespread devastation. More than 15 inches had fallen in less than 72 hours across much of the region. Soil already saturated from months of wetter-than-normal weather could hold no more. Rivers poured over their banks, inundating roads, homes and bridges. Neighborhoods, farms and cities were awash in several feet of brown, murky water. Nine people had drowned or been swept away.

Two summers earlier, many of the same streams and rivers that now were raging torrents had been reduced to trickles by a historic drought—the region’s worst in nearly 100 years, but its third severe drought in less than a decade.

Like most residents of the weather-weary region, Li wondered what on Earth was up.
“During the 2007 drought, I was living in Atlanta, working as an atmospheric scientist at Georgia Tech,” she recalls. “It got so bad, Florida and Georgia were preparing to go to court to fight over water rights in lakes that straddled their borders. Gov. Sonny Perdue asked the people of Georgia to pray for rain.

“We were seeing increasingly extreme summer precipitation patterns—dry year, wet year, dry year. Drought or deluge,” says Li, who joined the Nicholas School faculty as assistant professor of earth and ocean sciences in spring 2009.

“Everyone had a theory why, but no one seemed to know for sure.”

The most recent data from the United Nation’s Intergovernmental Panel on Climate Change (IPCC) showed no significant trends in rainfall for the Southeast, but Li, who has a PhD in atmospheric sciences and bachelor and master degrees in meteorology, felt sure there had to be an unknown mechanism at work, “something that was driving the region’s summer precipitation trends, causing these extremes,” she says.

Aided by a team of other climate scientists, and armed with decades of U.S. and European weather and climate data and a powerful new cluster of computers acquired shortly after arriving at Duke, Li set out to identify the unknown mechanism and, if possible, learn how to predict it.

She published her team’s results in a groundbreaking paper in the fall of 2010 in the Journal of Climate. The paper identified significant but previously undetected changes in the weather-making high pressure system known as the Bermuda High as the main cause of the summer rainfall variability. It also strongly linked the changes to humanmade global warming.

It was a big undertaking for such a new faculty member. But since her childhood days as a math and science standout at some of Beijing’s most fiercely competitive schools, Li has never felt a little hard work get in her way.

“My mother is a teacher and my father is a chemical engineer, so education was very important in our house. You didn’t want to bring home a bad report card,” she recalls with a laugh.

Her parents expected a lot of their slight, soft-spoken daughter, but they also inspired her. Because Li was good at math and enjoyed figuring out how things work, she decided to follow in her father’s footsteps and become an engineer. When she visited the Chinese Meteorological Center on a high school field trip, however, her career plans took a different track.

“I put on a white jacket and entered the supercomputer room, and that was it—I was hooked,” she remembers. “It really amazed me, the idea of using all those computers to simulate and predict weather. I thought, ‘This is the career I want!’”

After graduating from high school, Li entered Peking University and majored in meteorology. Four years later, in 1989, she graduated in the top two percent of her class there, and earned the right to be admitted to the Chinese graduate school of her choice without taking admissions exams. She chose the top-rated Chinese Academy of Meteorological Sciences, also in Beijing.

At the Chinese Academy, Li threw herself into her studies. She put in long hours in the lab and library to learn everything she could about tropical precipitation and typhoons, and how to use models to simulate their intensity and movement. After earning her master’s degree in 1992, she stayed on at the academy for three more years as a research scientist, with a side trip to the Bureau of Meteorology Research Center in Melbourne, Australia, as a visiting scientist.

By 1997, Li’s field of interest had broadened to include climate and cli-
mate change. She left China to attend the University of Arizona, where she planned to do her doctoral research on links between global warming and monsoon circulation in the Amazon. It was a topic that had parallels to the research on tropical storms and precipitation she had done in China, but was far less understood.

“A lot of people had studied monsoon circulations in Asia and North America, but very few knew South America had one too,” she says. By applying her research and modeling expertise on tropical precipitation to the topic, she hoped to help answer the question of whether the Amazon—home to 30 percent of the Earth’s species and the second largest heating source in the tropics—would become a carbon sink or source if global warming continued in coming years.

Precipitation is the critical factor in determining if a rainforest dies back and converts from a carbon sink into a source,” she explains, “Climate models showed that if warming continues, the Amazon will respond very strongly. An increased dry tendency becomes likely, and significant changes in vegetation could occur as the rainforest dies back.”

Midway through her studies, Li left the University of Arizona to follow her doctoral advisor to a new faculty post in the Department of Atmospheric Sciences at Georgia Tech.

She graduated from Georgia Tech in 2003, and stayed on as a research scientist another six years to continue her work on the Amazon. But by 2007—as the drought-stricken landscape of Georgia withered around her—she found herself wondering more and more about what could be causing the increasingly variable summer precipitation in her own backyard.

When the historic floods of 2009 hit, Li, now a faculty member at Duke, knew it was time to look into the matter.

“First we investigated the usual meteorological suspects: sea surface temperatures, soil moisture, hurricane activity and other factors that are known to have impacts on summer precipitation in the Southeast,” Li says. “None seemed to play the central role.”

A search of the scientific literature turned up a more promising lead: a previously overlooked paper that suggested the North Atlantic Subtropical High (NASH) might be the culprit Li was looking for.

The NASH, or Bermuda High, is a powerful high-pressure system that forms in the vicinity of Bermuda each summer and often acts as a heat pump, drawing warm and humid air up the East Coast. Scientists have long known the system’s powerful surface center helps steer the tracks of Atlantic hurricanes and plays a major role in shaping weather in the eastern United States, Western Europe and northwestern Africa.

The idea that the NASH might also play a role in summer rainfall variability in the Southeast hadn’t received much scientific notice, Li says, because “most people thought of the NASH as a constant—a system that developed each summer in pretty much the same area and didn’t change much over time. When you’re trying to explain variability, you don’t naturally think to look at a constant as its cause.”

But when she and her team started analyzing six decades of precipitation, humidity and wind observations, along with data on the height of pressure surfaces aloft, they made a startling discovery: Far from being a constant, the system had intensified significantly over a 60-year period from 1948 to 2007. Its center had grown by 0.9 geopotential meters a decade on average. (Geopotential meters are used to measure how high above sea level a pressure system extends; the greater the height, the greater the system’s intensity.)

The team’s analysis also showed
that as the NASH intensified, its area enlarged, bringing the system’s weather-making western ridge closer to the continental United States by 1.22 longitudinal degrees a decade.

“Once we found the trend, we realized the NASH’s movement was the driver we’d been looking for. As it intensified and moved westward, its impact on summer rainfall in the Southeast states grew stronger,” Li says.

Further analysis yielded a third tantalizing finding: The NASH’s meridional variation, or north-south movement, had grown more pronounced from 1978 to 2007, a period when the frequency of extreme rainfall variability in the Southeast had more than doubled over the previous 30 years. Six of the summers—defined for the purpose of Li’s study as the months of June, July and August—had been abnormally wet, while five were abnormally dry.

The link between the NASH and extreme summer rainfall variability was looking more and more promising, but several big pieces of the puzzle remained.

“We had to be able to show why some years the NASH’s movement caused more rain, and other years less,” Li says.

“Also, what was causing the system’s intensification and migration? And was there some way to predict it?”

The first piece fell into place when her team charted the annual paths of the NASH’s migration and compared them to the corresponding summer precipitation records. They found that when the NASH’s westward movement jogs a little to the north, the likelihood increases for more extreme dry weather in the Southeast that summer. If the NASH wobbles a little to the south, extreme wet weather becomes more likely.

To answer the second and third questions, the researchers thoroughly investigated possible natural causes, including the Atlantic Multivariate Oscillation and the Pacific Decadal Oscillation, which scientists have long known may affect high-pressure systems. They found no links.

“Our analysis shows this is not a natural variation like El Niño,” Li says.

“Instead, it strongly suggests that the changes in the NASH are mainly due to shifting atmospheric steering currents linked to anthropogenic warming. Our models predict the NASH will continue to intensify and expand as concentration of carbon dioxide and other greenhouse gases increase in Earth’s atmosphere. This intensification will further increase the likelihood of extreme summer precipitation variability in southeastern states in coming decades.”

Li and her team’s findings offer vital guidance for scientists, policymakers and everyday citizens, says Robert E. Dickinson, professor of geological sciences at the University of Texas at Austin and a member of both the National Academy of Sciences and the National Academy of Engineering.

“By application of a standard attribution methodology, Wenhong and her colleagues find this change is a result of global climate change and so should further amplify the occurrence of droughts in this region. Wenhong earlier studied seasonal precipitation in the Amazon with a similar conclusion,” Dickinson says. “Warnings that these regions will have strong droughts in the future, if heed, should provide time for their citizens to take adaptive measures to mitigate the risk.”

For her next study, Li plans to explore more fully how the NASH’s north-south wiggles affect rainfall, and what causes the wiggles.

“We think maybe the northwest wiggles are related to the PDO, or Pacific Decadal Oscillation, and the southwest wiggles are related to the NASH’s center of intensification,” she explains. “If this is true, we can use PDO and NASH indices to determine long-term climate predictions for summer rainfall.”

“IT FASCINATES ME TO LEARN WHY SOME PEOPLE DON’T BELIEVE IN CLIMATE CHANGE. I HOPE MY SCIENCE WILL, IN SOME WAY, HELP TO CHANGE THEIR MINDS.”
Down the road, she aims to extend the study to include the peak months of the North Atlantic hurricane season—particularly September through mid-October—and see what effects the NASH’s intensification has on storm tracks. She’d also like to resume her Amazon research, working with fellow Nicholas School faculty members to learn more about how global warming and other human activities influence climate variability in the tropics.

When she’s not juggling her research or teaching duties, Li enjoys playing tennis, “although I’m not very good at it,” and spending time with her husband, John Liu, and their 14-year-old daughter, Alice. She also enjoys reading books about climate change, and surfing online weather stories and data on Weather.com.

“I’m a little bit of a geek, maybe,” she says with a smile. “To me, studying climate and weather is fun! I want to learn as much as I can so I can figure out a way to answer climate skeptics. It fascinates me to learn why some people don’t believe in climate change. I hope my science will, in some way, help to change their minds.”

Tim Lucas is the Nicholas School’s national media relations and marketing specialist.
CAMPUS FARM: STUDENTS BRING PROJECT OUT OF THE CLASSROOM TO PUT IT ON THE TABLE AT DUKE

By Tawnee Milko MEM’12

On a sunny November day, more than 40 members of the Duke University community armed themselves with shovels and rakes and gathered at a one-acre overturned patch of earth in a Duke Forest meadow. Although many were novices to the farming business, they would launch—over the course of the next several hours—a new venture sown in a classroom that could eventually put student-grown food on Duke’s dining hall tables.

Photos courtesy of Campus Farm participants
The crisp afternoon marked the inaugural workday on the Duke Campus Farm, a multiyear undertaking to develop a fully educational farming facility off Friends School Road. Although primarily a Duke student-driven initiative, the project has also attracted the involvement and support of Duke faculty and staff, University of North Carolina students interested in sustainable agriculture, and multiple Duke organizations.

“I think it’s good for my generation to know where food comes from and not just eat it without knowing the hard work that goes into it—and from today, I know it’s hard work,” says Nina Rodriguez T’11, one of the farm’s student founders who participated in the workday.

The idea for a campus farm took root last spring in Charlotte Clark’s undergraduate Nicholas School course, ENV 171, Food and Energy, which explores the relationship between the entire food system, energy and climate change. At the heart of the class is a capstone research project that investigates a variety of client-based questions, says Clark, T’79, MEM ’83, PhD’07, Nicholas School visiting professor.

Last year, Jim Wulforst, director of dining services, and Mark Hough, campus landscape architect, asked the class to investigate whether it would be feasible for Duke to have a campus farm.

“We found that, yes, it would be feasible,” says Emily Sloss T ’10, another member of the original five-student class team who consulted with Duke Forest Resource Manager Judson Edeburn about a possible location for the farm.

“So we decided, ‘Why don’t we make it happen?’”

Over the course of a year, rallying under the motto, “one year, one acre,” 10 students formed the project’s core leadership, collaborating with Sustainable Duke in the Office of the Executive Vice President to hire Sloss part-time as the farm’s project manager.

Bon Appétit, the food management company at Duke that oversees several on-campus eateries, already has agreed to purchase and use the farm’s produce in East Campus’ Marketplace and West Campus’ Great Hall, and will provide signage indicating any dishes with farm-grown ingredients.

Sloss plans to work with the Bon Appétit chefs to determine what the new farmers should plant for their first crop this spring. The farm team has opted out of applying for an official organic certification, citing hefty fees, but wants to grow their produce as naturally as possible, without using pesticides and oil-based fertilizers, says Sloss.

Validating the budding farm’s importance to the Duke community, the Office of the Executive Vice President, in conjunction with Sustainable Duke, awarded the farm two major grants in late January. The farm received $14,709 through the student-run Students Taking an Active Role in Sustainability (STARS) to cover one year’s capital and operating costs, and approximately $2,600 from the Green Grant Fund to support a “farm mentor” position with local farmer Doug Jones during the spring and summer, said Casey Roe, Outreach Coordinator for Sustainable Duke.

The Robertson Scholars, a joint program with Duke and UNC-Chapel Hill, was the first organization to commit grant money to the project, providing $1,000 for the November 2010 farm workday.

The farm is poised to offer a crop of opportunities for students across the Triangle area. It will be an ideal place for students to conduct internships and masters projects, said Clark, who is on the farm’s board of advisors.

Michael Bernert, Pratt ’12, a Robertson Scholar who helped develop the farm’s business plan, notes that the farm is located halfway between Duke and UNC-Chapel Hill. “There’s a huge opportunity for collaboration between the two schools,” he says.

The farm will host several volunteer workdays over the coming months for any interested Duke and UNC-Chapel Hill students, faculty and staff. It plans to collaborate with multiple student organizations, including Duke Community Garden, the Apiary Club, and Farmhand, the Nicholas School graduate student organization.

“We see the Campus Farm as the locus of Dukewide interest in the environmental, social and health aspects of food,” said Tina Praprotnik JD/ MEM’13, and Monica La MEM’11, Farmhand co-presidents. “On one hand, Farmhanders can bring to the project their hands-on experience with local farms; on the other, we could use the farm to educate our volunteers so we can better help local farmers.”

The sustainable agriculture movement has become especially popular among students and educational facilities in the Triangle area.

“Food has a huge impact on climate change,” says Clark. With food’s often-costly energy pathways from sowing to serving, consumers’ food choices can have a significant impact on environmental problems ranging from water pollution to greenhouse gas emissions.

Clark’s Spring 2011 Food and Energy class, now in its fourth year, will see Emily Sloss and the Duke Campus Farm again—as clients. This year’s goal: Develop a marketing plan for the farm to inspire participation that is not only impassioned, but sustainable.

The class is one of multiple food-based courses offered across campus, including ENV 298-104, Agriculture and Sustainability, a graduate class taught this spring by Chantal Reid, assistant professor of the practice and biology. But Sloss would like to see a more formalized system in place.

“In the long run, our vision is to have a sustainable food program—an umbrella program where we can have a clearinghouse for people to go find resources and build community.”

Tawnee Milko MEM’12 is the Nicholas School’s 2010–2011 student communications assistant.
Four students at Duke University’s Nicholas School traveled to Costa Rica last summer to conduct research for a fully funded, client-centered group masters project investigating the health of a 32-acre red and black mangrove forest.

Client-centered group masters projects are a new initiative being offered at the Nicholas School (see story page 25).

Derek Fedak, Nina Rodriguez, Adam Spitzig and Marie Windstein spent seven weeks immersed in research and planning at the Flamingo Beach Resort and Spa in the Guanacaste region of northwestern Costa Rica. They will present their results at the school’s Masters Project Symposium April 14–15.

Red and black mangroves comprise two of the four mangrove plant families found along the Costa Rican coast. Mangrove forests are an ecosystem valued for the complex and often underappreciated habitat they provide for developing marine and estuarine species, says the students’ advisor, Curt Richardson, director of the Duke University Wetland Center and professor of resource ecology. Mangroves also are credited with protecting coastal areas from erosion and other wave action.

The four Nicholas School students worked toward two objectives: conducting a general ecological assessment of a mangrove forest adjacent to the Flamingo Beach Resort, and securing a Costa Rican government-issued Certification in Sustainable Tourism for the resort. Documenting that the mangroves were largely unpolluted was critical to help validate the resort’s low impact on the surrounding environment.

Rodriguez’s parents Pam and Carlos Rodriguez own the resort and provided a grant that covered the project’s costs, including transportation, housing, room and board and a stipend.

The Rodriguezes also wanted to explore the option of creating an educational boardwalk through the mangroves to help locals and visitors learn more about the importance of mangrove systems.

“This was a really good example of individuals who could tap into the resources of the Nicholas School and have it benefit both their business and the student academic experience,” said Karen Kirchof, assistant dean of Career Services.

While Spitzig and Rodriguez tackled the ecocertification paperwork, Fedak and Windstein spent many muddy days in the forest mapping the mangrove system, measuring geochemistry and water quality levels and monitoring vegetation and wildlife.

The team tried to engage the community in their work as much as possible, Fedak said. They organized a community clean-up, amassing more than 60 bags of trash around the forest’s edges. He and Windstein also gave a lecture on their research to local middle and high school students, who were so interested in learning about the mangrove system that they offered to conduct additional field projects on the mangroves once the Duke team’s work concluded.

“It’s reassuring to know we left the mangroves in their hands,” said Fedak. Feet now out of the Flamingo Beach mangrove forest mud and planted firmly on North Carolinian soil, the team has been busy running analyses on their data, which they hope will confirm scientifically the mangrove’s visible ap-
appearance of health. More paperwork also must be processed and submitted to help the resort earn a Certification in Sustainable Tourism, Fedak says.

Richardson anticipates that one of the key outcomes of the project will be “showing that in fact this is a wonderful mangrove, that it’s ecologically very rich in diversity, and that it’s an excellent resource for the bay community.”

Fedak is pursuing his Master of Environmental (MEM) degree in Ecosystem Science and Conservation. Windstein is pursuing hers in Global Environmental Change. Spitzig is pursuing concurrent MEM and Juris Doctor degrees; his MEM concentration is Ecosystem Science and Conservation. Rodriguez is an undergraduate at Duke who is pursuing a degree in Environmental Sciences and Policy. She is earning independent study credits for her part in the project.

Tawnee Milko MEM’12 is the Nicholas School’s 2010–2011 student communications assistant.

NEW CLIENT-CENTERED GROUP MASTERS PROJECT PROGRAM TAKES OFF

The Flamingo Beach mangrove project in Costa Rica (See Story, Page 24) provides an excellent example of a new initiative at the Nicholas School: the client-centered Group Masters Project program.

Charlotte Clark, the program’s coordinator and visiting assistant professor, works with a wide variety of interested clients in the public, private and nonprofit sectors to organize group project options. A committee of students and faculty ultimately approves the projects. First-year professional masters students can begin to apply to the projects each January. Assigned groups typically consist of three to five students from one or more program areas.

“This type of project will give students the collaborative, real-world experiences for which future employers are looking,” says Clark. Until this year, all masters projects—a requirement of graduation—were conducted individually.

The new program offered 16 group masters projects to some 48 students for the first time last spring in addition to the Costa Rica project, which was developed through the Nicholas School’s Career Services office. Most of these will be finished and presented during the school’s Masters Project Symposium April 14–15, with one scheduled for presentation in December. The growing program offered 20 projects for students to choose from in 2011–2012.

Masters students initially meet with their clients during the spring of their first year, but aren’t expected to begin work on the bulk of the group MP until the fall of their second year. Clark says this will let students concentrate on their internships during the summer, not MPs, though some client-centered group MPs may present summer internship opportunities.

Derek Fedak MEM’11, who is one of four students who conducted one of the first group MPs at the Flamingo Beach Resort in Costa Rica, says he hadn’t originally considered a client-centered group MP, but became excited when he saw how well the mangrove project would fit with his interests and professional goals.

“As long as you keep your client’s needs in mind, you can find ways to guide the project in directions you’re interested in,” he says. “It gave me many of the experiences I’ve been wanting to have.”

For more information on client-centered group MPs, go to nicholas.duke.edu/clientmps or contact Clark at cclark@duke.edu.

— Tawnee Milko MEM’12
POWERSWITCH: ALUM BREWSTER TRANSFORMING HOW WE USE ENERGY

by Erica Rowell

Photos by Judy Rolfe
FORGET ABOUT BUILDING IT. IF YOU DON’T BUILD IT, THEY WILL COME—AND WHISK YOUR ENERGY NEEDS TOWARD THE SMART-GRID FUTURE.

The “it” is a new power plant. And the “they” refers to David Brewster MEM’98 and EnerNOC, short for Energy Network Operations Center, a firm in the business of selling negawatts (instead of megawatts) to utilities.

“With a push of a button from our network operations center, we can reduce unnecessary consumption,” says Brewster, who co-founded the company in 2001. “That ability to actually control demand on the network creates a dispatchable resource that creates a lot more efficiency in the market.”

A quick visit to a stormy Thursday in the Northeast provides a real-world example. On June 24, 2010, amid powerful thunderstorms ravaging Maine and New Hampshire and a tornado ripping through Bridgeport, Conn., two major power plants failed. Grid operators signaled Brewster’s team, and EnerNOC’s control room kicked into gear, sending electricity reduction orders to area customers. In response, hundreds of sites tripped the switch on their reduction plans, dimming lighting, shutting down processing lines, tweaking HVAC settings and so forth.

In all, 380 megawatts of electricity were collectively pulled off the grid for two and a half hours. The wattage delivery, in the words of EnerNOC co-founder Tim Healy, was “the equivalent capacity of roughly three peaking power plants.”

It’s an innovative solution to one of our biggest energy problems—namely, the need to build more power plants to accommodate our ever-growing appetite for energy. Instead of tapping up backup plants when demand for electricity outstrips supply, utilities tap EnerNOC, whose customer sites cut nonessential electricity usage on demand.

While a price-based version of this system has been around for decades (interruptible tariffs allow utilities to incentivize customers by offering lower rates for reductions during peak-demand times), that less technological practice does not guarantee affordable real-time data communication or adequate automation to allow for smooth curtailment. EnerNOC’s technology-based solution does—while delivering a suite of complementary energy-management tools for even more reductions and added pollution cuts.

It’s nothing short of a quiet energy revolution.

THE VIRTUAL POWER PLANT

For all the high-tech, 21st-century tools EnerNOC employs to update an aging electricity delivery system designed for the 20th century, the company’s big hurdles are more psychological—one might even say evangelical—than technological. In turning on its head the way the industry has worked for more than a century, EnerNOC’s main challenge, says Brewster, is persuading utilities it’s a viable resource.

“Our heavy lift is getting utilities to agree to do this,” he says, “and getting regulators—the public service commissions, the public utility commissions in each state—to actually pay for it.”

That challenge is diminishing over time, thanks to a proven track record and mounting success stories. A customer base of about 100 grid operators and utilities that spans three countries (the United States, Canada and England) doesn’t hurt either, especially when it includes such heavy hitters as ISO New England, New York ISO and PJM Interconnection, as well as Pacific Gas and Electric Company, Salt River Project and Southern California Edison Company.

Last year EnerNOC signed its biggest industry contract ever with the Tennessee Valley Authority.

“Most people look at TVA as a pretty risk-averse, low-cost electricity territory, so I think it raised a lot of eyebrows when the industry saw TVA sign a 560-megawatt contract with EnerNOC to deploy demand response,” said Brewster.

If signing up utilities can be challenging, finding end-user sites is a “no-brainer.” The reason is simple: the utilities pay EnerNOC to be a resource and to reduce demand, and EnerNOC shares those payments with its endusers.

When signing up those endusers, EnerNOC looks for industrial, commercial and institutional heavyweights who typically draw a lot of energy. Simulating a power plant and building capacity require a lot of negawatts. And so size is the common denominator among its diverse list of customers who include well-known brands (AT&T, General Electric, Pfizer, Albertson’s, Shop Rite, Stop & Shop), hospitals (Stamford Hospital, Greenwich Hospital, UMass Memorial Health Care), universities (University of San Diego), and governments (Maine, Vermont, Boston, Connecticut), among many others. Take Connecticut’s heft, for example. The state’s 700 megawatts of demand response capacity within a 7,000-megawatt system peak mean that within minutes of notice, about 10 percent of the system’s demand can be made to disappear.

Paying end-users to be smarter about electricity use while helping them save on energy costs is a big selling point for EnerNOC, Brewster says, but the benefits do not stop there.

UNLOCKING A POWERFUL DATA STREAM

EnerNOC’s home page keeps a running tally of the dollars it has helped its customers save. At the time this magazine went to print, those savings altogether had reached $320 million and counting. Demand response is responsible for a big chunk of those savings, and what allows for the rest is the technology behind demand response.

That technology, the EnerNOC Site Server, is housed in an unassuming cabinet at the customer’s site that easily blends into boxes typical of an electric room. But the information it holds is anything but typical of what’s available
to the average American corporation. The box is the gateway connection between the site’s energy resources and EnerNOC; it reads and records a host of detailed energy information, from voltage and current to power levels and power quality, and sends all that data to EnerNOC’s control room, where, says Brewster, “our special sauce is located—the software to manage thousands of distributed energy resources and to do it in a centralized, secure fashion.”

While the software allows for near-instantaneous, sometimes even automated energy curtailment, its powerful data stream unlocks a world of information to end-users. Suddenly, says Brewster, these sophisticated commercial office properties, industrial facilities and universities, who are used to getting their bills 30 days after the fact and not understanding the line items on them, are seeing real-time energy data. They can log in and see minute by minute exactly how much energy they’re consuming, why and where. And that can be ground-shifting.

Says Brewster, “That then opens their eyes to, ‘hey, why am I getting a peak demand at 6:00 in the morning? It’s because I come in and turn on all my chillers at the same time. Or how much is this actually costing me. Or, you know what, I’m finding out that our chess club is coming into this building and turning on the lights and then leaving them running, and so we’re wasting all this electricity.’ So we start driving energy efficiency and getting customers much more attuned about how they consume electricity.”

With this valuable data in hand, EnerNOC can then work with their customers to reduce energy consumption all the time (not just during peak periods), to monitor and start reducing greenhouse gas emissions and to help them consider and go about procuring renewables.

“Our vision is to be not a one-trick pony,” says Brewster. “Our trick is to become an overall total energy management partner for these commercial and industrial facilities, so we’re helping them think about all their energy decision-making.”

PAVING THE WAY TO A CLEAN ENERGY FUTURE

Brewster has seen the future of energy and it is clean and bright. It is monitored and metered. It is dispatchable and digital. It is interconnected and smart. It is slowly starting to roll out.

“In the smart grid,” says Brewster, “there’s going to be the infrastructure layer, all these meters and the copper and the sensors. And then there’s going to be the application layers, the analytics driving energy efficiency with the data. And we are very much in the application layer.”

EnerNOC is to the smart grid what applications like eBay, Google and Yahoo are to the hardware network of switches and routers and fiber known as the Internet.

It’s not a far cry from what Brewster and Healy originally had in mind but it’s a different model.

“Our initial vision was that we were going to build the data communications network to link together all these distributed generation assets, these fuel cells and micro-turbines, and we were going to do the remote diagnostics and the metering and verification work,” says Brewster, who adds that in that vision, the customer would have had to pay them.

“On further investigation over the course of a year or so, we came upon the concept of demand response,” Brewster continues, explaining, “We could do everything we were thinking of doing, but we could do it behind a meter. We didn’t need to interconnect to the grid, we could actually not only use distributed generation, but we could actually do curtailment of demand, energy efficiency, and get paid as if we were selling power back to the grid.”

Before building his virtual power plant, Brewster studied the economics and policy of energy at Duke’s Nicholas School — a “great building block” for his work now, he says, in which a core focus is government and regulatory affairs. (Brewster is now a member of the Nicholas School’s Board of Visitors.)

“I think Duke is just so well positioned for building energy leaders of the future,” he says, “because it has such good undergraduate and graduate programs in the environment, in business, in policy and also in engineering, which are sort of the four pillars of the industry. And there’s such good cross-pollination and ability to take classes across those institutions."

Brewster, who as EnerNOC’s president approaches the business from an environmental angle, met CEO Healy, whose approach is more entrepreneurial, at Dartmouth’s Tuck School, where they both received their MBA.

In the decade since the two men took their company from a limited liability company to a corporation traded on the NASDAQ, Brewster and Healy have built up a network of some 8,000 sites and a demand capacity of five gigawatts—the equivalent of several large nuclear power stations.

The idea, says Brewster, is to keep growing their network of virtual power plants—adding more megawatts to the grid, cutting costs and reducing emissions, and ultimately fashioning, he hopes, the “killer app“ of the smart grid.

Erica Rowell is managing editor of Dean Chameides’ blog, TheGreenGrok.com. She is based in New York City.
EDIBLE REX:
TWO POSTDOCS WORK TO SEED A RURAL COUNTY WITH LOCAL FOOD

Photos by Les Todd

CARLA NORWOOD AND GABRIEL CUMMINGS
Two years after four San Francisco women put it on the etymological map, the Oxford English Dictionary declared “locavore” the 2007 Word of the Year, helping to grow the idea of a diet based on locally grown food. Now, two postdoctoral fellows at the Nicholas School—Carla Norwood T’96, MEM’01, and Gabriel Cumming—are working to put locavore on the North Carolina map by seeding the trend into northeastern Warren County, the place that gave rise to the environmental justice movement.

“We are trying to figure out ways small farms can sustainably manage their resources and provide good healthy food to both residents in poorer rural communities as well as residents in more affluent areas,” says Norwood. Through their project, called “Growing Local/Buying Local,” the researchers are exploring the possibilities of linking up small farmers with local markets to inject new life into a long-depressed economy and bring healthier food to the region. Part of their goal is to stretch the locavore movement beyond its typically wealthy boundaries.

One piece of this effort would enable women receiving federally funded food vouchers to purchase bundles of fresh, locally grown produce priced to match the vouchers’ value. The idea grew out of an interview with a grocery store manager who’d observed that people using these subsides often buy less produce than they can for fear of having to pay out of pocket. This subproject, which is a partnership with UNC’s Center for Health Promotion and Disease Prevention, is contingent on funding.

“Healthful food should not be just the benefit of the rich and well educated,” says Lisa Campbell, the Rachel Carson Associate Professor of Marine Affairs and Policy at the Nicholas School. Campbell has worked with Norwood and Cumming on past research projects and recognizes the really “unique and innovative” research method they’ve carved out and are putting into practice in Warren County.

“When we talk about our food system in general and healthful food in particular, the only way we will see local projects have a systemic impact,” says Campbell, “is if we can make healthy food something other than a luxury item.”

WARREN COUNTY’S CHANGING LANDSCAPE

The divides between Warren County, where Norwood is from, and Durham County, where Duke is located, are striking.

According to U.S. Census figures, the median household income in Warren, once the state’s richest county, is $33,632 compared to Durham County’s $51,292, and nearly a quarter of Warren County’s tiny population is below the poverty level compared to about 14 percent of Durham County’s.

“The hour-long distance between my home in Warren County and Duke traverses so many divides,” says Norwood. “There’s a huge economic gradient. There’s also a huge gradient in terms of agency and what people feel is possible.”

If there’s a lack of empowerment now, that wasn’t always the case in a county that’s seen big pendulum swings between prosperity and hard times—between its antebellum wealth built from rich soils and slave labor and today’s poverty. For example, in 1982, with the pendulum stuck on the poor side, Warren County’s predominantly African-American population put their collective foot down to rally fierce opposition to a PCB waste dump in the area. One protest resulted in “more than 500 arrests and national media attention,” according to Chemical Week, and led to the coining of “the phrase environmental racism to describe the mounting evidence of discrimination.”

Eventually the toxic waste site was closed and cleaned up, and the episode established Warren County as the birthplace of the environmental justice movement.

But that claim to fame carries with it some irony, says Campbell, because the area “has seen so little justice in a systemic way.”

The food system is just one example. Consolidation in the tobacco industry could be another.
“The tobacco buyout has decreased the viability of farming tobacco for small farmers,” says Norwood, who grew up on a tobacco farm. “What we have left is a landscape of small farms looking for ways to survive.”

A SOCIAL NETWORK: EMPOWERING A COMMUNITY WITH NEW TOOLS OF THE TRADE

Could tobacco’s small-farm infrastructure help in establishing a local food economy? That’s just one question the postdocs are exploring as they dig into the research they’ve been conducting since last year.

To study the feasibility of a sustainable Warren County food economy, Norwood and Cumming are doing geospatial analysis of the region and documenting trends in land ownership and management. They’re also tracking the origins of the area’s current food supply and estimating how much locally sourced food would be needed to feed the entire county. Secondary data on local food markets in the Triangle is helping them assess how much market share Warren County farms could provide.

In addition to these traditional methods, the team is conducting participatory research to gain insight and input directly from the community. Part of this work involves videotaping interviews with scores of area stakeholders—from farmers to landscapers to small-business owners to residents. After analyzing the taped interviews, the researchers will create a documentary-like video to present back to the community at community meetings, and then ultimately on the Web and via DVD distribution.

The video component is one of the powerful tools in Cumming’s and Norwood’s research toolbox, says Campbell.

“Gabe’s documentary comes from the analysis of data, not a preconceived message we’re trying to package for communities,” says Campbell who was so impressed by their video for a research project they conducted in Macon County that she invited them to work on her Down East project. They joined up, and put their self-dubbed “Community Voice” research model to work. After screening the video that came out of the Down East project, Campbell said, people were close to tears: “A woman came up to us and said, there are no other voices, it’s just our voices—thank you for letting us speak.” (See “Community Voice” sidebar, Page 32.)

PARTICIPATORY RESEARCH: VIDEO AS THE COMMUNITY’S GLUE

The Warren County interviews, 69 so far, provide compelling evidence that growing a local food economy is a natural fit for a place with a rich history of farming. But what’s missing, you might say, is the glue—a lack of cohesion.

“There are really a lot of leaders in the country, a lot of innovators, people doing great work in trying to build a local food and ag economy,” Cumming says. “However, the flip side of that is that there’s very little collective capacity.”

Lisa Blackwell, the owner of Southern City Steaks and Seafood in Warrenton, provides an example. “I don’t feel like I have enough access,” she told the researchers during an interview.

“I know that there is a farmer that has meat that is USDA-inspected and all, that is local, and they haven’t contacted me.”

Echoing the problem of access, Jeff Bender, a farmer, criticizes an infrastructure that encourages business between far-flung producers and buyers.

“Why are we having an economy that basically hauls food halfway across the country? Now that’s a lot of diesel that we can save,” says Bender, who also is concerned about the time factor involved in establishing business relationships. “As a small farmer, if you want to get into a grocery store chain or something, you’ve got to go there and spend a lot of time. You’ve got to convince him that you can meet his needs.”

Through this participatory research the connections needed for a local food system start being made. Suddenly, diverse members of the community, frequently balkanized along geographic, racial or economic lines, have access to each other. Suddenly a wide range of community constituents who’ve never shared the same dialog space before,
“COMMUNITY VOICE”

Carla Norwood and Gabriel Cumming developed their video-based research (called “Community Voice”) over a number of years in pockets of rural North Carolina.

“LITTLE TENNESSEE PERSPECTIVES” 2004–2005 in the western mountains of Macon County, N.C.

ISSUES AT STAKE: Development and its threats to the area’s natural and cultural assets

SUMMARY: This project, conducted when Cumming and Norwood were doing their doctoral work at the University of North Carolina at Chapel Hill, is where they developed their “Community Voice” methodology—interviewing stakeholders, producing maps and geospatial information, and ultimately creating a video representing local views, which they then presented to the community at public meetings.

RESULTS:
• The project served as a model for a larger regional initiative in 2008
• It helped initiate public dialogue around the critical issue of steep-slope development (a neighboring county used the project’s results to enact policies protecting steep slopes and manage development—thought to be the first such policies in southwestern North Carolina)
• It initiated an ongoing partnership with the Land Trust for the Little Tennessee to protect the cultural landscape of the Cowee Valley.

“CHANGE IN COASTAL COMMUNITIES” 2008–2009 on the coast in Carteret County, N.C.

ISSUES AT STAKE: Increasing development and amenity migration

SUMMARY: Principal investigator Lisa Campbell asked Norwood and Cumming to join her team on a project that was exploring encroaching development. Together, the researchers:
• conducted interviews with 70 area stakeholders to gain insight on local views surrounding land-use issues
• looked at environmental, economic and cultural impacts such development has in a largely undeveloped area rich with natural resources
• initiated dialog, analyzed and compiled the data on the myriad views represented, then produced the video “Voices of Down East”
• presented the video to community forums in September 2009.

RESULTS: The project team identified threats to natural and cultural assets and helped community members identify strategies for preserving and enriching these assets.

While the research is complete, Cumming, Norwood and Campbell continue to collaborate with local partners to turn their results into meaningful community change. With their support, a local partner organization, the Core Sound Waterfowl Museum & Heritage Center, has secured two grants that direct $400,000 toward sustainable economic development ventures in Carteret and two adjoining counties.

either in real life or the virtual space of film, are communicating to each other. And already the area is seeing some dividends from these newly forming social networks.

Says Norwood: “We’ve seen commonalities across racial lines and size of farms so we’ve got some small farmers working with some medium-sized farmers, black and white farmers working together on some grant applications, and that’s unprecedented in Warren County.”

MOVING TOWARD A LOCAL FOOD ECONOMY: EASY AS PIE?

Facilitating conversations, crunching numbers, and analyzing data, the researchers are sowing the seeds for what they hope will grow into a local and regional food economy. For many, this is a back-to-basics concept, not just a new trend.

“Well, it was the way of life when I was growing up. And it was not a movement.”

Returning the area to that way of life is something Cumming and Norwood are working toward both as researchers and as husband and wife. In this way, their research efforts to help kick-start community conversations and ultimately revive a local food economy blend seamlessly into their personal agenda which involves contributions as investors and entrepreneurs.
On this latter front, for example, they hope to turn the commercial property they own in the heart of downtown Warrenton into a “laboratory for local food economies and asset-based economic development,” including their own pie shop. Why pies?

“The pie is a great canvas for local agricultural bounty,” says Cumming. “In that pie shell you can put any number of ingredients and fillings and those can vary seasonally. They can be sweet or savory. They can even include dairy products and meat products.”

If the community voices on video are representative, a good many residents are onboard with those fillings being as locally produced as possible.

“I think you need to grow self-sufficiency,” says Alston, “and with the local economy, local food is where you’re going to get that.”

And so the locavore idea, at once firmly rooted and newly planted in Warren County, spreads, in hopes of moving beyond the lips and off the video screen into on-the-ground reality.

Erica Rowell is managing editor of Dean Chameides’ blog, TheGreenGrok.com. She is based in New York City.

Have you ever tried to host an event, but didn’t know who were the right Nicholas School alumni to invite, or needed career advice but didn’t know who to contact? Students often ask Career Services staff members where specific alumni work or they seek advice about which alumni to invite to speak at student conferences. While Career Services is a great resource, unfortunately it’s not the Yellow Pages for Nicholas School alums nor do staff members have exhaustive lists!

With an alumni network comprised of highly respected conservationists, scientists, business entrepreneurs and policymakers, Nicholas School students are uniquely positioned to engage the industries’ leading practitioners to get a clear view of the paths they forged and to question them about the challenges that await. Yet despite these opportunities, many students fail to engage with Nicholas alumni because the information available about them on the web is incomplete or outdated.

Social media has become the “go-to place” for many to update professional and personal data. In an effort to better harness this information and foster a more robust Nicholas community, Career Services and External Affairs, aided by current student groups will be proactively developing a “go-to” alumni network via LinkedIn—specifically expanding the utility and membership of the Nicholas School of the Environment group.

As an online networking application, LinkedIn enables students, faculty and graduates to develop a professional database of contacts, reconnect with former colleagues, and identify individuals who work in various fields of interest or relevant geographical regions.

With more members and participation, The Nicholas School LinkedIn Group will become the engine for improving accessibility and connectivity for the Nicholas School community.

You can help make this happen!

- Alumni who are LinkedIn savvy can serve as ad hoc advisors for the expansion of the school’s LinkedIn group; e-mail Karen Kirchof, assistant dean for Career Services, at kgki@duke.edu if you are interested;
- Alumni and Nicholas students, faculty and staff are encouraged to connect to the school’s growing community by joining the Nicholas School LinkedIn Group.
- Alumni new to LinkedIn can ask student volunteers to help them create a LinkedIn profile and connect to the Nicholas School group. E-mail Cassidy at cvt2@duke.edu if you need help. Join us!

Cassidy Travis MEM’12, with a focus in environmental economics and policy, is the student alumni representative to the Nicholas School Alumni Council.
DESIGNING VITAL PROTECTED AREAS FOR OUR OCEANS AND COASTS.

PROTECTING AND MANAGING ENDANGERED MARINE LIFE.

UNDERSTANDING THE IMPACTS OF CLIMATE CHANGE ON OUR OCEAN ECOSYSTEMS.

ALL ARE ACHIEVABLE—BUT TO DO THEM WELL, ALL REQUIRE THE LATEST GENETIC TOOLS.

That’s why the Nicholas School has made a major commitment to update and expand the Duke University Marine Laboratory’s research facilities and technology in marine genetics.

“Over the past decade, some of the most revolutionary advances in marine science and conservation have been in the area of genetics,” says Cindy Lee Van Dover, who has directed the Marine Lab since 2006 and has been reappointed to another five-year term beginning July 2011. “Those advances enable scientists to understand how organisms respond to the environment, map historical relationships among populations and species and tease apart processes at the cellular level that influence the life of an organism.”

The Duke Marine Lab, a unit of the Nicholas School, has shown remarkable growth in the area of marine genetics, despite the fact that most of the research and education facilities have remained largely unchanged for more than three decades.

To remain at the forefront of this science, the Marine Lab’s research facilities must be upgraded now, Van Dover says. That’s why the Nicholas School plans to build a new Marine Science and Conservation Genetics Center: a state-of-the-art facility that will give Duke faculty and students the tools and facilities to apply the latest genetic methods as they work collaboratively toward understanding marine systems and identifying solutions to problems in the marine environment.

The nearly 10,000-square-foot Marine Science and Conservation Genetics Center will feature a 20-seat molecular biology research laboratory with flexible space for up to four faculty and with technical spaces for specialized research equipment. It also will include a 16-seat teaching lab designed for molecular-based coursework, as well as office space and meeting areas for faculty, students, research associates and visiting scientists. In keeping with Duke University’s commitment to leadership in sustainability, the new center will be designed to meet the highest standards of “green” methods, materials and technologies. It will be a model for environmentally sustainable development, designed with sensitivity to the changing coastal environment, Van Dover says.

The Marine Science and Conservation Genetics Center will be the first building in a planned multi-phase, green renovation and expansion of the Marine Lab’s Pivers Island campus in Beaufort.

“Despite the growth of the Marine Lab’s faculty and the advances in research technology, no new research laboratories have been constructed here since 1972,” Van Dover says. “Our faculty members have been remarkably productive despite being housed in cramped, old and worn lab spaces. But to attract and retain the best new junior and senior faculty, visiting scientists and students, we must offer more up-to-date, appropriately sized and equipped research facilities.”

Nicholas School Dean William L. Chameides agrees, and is leading efforts to secure $6.75 million in private donations to fund construction of, and operating costs for, the Marine Science and Conservation Genetics Center. The school is in discussions with an international conservation-focused foundation to create a significant challenge commitment to help make this project a reality. Several donors have stepped forward with leadership gifts; naming opportunities are still available. Construction is planned to begin in summer 2012 near the Bookhout building on the south side of Pivers Island, with opening slated for fall 2013.

For more information about funding opportunities within the Marine Lab’s new center, contact Nicholas School Associate Dean for External Affairs Chandra Christian at 919-613-8019 or chandra.christian@duke.edu.

Laura Ertel is a freelance writer based in Durham, N.C.
April 7  3:30–5 p.m.
HENRY J. OOSTING MEMORIAL LECTURE
Chris Field, Director, Department of Global Ecology, Carnegie Institution for Science, Stanford University.
Griffith Auditorium, Bryan Center, Duke Campus
CONTACT: Daniel D. Richter at drichter@duke.edu

April 7-8
NICHOLAS SCHOOL BOARD OF VISITORS’ SPRING MEETING
Washington Duke Inn
Durham, N.C.
CONTACT: Celeste Brogdon 919-613-8035 or celeste.brogdon@duke.edu

April 8  2 p.m.
“FARM TO FORK: THE BENEFITS OF SUSTAINABLE EATING”
Talk by Steven L. Hopp, co-author of Animal, Vegetable, Miracle, and Laura Hall, owner, entrepreneur and creator of The Refectory Café at Duke Refectory Café, Duke Divinity School, Westbrook Bldg.
CONTACT: Celeste Brogdon 919-613-8035 or celeste.brogdon@duke.edu

April 9  2 p.m.
THE DUKE LEAF™ AWARD CEREMONY
Author Barbara Kingsolver, Honoree
Page Auditorium
Duke Campus
Reception following ceremony at Blue Express Cafe
CONTACT: Celeste Brogdon 919-613-8035 or celeste.brogdon@duke.edu

April 9  8 a.m.
2ND ANNUAL DUKE FOREST PINE CONE PACER 5K
Durham Division, NC-751
CONTACT: Office of the Duke Forest, 919-613-8013 or dukeforest@duke.edu

April 14–15
MASTERS PROJECT SYMPOSIUM
MEM and MF candidates’ masters project presentations
Von Canon Rooms, Bryan Center, Duke Campus
CONTACT: Erika Lovelace 919-613-7459 or admissions@nicholas.duke.edu

April 16  6:30–11 p.m.
SPRING SOIREE
American Tobacco Campus, Bay 7
Durham, N.C.
CONTACT: Nancy Kelly 919-613-8090 or nkelly@duke.edu

April 28–29
BEAUFORT MASTERS PROJECT SYMPOSIUM (Coastal Environmental Management students)
Repass Center, Duke Marine Lab, Beaufort, N.C.
CONTACT: Lauren Stulgis 252-504-7531 or lauren.stulgis@duke.edu

April 29  3 p.m.
STANBACK INTERNSHIP PROGRAM 15TH ANNIVERSARY CELEBRATION
Keynote Speaker: Lester R. Brown, founder and president Earth Policy Institute
Griffith Film Theater, Bryan Center, Duke Campus
CONTACT: Quiiana Morton 919-613-8001 or qmm@duke.edu

May 6
2011 DUKE FORESTRY ALUMNI CELEBRATION
R. David Thomas Executive Conference Center and Duke Forest
CONTACT: Quiiana Morton 919-613-8001 or qmm@duke.edu

May 13  8:30 a.m.–5 p.m.
DUKE ENVIRONMENTAL LEADERSHIP MASTERS PROJECT SYMPOSIUM
LSRC A158, Duke Campus
CONTACT: The DEL Program 919-613-8082 or del@nicholas.duke.edu

May 14  9:30 a.m.
NICHOLAS SCHOOL RECOGNITION CEREMONY FOR GRADUATE AND PROFESSIONAL DEGREE CANDIDATES
Keynote Speaker: Christina Fiqueres, Executive Secretary of the UN Framework Convention on Climate Change
LSRC Great Lawn, Duke Campus
CONTACT: Nancy Kelly 919-613-8090 or nkelly@duke.edu

Aug. 7-12
96TH ECOLOGICAL SOCIETY OF AMERICA ANNUAL MEETING
Austin Convention Center
Austin, Texas
CONTACT: Tricia Crocker, Exhibits Manager & Registrar 202-833-8773 x 226 or tricia@esa.org
CHECK OUT THE 2011 VIDEO CONTEST WINNERS

SUSTAINABLE ADVENTURES WITH THE FLAT GROK

NICHOLAS.DUKE.EDU/FLATGROK

Snap this QR code with your mobile phone and link to the site. New-model phones come with QR readers. If yours doesn’t, go to the app store and search QR Reader.